The Nuneham Estate

Parkland Management Plan

Appendix C: Ecology Scoping Appraisal by James Johnston Ecology

May 2019

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NUNEHAM COURTENAY ESTATE, OXFORDSHIRE

ECOLOGY SCOPING APPRAISAL

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1.0 INTRODUCTION AND BACKGROUND

This report has been prepared by *James Johnston Ecology,* on behalf of Nuneham Estate Ltd*.* It provides the results of an ecological walkover survey, Phase 1 Habitat Survey, and 'Initial Protected Species Appraisal' undertaken across the Nuneham Courtenay Estate, just south of Oxford. This large estate (involving farmland and a number of residential properties), has recently changed hands and the new owners will be proposing some alterations to estate management and seeking planning permission for some building alterations and 'change of use' permissions, to diversify the estate's income. Detailed scheme designs are not yet available for assessing the potential associated ecology impacts, but it was considered valuable to start planning with an appraisal of the current ecology of the estate, thereby providing a review of Ecology Constraints and Opportunities.

This is to assist with both future planning of environmental enhancement within the estate, and specific planning of what detailed ecology and fauna surveying will be required for the support of any planning applications or renovation projects.

Such sites can support a range of protected species issues and also ecologically valuable habitat. Potential impacts to protected species are a 'material consideration' in planning decisions, and Local Plan policies protect against loss of ecologically valuable habitats. All British reptile species are protected from 'intentional' and 'reckless' harm and disturbance, under the Wildlife and Countryside Act 1981 (as amended 1985 and 2000), and great crested newts (GCN) and bats (and their places of shelter) are also protected under the Habitats Regulations 2010. British birds, except certain pest species, are also protected from disturbance through the Wildlife and Countryside Act 1981, while actively nesting.

The remainder of this report presents the appraisal Methods, Findings, Constraints and Opportunities, and the Summary and Conclusions. Photographs are interspersed in the text to help set the context and show the features, and the plans at the back of the report include 'Habitats (North and South)', and 'Constraints and Opportunities'.

2.0 METHODS

Records Search – An ecology records search was undertaken, seeking info regarding local wildlife designations, through the Thames Valley Environmental Records Centre (TVERC). This used a 2km search area from the centre of the Estate (taking in all of the Estate's land). Information on statutory nature conservation designations was gathered through a web-search (Natural England's 'nature on the map' / MAGIC/DEFRA website). The writer also has significant past experience of the notable fauna of this part of the District from 'scores' of ecology and fauna surveys conducted over the last 22 years for other planning projects.

Walkover Survey – An ecology walkover survey / extended phase 1 habitat survey was undertaken across the whole Estate by James Johnston over several days between 8th – 16th November 2017. This involved walking most of the Estate, and its hedgerows, field boundaries and Estate boundaries, noting the principal plant species, mapping the habitats, assessing the hedges, noting any evidence of fauna, and assessing the habitats for their potential to support notable or legally protected species (eg – assessing grassland type for its potential to support reptiles). Incidental bird observations were noted. An attempt was also made to locate any ponds to assess their potential for supporting great crested newts.

Personnel – The survey and appraisal was undertaken by James Johnston (MCIEEM / CEnv), a Consultant Ecologist with 22 years habitat and fauna survey experience, who holds current survey licences for great crested newts, bats and barn owls.

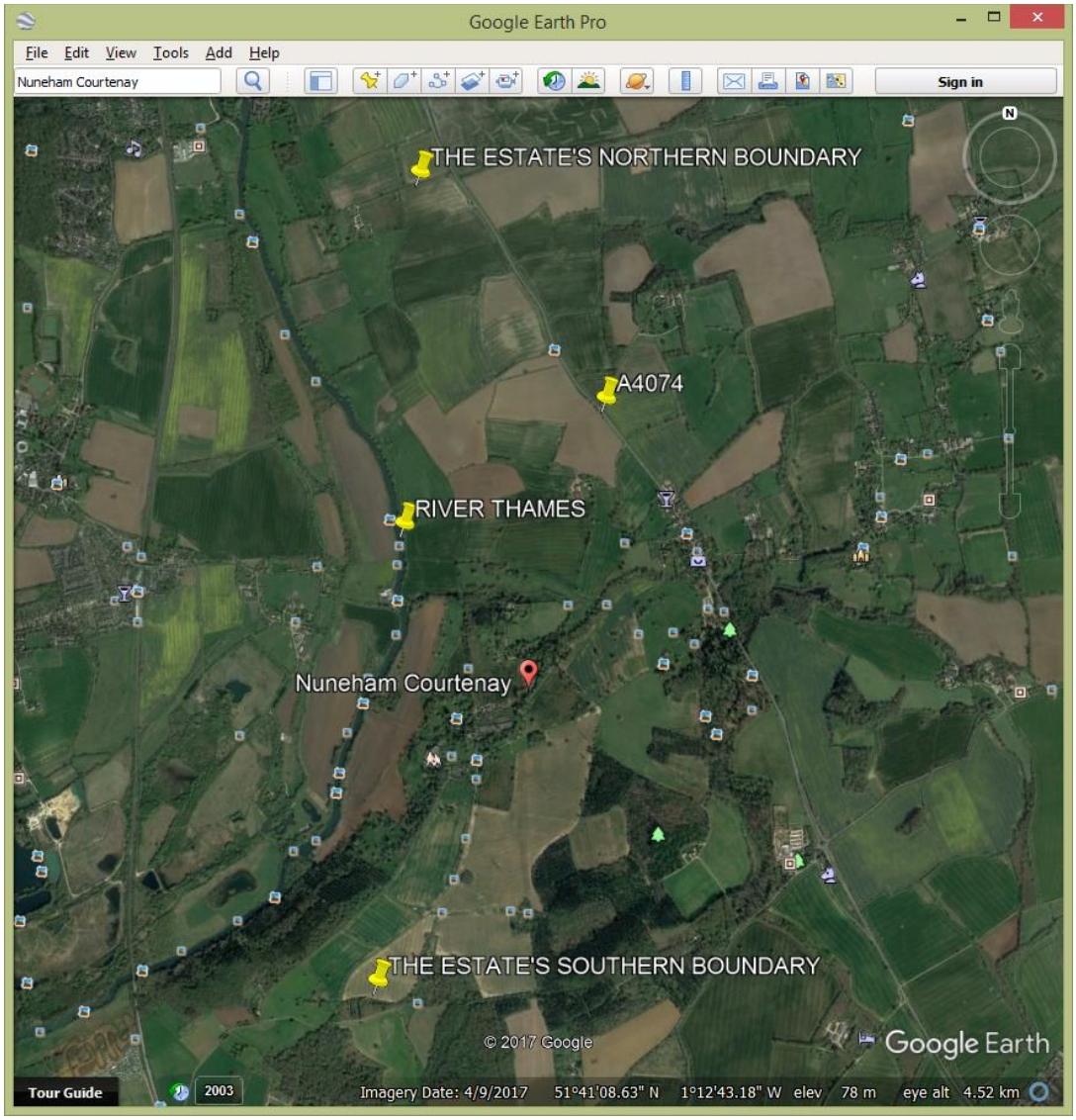
Weather – The weather during the surveys was suitable for reliable habitat surveying: 08 - 16/11/17 – Dry and cold, with mixed sunshine and cloud, and temperatures of +10 to +1^{0}C (max/min – day/night);

Limitations / Caveats - Ecology survey work can only present a 'snap-shot' of the ecology conditions at that time. Site conditions and fauna usage patterns can change over short timeframes and so new or altered ecology constraints in the near future can be different from the recent past. Detailed fauna surveys also only represent a sampling exercise, and so there is always an opportunity for some fauna usage to go unnoticed, particularly any rare or sporadic site usage by elusive fauna. Nevertheless, significant field experience and the use of accepted standard survey techniques, appraisal methods and equipment, together are recognised as allowing these limitations to be sufficiently reduced. No specific additional (significant) limitations were presented by the conditions of this site, but the very large area of the Estate made it impractical to survey every field margin and bramble patch in detail, for instance for badger setts, and so badger setts were located where possible, but some may have been missed.

3.0 FINDINGS

Surroundings

The Nuneham Estate lies few miles south of Oxford city, in the countryside, bordered by the River Thames to its west and the A4074 road to its east. The northern and southern extents of the estate are shown on the aerial photo below, courtesy of Google Earth. The landscape here supports mainly farmland (mostly arable), but also with some woodland copses, a hedgerow network, and several properties with gardens and grounds, including historic parklands. Ponds exist and there are many ancient parkland trees. The range of habitats and features gives good potential for a wide range of notable wildlife.

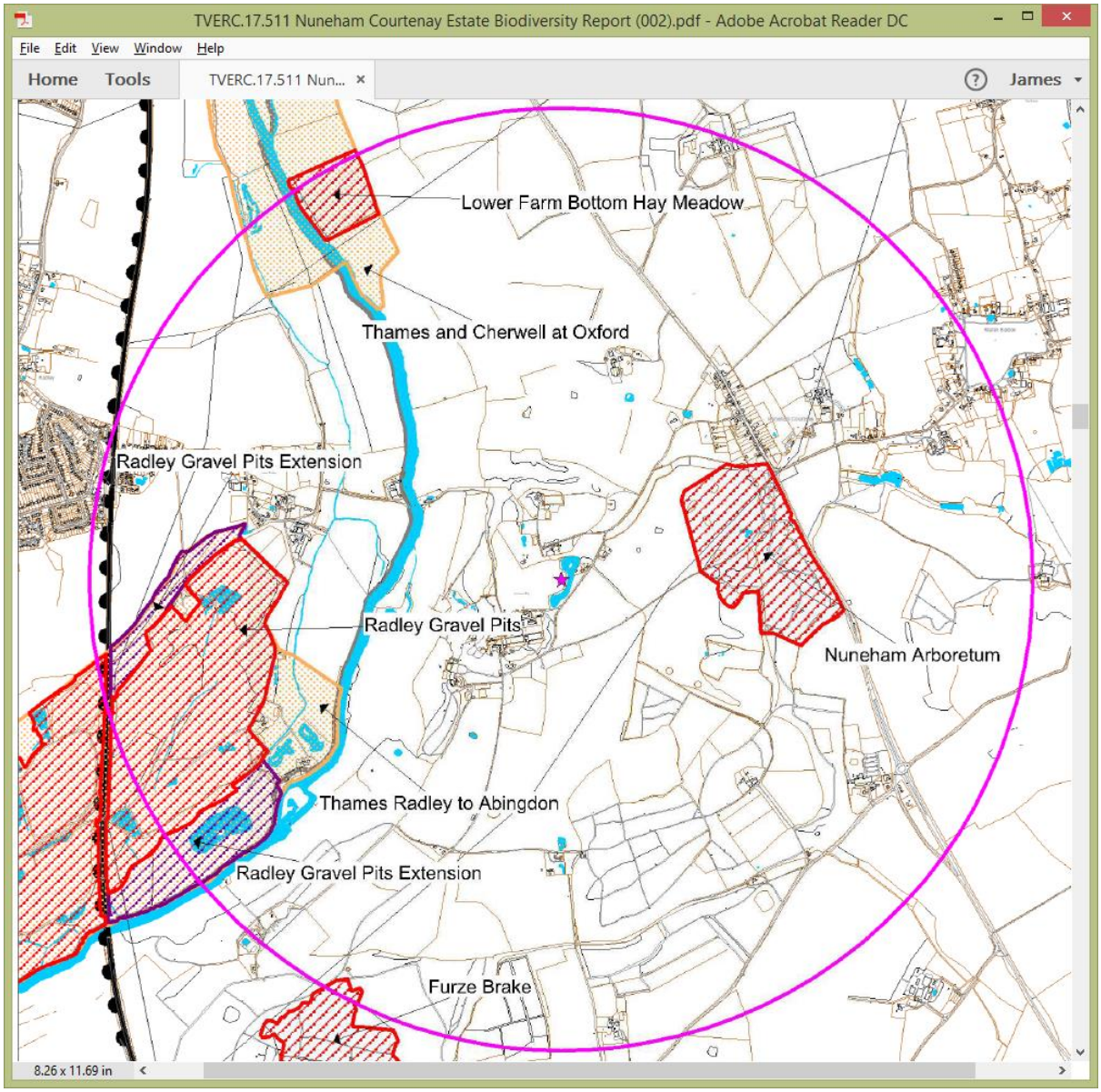


Aerial photo of the Estate courtesy of Google Earth (site centred)

Nature Conservation Designations

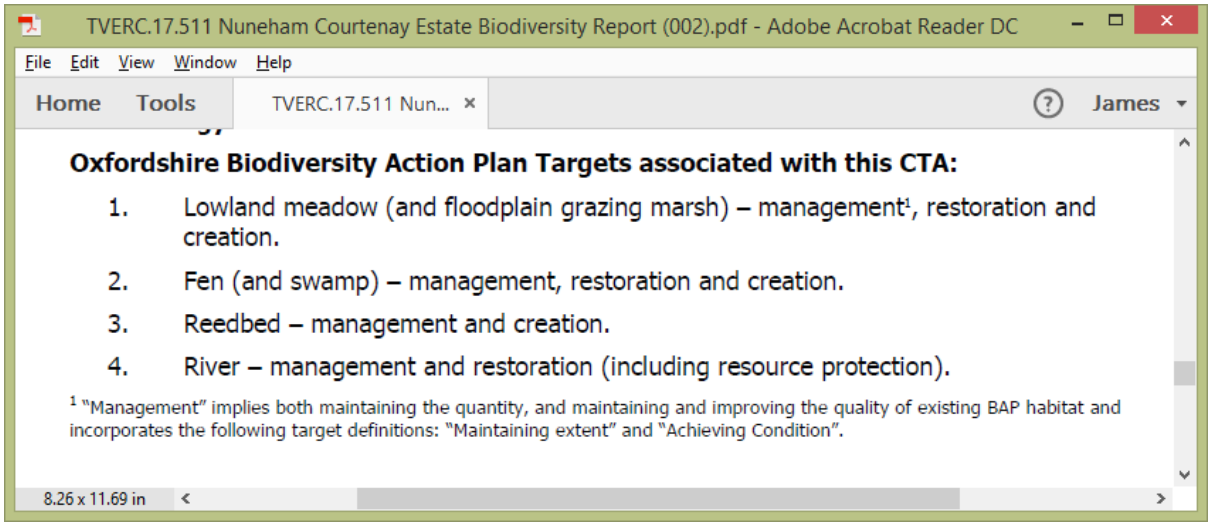
Statutory Designations – There are no statutory designations (such as SSSI) within the boundaries of the Nuneham Estate, or within a kilometre.

Local / Non-statutory Designations - TVERC confirmed the presence of one local / non-statutory wildlife designation within the Estate, plus three others nearby. The on-site designation is 'Lower Farm Bottom Hay Meadow' (a Local Wildlife Site, Ref – 50F08), designated for its unimproved species-rich meadow and population of snakeshead fritillaries. This is in the north-west of the Estate (see location below).



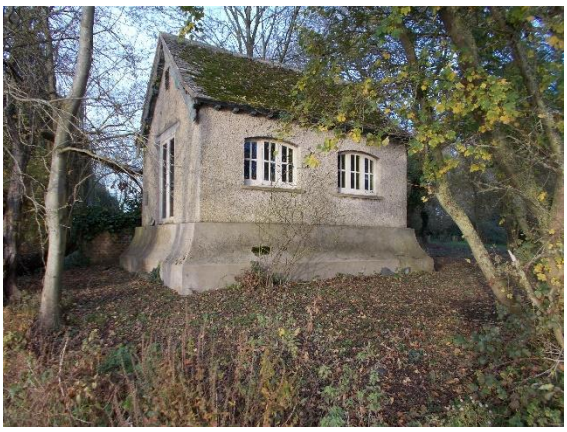
Local Designations

The north-west of the Nuneham Estate also lies within the extensive Thames and Cherwell at Oxford CTA (Conservation Target Area). The published Biodiversity Action plan Targets associated with this CTA are as follows:



On-site Buildings / Structures

There are large numbers of buildings across the Estate, including old traditional barns, modern barns, houses of varying ages from the 1960's back to 1700's, a church / chapel (de-consecrated), boat house, and the grand and large Nuneham House. None of these have been surveyed for evidence of notable fauna or legally protected species, but the potential for notable fauna is considered, and some photos of a range of the buildings are provided below. Materials include brick, stone, clay tiles, natural slates, and modern artificial materials.



Habitats

The habitats of the Estate have been mapped to NCC Phase 1 standard and the resultant maps are shown at the back of this report. Brief descriptions of the habitats are also provided below.

Grassland – The largest area of any habitat within the Estate is cultivated arable land, supporting a range of rotated crops (marked as 'A' on the habitat plan). Much of the site's grassland is agriculturally 'improved' and species-poor, supporting common grasses such as ryegrass, cocksfoot, annual meadow-grass, and common bent (marked 'I' on the habitat plan). Some of the grasslands in the south of the Estate have slightly greater grass species diversity (but still herb-poor), and are tussocky from irregular management, and these are classed as herb-poor semi-improved grassland (marked 'SI' on the habitat plan). There are also linear patches of damp grassland in hollows, valleys, and seasonal ditches supporting damp-loving herbs (rushes, sedges, willowherb, tufted hairgrass, common reed).

One field of species-rich unimproved grassland exists in the north-west of the Estate (Lower Farm Bottom Meadow), and this is an ancient flood-meadow supporting rare herbs / flowers, such as snakeshead fritillary.

Arable land in north

Improved grassland in north

Semi-improved grassland in south

Damp grassland in valley

Woodland and Trees – The Estate has a good number of large veteran trees dotted around, either standing alone in fields or in single lines and narrow belts along former hedge lines / field boundaries, or otherwise within the ancient parkland setting of Nuneham House. English oak is by far the most common species of ancient tree, and many examples appear to be several hundred years old, while occasionally there are also crack willow, ash, chestnuts, plus veteran planted ornamentals such as redwoods, London planes, and common limes. Alongside the River Thames in the west (and around ponds throughout the site) the trees tend to be willow, hybrid black poplar, and English oak.

Blocks of woodland cover relatively small areas within the Estate and include recent broadleaf plantations (young field maple and ash), and older mature mixed shelter belts (oak, pines, holly, sycamore). No semi-natural ancient woodland was found on site, but some woodlands are old and well established. There are also several very small circular copses, of broad leaf and mixed (conifer and broadleaf) woodland standing within the arable fields, and these were likely planted in the 1700's for visual effect as part of the 'Capability Brown' designed landscape. They support only common shade-tolerant herbs (eg – bramble, dogs mercury, herb Robert) and no ancient woodland ground-flora.

Line of mature oaks

Veteran oak + young shelter belt

Veteran parkland trees

London planes by boathouse

Mature mixed circular copse

Hybrid black poplars by lake

Old willow pollards. In north

Hedges and Scrub – There are a range of hedge types across the Estate including native tall species-rich hedges with trees, species-rich hedges without trees (annually trimmed low), species-poor hedges, and gappy / redundant hedges (just a sparse line of shrubs of trees remaining). The ecologically more valuable hedges tend to be located in the northern half of the site. The typical hedgerow species here are field maple, hazel, hawthorn, blackthorn, elm, spindle, and occasionally sycamore, oak, willow, and ash. Most hedges have an adjacent ditch. The different hedge types are marked on the habitat plans.

Moderate diversity hedge with trees in north of Estate

Sp-rich hedge with trees in north

Tall hedge + ditch. No trees. In north

Gappy redundant hedge in north

Trimmed sp-rich hedge in south

Wetland / Marsh – There are large numbers of seasonally wet ditches crossing the site and generally draining westwards towards the River Thames. The ditches tend to support common ruderal herbs on their banks, and some common wetland plants (bramble, stinging nettle, cow parsley, greater willowherb) with their growth no doubt stimulated by fertiliser run-off from the adjacent arable fields. Further west the bases of the ditches remain wet for most of the time and so encourage emergent plants such as common reed.

Ditch in north

Ditch in north

In the north-west corner of the Estate (on the boundary) is a backwater area to the river Thames where a side channel from the river heads north then peters out, creating a 6m wide linear ponded area with wet woodland and emergent vegetation adjacent (mature willows and poplars and a rim of reeds). Similarly, in at least three other western boundary areas there are old side channels to the Thames that have become silted and now support a shady silted 'ox-box' pond, and associated marshy community and boundary wetland trees.

NW boundary wetland

SW marshy 'ox-box' pond

River and Ponds – The River Thames marks the Estate's western boundary. It is large and wide in this part of the country, with steep banks supporting a mix of tall grass, ruderal herbs, scrub and trees.

The Thames

The Thames

There are several ponds and small lakes around the Estate. Some are old field ponds (which tend to be only seasonally / occasionally wet) and have one or two old willow pollards beside them (mainly in the north). Other ponds were likely created as part of the historic landscaping of the Estate and so are recreational / sporting features (mainly in the south). They tend to be heavily silted from leaf-fall and the larger lakes have ecological damage from large waterfowl populations (no floating or marginal wetland plants and low water oxygen content).

Small pond in west (target note 5)

Large pond by chapel in east

Degraded silted lake in middle of Estate

Fauna

TVERC Records – TVERC confirmed they hold the following records of notable birds within the area (recorded from the nearby designated wildlife sites in recent years), and including red- and amber-list species of conservation concern:

Red List: Lesser spotted woodpecker, yellowhammer, grasshopper warbler, marsh tit, house sparrow, starling, song thrush, linnet, reed bunting, skylark, spotted flycatcher, bullfinch, turtle dove, tree sparrow, fieldfare, lapwing
Amber List: Teal, shoveler, wigeon, gadwall, pochard, goldeneye, lesser redpoll, stock dove, mute swan, house martin, kestrel, swallow, herring gull, common gull, lesser black-backed gull, black-headed gull, grey wagtail, yellow wagtail, redstart, willow warbler, dunnock, water rail, goldcrest, sand martin, woodcock, redshank, lapwing, cuckoo, cormorant, green woodpecker, mistle thrush, goldfinch, mallard, barn owl, common whitethroat, red kite, stock dove, swift, black-headed gull.

Bats – All of the buildings on site were seen to have some potential for supporting bat roosts for the more common bat species (such as pipistrelles and brown long-eared bats). Some of the older buildings and also the mature veteran trees dotted around the whole Estate also have good potential for rarer bat species, such as noctules. The tree lines, copses, tall hedges, grasslands, and wetlands will all likely have moderate importance to foraging and commuting bats.

Birds – Bird species seen within the Estate during the walkover surveys included : buzzard, red kite, hedge accentor, robin, wren, blackbird, crow, goldfinch, woodpigeon, and barn owl. The arable field margins could be important for ground-nesting birds in summer, and other habitats likely to support nests include buildings, hedges, trees, and bramble patches. A barn owl was seen roosting inside the semi-derelict small brick pump shed at Target Note 2 on the habitat plan. This very rare and Specially Protected bird species could potentially also be nesting somewhere around one of the farm buildings.

Badger – A large old main badger sett (supporting a large family clan of badgers) exists in one of the small woodland copses in an arable field in the middle of the

Estate (Target Note 4), and a smaller active badger sett was also seen in a hedge bank at Target Note 6. These badgers will all be heavily reliant upon the foraging resources of the semi-improved grassland around the central parts of the Estate (around Target Note 8), and they will also use ditches, hedges and ponds as foraging opportunities.

Reptiles and Amphibians – The ponds and lakes on site have medium potential for supporting great crested newts. This species is frequently recorded in old ponds in this part of the country, although landscape ponds that are well-stocked with fish will be unlikely to support them. Seasonally wet field ponds are moderately likely to support them.

Old permanent pasture is likely to support reptiles such as slow worm and common lizard (particularly where there is tussocky grass and south-facing slopes – such as around Target Note 8). River banks, marshy areas and pond banks, are also likely to support grass snakes.

Invertebrates – The veteran trees and ancient parkland trees are likely to support notable insect communities including rare and protected insects (such as stag beetles), particularly around features of trunk or branch rot.

Evaluation

The designated wildlife site in the north-west of the Estate (Lower Farm Bottom Meadow) is a rare and high-diversity habitat of high local value to ecology. The veteran trees, species-rich hedges, and broad-leaf woodland copses are features that offer notable ecology opportunities, and medium diversity that cannot readily be re-created in the low to medium-range term, and hence these are of medium ecology value in the local context, but high ecology value within the context of the Estate.

Similarly, the semi-improved grasslands of the central parts of the Estate are also considered of Medium Local Value to ecology and high ecology value within the estate context, for their importance to foraging badgers and barn owls, and their likely support of protected reptile species. Wetland and ponds are also likely to be of at least medium ecology value within the Estate context (higher if great crested newts are confirmed at a later date), because they are locally and Nationally declining habitat types, that tend to be of importance to invertebrates and foraging birds and bats. The arable land and improved grassland is of low ecology value.

4.0 CONSTRAINTS AND OPPORTUNITIES

Habitat

Meadow - The unimproved meadow in the north-west of the Estate (Lower Farm Bottom Meadow – Target Note 7), which is designated a Local Wildlife Site, carries the greatest ecology constraint to alterations, as it has policies protecting it through the planning system (reflecting its sensitivity and high ecology value). That field should be maintained as meadow, and fertilisers and re-seeding must be avoided here, otherwise the ecology value will be lost. Spray drift from adjacent fields must also be avoided through standard good practice measures (avoiding spraying during windy conditions). Taking hay annually in late summer is the best management technique for maintaining the ecology value.

The three adjacent fields to this meadow (north and south of it) are within the Conservation Target Area / CTA (with published long-term objectives for ecology enhancement – wetland creation), but their ecology value has been lost in the past to fertiliser applications and re-seeding, and so it will not be simple to restore their ecology value. Soil nutrient levels would need to be reduced before native grassland re-seeding was attempted in those northern CTA areas (but could be attempted using hay / seeds taken from the existing species-rich meadow).

Semi-improved grassland – Around the centre and south-west of the Estate the current semi-improved grassland habitat should ideally be maintained as such (infrequent tall mowing / topping or low-intensity grazing, and avoidance of fertilisers, are best for maintaining the ecology value). This will maintain the valuable foraging resource for badgers and barn owls (that have been confirmed as present), and provide suitable habitat for reptiles (which may be present).

Hedges – The species-rich hedges (mainly located in the north) are valuable habitats that should be protected and maintained. They are likely afforded some

legal protection from being removed, through the Hedgerows Regs 1997, and they provide good habitat for birds and bats. Once per annum side-trimming is appropriate management. The gappy hedges present a great opportunity for ecology enhancement through re-planting the gaps with locally sourced native trees and shrubs (hazel, field maple, damson, crab apple, spindle, English oak, elm, ash, willows). Similarly, the re-instatement of native hedges that have been lost in the past along field boundaries (where ditches still remain), would provide significant ecology enhancement to the Estate, and would particularly benefit birds, bats and invertebrates. Existing low trimmed hedges could also be enhanced by marking young trees that can be allowed to mature and grow tall, to establish mature trees within the hedgerow.

Trees - The moderate numbers of ancient / veteran trees around the Estate (mainly oaks, but also other tree species) are a valuable nature conservation resource that should be protected with minimal intervention. Dead and dying trees should be left standing if their location does not present a public danger. Dangerous limbs should be removed but leaving the rest of the tree standing if possible, and cut dead limbs should be left on the ground to rot (for rare insects to continue inhabiting them). Any tree or limb removal must first consider the potential for bat roosts to be impacted, and detailed bat surveying would be required if any potential Bat Roost Features are present (such as rot holes). The Estate enhancement strategy should involve long-term under-planting of locally sourced English oak trees, beneath the canopy spread of the veteran oaks, so that as individual veteran trees gradually naturally die off in future decades, there are already other young replacement oaks beneath them, ready to grow up into their place.

Old willow pollards exist around pond, ditch and river edges. These pollards would benefit from re-establishing once per 10 years pollarding (cutting main stems to use as firewood around the Estate, leaving the bare willow trunk to then re-sprout). This management benefits invertebrates and encourages longevity of the tree.

Woodland – The woodlands should be maintained in the traditional manner of occasional thinning and coppicing of some areas, whilst leaving some non-intervention areas for 'nature' to manage. Any proposed re-planting should seek to increase the numbers of native species and increase the botanical diversity, and re-establish dense under-storeys. This is compatible with the past sporting uses of the woodlands as pheasant covers.

The small areas of wet woodland / carr, around former ponds, depressions and ox-bow features, are best left as 'non-intervention' areas, maintaining the existing dense 'tangles' of vegetation, fallen limbs, damp scrub, and emergent plants, as good undisturbed shelter for a variety of notable fauna (eg – potential resting-up places for otters, wet banks suitable for water voles, and undisturbed bird nesting opportunities).

Ponds / Lakes – The smaller field ponds around the site are suffering from lower water tables / reduced rainfall, and lack of management that has allowed siltation, and hence many are now defunct or often dry. Partial restoration would be practical through removing silt from the central pond areas in winter (when newts and nesting birds would be absent). Silt could simply be excavated and left adjacent on a field boundary, so that the middle part of the pond was made deep and could hold water for a longer part of the year (but leaving emerging plants in silty margins as cover). Where ponds are close to buildings, any future alterations to buildings should look at the potential for using roof water to top up ponds (for instance beside the church in the eastern part of the Estate – Target Note 3).

The large lake in the centre of the Estate (beside Target Note 9) currently has degraded ecology value, but has good potential for ecology enhancement. It would significantly benefit from de-silting (sludge pumping during winter months), and from removal of many of the trees on the south-west side, to allow more light in whilst reducing wind-blown leaf fall into the water. Limiting water fowl numbers would also benefit the ecology by allowing marginal and floating vegetation to establish and reducing water nutrient levels to increase water oxygen levels (helping invertebrates flourish).

Invasive Plants – Three separate stands of invasive Japanese Knotweed were noted within the Estate or on boundaries (all in the south of the Estate), and these are shown as Target Notes 13, 14 and 16 on the Habitats plan (South). This foreign herb / shrub is highly undesirable for its aggressive growth and harm to native habitats, ease of spreading into new areas, risk of damage to property, and through the fact that it is unlawful to cause it to spread. Small fragments of its roots can readily grow into new plants and colonise new areas and so soil from those areas should be treated as 'controlled waste'. A system for eradication should be implemented, involving regular monitoring and applications of strong glyphosate, including injecting stems (probably over several years).

Fauna

Below are some specific actions and features that would benefit certain notable fauna at the Estate.

Bats – Avoid felling or lopping trees that have rot holes, splits and other potential bat roost features. Re-plant old hedge lines to increase connectivity and foraging habitat. Erect bat boxes in woodland and hedge lines that have trees.

Birds – Avoid bramble, scrub or tree clearance during the March to August nesting season. Re-plant old hedge lines as nesting and foraging habitat. Avoid hedge trimming during March to August. Leave wider grassy margins to arable fields, managed by once per year topping to encourage tussocky grassland – ideal for barn owl hunting. Maintain semi-improved grasslands as tall tussocky grasslands (avoid fertiliser), to maximise vole numbers for barn owl hunting. Replace slipped slates on pumphouse shed roof (Target Note 2) and install barn owl nest box as high as possible inside near the internal ridge (to encourage barn owl nesting). Install barn owl roost boxes elsewhere around the Estate in open / accessible barns (such as Target Note 12).

Otter and Water Vole – Leave the banks of the River Thames plus any nearby wet woodland unmanaged, to keep a 'tangled' mosaic of scrub, ruderal herbs and trees, and maintain the existing good potential shelter that exists for water voles and otter. Consider constructing a buried dedicated artificial otter holt beside one of the wet woodland areas along the western Estate boundary, to encourage future otter breeding.

Reptiles and Amphibians – Semi-improved grasslands should be managed to maintain plant diversity and a 'rough' tussocky sward with some build-up of matted dead-grass, through either low intensity grazing or once per year topping at 25-30cm

cutting height. Avoid fertilisers and any re-seeding. For encouragement of newts, avoid stocking ponds with fish, reduce waterfowl numbers, increase light levels reaching pond surface, encourage higher water oxygen levels to stimulate floating vegetation.

Building Development Projects

The large numbers of buildings around the Estate, of different types, styles and materials, including some that appear redundant, presents significant opportunities for re-development, changes of use, and alterations, to diversify Estate income. Where such alterations would require planning permission, the planning system requires that an ecology appraisal report is submitted with the planning application, which assesses the ecology of the land and buildings within the application boundary, and whether any legally protected fauna would suffer any adverse impact.

In particular, the potential for bat roosts to be disturbed, altered or destroyed, is a principal concern, and must be resolved through a bat survey (following the methods detailed within the 2016 published 'Bat Surveys for Professional Ecologists'), involving first a preliminary appraisal (gaining past records of bats in the vicinity, assessing the potential for a bat roost at that building, and looking for daylight evidence of bat roosts). Where there is bat evidence or any potential for hidden roosts, this is then followed up with detailed bat emergence surveys that are seasonally restricted to the May to August period. Prior programming of any potential planning applications, and a long lead-in time, is therefore required, in order that the detailed summer-time bat survey data is gathered before the full planning application is submitted. This also has the benefit of ensuring that the bat roost implications and any required compensatory roost requirement is properly designed into the scheme from the outset.

Where a bat roost will be disturbed, or altered or destroyed by the scheme, then a Natural England Bat Derogation Licence must first be in place. This cannot be applied for until full planning permission has been granted. The licence application

must also be supported by bat surveys from three dusk or dawn periods within the most recent summer bat activity season.

The ecology appraisal must also consider the potential for other notable or legally protected fauna to be impacted, for instance the potential for great crested newts to be impacted by any landscaping work (if the scheme is within 250m of any ponds); or for active bird nests to be disturbed; or for reptiles to be active in any impacted habitats. Many of these potential impacts can be avoided via a Precautionary Method Statement and careful programming of clearance and construction works (for instance timing habitat clearance to avoid the bird nesting season). However, where great crested newt habitat may be impacted, the planning system usually requires confirmation of its value to great crested newts (through detailed spring-time newt surveying of the associated pond to indicate the newt population size (if any)), because great crested newt terrestrial habitat (eg – grassland used for foraging) is also legally protected and so its loss or damage also requires a derogation licence.

Reptiles are legally protected but their habitat is not, and so it can be acceptable to simply discourage them from a working area or physically translocate them, without any licence required.

Where building renovation is proposed, which does not require any planning permission, the laws protecting fauna still apply, and so prior fauna surveys are still required (and mitigation and/or licensing if there are impacts), in order to avoid unlawful activity.

5.0 SUMMARY AND CONCLUSIONS

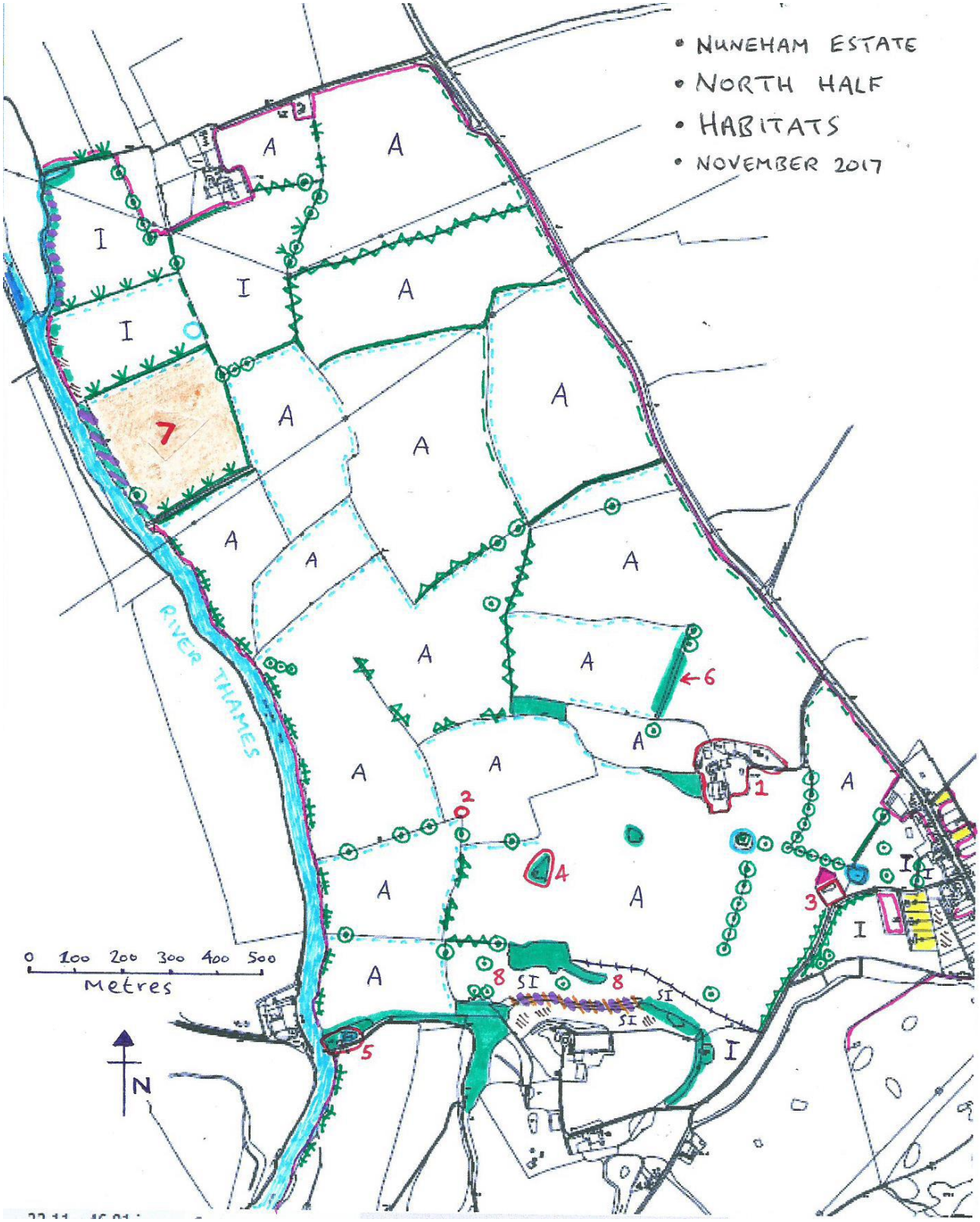
Nuneham Courtenay Estate supports a range of habitats and features, some of which are of high ecological value. There is one designated Local Wildlife Site in the north-west (a species-rich meadow); plus the River Thames along the western boundary; several species-rich hedgerows; moderate numbers of large veteran trees and lines of veteran trees, a range of pond types, woodland copses, small areas of unmanaged 'tangled' wet woodlands, and some 'rough' semi-improved grasslands. These are the more notable habitats.

Within the Estate there is a range of notable fauna and legally protected species, such as badger setts; barn owls; significant potential for a wide range of bat species and very likely a large number of bat roosts (around buildings and trees); moderate potential for protected great crested newts around the ponds, and reptiles around the semi-improved grasslands; plus notable / declining bird species throughout the Estate, and likely rare invertebrates associated with the veteran trees. Otters have been recorded on the Thames, and so will likely at least pass through at times and 'rest up'.

This report outlines a range of 'constraints and opportunities' presented by the above habitats and fauna. Overall, the Estate presents significant opportunity for ecology enhancement, including restoring degraded features such as ponds and hedges, but also altering management to favour rare fauna (such as rough grassland margins for barn owl hunting). Nest and roost boxes can be used to encourage notable fauna. Three patches of Japanese Knotweed exist within the Estate, and these should be monitored and eradicated, due to the aggressive and damaging nature of this plant.

There is also potential for adverse impacts to notable fauna and protected species, if any areas or buildings are proposed for alterations or renovations. Where such projects are proposed, detailed fauna surveys are first required, in order that appropriate mitigation can be designed into the scheme, to avoid legal infringement. The required fauna surveys tend to be seasonally restricted and so a long 'lead-in' time to proposed development projects is recommended. The plans below locate features discussed above.

PLANS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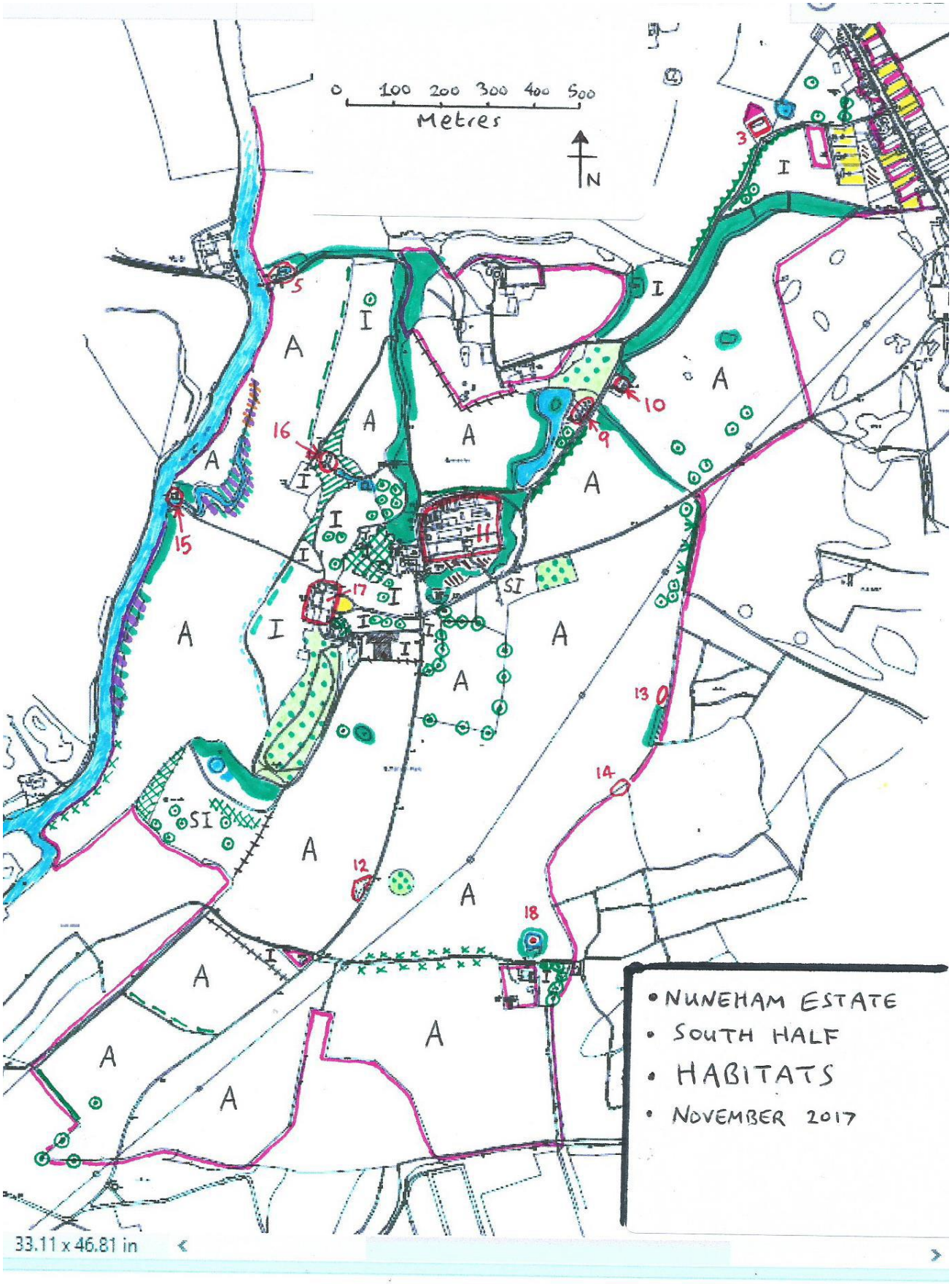
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• KEY TO HABITATS PLAN