

Oxfordshire Fens Project

Hinksey Heights Baseline Report

David Morris

May 2019

Contents

1. Introduction.....	1
1.1. Background	1
1.2. Purpose and structure of this report	1
2. Baseline study methods	3
2.1. Study overview and data management	3
2.2. Desk study.....	3
2.3. Field survey	4
2.4. Nomenclature	6
3. Baseline study results	7
3.1. Topography and geomorphology.....	7
3.2. Geology	7
3.3. Hydrology	12
3.4. Hydrogeology	14
3.5. Habitats and vegetation.....	17
3.6. Biodiversity	30
4. References	35
Appendix 1. Photographs	36
Appendix 2. Site list.....	40

Tables

Table 3.1. Description of bedrock units outcropping within and around the Hinksey Heights study area.....	8
Table 3.2. Habitats within the surface water and groundwater catchments of the Hinksey Heights study area.....	13
Table 3.3. Priority habitats within the Hinksey Heights project area	17
Table 3.4. Summary of taxa recorded from the Hinksey Heights study area	30
Table A2.1. Explanation of legal and conservation statuses of taxa recorded from the Hinksey Heights study area.	40
Table A2.2. List of taxa recorded from the Hinksey Heights study area.	41

Figures

Figure 1.1. Site plan of the Hinksey Heights project area	2
Figure 3.1. Topography and surface water catchment of Hinksey Heights project area	9
Figure 3.2. Geology and groundwater catchment of Hinksey Heights project area	10
Figure 3.3. Surface water and groundwater features of the Hinksey Heights project area ..	11
Figure 3.4. Habitats within the surface water and groundwater catchments of the Hinksey Heights project area	16

Figure 3.5. Habitats of the Hinksey Heights project area.....	21
Figure 3.6. Priority habitats of the Hinksey Heights project area	23
Figure 3.6. Legend to plant communities.....	25
Figure 3.8. Vegetation of the Hinksey Heights project area.....	26

1.Introduction

1.1. Background

The Oxfordshire Fens Project is undertaking habitat restoration work to re-establish alkaline fen at Hinksey Heights. The project area is located between the Hinksey Heights Golf Club and North Hinksey (grid reference SP 493 043), situated in a valley draining the high ground of the mid-vale ridge to the west of Oxford. A plan of the project area is provided in Figure 1.1.

This report refers to the following units within the project area, shown in Figure 1.1:

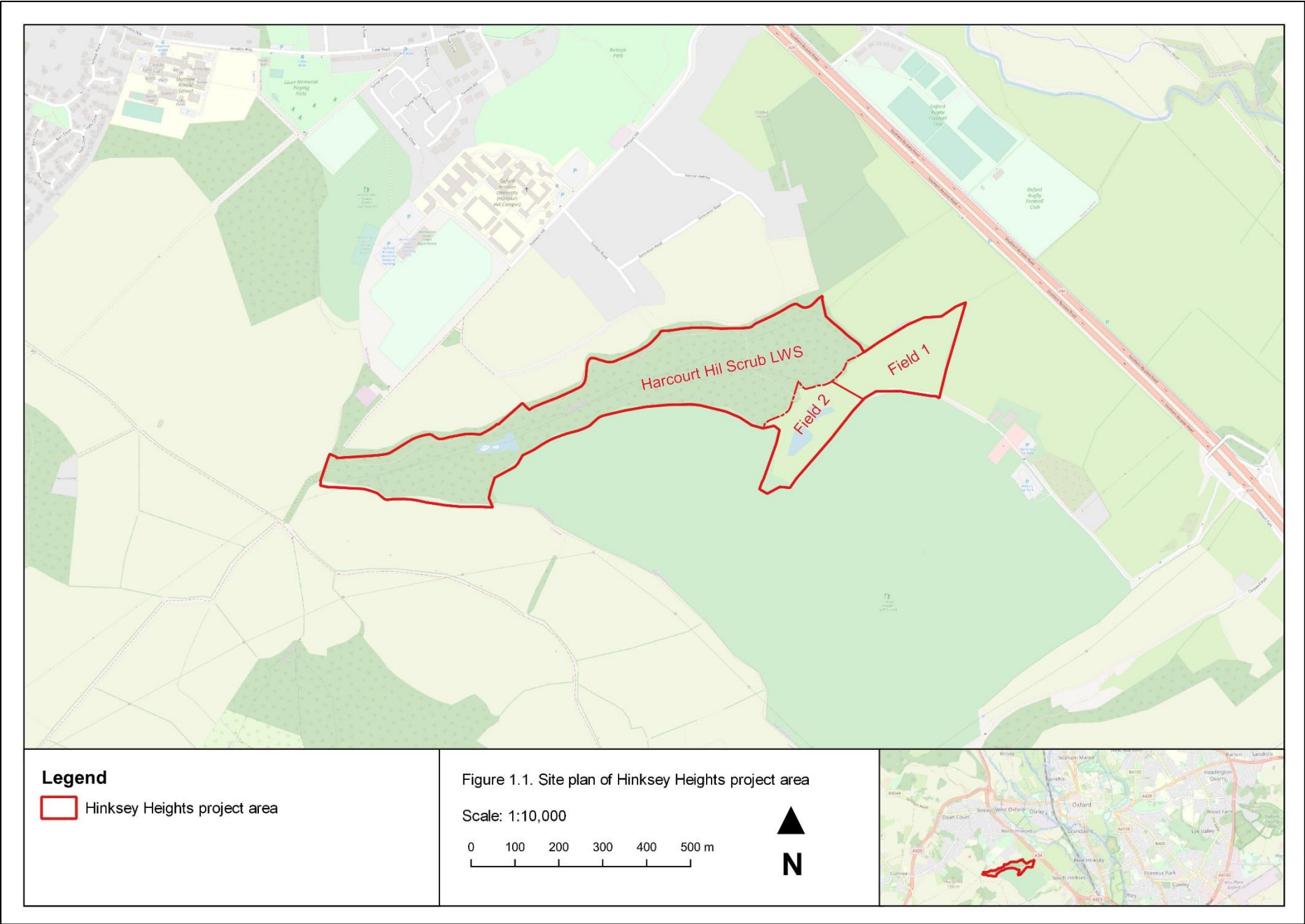
- Harcourt Hill Scrub Local Wildlife Site – the mostly wooded valley designated as a Local Wildlife Site (LWS);
- Field 1 – an undesignated field at the eastern end of the valley; and
- Field 2 – an undesignated field in a smaller valley to the south of the LWS.

1.2. Purpose and structure of this report

The purpose of this report is to provide information gathered through desk study and field survey to form a baseline understanding of the hydro-ecology and biodiversity of the project area.

Section 2 of this report describes the methods followed and sources of information used for the desk study and field survey undertaken. Section 3 presents the results of this work, under the following topic headings:

- topography and geomorphology;
- geology;
- hydrology;
- hydrogeology;
- habitats and vegetation; and
- biodiversity.



2. Baseline study methods

2.1. Study overview and data management

The baseline study of the project area comprised a desk study to gather background information, with more detailed information gathered by field survey. The methods for these elements are described below.

All biological records obtained during the desk study and made during the field survey were entered into a Microsoft Access database set up for the study. All spatial data obtained or created during the desk study and field survey were gathered in a GIS project in QGIS (QGIS Development Team, 2019).

2.2. Desk study

The following sources of information were used for the desk study:

- Biological records:
 - boundaries of LWS and proposed LWS made available by Thames Valley Environmental Records Centre (TVERC);
 - biological records made available by TVERC in July 2018;
 - biological records downloaded in March 2019 from the National Biodiversity Network Atlas (NBN, 2019);
 - records of bryophytes recorded from the project area on 7th January 2018, obtained from the British Bryological Society; and
 - records of fungi, vascular plants and invertebrates compiled by and obtained from Dr Judy Webb, collected at various dates up to 2018.
- Water quality data:
 - results of water quality testing within the project area undertaken as part of the Freshwater Habitats Trust project Clean Water for Wildlife (Freshwater Habitats Trust, 2016), provided by Dr Jeremy Biggs.
- Spatial data:
 - 2017 1m LiDAR Digital Terrain Model (DTM) obtained from the data.gov.uk portal;
 - British Geological Society (BGS) bedrock and superficial geological mapping obtained through the BGS Web Mapping Service;
 - The Ordnance Survey (OS) Open Data products Open Rivers and Terrain® 50;
 - freely available background mapping such as OpenStreetMap; and
 - Google Earth satellite imagery.

The above spatial data were used to:

- map the locations of watercourses and other hydrological features;
- calculate the topographical catchment of the project area, using the LiDAR DTM and the SAGA terrain analysis processing tools in QGIS;

- map the habitats within the topographical catchment of the project area using Google satellite imagery, using the following broad habitats, based on the Phase 1 habitat classification (JNCC 2010) (cf. Section 2.3):
 - broadleaved semi-natural woodland;
 - broadleaved plantation woodland;
 - scrub and hedgerows;
 - neutral grassland;
 - improved grassland;
 - arable;
 - amenity grassland;
 - residential properties and gardens; or
 - other buildings and hardstanding.
- redraw geological boundaries from the BGS 1:50,000 bedrock geological mapping by identifying topographic features from the LiDAR DTM.

2.3. Field survey

Field survey work comprised the following survey elements, the methods of each of which are described below:

- hydrological walkover;
- botanical survey;
- habitat and vegetation survey; and
- invertebrate survey.

The hydrological walkover and botanical, habitat and vegetation surveys were undertaken by David Morris, beginning 21st July 2018 and continuing over subsequent *ad hoc* visits to April 2019. The invertebrate sampling was undertaken during a single visit to the project area by Dr Judy Webb in July 2018.

Records of other taxonomic groups observed incidentally during site work, such as birds, were also gathered over this period. Representative photographs of features of the project area were collected, taken using an Olympus Tough® compact camera.

Hydrological walkover

The following surface water and groundwater features were recorded during site visits:

- bodies of open water, e.g. ponds;
- watercourses, e.g. ditches and streams;
- areas of diffuse groundwater discharge (seepages);
- areas of discrete groundwater discharge (springs); and
- deposits of calcite precipitated from groundwater (tufa).

The direction of flow of watercourses was recorded. If springs showed evidence of tufa formation or concentrations of iron oxide, then this was also recorded. Hydrological features were recorded as waypoints using a Garmin eTrex® 10 handheld Global Positioning System (GPS) unit (horizontal accuracy approximately 5m) or recorded on field maps. Features were digitised in QGIS. Watercourse channels and the extents of ponds were digitised using the LIDAR DTM.

Botanical survey

All stonewort, bryophyte and vascular plant taxa encountered during the survey were recorded, with separate lists compiled for the three units of the project area. Each taxon recorded was assigned a relative frequency using the DAFOR scale (Dominant, Abundant, Frequent, Occasional, Rare). The qualifier 'local' was added to indicate a heterogeneous distribution, e.g. LF for 'locally frequent'.

Particular note was taken of the following vascular plant taxa:

- legally protected species listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended); and
- plants of local or national conservation concern:
 - species of principal importance, listed in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006;
 - Nationally Rare or Nationally Scarce taxa (BSBI, 2017);
 - taxa listed as Near Threatened, Vulnerable, Endangered or Critically Endangered on the vascular plant red lists for Great Britain (Cheffings *et al.*, 2005) or England (Stroh *et al.*, 2014); or
 - taxa listed as rare or scarce in the administrative county of Oxfordshire (Killick *et al.*, 2018).

Note was also taken of invasive non-native plant taxa, such as those listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), or other invasive or potentially invasive non-native plants.

Where a notable or invasive plant taxon occurred in a discrete population then a ten-figure grid reference of its location was recorded using a Garmin eTrex® 10 handheld GPS unit (horizontal accuracy approximately 5m) and ecological notes were recorded.

Habitat and vegetation survey

The methodology of the National Vegetation Classification (NVC) was followed to classify the vegetation of the project area (Rodwell, 2006). Homogenous stands of vegetation were mapped and assigned to units of the NVC, to sub-community where possible. Assignment of units of the NVC was largely made in the field. Quadrat samples of stands were not recorded. Some vegetation could not be assigned to units of the NVC and was assigned to *ad hoc* units, e.g. disturbed, early successional or artificial habitats or stands of single species not included in the NVC.

Vegetation mapping was detailed. Complex vegetation was mapped at a scale of approximately 1:1,500, with stands resolved as polygon features if having an area greater than approximately 1m². Simpler vegetation, such as woodland, was mapped at a larger scale. Mapping was undertaken using field survey maps produced in QGIS, comprising

Google satellite imagery at an appropriate scale and overlain with 100m and 10m OS grids. The survey maps were printed and annotated in the field, using a Garmin eTrex® 10 handheld GPS unit to locate positions (horizontal accuracy approximately 5m). Completed field survey maps were scanned, and georeferenced and digitised in QGIS.

The survey aimed to cover the whole project area but areas supporting wetland habitats were targeted. Areas not covered or not adequately covered during the survey, such as peripheral areas of dry woodland, were mapped from Google satellite imagery and the vegetation classified based on observations from nearby.

Stands were also assigned to the following broad habitats, based on the Phase 1 habitat classification (JNCC, 2010) (cf. Section 2.2):

- broadleaved semi-natural woodland;
- broadleaved plantation woodland;
- scrub and hedgerows;
- neutral grassland;
- calcareous grassland;
- improved grassland;
- tall ruderal;
- fen, marsh and swamp;
- open water;
- arable;
- amenity grassland;
- residential properties and gardens; or
- buildings and hardstanding.

Results of the habitat and vegetation survey were evaluated to identify priority habitats (i.e. habitats listed in accordance with Section 41 of the Natural Environment and Rural Communities Act 2006, as being of principal importance for the conservation of biodiversity) using the definitions provided by the Joint Nature Conservation Committee (Maddock, 2011).

Invertebrate survey

The invertebrate survey was undertaken by sweep netting during a single visit by Dr Judy Webb in July 2018. The survey visited a limited area of the site and limited range of habitats but aimed to give an initial indication of the diversity of species of true fly (Diptera) associated with herbaceous fen and wet woodland. Craneflies (Tipulidae) and fungus gnats (Sciaridae) collected were sent for determination to Alan Stubbs and Peter Chandler, respectively, but invertebrates were otherwise identified by Dr Judy Webb.

2.4. Nomenclature

Nomenclature throughout this report follows the latest MapMate® species dictionary (Mapmate Limited, 2019), e.g. Stace (2010) for vascular plants.

3. Baseline study results

This section presents baseline information about the Hinksey Heights project area, gathered from desk study and field survey. This information is divided into the following topics:

- topography and geomorphology;
- geology;
- hydrology;
- hydrogeology;
- habitats and vegetation; and
- biodiversity.

Photographs from the project area are provided in Appendix 1.

3.1. Topography and geomorphology

The topography of the project area is shown in Figure 3.1. The project area comprises a narrow valley cut into the high ground of the mid-vale ridge to the west of Oxford. The valley is open at the eastern end, with a long main valley oriented approximately west-south-west to east-north-east, within the LWS, and a smaller valley joining from south-south-west. The latter valley includes Field 2 and extends beyond the project area south into the golf course. The project area varies in elevation from a low of approximately 60m above Ordnance Datum (mAOD) along the A34 at its eastern end to approximately 110mAOD at the western end of the main valley. The width of the main valley tapers from east to west, from approximately 275m wide at the eastern end to 75m wide below the pond toward the west, to approximately 25m wide at the western end of the project area.

There are numerous breaks in slope within the project area, particularly on the southern slopes. The tops of the valleys are marked by well-defined escarpments, with slopes of approximately 20-25%. This break in slope varies in elevation between 90-100mAOD on the northern side and 90-95mAOD on the southern side. Most of the project area is on slopes and there is no well-defined valley bottom until the ground opens out at the eastern end, in the centre of the project area, and within the smaller southern valley. The slope of the sides of the main valley through most of its length is approximately 10%, particularly on the northern side which has a more consistent slope.

3.2. Geology

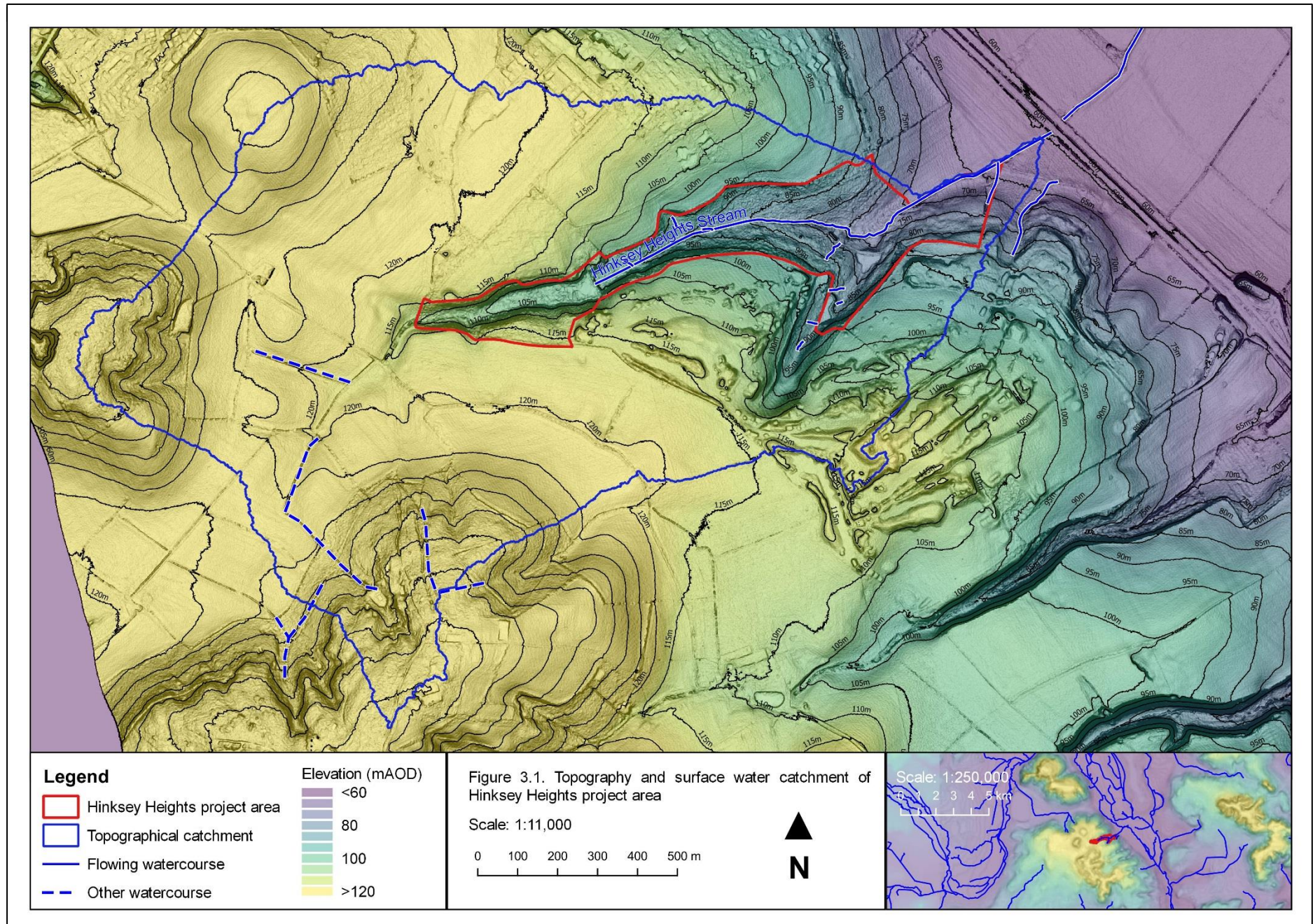
The geology of the project area is shown in Figure 3.2, modified from the BGS 1: 50,000 geological mapping. There are no superficial deposits mapped for the project area, but there are extensive deposits of tufa (travertine) and peat within the main valley. Along the slopes of the main valley are numerous very large solid concretions of tufa around springs, as well as more diffuse deposits. The main stream through the valley (see Section 3.3) also supports extensive tufa concretions along its banks, and there are several reaches where

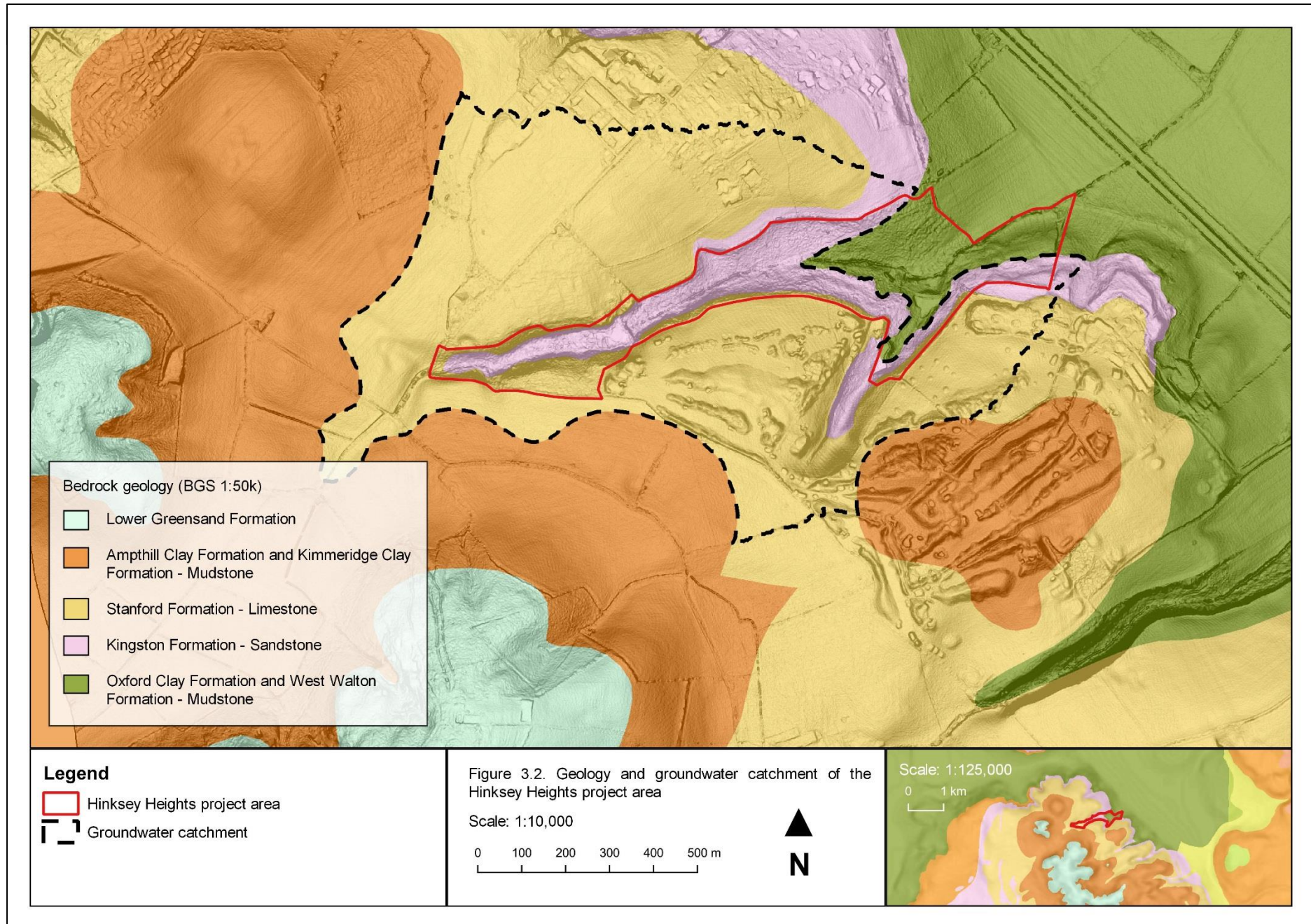
large tufa barrages have formed within the channel (Photograph 1, Appendix 1), mainly in the lower, less modified reaches. The peaty deposits have not been investigated. Casual observation suggests these are relatively shallow and loamy and, in many areas, form a loose matrix with calcite precipitated by groundwater emergence.

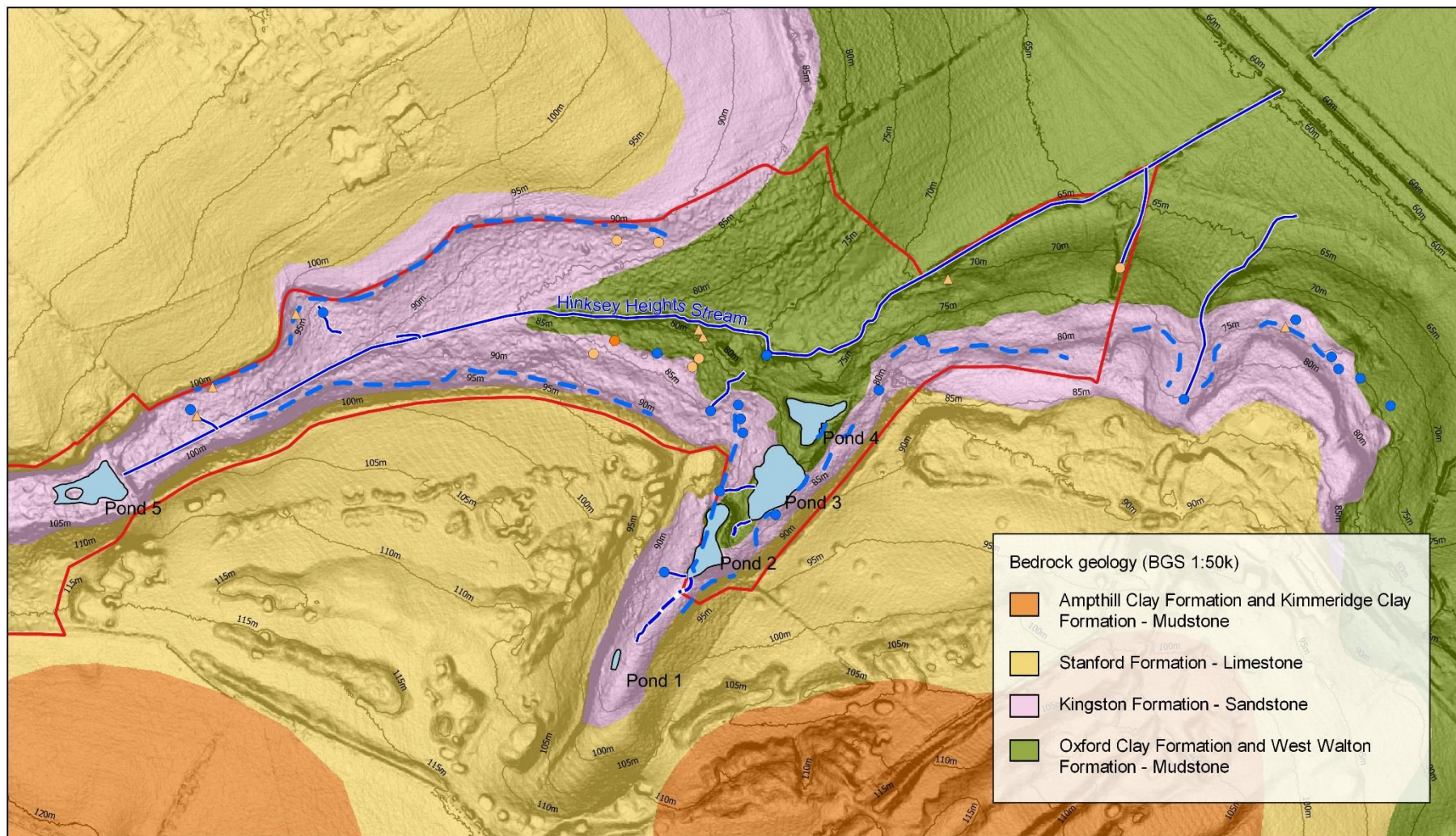
The bedrock geology of the project area and its surroundings are dominated by Jurassic rocks, summarised in stratigraphical sequence in Table 3.1. The bedrock formations outcropping within the site largely belong to the Corallian Group. This is a complex succession of interdigitating limestones, marls, sandstones, sands, siltstones, silts, spiculites and mudstones, here represented by outcrops of the limestone of the Stanford Formation above the valley and sandstone of the Kingston Formation along the valley sides. The Oxford Clay Formation outcrops at lower elevations, forming the valley bottom in the eastern part of the project area. The Kimmeridge and Ampthill Clay Formation outcrops on the higher ground around the site, and the Lower Greensand Group forms the summits of Boar's Hill and Hurst Hill, to the south and west, respectively.

Table 3.1. Description of bedrock units outcropping within and around the Hinksey Heights study area (BGS, 2019)

Bedrock unit	Lithological description
Lower Greensand Group	Mainly sands and sandstones (varying from well-sorted fine-grained to poorly sorted medium- to coarse-grained) with silts and clays in some intervals.
Kimmeridge and Ampthill Clay Formation	Mudstone
Stanford Formation	Generally medium-grained quartzose sands, locally fine- and coarse-grained, with carbonate cemented beds and doggers which are sandy limestone or calcareous sandstone; some beds of spiculitic sandstone which are relatively sand-free, shelly and/or ooidal limestone, sandy or silty mudstone, and calcareous mudstone. Strata are generally grey when fresh, weathering to brown or yellow.
Kingston Formation	Shell detrital limestones, ooidal limestone, coralline limestone, fossiliferous marls, and interbedded limestone, marl and mudstone.
Oxford Clay Formation	Mudstone







Legend

- | | | |
|--|---|--|
| Hinksey Heights project area | --- Culverted watercourse | ● Tufa forming spring |
| Pond | --- Seepage | ● Ferruginous spring |
| — Flowing watercourse | ● Spring | ▲ Tufa deposit |

Figure 3.2. Surface water and groundwater features of the Hinksey Heights project area

Scale: 1:5,000

0 100 200 m



3.3. Hydrology

Surface water features

The surface water features identified within and around the project area are shown in Figure 3.1 and Figure 3.3. The project area is drained principally by a watercourse along the bottom of the main valley, hereafter referred to as the Hinksey Heights Stream (Photograph 1, Appendix 1), which flows west to east down to the Thames floodplain. The stream rises at or just to the west of the pond at the head of the valley. There is a channel continuing up the valley west and out of the project area, but it was dry when investigated in July 2018. The outlet from the project area is culverted beneath the A34. The stream channel has been artificially deepened and straightened along most of its length and there are remains of concrete dams in places. The stream is not classed as Main River by the Environment Agency.

There are five artificial ponds within and around the project area, one at the head of the main valley (shown as Pond 5 on Figure 3.3) and four in the smaller valley (Ponds 1 to 4), one of which (Pond 1) is within the golf course and outside the project area. The latter four ponds form a south-north group, with a dam between the northern two ponds and a dam across the northern side of the northern-most pond.

The pond at the head of the main valley (Pond 5) is formed behind a dam across the Hinksey Heights Stream and drains directly into the Hinksey Heights Stream. The drainage of the other ponds is not clear. The pond in the golf course (Pond 1) drains north into the southern-most of the ponds within the project area (Pond 2) via a watercourse. This is largely culverted but has a short open stretch within the golf course. One land drain was observed discharging via a plastic pipe into this open watercourse in April 2019 and there is likely further land drainage in this area. There is a short open watercourse draining into the pond immediately to the north (Pond 3) and at the top of this watercourse is a buried chamber with two inlets, one of which was running in April 2019. This water could originate from the pond to the south (Pond 2), but there was no obvious outfall from this pond and there could be inputs from land drainage from the golf course. The water of the two southern ponds (Ponds 1 and 2) was much more turbid than that of the two to the north (Ponds 3 and 4), suggesting these two pairs of ponds may not be directly connected.

There was no obvious outfall for the pond to the north (Pond 3) but there was a shallow linear depression extending from the eastern corner which may function as an overflow channel. Similarly, there was no obvious outfall for the northern pond (Pond 4), but it was observed to flow overland and under the boardwalk and down-gradient toward the Hinksey Heights Stream during the winter of 2019 when the level was high. There is a stone culvert in the bank of the Stream to the north, below the level of the field, and which has been observed to discharge water into the stream; it may be connected to the pond or be an old tiled land drain.

The northern of the four ponds (Pond 4) has a small pump house on its eastern bank, with a pipe connecting the two. Presumably, this pump supplies water to the golf club for watering the course. Over the dry hot weekend of 20th April, pumping had caused a significant drawdown of around 0.5m.

The four ponds within the project area sustained high water levels throughout the dry summer of 2018, and the northern two of the four ponds within the smaller valley (Ponds 3 and 4) have always been observed to have very clear water. With no significant surface water inputs, the ponds therefore appear to be supplied by groundwater. Similarly, the Hinksey Heights Stream runs year-round, and it is likely sustained by a significant base-flow derived from groundwater.

In addition to the watercourses described above, there are several other watercourses within and around the project area. Within the project area, additional watercourses comprise small channels draining springs, such as on the slopes above the A34. Outside the project area, watercourses are shown on maps near to the summit of Boar's Hill to the south-west, within the surface water catchment of the project area (Figure 3.1). These may rise from springs at the junction of the Lower Greensand and Kimmeridge and Ampthill Clays (Figure 3.2). They may feed into the surface drainage network flowing through the main valley or could infiltrate to ground once they reach more permeable strata lower down.

Water quality

Water quality testing was undertaken by volunteers for the Freshwater Habitats Trust on 27th March 2016. A sample of water was collected from the Hinksey Heights Stream at the eastern end of the main valley at approximately SP 49617 04435, and the nitrate (NO³⁻) and phosphorus (P) were measured using simple solution-based kits provided by the Freshwater Habitats Trust (further details of the sampling method are available at <https://freshwaterhabitats.org.uk/projects/clean-water/>). The sample found concentrations of 0.02-0.05ppm and 0.2-0.5ppm of nitrate and phosphorus, respectively. These values indicate no evidence of pollution.

Topographical catchment

The upslope area of the project area is shown in Figure 3.1. This topographical catchment has an area of approximately 204ha, mostly comprising the area around Hinksey to the north and Boars Hill to the south. The habitats within the catchment are shown in Figure 3.4 and summarised by area in Table 3.2.

Table 3.2. Habitats within the surface water and groundwater catchments of the Hinksey Heights study area

Habitat	Catchment / Area (ha) (% of catchment area)	
	Surface water	Groundwater
Arable	39.2 (19.2%)	8.3 (9.0%)
Bare ground	0.1 (0.1%)	0.1 (0.2%)
Broadleaved semi-natural woodland	35.3 (17.3%)	5.9 (6.4%)
Buildings	2.0 (1.0%)	2.0 (2.2%)
Calcareous grassland	0.0 (0.0%)	0.0 (0.0%)
Fen, marsh and swamp	4.4 (2.2%)	3.4 (3.7%)
Improved grassland	41.9 (20.6%)	7.6 (8.3%)

Habitat	Catchment / Area (ha) (% of catchment area)	
	Surface water	Groundwater
Neutral grassland	24.2 (11.8%)	21.0 (22.8%)
Plantation woodland	5.5 (2.7%)	0.7 (0.7%)
Residential	3.6 (1.8%)	3.6 (3.9%)
Scrub	8.2 (4.0%)	7.1 (7.7%)
Sport / amenity	38.1 (18.7%)	32.3 (35.1%)
Standing water	0.5 (0.3%)	0.2 (0.3%)
Tall ruderal	0.8 (0.4%)	0.4 (0.5%)

3.4. Hydrogeology

Evidence of groundwater

The hydrogeological features of the project area identified from field survey are shown in Figure 3.3. The project area showed extensive groundwater emergence along the sides of the valleys and slopes, marked out by sharply-defined transitions from dry scrub, woodland or grassland to wet woodland, tall-herb fen or other wetland vegetation (see Section 3.5 for descriptions). Within the main valley, from the pond at the head of the valley to the smaller valley to the east, groundwater appears to emerge in a zone extending high up the valley sides. Along the length of the main valley are numerous springs, on both the northern and southern sides, several of which have very large tufa concretions (Section 3.2) and some are conspicuously iron-rich. Springs appeared to extend further west up the valley on the northern compared to the southern side. There is a zone of particularly strong spring flow in woodland at the eastern end of the main valley, with large spring mounds, and permanently saturated ground, tufa and runnels extending across much of the slope above the Hinksey Heights Stream. Springs additional to those identified in Figure 3.2 may be present but currently obscured by overgrown vegetation.

There does not appear to be any groundwater emergence upstream of the pond at the western end of the main valley, above around 100mAOD. In the central part of the project area where the two valleys meet, the area below a break in slope at around 79mAOD appeared to have limited or no groundwater influence. Groundwater emergence in the smaller valley within Field 2 appeared to be constrained, with narrower areas of seepage situated above the ponds.

Evidence of groundwater emergence continues east from the valley, on the slopes above the A34. There is a zone of groundwater emergence, including several springs, at elevations between approximately 73 and 80mAOD. Two small watercourses rise from these springs, one of which is outside the project area. The zone of groundwater influence is narrower than within the main valley, confined to a series of breaks in slope at higher elevations, above vegetation with little or no apparent groundwater influence.

As described above, the five ponds within the project area are likely to be groundwater supplied.

Hydrogeological catchment

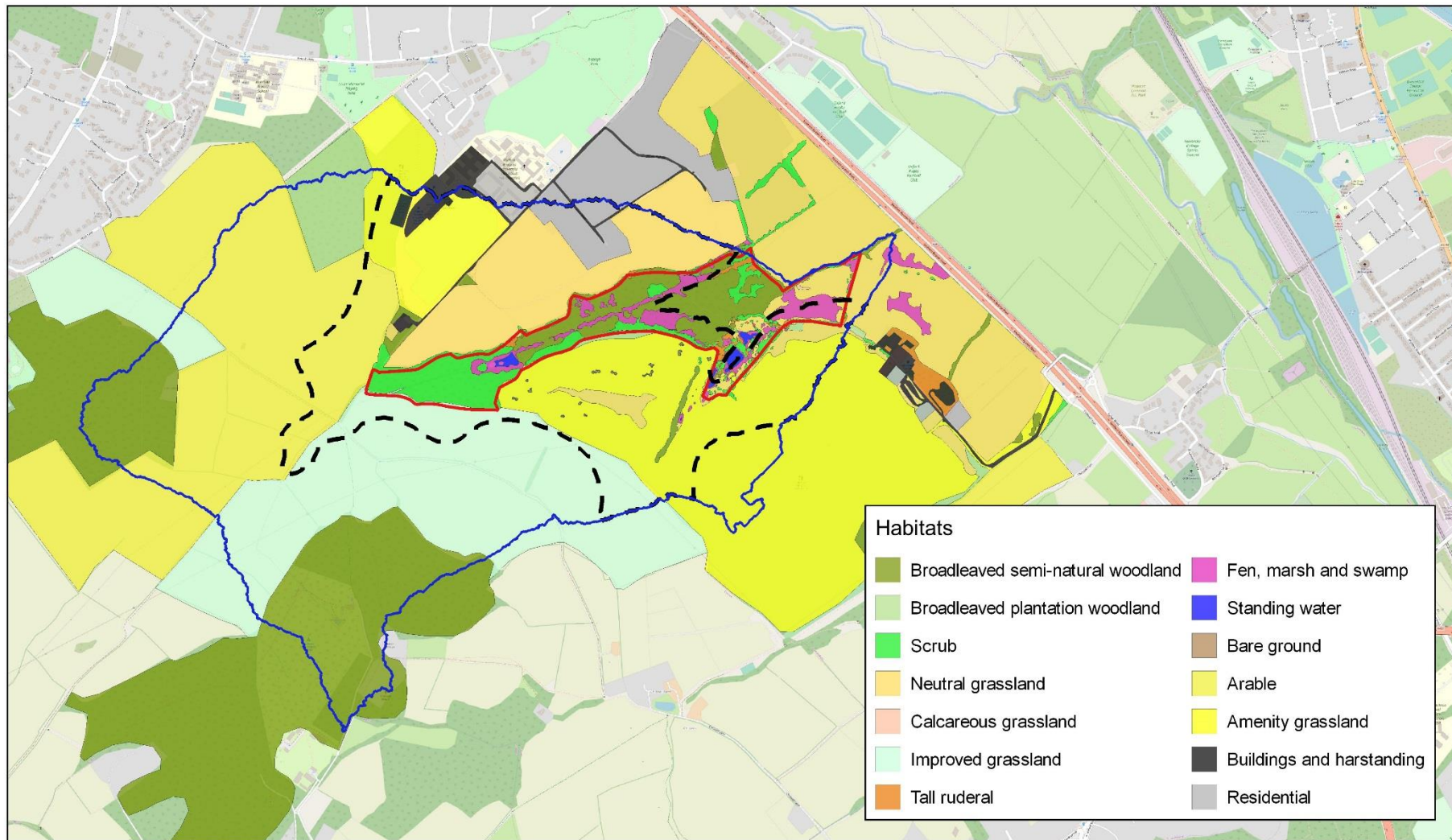
There are no BGS records of boreholes within or near to the project area from which to infer information about groundwater levels or flows. The nearest boreholes recorded within the bedrock formations within the groundwater catchment of the project area are to the north in Hinksey and to the south in the Boar's Hill area and no groundwater strikes were recorded from these.

The groundwater catchment of the project area is likely to be more limited than the surface water catchment due to the presence of extensive outcroppings of the Kimmeridge and Ampthill Clay Formation across the high ground to the west and south of the project area. These relatively impermeable strata are likely to limit infiltration in the higher areas, with relatively greater run-off compared to the more permeable strata of the Corallian Group lower down. Recharge of springs on the northern slope of the main valley is therefore most likely to occur within the fields between the main valley and Hinksey to the north. Springs on the southern slopes are likely to be recharged mainly from the golf course to the south.

Flows within the Corallian Group will be confined below by the Oxford Clay, which is an aquitard, and its outcropping in the eastern part of the valley largely corresponds with the locations of springs. There does not appear to be any indication that groundwater flows along the dip of the strata, i.e. north-west to south-east, springs being evenly distributed around the project area. Flows therefore likely largely follow topography.

The valley of the project area forms the second in a north-to-south sequence of valleys along the mid-vale ridge: Raleigh Park to the north, and Chilswell Valley and Limekiln Copse to the south-east. These valleys support similar spring-fed wetlands and are at similar elevations to the study, again corresponding to outcroppings of the Oxford Clay. Given the similarity in elevation, the topographic watersheds between these valleys likely also represent approximate groundwater divides.

The hydrogeological catchment of the spring-fed areas described above is shown in Figure 3.2. It has a total area of approximately 92ha. The habitats within the catchment are shown in Figure 3.4 and summarised by area in Table 3.2.



Legend

- Hinksey Heights project area
- Topographic catchment
- Groundwater catchment

Figure 3.4. Habitats of the surface and groundwater catchments of the Hinksey Heights project area

Scale: 1:15,000

0 25 50 75 100 m



3.5. Habitats and vegetation

Summary

The habitats within the project area are shown in Figure 3.5. Seven priority habitats were identified within the study area, summarised in Table 3.3 and shown in Figure 3.6. The vegetation of the study area is shown in Figure 3.8 and described by broad habitat below.

The four ponds within the project area (see Section 3.3) comprise Ponds priority habitat as at least Pond 4 supports common toad (*Bufo bufo*) and great crested newt (*Triturus cristatus*) (see Section 3.6). As the four ponds are nearby and connected by suitable terrestrial habitat, they are likely all used by one or both species.

Table 3.3. Priority habitats within the Hinksey Heights project area

Priority habitat	Area (ha) (% of project area)	Description
Hedgerows	0.45 (1.9%)	Hedgerows bounding Field 1 and Field 2
Lowland Calcareous Grassland	0.04 (0.2%)	Small stands in Field 1
Lowland Fens	3.59 (15.3%)	Tall-herb and fen in areas of groundwater emergence across the project area
Lowland Mixed Deciduous Woodland	3.60 (15.3%)	Ash (<i>Fraxinus excelsior</i>) woodland at the eastern end of the main valley and on higher ground around the valley
Ponds	0.59 (2.5%)	The four ponds within the study area
Reedbeds	0.36 (1.5%)	The stand of common reed (<i>Phragmites australis</i>) around the pond at the head of the main valley
Wet Woodland	4.22 (18.0%)	Mixed woodland of ash and willows (<i>Salix</i> spp.) along the slopes of the main valley, within Harcourt Hill Scrubs LWS

Woodland and scrub

Most of the main valley is wooded (Sheets 3 and 4, Figure 3.8). The higher ground around and at the head of the main valley, and a central area to the north of where the two valleys meet, support dry woodland and scrub, dominated by ash (*Fraxinus excelsior*) and hawthorn (*Crataegus monogyna*), respectively. Woodland along the edge of the golf course has been planted.

Stands of woodland dominated by ash support an open shrub layer of hawthorn and hazel (*Corylus avellana*), with a ground layer with abundant dog's-mercury (*Mercurialis perennis*) and wood false-brome (*Brachypodium sylvaticum*). Most stands were referred to W8e *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, with frequent common nettle (*Urtica dioica*) in the ground layer. Stands of scrub dominated by hawthorn were referred to W21 *Crataegus monogyna*-*Hedera helix* scrub, including extensive mature

stands at the head of the main valley (Sheet 4, Figure 3.8). The ground flora of this scrub varies from eutrophic vegetation dominated by stinging nettle, referred to W21a *Crataegus monogyna-Hedera helix* scrub, *Hedera helix-Urtica dioica* sub-community, to vegetation similar to that of the ash woodland, with abundant dog's-mercury or wood false-brome, referred respectively to W21b *Crataegus monogyna-Hedera helix* scrub, *Mercurialis perennis* sub-community and W21c *Crataegus monogyna-Hedera helix* scrub, *Brachypodium sylvaticum* sub-community. The large stands of scrub of hawthorn scrub at the head of the main valley support small glades with a richer ground layer of calcicoles such as wild basil (*Clinopodium vulgare*) and wild liquorice (*Astragalus glycyphyllos*).

Scrub is also found around the periphery of Field 1 and forms a mosaic with grassland in Field 2 (Sheets 1 and 2, Figure 3.8). In Field 2, there are dense stands of elm-leaved bramble (*Rubus ulmifolius*), referred to W24 *Rubus fruticosus-Holcus lanatus* underscrub, and less extensive stands of dewberry (*Rubus caesius*).

The slopes of the main valley are dominated by wet woodland, with a canopy of ash, crack willow (*Salix x fragilis sens. lat.*), grey willow (*S. cinerea*) and white willow (*S. alba*). Willows are dominant in most areas, with large trees along the northern slope. From World War II aerial photography available via Google Earth® these trees appear to have originated from planted stock, and in some areas rows of trees can still be discerned. The ground layer of this wet woodland is dominated by tall herbs such as common nettle, common reed, great horsetail (*Equisetum telmateia*), hemp agrimony (*Eupatorium cannabinum*) and lesser pond-sedge (*Carex acutiformis*) (Photograph 8, Appendix 1). The canopy along the northern side of the valley is very open, and in some areas are glades dominated by great horsetail and lesser pond-sedge. This woodland vegetation was referred to W2a *Salix cinerea-Betula pubescens-Phragmites australis* woodland, *Alnus glutinosa-Filipendula ulmaria* sub-community. Although some of the nominate species of this plant community are rare within examples within the project area, this is a broadly-defined woodland vegetation type. Developing from herbaceous fen vegetation, its composition depends on the antecedent vegetation and the proximity of tree species able to colonise.

Grassland

There are large areas of grassland within Field 1 and Field 2, largely comprising rank species-poor neutral grassland swards dominated by bulky grasses such as cock's-foot (*Dactylis glomerata*), false oat-grass (*Arrhenatherum elatius*), tall fescue (*Schedonorus arundinaceus*), tufted hair-grass (*Deschampsia cespitosa*) and Yorkshire fog (*Holcus lanatus*), with abundant tall ruderal species such as common nettle and hogweed (*Heracleum sphondylium*). The most extensive stands of grassland are dominated by false oat-grass (Photograph 8, Appendix 1), referred to MG1 *Arrhenatherum elatius* grassland, most frequently the weedy MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community.

Some stands of MG1 *Arrhenatherum elatius* grassland support calcicoles such as pyramidal orchid (*Anacamptis pyramidalis*) and woolly thistle (*Cirsium eriophorum*), and there are small stands of calcareous grassland dominated by upright brome (*Bromopsis erecta*), referred to CG3 *Bromus erectus* grassland (Sheet 1, Figure 3.8). The largest such stand is in Field 1 and supports small populations of the calcicoles dwarf thistle (*Cirsium acaule*), cowslip (*Primula veris*), glaucous sedge (*Carex flacca*), hairy violet (*Viola hirta*),

quaking grass (*Briza media*), salad burnet (*Poterium sanguisorba*) and spiny restharrow (*Ononis spinosa*) (Photograph 2, Appendix 1). This stand is located on a break in slope so that the soil is likely thinner than the surroundings, which support species-poor false oat-grass grassland.

Tall-herb and fen

Tall-herb and fen are the most spatially complex habitats within the project area and are described below by project area unit.

Harcourt Hill Scrub LWS

Species-poor stands of tall-herb dominated by common reed occupy most of the unwooded parts of the main valley, within the LWS (Sheets 3 and 4, Figure 3.8). Like the wet woodland described above this vegetation is found in the extensive zones of groundwater seepage on the northern and southern slopes of the valley, including along the wayleave of overhead electricity cables that run across the valley. Hemp agrimony is frequent throughout most stands, in vegetation referred to S25a *Phragmites australis-Eupatorium cannabinum* tall herb fen, typical sub-community. Tall-herb on the lower part of the slope on the southern side of the valley is less dense and lesser pond-sedge is co-dominant and common valerian (*Valeriana officinalis*) locally frequent.

The common reed-dominated tall-herb has not been cut for many decades and has developed a thick layer of litter (Photograph 3, Appendix 1). Many areas therefore support eutrophic vegetation with abundant cleavers (*Galium aparine*) and common nettle and frequent woody nightshade (*Solanum dulcamara*). Where hemp agrimony is absent from such tall-herb, usually in more elevated and drier areas, this vegetation has been referred to S26 *Phragmites australis-Urtica dioica* tall herb fen.

Field 1

Wetland vegetation extends beyond the valley into Field 1, forming a sharply-defined zonation of dry grassland in upslope and downslope areas with intermediate stands of fen vegetation running mid-slope across the hillside (Sheet 1, Figure 3.8). Fen vegetation comprises stands of lesser pond-sedge, referable to S7 *Carex acutiformis* swamp, species-poor stands of blunt-flowered rush, referable to M22a *Juncus subnodulosus-Cirsium palustre* fen meadow, typical sub-community, and vegetation in which meadowsweet (*Filipendula ulmaria*) is codominant with blunt-flowered rush, referred to M27 *Filipendula ulmaria-Angelica sylvestris* mire (Photograph 10, Appendix 1). The stands of M22 *Juncus subnodulosus-Cirsium palustre* fen meadow occupy areas around springs and where water accumulates in runnels, while M27 *Filipendula ulmaria-Angelica sylvestris* mire is present on the flatter ground toward the top of the slope. Areas around springs and runnels are more open with abundant *Cratoneuron filicinum* and marsh horsetail (*Equisetum palustre*) and, locally, tufa deposits. The pattern of meadowsweet dominance is likely largely a result of lack of grazing, the species increasing without regular cropping. Its restriction to areas of less groundwater-influence could also be due to its sensitivity to iron (Snowden and Wheeler, 1993) which would accumulate in springs and runnels.

The above fen vegetation is surrounded by zones of hard rush (*Juncus inflexus*), on the upslope edge as scattered plants but as extensive stands referred to MG10b *Juncus*

effusus-Holcus lanatus, *Juncus inflexus* sub-community on the downslope side. The forb species are similar between this and the above fen vegetation, e.g. marsh thistle (*Cirsium palustre*) and water mint (*Mentha aquatica*), but great horsetail is also abundant within this zone (Photograph 6, Appendix 1). This zone likely indicates predominantly vertical rather than lateral water table movements and more poorly aerated soils. Great horsetail is also abundant upslope within some areas of false oat-grass dominated grassland and in tall ruderal vegetation dominated by common nettle. The latter vegetation has been referred to the *ad hoc* community OV24a *Urtica dioica-Galium aparine* community, typical sub-community, *Equisetum telmateia* variant.

Field 2

Wetland vegetation within Field 2 continues the zone of groundwater seepage around the valley slopes from the LWS east into Field 1, but this zone is much narrower than in the other project area units (Sheet 2, Figure 3.8). The zonation of vegetation is similar to that seen in Field 1, with upslope and downslope areas supporting dry grassland and an intermediate sharply-defined zone of fen vegetation. Some of the wetland vegetation within Field 2 appeared to be being colonised by scrub or coarser wetland species such as hard rush and bulrush (*Typha latifolia*).

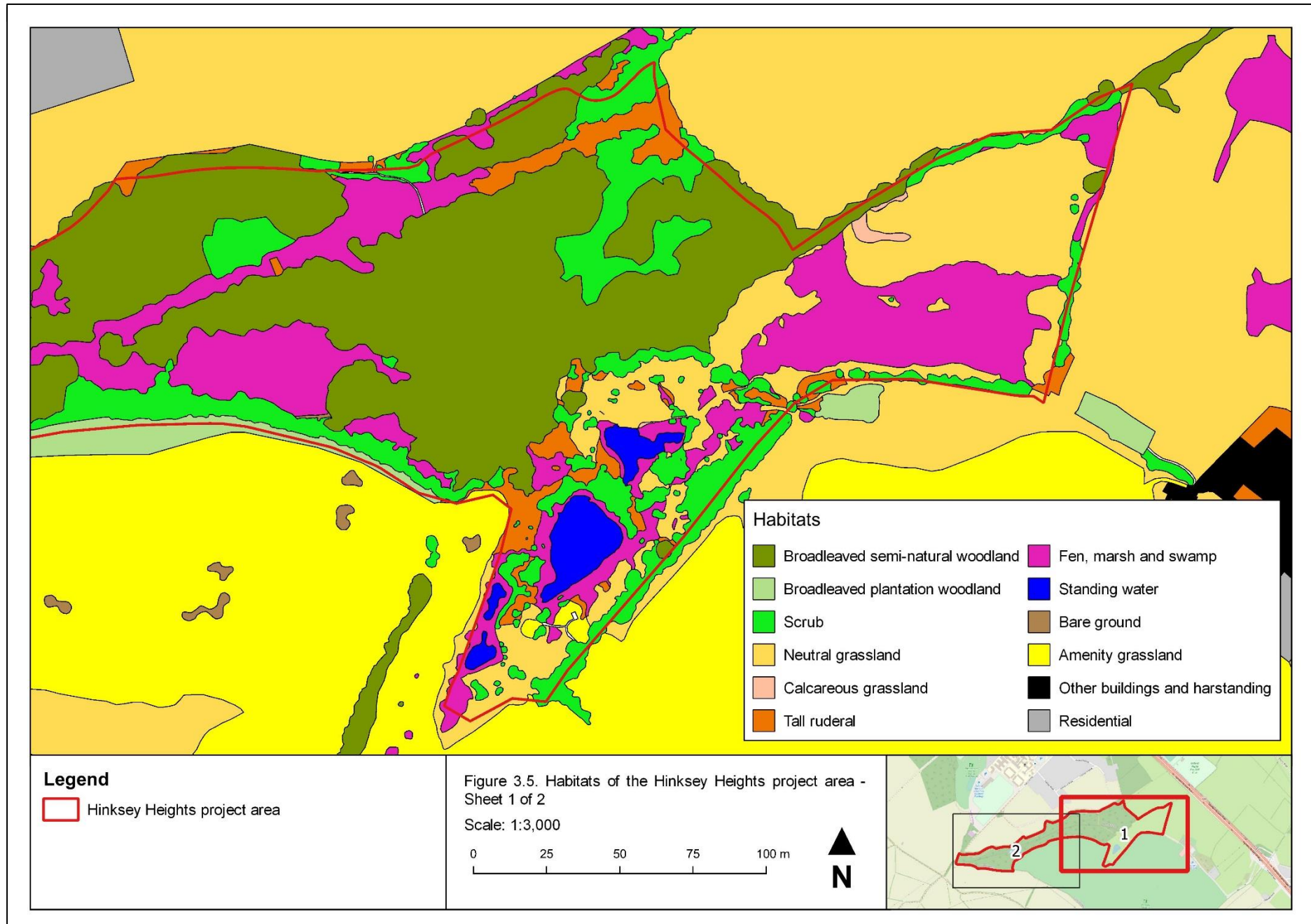
Species-poor stands of blunt-flowered rush are found around the margins of the three ponds within Field 2 (and around Pond 1 within the golf course to the south) and around springs on the slopes above the ponds. The stand around the springs to the north of Pond 3 supports abundant marsh valerian (*Valeriana dioica*), and some stands are quite open with abundant *Cratoneuron filicinum* and, locally, tufa deposits.

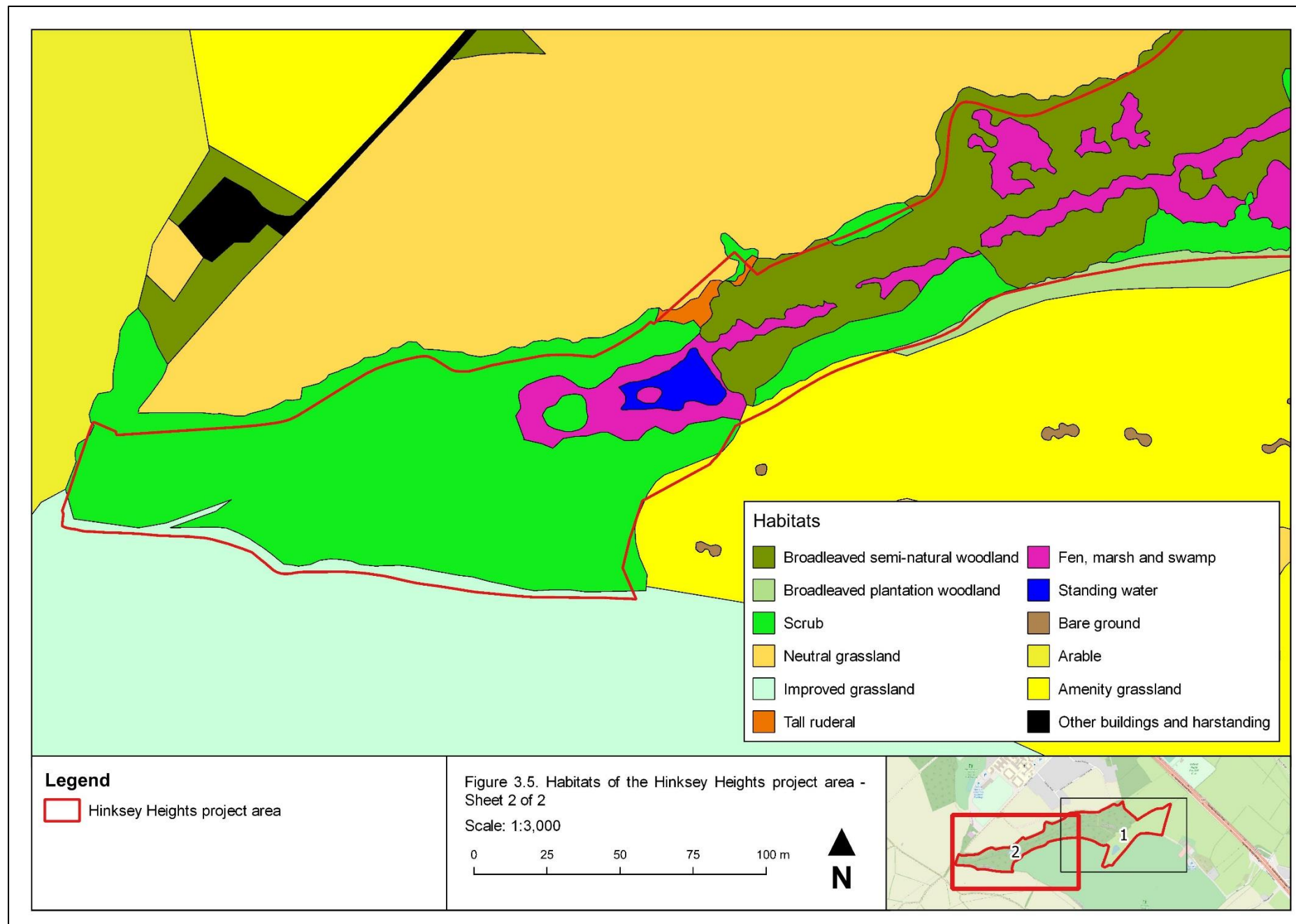
There are extensive stands of tall ruderal vegetation dominated by common nettle and great horsetail, particularly along the boundary with the golf course and around a spring above the Hinksey Heights Stream in the northern part of Field 2.

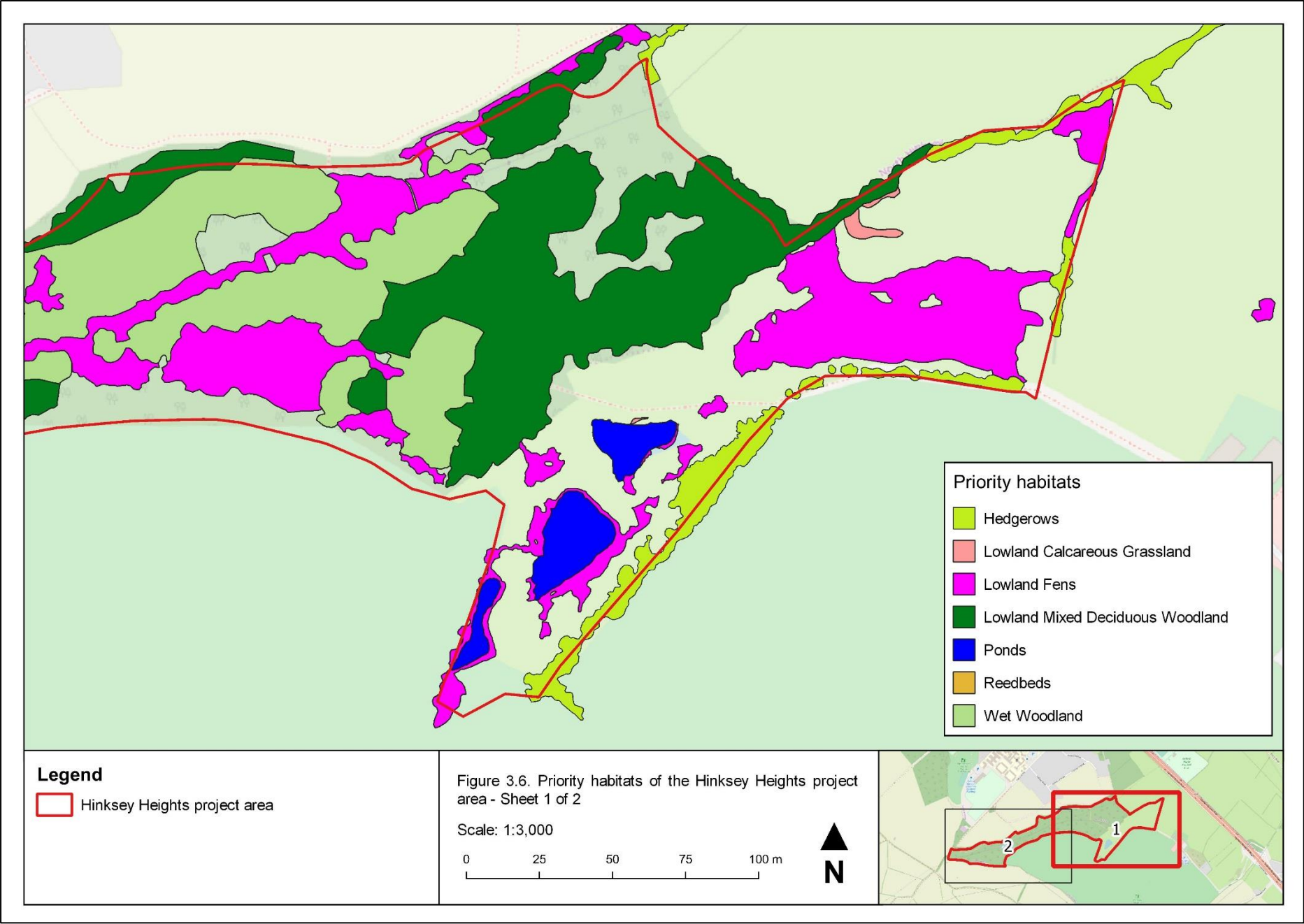
Emergent and aquatic vegetation

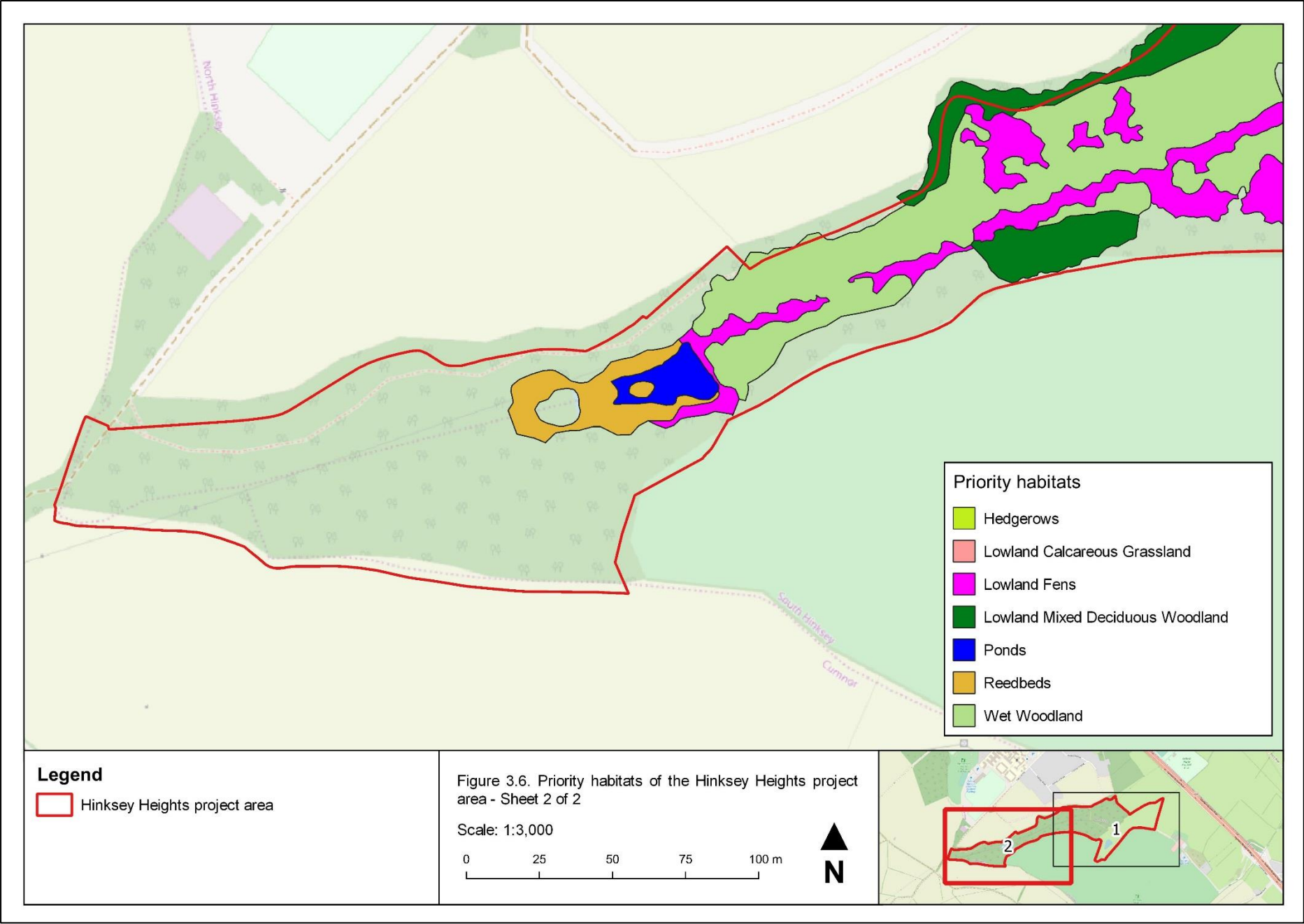
Emergent and aquatic vegetation are restricted to the ponds within the project area. The margins of the three ponds in Field 2 support dense stands of the tall emergent species bulrush and common clubrush (*Schoenoplectus lacustris*), referred to S12 *Typha latifolia* swamp and S9 *Scirpus lacustris* swamp, respectively. Associated species include purple loosestrife (*Lythrum salicaria*), water mint and water plantain (*Alisma plantago-aquatica*). The margins of the pond at the head of the main valley (Pond 5, Figure 3.3) are dominated by dense emergent stands of common reed, referable to S4 *Phragmites australis* swamps and reed-beds.

Aquatic vegetation is restricted to the two northern ponds within Field 2 (Pond 3 and Pond 4), comprising dense submerged beds of common stonewort (*Chara vulgaris*). The pond to the south (Pond 2) may also support stoneworts but during survey work the water was always much more turbid than the ponds to the north and it was not clear whether vegetation on the bottom of the pond comprised stoneworts or other algae. The pond at the head of the main valley (Pond 5) was observed to be very turbid and did not support any aquatic vegetation.





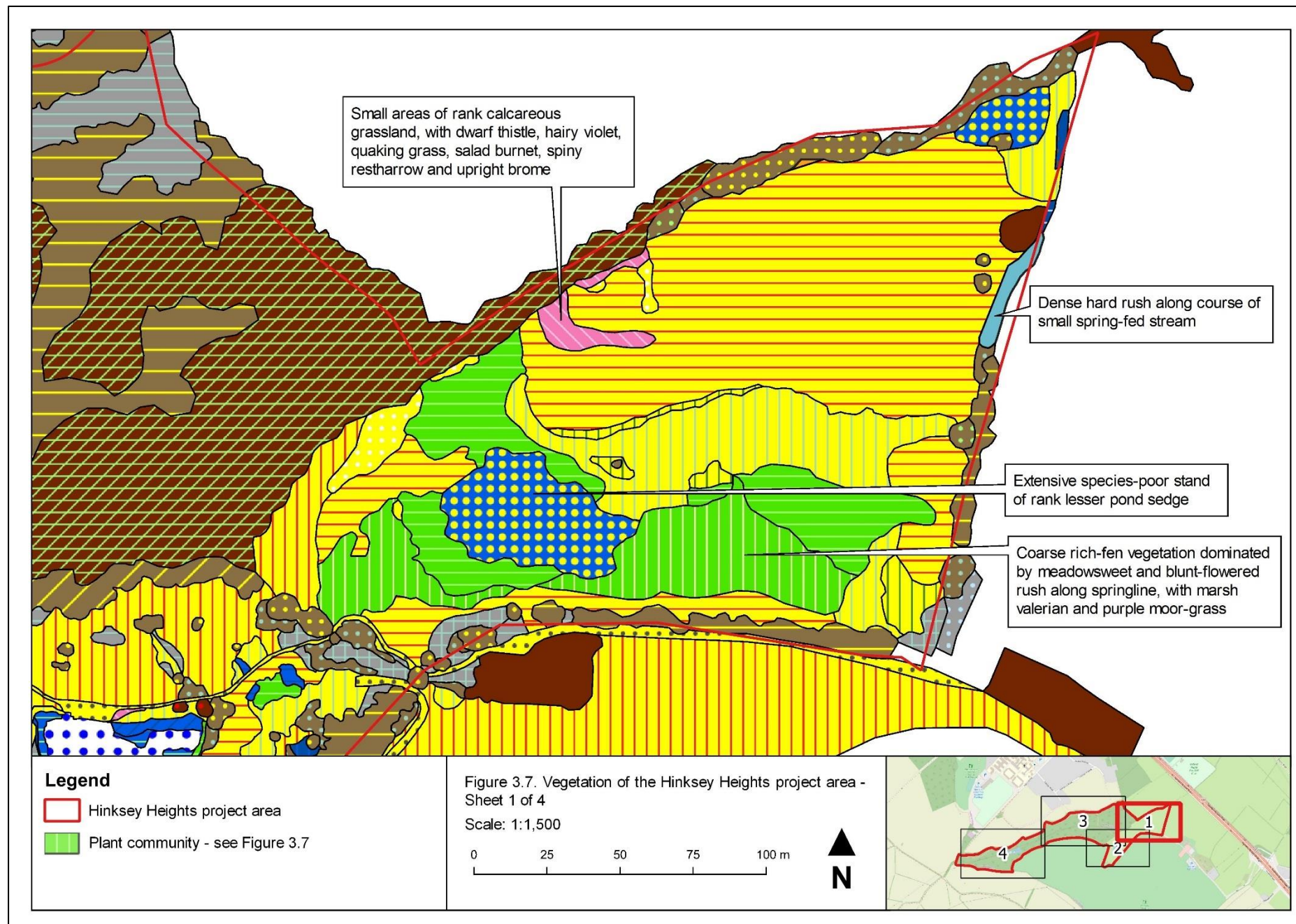


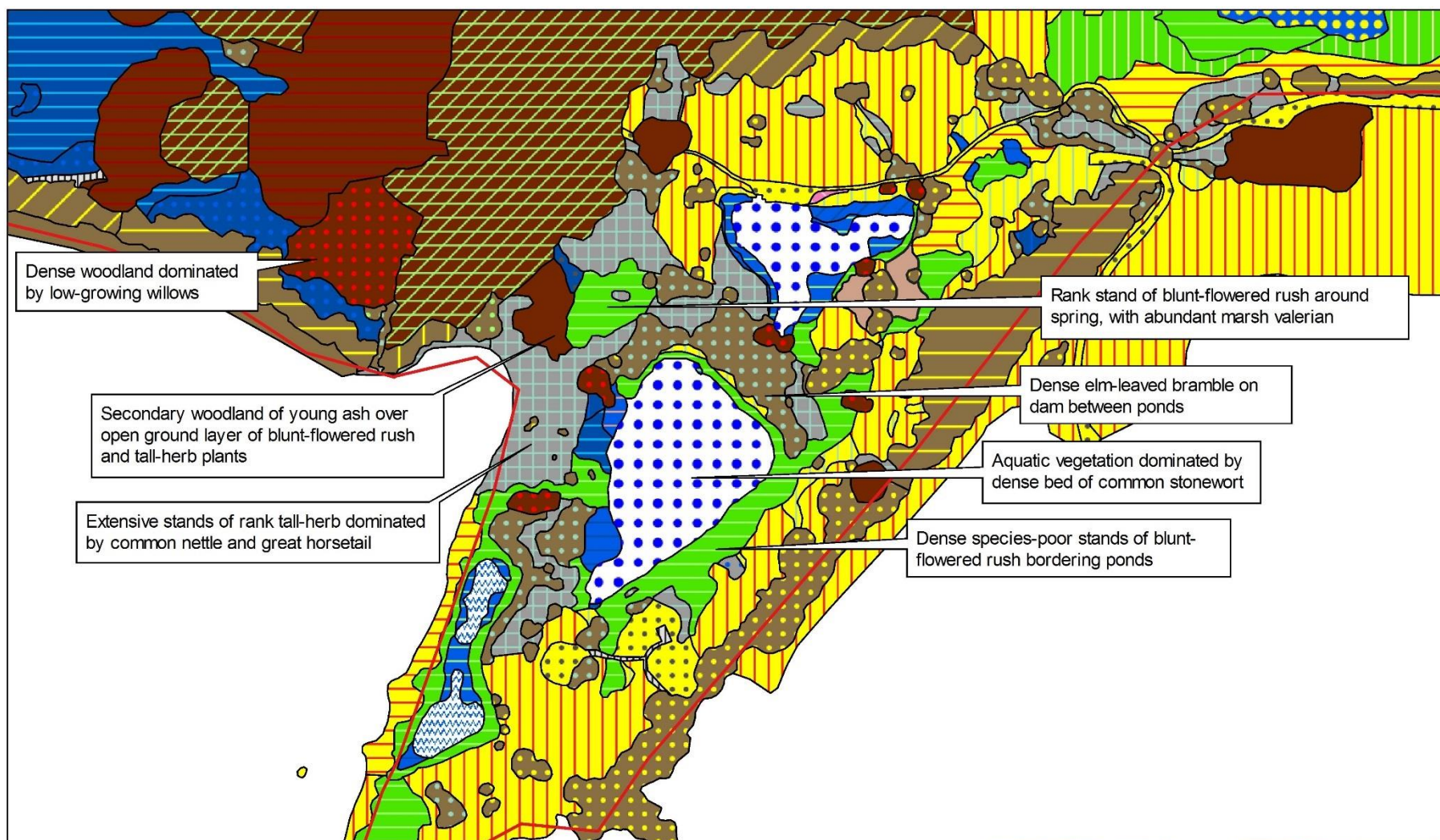


Legend to plant communities

	Bare/disturbed ground		S7 <i>Carex acutiformis</i> swamp
	Boardwalk		S8a <i>Scirpus lacustris</i> ssp. <i>lacustris</i> swamp, <i>Scirpus lacustris</i> ssp. <i>lacustris</i> sub-community
	Open water		S8b <i>Scirpus lacustris</i> ssp. <i>lacustris</i> swamp, <i>Sparganium erectum</i> sub-community
	Chara dominated vegetation		S12a <i>Typha latifolia</i> swamp, <i>Typha latifolia</i> sub-community
	A9 <i>Potamogeton natans</i> community		S12b <i>Typha latifolia</i> swamp, <i>Mentha aquatica</i> sub-community
	CG3d <i>Bromus erectus</i> grassland, <i>Festuca rubra</i> - <i>Festuca arundinacea</i> sub-community		S12c <i>Typha latifolia</i> swamp, <i>Alisma plantago-aquatica</i> sub-community
	<i>Equisetum telmateia</i> dominated vegetation		S22a <i>Glyceria fluitans</i> water-margin vegetation, <i>Glyceria fluitans</i> sub-community
	<i>Juncus inflexus</i> -dominated vegetation		S23 Other water-margin vegetation
	M22a <i>Juncus subnodulosus</i> - <i>Cirsium palustre</i> fen meadow, typical sub-community		S25a <i>Phragmites australis</i> - <i>Eupatorium cannabinum</i> tall-herb fen, <i>Phragmites australis</i> sub-community
	M22b <i>Juncus subnodulosus</i> - <i>Cirsium palustre</i> fen meadow, <i>Briza-Trifolium</i> spp. sub-community		S26 <i>Phragmites australis</i> - <i>Urtica dioica</i> tall-herb fen
	M27b <i>Filipendula ulmaria</i> - <i>Angelica sylvestris</i> tall-herb fen, <i>Urtica dioica</i> - <i>Vicia cracca</i> sub-community		S26b <i>Phragmites australis</i> - <i>Urtica dioica</i> tall-herb fen, <i>Arrhenatherum elatius</i> sub-community
	MG1 <i>Arrhenatherum elatius</i> grassland		S26d <i>Phragmites australis</i> - <i>Urtica dioica</i> tall-herb fen, <i>Epilobium hirsutum</i> sub-community
	MG1a <i>Arrhenatherum elatius</i> grassland, <i>Festuca rubra</i> sub-community		Dense scrub
	MG1b <i>Arrhenatherum elatius</i> grassland, <i>Urtica dioica</i> sub-community		<i>Rubus caesius</i> dominated vegetation
	MG7 <i>Lolium perenne</i> leys and related grasslands		Woodland
	MG9b <i>Holcus lanatus</i> - <i>Deschampsia cespitosa</i> grassland, <i>Arrhenatherum elatius</i> sub-community		W1 <i>Salix cinerea</i> - <i>Galium palustre</i> woodland
	MG10b <i>Juncus effusus</i> - <i>Holcus lanatus</i> rush-pasture, <i>Juncus inflexus</i> sub-community		W2a <i>Salix cinerea</i> - <i>Betula pubescens</i> - <i>Phragmites australis</i> woodland, <i>Alnus glutinosa</i> - <i>Filipendula ulmaria</i> sub-community
	MG12 <i>Festuca arundinaceus</i> grassland		W6b <i>Alnus glutinosa</i> - <i>Urtica dioica</i> woodland, <i>Salix fragilis</i> sub-community
	OV24a <i>Urtica dioica</i> - <i>Galium aparine</i> community, typical sub-community		W8d <i>Fraxinus excelsior</i> - <i>Acer campestre</i> - <i>Mercurialis perennis</i> woodland,
	OV24a <i>Urtica dioica</i> - <i>Galium aparine</i> community typical sub-community, <i>Equisetum telmateia</i> variant		W8e <i>Fraxinus excelsior</i> - <i>Acer campestre</i> - <i>Mercurialis perennis</i> woodland, <i>Geranium robertianum</i> sub-community
	OV25 <i>Urtica dioica</i> - <i>Cirsium arvense</i> community		W21 <i>Crataegus monogyna</i> - <i>Hedera helix</i> scrub
	OV26 <i>Epilobium hirsutum</i> community		W21a <i>Crataegus monogyna</i> - <i>Hedera helix</i> scrub, <i>Hedera helix</i> - <i>Urtica dioica</i> sub-community
	OV27 <i>Epilobium angustifolium</i> community		W21b <i>Crataegus monogyna</i> - <i>Hedera helix</i> scrub, <i>Mercurialis perennis</i> sub-community
	S4a <i>Phragmites australis</i> swamp and reed-beds, <i>Phragmites australis</i> sub-community		

Figure 3.7. Legend to plant communities





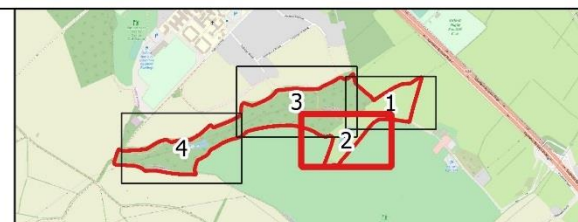
Legend

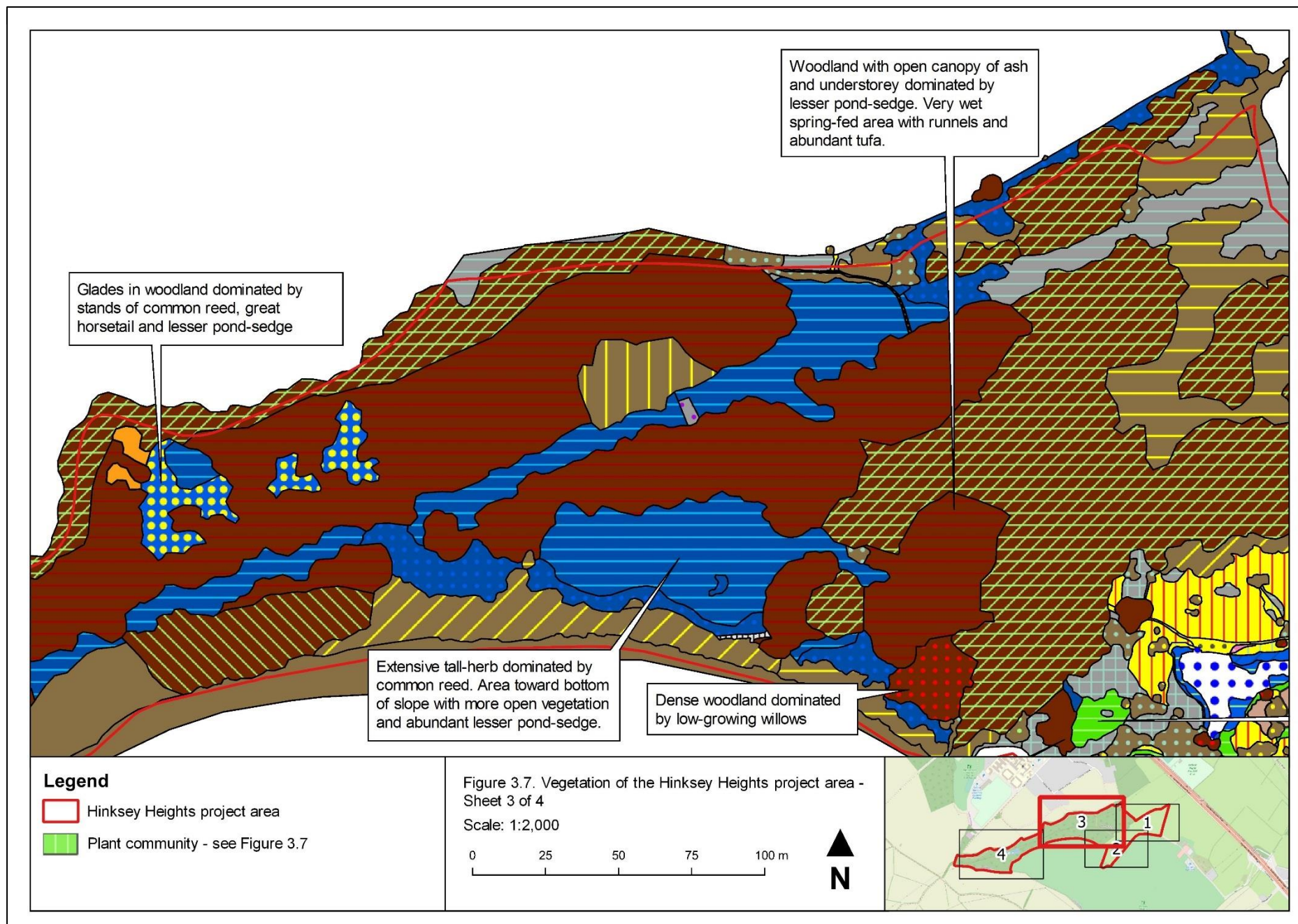
- Hinksey Heights project area
- Plant community - see Figure 3.7

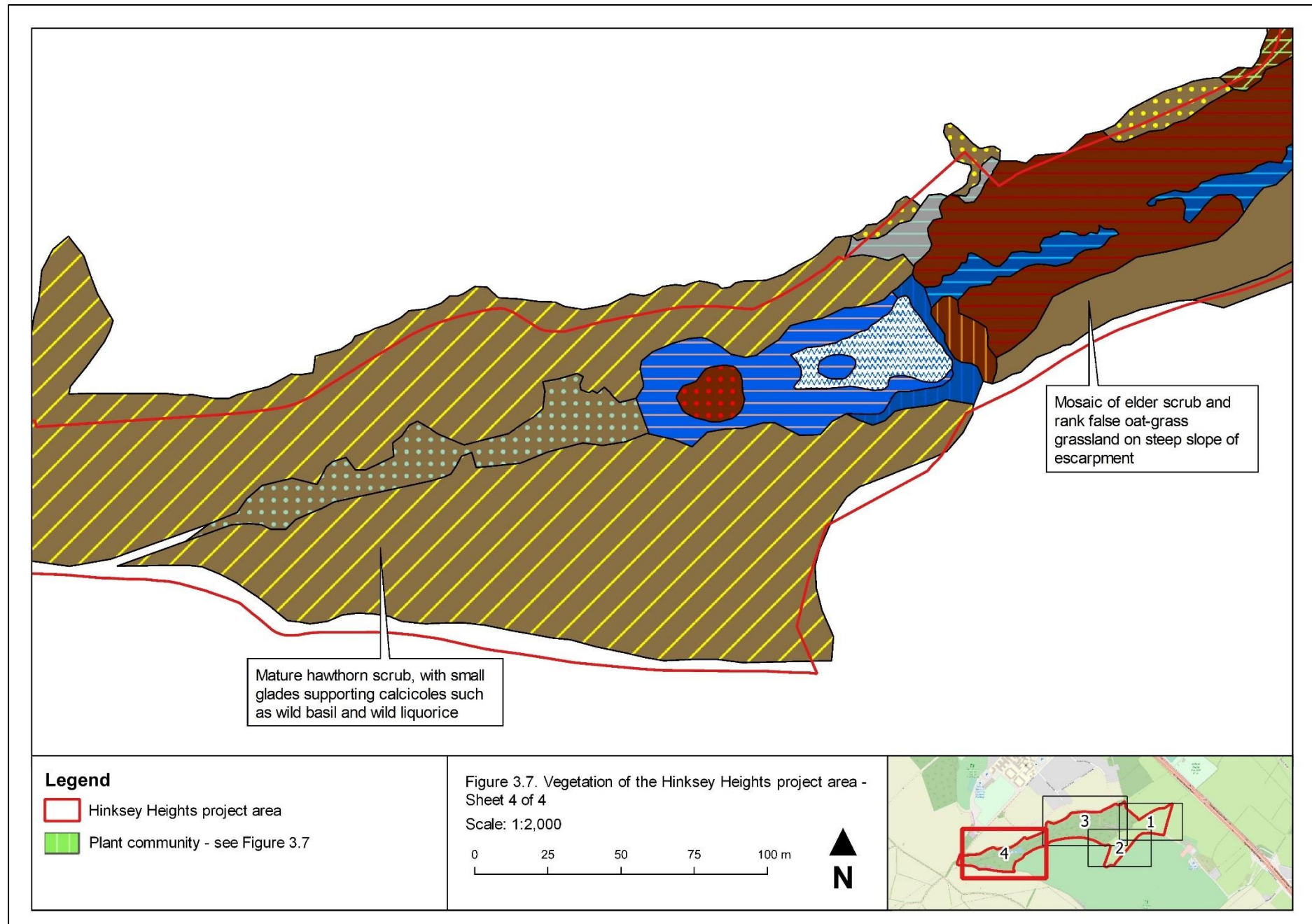
Figure 3.7. Vegetation of the Hinksey Heights project area - Sheet 2 of 4

Scale: 1:1,500

0 25 50 75 100 m







3.6. Biodiversity

Summary

Combining field survey records and records from other sources, a total of 535 taxa have been recorded from the project area, a full list of which is provided in Appendix 2. Records are summarised in Table 3.4 and further described below. The records are biased toward plants and invertebrates are significantly under-represented. Some other groups are also under-represented or absent, e.g. lichens and bats.

A total of 37 'notable' taxa have been recorded, i.e. native species with an associated legal or conservation status. This total includes 12 species that are of principal importance for the conservation of biodiversity (formerly biodiversity action plan (BAP) species), including cuckoo (*Cuculus canorus*), great crested newt and harvest mouse (*Micromys minutus*). For a full explanation of legal and conservation statuses recorded, see Table A2.1, Appendix 2.

Table 3.4. Summary of taxa recorded from the Hinksey Heights study area

Taxonomic group	Number of taxa	Number of notable taxa
Fungi	62	0
Lichens	5	0
Non-lichenized fungi	57	0
Plants	306	13
Liverworts	10	0
Mosses	53	1
Stoneworts	1	0
Conifers	2	0
Ferns and allies	10	1
Flowering plants	230	11
Animals – invertebrates	112	3
Ants, bees, sawflies and wasps	3	0
Beetles	2	0
Bush crickets, crickets and grasshoppers	2	1
Butterflies and moths	10	0
Centipedes	4	0
Dragonflies and damselflies	4	0
Millipedes	5	0
Slugs and snails	29	0
True bugs	1	0
True flies	46	2
Woodlice	6	0
Animals - vertebrates	54	19
Amphibians	3	3
Birds	42	14
Mammals	9	1
Reptiles	1	1
Total	535	36

Fungi

Lichens are under-represented in the site list, with only five recorded. Non-lichenized fungi have been surveyed by members of the Fungus Survey of Oxfordshire and are therefore better represented, with 57 species recorded. No notable taxa have been recorded, but some such as stinking fan vault (*Camarophyllopsis foetens*), a species of calcareous grassland, are uncommon nationally. Due to the diversity of habitats, there is likely to be a much greater fungal diversity within the project area.

Non-vascular plants

One stonewort has been recorded from the project area, common stonewort, recorded during the botanical survey. This species was found growing in dense colonies on the bottoms of Ponds 3 and 4 (see Figure 3.3 for pond numbers). Aquatic vegetation was not sampled using a grapple or other methods, and further stonewort species could be present in the ponds.

Bryophytes (liverworts and mosses) have been surveyed by local members of the British Bryological Society, recording totals of nine liverwort and 51 moss taxa. One further liverwort and two further moss taxa were recorded during the botanical survey. The bryophyte assemblages were typical for the kinds of habitats with the project area. Few taxa associated with rich-fen habitat were recorded, i.e. the mosses *Bryum pseudotriquetrum*, *Cratoneuron filicinum* and *Fissidens adianthoides* and the liverwort *Pellia endiviifolia*. *C. filicinum* was abundant in springs in many areas and along the Hinksey Heights Stream and *P. endiviifolia* was also abundant along the stream. *Bryum pseudotriquetrum* and *Fissidens adianthoides* were rare, the former in small quantity in a spring in Field 1 (SP 49774 04511), the latter on the banks of the Hinksey Heights Stream.

One notable bryophyte taxon was recorded, the Nationally Scarce moss *Brachythecium salebrosum*. This species was recorded in 2018, growing on an elder (*Sambucus nigra*) on the edge of tall-herb fen on the southern side of the main valley (SP 4927 0441; Photograph 7, Appendix 1) and on a fallen log over the Hinksey Heights Stream (SP 4915 0443).

Vascular plants

The most speciose group recorded from the project area is vascular plants, with 2 conifers, 10 ferns and fern allies and 230 flowering plants recorded. For a site that is mostly wooded, the diversity of vascular plants recorded reflects the range of additional habitats within the project area, particularly the grassland, fen and ponds in the two fields at the eastern end of the valley. Species recorded include a range of characteristic fen plants, e.g. blunt-flowered rush, marsh valerian and purple moor-grass (*Molinia caerulea*), as well as those of calcareous grassland and other non-wetland habitats, e.g. pyramidal orchid, upright brome and wild liquorice.

Twelve notable vascular plant taxa have been recorded from the project area. Three species that are scarce in the administrative county of Oxfordshire were recorded during the botanical survey: distant sedge (*Carex distans*), purple moor-grass and southern polypody (*Polypodium interjectum*). These species do not have any national legal or conservation status. Distant sedge was recorded as one clump at the bottom of an area of seepage in Field 1 (SP 49779 04508) and as three clumps at the eastern edge of Pond 4 in

Field 2 (SP 49685 04376). In both locations plants grew in more open areas of blunt-flowered rush dominated fen vegetation. Purple moor-grass was recorded as several tussocks scattered along the top of the seepage at the southern (upper) edge of the springline in the Field 1 (SP 49851 04430), in more open vegetation at the edge of tall-herb dominated by blunt-flowered rush and meadowsweet. The fern southern polypody was recorded within the LWS growing epiphytically on several trees, e.g. crack willow and crab apple (*Malus sylvestris*). This species is likely under-recorded rather than genuinely scarce in Oxfordshire (BSBI, 2019).

Nine further notable vascular plant species were recorded. Bluebell (*Hyacinthoides non-scripta*) is listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) but is protected only from commercial exploitation and is of no conservation concern. Two species have been recorded that are listed as Vulnerable on the vascular plant red list for England, lesser spearwort (*Ranunculus flammula*) and strawberry clover (*Trifolium fragiferum*). Lesser spearwort was last recorded in 1985 and it is not known where it was found. Strawberry clover was last recorded in 2010, in the short, trampled grassland to the north of Pond 4 in Field 2.

Two wetland plants listed as Near Threatened on the vascular plant red list for England have been recorded, common valerian and marsh valerian, recorded during the botanical survey. Common valerian was found in common reed dominated tall-herb on the south side of the main valley (SP 49465 04433), around the pond at the western end of the valley (SP 48963 04283) and in woodland elsewhere. Marsh valerian was recorded from small areas of blunt-flowered rush dominated vegetation in Field 1 (SP 49831 04444) and Field 2 (SP 49593 04358), with many plants in the latter location. The non-wetland species quaking grass, sanicle (*Sanicula europaea*), spiny restharrow and wild strawberry (*Fragaria vesca*) are also listed as Near Threatened on the vascular plant red list for England and were recorded during the botanical survey. Quaking grass and spiny restharrow were recorded as small populations in the small area of calcareous grassland in Field 1, and sanicle and wild strawberry were recorded in the ash woodland at the eastern end of the main valley, within the LWS.

Invertebrates

There were limited records of invertebrates from the project area, with historic records of centipedes and millipedes, dragonflies and damselflies, slugs and snails and woodlice. Records for other groups, particularly true flies, were added during the invertebrate survey in 2018.

The survey recorded 47 fly species, including the RDB2 flat-footed fly *Seri obscuripennis*. The craneflies recorded comprise species that breed in wetlands, including several species of calcareous wetlands, and the species recorded represent a good range for the limited survey effort. Most of the fungus gnats recorded breed in the fruiting bodies of fungi and the diversity recorded reflects the abundance and diversity of this food source within the project area. One soldierfly species of herbaceous fen was recorded, the banded general (*Stratiomys potamida*). This was swept from common reed dominated tall-herb on the south side of the main valley, within the LWS.

Nine butterflies have been recorded and include the silver-washed fritillary (*Argynnis paphia*), which is local in Oxfordshire and was recorded during the invertebrate survey. The only moth species recorded was the scarlet tiger (*Callimorpha dominula*), adults of which were recorded during the invertebrate survey and larvae were found among tall-herb during site work in April 2019. The scarlet tiger is a characteristic invertebrate of fens, though it is also increasingly associated with gardens.

Amphibians and reptiles

Three amphibian and one reptile species have been recorded from the project area. There are historic records of common frog (*Rana temporaria*) and great crested newt, while grass snake (*Natrix natrix*) and toad were recorded during sitework in 2019. All these species are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), and great crested newt is a European Protected Species. The three amphibians were recorded from the ponds within the project area. Grass snake was seen at the edge of scrub and rough grassland in Field 2, and several individuals were found in April 2019 during management work under piles of reed on the south side of the main valley in the LWS (Photograph 4, Appendix 1).

Birds

A total of 43 bird species were recorded during site work over 2018/19, 14 of which are notable. Records of birds were also available from other sources, including of species additional to those listed in Appendix 2, but it could not be determined whether they were from the project area or the wider area.

The birds recorded were typical of the habitats present, with most associated with scrub and woodland. These included marsh tit (*Parus palustris*) and song thrush (*Turdus philomelos*), listed as Red on the list of Birds of Conservation Concern (BOCC), and bullfinch (*Pyrrhula pyrrhula*) and dunnock (*Prunella modularis*), Amber listed. These species are also species of principal importance. A small number of other species were recorded from other habitats, such as reed bunting (*Emberiza schoeniclus*) recorded from common reed dominated tall-herb in several locations around the LWS. Reed bunting is Amber listed and a species of principle importance. Cuckoo, a species of principal importance and Red listed, was recorded in late April 2019 from the western end of the main valley, where two birds were heard calling.

As these records were made over autumn, winter and early spring, they likely do not represent the full diversity of birds within the project area. While the records cannot be used to determine breeding status, most of the species recorded are likely resident and could breed within the project area. Some resident species recorded are unlikely to breed within the project area, e.g. skylark (*Alauda arvensis*), which was only heard flying overhead. The records include a small number of migrants, such as fieldfare (*Turdus iliacus*) which does not breed in Oxfordshire, and others such as snipe (*Gallinago gallinago*), which is likely only present outside the breeding season.

Mammals

A total of nine mammals were recorded during site work over 2018/19. Bats were seen on site over this period, but the species could not be identified.

Signs of badger, including entrances to setts, latrines and feeding signs, were observed during 2018/19 in the scrub along the boundary with the golf course. Records from other sources indicate historic presence of badger setts in the scrub at the western end of the valley.

The presence of harvest mouse, a species of principal importance, was established during site work over 2018/19. Several old nests were found in the large stand of common reed dominated tall-herb on the south side of the main valley.

Invasive non-native species

Two non-native animals, grey squirrel (*Sciurus carolinensis*) and muntjac (*Muntiacus reevesi*), have been recorded from the project area. These species are listed on Part I of Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

No plants listed on Part II of Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) have been recorded. A small number of other invasive or potentially invasive non-native plants have been recorded, however. Of these, small balsam (*Impatiens parviflora*) is locally abundant in some parts of the main valley, including tall-herb dominated by common reed on the north and south sides of the valley, and in some areas of wet woodland and scrub.

4. References

- BGS, 2019. The BGS Lexicon of Named Rock Units. [Online] Available at: <https://www.bgs.ac.uk/lexicon/> [Accessed April 2019].
- BSBI, 2017. National Status Checklist. [Online] Available at: <https://database.bsbi.org/object.php?objectid=2cd4p9h.b41gsgandclass=ChecklistInstance> [Accessed July 2017].
- BSBI, 2019. BSBI maps. [Online] Available at: <https://bsbi.org/maps> [Accessed April 2019].
- Cheffings, C. M. et al., 2005. The Vascular Plant Red Data List for Great Britain Species Status 7: 1-116, Peterborough: Joint Nature Conservation Committee.
- Eaton, M. et al., 2015. Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds, Volume 108, pp. 708-746.
- Freshwater Habitats Trust, 2016. Clean Water for Wildlife. [Online] Available at: <https://freshwaterhabitats.org.uk/projects/clean-water/> [Accessed May 2019].
- JNCC, 2010. Handbook for Phase 1 Habitat Survey, Peterborough: Joint Nature Conservation Committee.
- Killick, H. J., Erskine, S. E., Lambrick, C. R. and Lee, E. M., 2018. Oxfordshire's Threatened Plants. Pisces.
- Maddock, A., 2011. UK Biodiversity Action Plan Priority Habitat Descriptions. [Online] Available at: <http://jncc.defra.gov.uk/page-5718> [Accessed May 2019].
- Mapmate Limited, 2019. Mapmate v2.4.0.
- NBN, 2019. National Biodiversity Network Atlas. [Online] Available at: <https://nbnatlas.org> [Accessed March 2019].
- QGIS Development Team, 2019. QGIS Geographic Information System. Open Source Geospatial Foundation Project.
- Rodwell, J. S., 2006. National Vegetation Classification: Users' Handbook, Peterborough: Joint Nature Conservation Council.
- Snowden, R. E. and Wheeler, B. D., 1993. Iron Toxicity to Fen Plant Species. Journal of Ecology, 81(1), pp. 35-46.
- Stace, C. A., 2010. New Flora of the British Isles. 3 ed. Cambridge: Cambridge University Press.
- Stroh, P. A. et al., 2014. A Vascular Plant Red List for England. Bristol: Botanical Society of Britain and Ireland.

Appendix 1. Photographs



Photograph 1: The Hinksey Heights Stream with in-channel tufa barrages. 07/01/2018. David Morris



Photograph 2: Calcareous grassland with cowslips in Field 1. 14/04/2019. David Morris



Photograph 3: Stand of common reed with thick layer of litter. 22/07/2019. David Morris



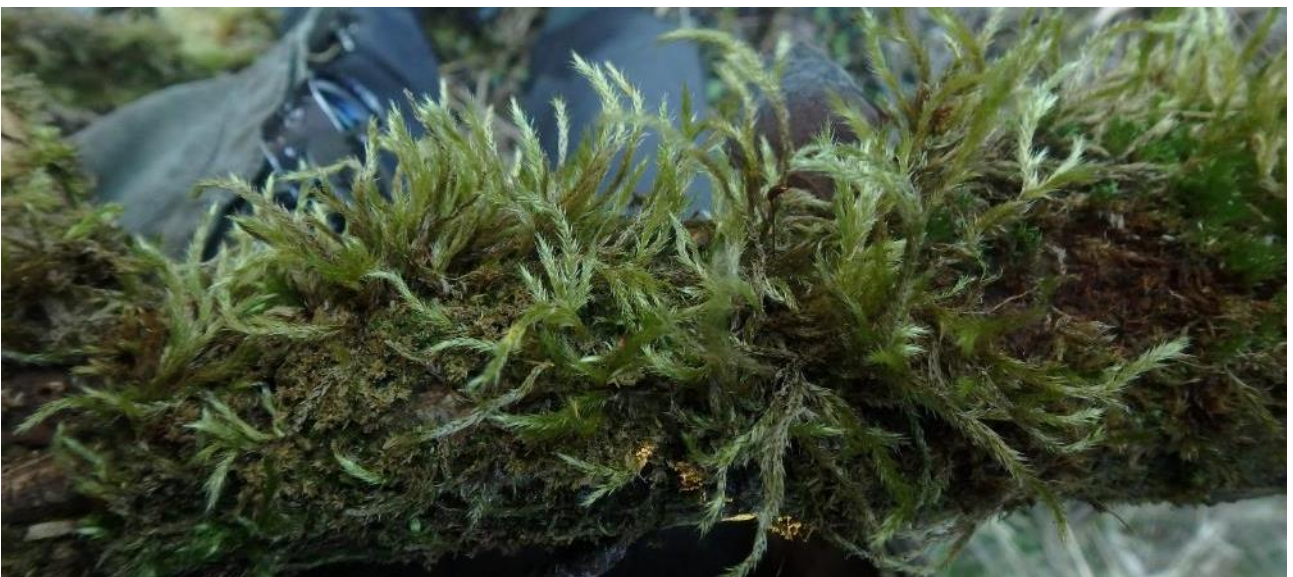
Photograph 4: Female grass snake encountered among reeds during site work. 14/04/2019. David Morris



Photograph 5: Rank false oat-grass dominated grassland in the lower part of Field 1. 22/07/2018. David Morris



Photograph 6: Great horsetail within hard rush dominated vegetation, at the top of the slope within Field 1. 21/07/2018. David Morris



Photograph 7: *Brachythecium salebrosum* growing on an elder (SP 4927 0441). 07/01/2018. David Morris



Photograph 8: Ground layer of wet woodland on the northern slope of the main valley, within the LWS, with abundant great horsetail and hemp agrimony. 22/07/2018. David Morris



Photograph 9: Pond 4, Field 2. Large stand of dewberry (centre) and elm-leaved bramble (right) with zone of blunt-flowered rush above pond (left). 30/03/2019. David Morris



Photograph 10: Stands of blunt-flowered rush (left) and lesser pond-sedge (right) within Field 1. 21/07/2018. David Morris

Appendix 2. Site list

Table A2.1. Explanation of legal and conservation statuses of taxa recorded from the Hinksey Heights study area.

Legal / conservation status	Description
Annex II	Species (excluding birds) listed on Annex II of EC Directive Directive92/43/EEC ('Habitats Directive') (European Protected Species)
BOCC Amber, BOCC Red	Birds listed on the <i>Birds of Conservation Concern</i> (Eaton <i>et al.</i> , 2014) as 'amber' or 'red', respectively
Eng NT, Eng VU	Vascular plants listed on the vascular plant red list for England (Stroh <i>et al.</i> , 2014) as Waiting List, Near Threatened or Vulnerable, respectively, as determined by assessment against International Union for the Conservation of Nature (IUCN) threat criteria. Plants listed as Vulnerable are considered at threat of extinction in England but not endangered. Plants listed as Near Threatened are considered not immediately threatened but could become threatened e.g. if previous declines continue.
Na	Invertebrate species that do not fall within the Red Data Book categories but thought to occur in 30 or fewer 10km squares of the OS national grid, or for less well-recorded groups in seven or fewer vice counties
Nationally Scarce	Taxa recorded in Britain from 15-100 10km squares of the OS national grid
Oxon RPR	Plant taxa listed on the Oxfordshire rare plants register as rare or scarce in the administrative county of Oxfordshire (Killick <i>et al.</i> , 2018)
RDB2, RDBK	Invertebrate species listed in one of the Red Data Books as category 2 (Vulnerable) or K (unknown status), respectively
S41	Species of principal importance for the conservation of biodiversity in England, listed in accordance with Section 41 of the Natural Environment and Rural Communities Act 2006
Schedule 1	Birds listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Birds listed on Schedule 1 are protected from disturbance during breeding, in addition to the protection afforded to all wild birds under the Act.
Schedule 5	Animals other than birds listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).
Schedule 8	Algae, fungi and plants listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended). Wild populations of species listed on Schedule 8 are protected from commercial exploitation and/or the collecting of any part of a plant.
Schedule 9	Listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), a list of legally controlled invasive non-native species. Part I of Schedule 9 comprises a list of non-native animals naturalized in the wild in the UK that it is an offence to release into the wild. Part II a list of non-native algae, fungi and plants which it is illegal to plant or otherwise cause to grow in the wild.

Table A2.2. List of taxa recorded from the Hinksey Heights study area.

Scientific name	Common name	Legal / conservation status	Latest year recorded
Fungi - Lichens			
<i>Evernia prunastri</i>	-	-	2009
<i>Peltigera lactucifolia</i>	-	-	2018
<i>Ramalina farinacea</i>	-	-	2009
<i>Ramalina fastigiata</i>	-	-	2010
<i>Xanthoria parietina</i>	-	-	2018
Fungi - Non-lichenized			
<i>Ascocoryne sarcoides</i>	-	-	2009
<i>Auricularia auricula-judae</i>	Jelly ear	-	2010
<i>Bjerkandera adusta</i>	Smokey bracket	-	2011
<i>Calocera cornea</i>	-	-	2009
<i>Camarophylloopsis foetens</i>	Stinking fan-vault	-	2010
<i>Chlorociboria aeruginosa</i>	Green Elf-cup	-	2009
<i>Chondrostereum purpureum</i>	Silverleaf	-	2009
<i>Coleosporium tussilaginis</i>	-	-	2009
<i>Collybia butyracea</i>	Butter cap	-	2009
<i>Coprinus disseminatus</i>	-	-	2010
<i>Coprinus micaceus</i>	-	-	2010
<i>Crepidotus mollis</i>	-	-	2009
<i>Dacrymyces stillatus</i>	-	-	2009
<i>Daedaleopsis confragosa</i>	Blushing bracket	-	2018
<i>Daldinia concentrica</i>	King alfred's cakes	-	2018
<i>Dermoloma atrocinereum</i>	-	-	2010
<i>Flammulina velutipes</i>	Winter fungus	-	2009
<i>Ganoderma applanatum</i>	-	-	2010
<i>Geastrum triplex</i>	Collared earthstar	-	2009
<i>Gymnopus peronatus</i>	Wood wooly foot	-	2009
<i>Hebeloma sacchariolens</i>	-	-	2009
<i>Helvella atra</i>	-	-	2010
<i>Helvella crispa</i>	-	-	2010
<i>Hypholoma fasciculare</i>	Sulphur tuft	-	2010
<i>Hypoxylon fragiforme</i>	-	-	2009
<i>Inocybe geophylla</i>	-	-	2009
<i>Kretzschmaria deusta</i>	-	-	2009
<i>Kuehneromyces mutabilis</i>	-	-	2010
<i>Laccaria laccata</i>	The deceiver	-	2009
<i>Lactarius pubescens</i>	-	-	2010
<i>Lactarius torminosus</i>	-	-	2009
<i>Laetiporus sulphureus</i>	Chicken of the Woods	-	2018
<i>Lepiota boudieri</i>	-	-	2019
<i>Lepiota cristata</i>	-	-	2019
<i>Lepiota fuscovinacea</i>	-	-	2010

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Lycoperdon pyriforme</i>	Stump puffball	-	2010
<i>Macrotyphula juncea</i>	Slender club	-	2009
<i>Melanophyllum haematospermum</i>	Red-spored dapperling	-	2009
<i>Mycena galericulata</i>	-	-	2018
<i>Mycena galopus</i>	-	-	2009
<i>Mycena polygramma</i>	-	-	2009
<i>Paxillus involutus</i>	-	-	2010
<i>Phlebia tremellosa</i>	-	-	2009
<i>Phragmidium violaceum</i>	-	-	2009
<i>Pluteus cervinus</i>	-	-	2010
<i>Pluteus podospileus</i>	-	-	2010
<i>Pluteus salicinus</i>	-	-	2011
<i>Polyporus badius</i>	Bay polypore	-	2018
<i>Polyporus brumalis</i>	-	-	2009
<i>Polyporus varius</i>	-	-	2019
<i>Rutstroemia firma</i>	Little brown buttons	-	2009
<i>Stereum hirsutum</i>	-	-	2009
<i>Trametes gibbosa</i>	-	-	2009
<i>Trametes versicolor</i>	Turkey tail	-	2009
<i>Vuilleminia comedens</i>	-	-	2009
<i>Xerula radicata</i>	Rooting shank	-	2010
<i>Xylaria hypoxylon</i>	Candle snuff	-	2010
Plants - Stoneworts			
<i>Chara vulgaris</i>	Common stonewort	-	2018
Plants - Liverworts			
<i>Cephalozia bicuspidata</i>	Two-horned pincerwort	-	2018
<i>Conocephalum conicum sens. str.</i>	Great scented liverwort	-	2018
<i>Frullania dilatata</i>	Dilated scalewort	-	2018
<i>Lophocolea bidentata</i>	Bifid crestwort	-	2018
<i>Lophocolea heterophylla</i>	Variable-leaved crestwort	-	2018
<i>Metzgeria consanguinea</i>	Whiskered veilwort	-	2019
<i>Metzgeria furcata</i>	Forked veilwort	-	2018
<i>Metzgeria violacea</i>	Blueish veilwort	-	2018
<i>Pellia endiviifolia</i>	Endive peltia	-	2018
<i>Radula complanata</i>	Even scalewort	-	2018
Plants - Mosses			
<i>Amblystegium serpens var. serpens</i>	Creeping feather-moss	-	2018
<i>Aulacomnium androgynum</i>	Bud-headed groove-moss	-	2018
<i>Barbula convoluta var. convoluta</i>	Lesser bird's-claw beard-moss	-	2018
<i>Barbula unguiculata</i>	Bird's-claw beard-moss	-	2018
<i>Brachytheciastrum velutinum</i>	Velvet feather-moss	-	2018
<i>Brachythecium rivulare</i>	River feather-moss	-	2018
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	-	2018
<i>Brachythecium salebrosum</i>	Smooth-stalk feather-moss	Nationally Scarce	2018

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Bryum caespitium</i>	Tufted thread-moss	-	2018
<i>Bryum capillare</i>	Capillary thread-moss	-	2018
<i>Bryum pseudotriquetrum</i>	Marsh bryum	-	2018
<i>Calliergonella cuspidata</i>	Pointed spear-moss	-	2018
<i>Campylopus introflexus</i>	Heath star moss	-	2018
<i>Ceratodon purpureus</i>	Redshank	-	2018
<i>Cirriphyllum piliferum</i>	Hair-pointed feather-moss	-	2018
<i>Cratoneuron filicinum</i>	Fern-leaved hook-moss	-	2018
<i>Cryphaea heteromalla</i>	Lateral cryphaea	-	2018
<i>Dicranella varia</i>	Variable forklet-moss	-	2018
<i>Didymodon insulanus</i>	Cylindric beard-moss	-	2007
<i>Didymodon sinuosus</i>	Wavy beard-moss	-	2018
<i>Didymodon tophaceus</i>	Olive beard-moss	-	2018
<i>Eucladium verticillatum</i>	Whorled tufa-moss	-	2007
<i>Fissidens adianthoides</i>	Maidenhair pocket-moss	-	2018
<i>Fissidens taxifolius</i> var. <i>taxifolius</i>	Common pocket-moss	-	2018
<i>Fissidens viridulus</i>	Green pocket-moss	-	2018
<i>Hypnum andoi</i>	Mamillate plait-moss	-	2007
<i>Hypnum cupressiforme</i> var. <i>cupressiforme</i>	-	-	2018
<i>Hypnum cupressiforme</i> var. <i>resupinatum</i>	Supine plait-moss	-	2018
<i>Kindbergia praelonga</i>	Common feather-moss	-	2018
<i>Leptodictyum riparium</i>	Kneiff's feather-moss	-	2007
<i>Mnium hornum</i>	Swan's-neck thyme-moss	-	2007
<i>Orthotrichum affine</i>	Wood bristle-moss	-	2018
<i>Orthotrichum diaphanum</i>	White-tipped bristle-moss	-	2018
<i>Orthotrichum lyellii</i>	Lyell's bristle-moss	-	2018
<i>Orthotrichum pulchellum</i>	Elegant bristle-moss	-	2018
<i>Orthotrichum stramineum</i>	Straw bristle-moss	-	2018
<i>Orthotrichum tenellum</i>	Slender bristle-moss	-	2018
<i>Oxyrrhynchium hians</i>	Swartz's feather-moss	-	2018
<i>Plagiomnium rostratum</i>	Long-beaked thyme-moss	-	2018
<i>Plagiomnium undulatum</i>	Hart's-tongue thyme-moss	-	2018
<i>Plagiothecium nemorale</i>	Woodsy silk-moss	-	2007
<i>Platyhypnidium riparioides</i>	Long-beaked water feather-moss	-	2018
<i>Pleuridium subulatum</i>	Awl-leaved earth-moss	-	2018
<i>Rhynchostegium confertum</i>	Clustered feather-moss	-	2018
<i>Rhytidiadelphus squarrosus</i>	Springy turf-moss	-	2018
<i>Rhytidiadelphus triquetrus</i>	Big shaggy-moss	-	2019
<i>Syntrichia montana</i>	Intermediate screw-moss	-	2018
<i>Thamnobryum alopecurum</i>	Fox-tail feather-moss	-	2018
<i>Thuidium tamariscinum</i>	Common tamarisk-moss	-	2018
<i>Ulota bruchii</i>	Bruch's pincushion	-	2018

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Ulota phyllantha</i>	Frizzled pincushion	-	2019
<i>Zygodon conoideus</i> var. <i>conoideus</i>	-	-	2018
<i>Zygodon viridissimus</i> var. <i>viridissimus</i>	Green yoke-moss	-	2018
Plants - Ferns and allies			
<i>Dryopteris affinis</i> subsp. <i>affinis</i>	-	-	2018
<i>Dryopteris carthusiana</i>	Narrow buckler-fern	-	2018
<i>Dryopteris dilatata</i>	Broad Buckler-fern	-	2018
<i>Dryopteris filix-mas</i>	Male-fern	-	2018
<i>Equisetum arvense</i>	Field horsetail	-	2018
<i>Equisetum fluviatile</i>	Water horsetail	-	2000
<i>Equisetum palustre</i>	Marsh horsetail	-	2018
<i>Equisetum telmateia</i>	Great horsetail	-	2018
<i>Polypodium interjectum</i>	Intermediate polypody	Oxon RPR	2019
<i>Polystichum setiferum</i>	Soft Shield-fern	-	2018
Plants - Conifers			
<i>Taxus baccata</i>	Yew	-	2000
<i>X Cuprocyparis leylandii</i>	Leyland cypress	-	2000
Plants - Flowering plants			
<i>Acer campestre</i>	Field maple	-	2018
<i>Acer pseudoplatanus</i>	Sycamore	-	2000
<i>Achillea millefolium</i>	Yarrow	-	2018
<i>Agrimonia eupatoria</i>	Agrimony	-	2018
<i>Agrostis capillaris</i>	Common bent	-	2018
<i>Agrostis stolonifera</i>	Creeping bent	-	2018
<i>Ajuga reptans</i>	Bugle	-	2018
<i>Alisma plantago-aquatica</i>	Water-plantain	-	2018
<i>Alliaria petiolata</i>	Garlic mustard	-	2018
<i>Alnus glutinosa</i>	Alder	-	2018
<i>Alopecurus pratensis</i>	Meadow foxtail	-	2018
<i>Anacamptis pyramidalis</i>	Pyramidal orchid	-	2018
<i>Anagallis arvensis</i>	Scarlet pimpernel	-	2000
<i>Angelica sylvestris</i>	Wild angelica	-	2018
<i>Anisantha sterilis</i>	Barren brome	-	2000
<i>Anthriscus sylvestris</i>	Cow parsley	-	2018
<i>Apium nodiflorum</i>	Fool's-water-cress	-	2018
<i>Arctium lappa</i>	Greater burdock	-	2000
<i>Arctium minus</i>	Lesser burdock	-	2000
<i>Arctium minus</i> sens. <i>lat.</i>	-	-	2018
<i>Arrhenatherum elatius</i>	False oat-grass	-	2018
<i>Arum maculatum</i>	Lords-and-ladies	-	2019
<i>Aster</i> agg.	Michaelmas daisy	-	2018
<i>Astragalus glycyphyllos</i>	Wild liquorice	-	2018
<i>Berberis vulgaris</i>	Barberry	-	2018

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Betula pendula</i>	Silver birch	-	2018
<i>Brachypodium sylvaticum</i>	False-brome	-	2018
<i>Briza media</i>	Quaking-grass	Eng NT	2018
<i>Bromopsis erecta</i>	Upright brome	-	2018
<i>Bromopsis ramosa</i>	Hairy-brome	-	2018
<i>Bromus commutatus</i>	Meadow brome	-	2018
<i>Bryonia dioica</i>	White bryony	-	2018
<i>Caltha palustris</i>	Marsh-marigold	-	1992
<i>Calystegia sepium</i>	Hedge bindweed	-	2018
<i>Capsella bursa-pastoris</i>	Shepherd's-purse	-	2000
<i>Cardamine flexuosa</i>	Wavy bitter-cress	-	2018
<i>Cardamine hirsuta</i>	Hairy bitter-cress	-	2018
<i>Carex acutiformis</i>	Lesser pond-sedge	-	2018
<i>Carex distans</i>	Distant sedge	Oxon RPR	2019
<i>Carex flacca</i>	Glaucous sedge	-	2018
<i>Carex hirta</i>	Hairy sedge	-	2018
<i>Carex otrubae</i>	False fox-sedge	-	2000
<i>Carex pendula</i>	Pendulous sedge	-	2018
<i>Carex remota</i>	Remote sedge	-	2018
<i>Carex sylvatica</i>	Wood-sedge	-	2018
<i>Centaurea nigra</i>	Common knapweed	-	2018
<i>Cerastium fontanum</i>	Common mouse-ear	-	2018
<i>Chaerophyllum temulum</i>	Rough chervil	-	2018
<i>Chamerion angustifolium</i>	Rosebay willowherb	-	2018
<i>Circaea lutetiana</i>	Enchanter's-nightshade	-	2018
<i>Cirsium acaule</i>	Dwarf thistle	-	2019
<i>Cirsium arvense</i>	Creeping thistle	-	2018
<i>Cirsium eriophorum</i>	Woolly thistle	-	2018
<i>Cirsium palustre</i>	Marsh thistle	-	2018
<i>Cirsium vulgare</i>	Spear thistle	-	2018
<i>Clematis vitalba</i>	Traveller's-joy	-	2018
<i>Clinopodium vulgare</i>	Wild basil	-	2018
<i>Conium maculatum</i>	Hemlock	-	1985
<i>Convolvulus arvensis</i>	Field bindweed	-	2018
<i>Cornus sanguinea</i> subsp. <i>sanguinea</i>	Dogwood	-	2018
<i>Corylus avellana</i>	Hazel	-	2018
<i>Crataegus monogyna</i>	Hawthorn	-	2018
<i>Crepis biennis</i>	Rough hawk's-beard	-	2019
<i>Crepis capillaris</i>	Smooth hawk's-beard	-	2000
<i>Cynosurus cristatus</i>	Crested dog's-tail	-	2018
<i>Dactylis glomerata</i>	Cock's-foot	-	2018
<i>Dactylorhiza fuchsii</i>	Common spotted-orchid	-	2018
<i>Daucus carota</i> subsp. <i>carota</i>	Wild carrot	-	2018

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Deschampsia cespitosa</i>	Tufted hair-grass	-	2018
<i>Dipsacus fullonum</i>	Wild teasel	-	2018
<i>Eleocharis palustris</i>	Common spike-rush	-	2018
<i>Elymus caninus</i>	Bearded couch	-	2018
<i>Elytrigia repens</i>	Common couch	-	1985
<i>Elytrigia repens f. repens</i>	Common couch	-	2018
<i>Epilobium ciliatum</i>	American willowherb	-	2000
<i>Epilobium hirsutum</i>	Great willowherb	-	2018
<i>Epilobium parviflorum</i>	Hoary willowherb	-	2018
<i>Euonymus europaeus</i>	Spindle	-	2000
<i>Eupatorium cannabinum</i>	Hemp-agrimony	-	2018
<i>Fagus sylvatica</i>	Beech	-	1985
<i>Fallopia convolvulus</i>	Black-bindweed	-	1985
<i>Festuca rubra</i>	Red fescue	-	2018
<i>Ficaria verna</i>	Lesser celandine	-	1985
<i>Filipendula ulmaria</i>	Meadowsweet	-	2018
<i>Fragaria vesca</i>	Wild strawberry	Eng NT	2018
<i>Fraxinus excelsior</i>	Ash	-	2018
<i>Galium album</i>	Hedge bedstraw	-	2018
<i>Galium aparine</i>	Cleavers	-	2018
<i>Galium saxatile</i>	Heath bedstraw	-	1985
<i>Galium uliginosum</i>	Fen bedstraw	-	2018
<i>Galium verum</i>	Lady's bedstraw	-	2018
<i>Geranium dissectum</i>	Cut-leaved crane's-bill	-	2000
<i>Geranium robertianum</i>	Herb-robert	-	2018
<i>Geum urbanum</i>	Wood avens	-	2018
<i>Glechoma hederacea</i>	Ground-ivy	-	2018
<i>Glyceria fluitans</i>	Floating sweet-grass	-	2018
<i>Glyceria maxima</i>	Reed sweet-grass	-	2000
<i>Hedera helix</i>	Common ivy	-	2018
<i>Heracleum sphondylium</i>	Hogweed	-	2018
<i>Holcus lanatus</i>	Yorkshire-fog	-	2018
<i>Hordeum secalinum</i>	Meadow barley	-	2018
<i>Humulus lupulus</i>	Hop	-	2018
<i>Hyacinthoides non-scripta</i>	Bluebell	Schedule 8	1985
<i>Hyacinthoides x massartiana</i>	Hybrid bluebell	-	2019
<i>Hypericum perforatum</i>	Perforate st john's-wort	-	2000
<i>Hypericum tetrapterum</i>	Square-stalked st john's-wort	-	2018
<i>Ilex aquifolium</i>	Holly	-	2018
<i>Impatiens parviflora</i>	Small balsam	-	2018
<i>Iris foetidissima</i>	Stinking iris	-	2018
<i>Juncus articulatus</i>	Jointed rush	-	2018
<i>Juncus effusus</i>	Soft-rush	-	2018
<i>Juncus inflexus</i>	Hard rush	-	2018

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Juncus subnodulosus</i>	Blunt-flowered rush	-	2019
<i>Lamium album</i>	White dead-nettle	-	2000
<i>Lapsana communis</i>	Nipplewort	-	2018
<i>Lathyrus pratensis</i>	Meadow vetchling	-	2018
<i>Leucanthemum vulgare</i>	Oxeye daisy	-	2018
<i>Ligustrum vulgare</i>	Wild privet	-	2018
<i>Linum catharticum</i>	Fairy flax	-	2018
<i>Lolium perenne</i>	Perennial rye-grass	-	2018
<i>Lotus corniculatus</i>	Common bird's-foot-trefoil	-	2018
<i>Lotus pedunculatus</i>	Greater bird's-foot-trefoil	-	2018
<i>Luzula campestris</i>	Field wood-rush	-	2019
<i>Lythrum salicaria</i>	Purple-loosestrife	-	2018
<i>Malus pumila</i>	Apple	-	2000
<i>Malus sylvestris</i>	Crab apple	-	2018
<i>Matricaria discoidea</i>	Pineappleweed	-	2018
<i>Medicago lupulina</i>	Black medick	-	2000
<i>Mentha aquatica</i>	Water mint	-	2018
<i>Mentha spicata</i>	Spear mint	-	2000
<i>Mercurialis perennis</i>	Dog's mercury	-	2018
<i>Moehringia trinervia</i>	Three-nerved sandwort	-	2018
<i>Molinia caerulea</i>	Purple moor-grass	Oxon RPR	2019
<i>Myosotis arvensis</i>	Field forget-me-not	-	1985
<i>Myosotis laxa</i>	Tufted forget-me-not	-	2018
<i>Myosotis scorpioides</i>	Water forget-me-not	-	2018
<i>Myosotis sylvatica</i>	Wood forget-me-not	-	2000
<i>Myosoton aquaticum</i>	Water chickweed	-	2018
<i>Neottia ovata</i>	Common twayblade	-	2018
<i>Odontites vernus</i>	Red bartsia	-	2018
<i>Ononis spinosa</i>	Spiny restharrow	Eng NT	2018
<i>Papaver rhoeas</i>	Common poppy	-	2000
<i>Pentaglottis sempervirens</i>	Green alkanet	-	2019
<i>Persicaria amphibia</i>	Amphibious bistort	-	2018
<i>Phalaris arundinacea</i>	Reed canary-grass	-	2018
<i>Phleum bertolonii</i>	Smaller cat's-tail	-	2000
<i>Phleum pratense</i>	Timothy	-	2018
<i>Phragmites australis</i>	Common reed	-	2018
<i>Pimpinella saxifraga</i>	Burnet-saxifrage	-	2018
<i>Plantago lanceolata</i>	Ribwort plantain	-	2018
<i>Plantago major</i>	Greater plantain	-	2018
<i>Poa annua</i>	Annual meadow-grass	-	2000
<i>Poa pratensis sens. lat.</i>	Smooth meadow-grass	-	1985
<i>Poa trivialis</i>	Rough meadow-grass	-	2018
<i>Polygonum aviculare</i>	Knotgrass	-	2018
<i>Potentilla anserina</i>	Silverweed	-	2018

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Potentilla reptans</i>	Creeping cinquefoil	-	2018
<i>Poterium sanguisorba</i> subsp. <i>sanguisorba</i>	Salad burnet	-	2019
<i>Primula veris</i>	Cowslip	-	2019
<i>Primula vulgaris</i>	Primrose	-	2019
<i>Prunella vulgaris</i>	Selfheal	-	2018
<i>Prunus avium</i>	Wild cherry	-	2018
<i>Prunus domestica</i>	Wild plum	-	2018
<i>Prunus spinosa</i>	Blackthorn	-	2018
<i>Pulicaria dysenterica</i>	Common fleabane	-	2018
<i>Quercus robur</i>	Pedunculate oak	-	2018
<i>Ranunculus flammula</i>	Lesser spearwort	Eng VU	1985
<i>Ranunculus repens</i>	Creeping buttercup	-	2018
<i>Rhamnus cathartica</i>	Buckthorn	-	2018
<i>Ribes nigrum</i>	Black currant	-	1985
<i>Ribes rubrum</i>	Red currant	-	2018
<i>Rosa arvensis</i>	Field-rose	-	2018
<i>Rosa canina</i> agg.	Dog-rose	-	2018
<i>Rosa x dumalis</i>	Rosa caesia x canina	-	2018
<i>Rubus caesius</i>	Dewberry	-	2018
<i>Rubus fruticosus</i> agg.	Bramble	-	2000
<i>Rubus ulmifolius</i>	Elm-leaved bramble	-	2018
<i>Rubus vestitus</i>	-	-	2018
<i>Rumex obtusifolius</i>	Broad-leaved dock	-	2018
<i>Rumex sanguineus</i>	Wood dock	-	2018
<i>Salix alba</i>	White willow	-	2018
<i>Salix caprea</i>	Goat willow	-	1985
<i>Salix cinerea</i>	Grey willow	-	2018
<i>Salix triandra</i>	Almond willow	-	2018
<i>Salix viminalis</i>	Osier	-	2018
<i>Salix x fragilis sens. lat.</i>	Hybrid crack-willow	-	1985
<i>Salix x multinervis</i>	Eared/grey willow hybrid	-	2018
<i>Sambucus nigra</i>	Elder	-	2018
<i>Sanicula europaea</i>	Sanicle	Eng NT	2018
<i>Schedonorus arundinaceus</i>	Tall fescue	-	2018
<i>Schedonorus giganteus</i>	Giant fescue	-	2018
<i>Schoenoplectus lacustris</i>	Common club-rush	-	2018
<i>Scorzonoides autumnalis</i>	Autumn hawkbit	-	2018
<i>Scrophularia auriculata</i>	Water figwort	-	2018
<i>Scrophularia nodosa</i>	Common figwort	-	2000
<i>Senecio erucifolius</i>	Hoary ragwort	-	2018
<i>Senecio jacobaea</i>	Common ragwort	-	2018
<i>Silene dioica</i>	Red campion	-	1985
<i>Silene latifolia</i>	White campion	-	1985

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Solanum dulcamara</i>	Bittersweet	-	2018
<i>Sonchus asper</i>	Prickly sow-thistle	-	2000
<i>Sorbus aria</i> agg.	Whitebeam	-	2000
<i>Stachys palustris</i>	Marsh woundwort	-	2018
<i>Stachys sylvatica</i>	Hedge woundwort	-	2018
<i>Stellaria holostea</i>	Greater stitchwort	-	2000
<i>Stellaria media</i>	Common chickweed	-	2018
<i>Symphytum officinale</i>	Common comfrey	-	2018
<i>Tamus communis</i>	Black bryony	-	2018
<i>Taraxacum</i> agg.	Dandelion	-	2018
<i>Torilis japonica</i>	Upright hedge-parsley	-	2018
<i>Trifolium fragiferum</i>	Strawberry clover	Eng VU	2010
<i>Trifolium pratense</i>	Red clover	-	2018
<i>Trifolium repens</i>	White clover	-	2018
<i>Tussilago farfara</i>	Colt's-foot	-	2018
<i>Typha angustifolia</i>	Lesser bulrush	-	2018
<i>Typha latifolia</i>	Bulrush	-	2018
<i>Ulmus glabra</i>	Wych elm	-	2000
<i>Ulmus procera</i>	English elm	-	2019
<i>Urtica dioica</i>	Common nettle	-	2018
<i>Valeriana dioica</i>	Marsh valerian	Eng NT	2018
<i>Valeriana officinalis</i>	Common valerian	Eng NT	2000
<i>Valeriana officinalis</i> subsp. <i>sambucifolia</i>	-	-	2018
<i>Veronica arvensis</i>	Wall speedwell	-	2000
<i>Veronica beccabunga</i>	Brooklime	-	2018
<i>Veronica chamaedrys</i>	Germander speedwell	-	2018
<i>Veronica persica</i>	Common field-speedwell	-	2000
<i>Viburnum opulus</i>	Guelder-rose	-	2018
<i>Vicia cracca</i>	Tufted vetch	-	2018
<i>Vicia sativa</i>	Common vetch	-	1985
<i>Vicia tetrasperma</i>	Smooth tare	-	2000
<i>Viola hirta</i>	Hairy violet	-	2019
Animals - Centipedes			
<i>Lithobius crassipes</i>	-	-	1993
<i>Lithobius forficatus</i>	-	-	1993
<i>Lithobius melanops</i>	-	-	1993
<i>Lithobius variegatus</i>	-	-	1993
<i>Cylindroiulus punctatus</i>	Blunt-tailed snake-millipede	-	1993
<i>Glomeris marginata</i>	Pill millipede	-	1993
<i>Nemasoma varicorne</i>	-	-	1993
<i>Ophiulus pilosus</i>	-	-	1993
<i>Proteroiulus fuscus</i>	Snake-millipede	-	1993
Animals - Woodlice			

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Haplophthalmus danicus</i>	-	-	1993
<i>Ligidium hypnorum</i>	-	-	1993
<i>Oniscus asellus</i>	Common shiny woodlouse	-	1993
<i>Philoscia muscorum</i>	Common striped woodlouse	-	1993
<i>Porcellio scaber</i>	Common rough woodlouse	-	1993
<i>Trichoniscus pusillus</i>	-	-	1993
Animals - Slugs and snails			
<i>Acanthinula aculeata</i>	Prickly snail	-	1991
<i>Aegopinella nitidula</i>	Smooth glass snail	-	2000
<i>Aegopinella pura</i>	Clear glass snail	-	2000
<i>Arianta arbustorum</i>	Copse snail	-	2000
<i>Arion (Mesarion) subfuscus</i>	Dusky slug	-	2000
<i>Carychium minimum</i>	Herald snail	-	2000
<i>Carychium tridentatum</i>	Slender herald snail	-	1991
<i>Cepaea hortensis</i>	White-lipped Snail	-	2000
<i>Cepaea nemoralis</i>	Brown-lipped Snail	-	2000
<i>Clausilia bidentata</i>	Common door snail	-	2000
<i>Cochlicopa lubrica</i>	Slippery moss snail	-	2000
<i>Deroceras laeve</i>	Marsh slug	-	2000
<i>Discus rotundatus</i>	Rounded snail	-	2000
<i>Euconulus alderi</i>	-	-	1991
<i>Lymnaea truncatula</i>	Dwarf pond snail	-	1991
<i>Monacha cantiana</i>	Kentish snail	-	2000
<i>Nesovitrea hammonis</i>	-	-	1991
<i>Oxychilus alliarius</i>	Garlic snail	-	1991
<i>Oxychilus cellarius</i>	Cellar snail	-	1991
<i>Punctum pygmaeum</i>	Dwarf snail	-	2000
<i>Succinea putris</i>	Large amber snail	-	2000
<i>Trichia hispida</i>	Hairy snail	-	2000
<i>Trichia plebeia</i>	-	-	1991
<i>Trichia striolata</i>	Strawberry snail	-	2000
<i>Vertigo antivertigo</i>	Marsh whorl snail	-	1991
<i>Vitrea contracta</i>	Milky crystal snail	-	2000
<i>Vitrea crystallina</i>	Crystal snail	-	2000
<i>Vitrea pellucida</i>	Winter semi-slug	-	1991
<i>Zonitoides nitidus</i>	Shiny glass snail	-	2000
Animals - Insects - Beetles			
<i>Propylea quatuordecimpunctata</i>	14-spot ladybird	-	2018
<i>Rhagonycha fulva</i>	-	-	2018
Animals - Insects - True flies			
<i>Agathomyia wankowiczii</i>	-	-	2018
<i>Allodiopsis rustica</i>	-	-	2018
<i>Austrolimnophila ochracea</i>	-	-	2018
<i>Bombylius major</i>	-	-	2019

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Chrysopilus asiliformis</i>	-	-	2018
<i>Chrysopilus cristatus</i>	-	-	2018
<i>Dicranophragma nemorale</i>	-	-	2018
<i>Diogma glabrata</i>	-	-	2018
<i>Ellipteroides lateralis</i>	-	-	2018
<i>Erioptera lutea</i>	-	-	2018
<i>Exechiopsis membranacea</i>	-	-	2018
<i>Gonomyia abscondita</i>	-	RDBK	2018
<i>Isonneuromyia semirufa</i>	-	-	2018
<i>Lipara lucens</i>	-	-	2019
<i>Macrocera angulata</i>	-	-	2018
<i>Molophilus appendiculatus</i>	-	-	2018
<i>Molophilus bifidus</i>	-	-	2018
<i>Molophilus corniger</i>	-	-	2018
<i>Molophilus medius</i>	-	-	2018
<i>Mycetophila abiecta</i>	-	-	2018
<i>Mycetophila adumbrata</i>	-	-	2018
<i>Mycetophila britannica</i>	-	-	2018
<i>Mycetophila curviseta</i>	-	-	2018
<i>Mycetophila marginata</i>	-	-	2018
<i>Mycetophila ocellus</i>	-	-	2018
<i>Mycetophila perpallida</i>	-	-	2018
<i>Mycetophila pictula</i>	-	-	2018
<i>Mycetophila stylatiformis</i>	-	-	2018
<i>Mycetophila trinotata</i>	-	-	2018
<i>Mycomya winnertzi</i>	-	-	2018
<i>Neolimonia dumetorum</i>	-	-	2018
<i>Nephrotoma analis</i>	-	-	2018
<i>Nephrotoma cornicina</i>	-	-	2018
<i>Opomyza florum</i>	-	-	2018
<i>Opomyza germinationis</i>	-	-	2018
<i>Paradelphomyia dalei</i>	-	-	2018
<i>Philophylla caesio</i>	-	-	2018
<i>Platurocypta testata</i>	-	-	2018
<i>Pseudolimnophila sepium</i>	-	-	2018
<i>Ptychoptera lacustris</i>	-	-	2018
<i>Rhipidia maculata</i>	-	-	2018
<i>Seri obscuripennis</i>	-	RDB2	2010
<i>Stigmatomeria crassicornis</i>	-	-	2018
<i>Stratiomys potamida</i>	Banded general	-	2018
<i>Tipula helvola</i>	-	-	2018
<i>Volucella zonaria</i>	-	-	2018
Animals - Insects - True Bugs			
<i>Palomena prasina</i>	Common green shieldbug	-	2018

Scientific name	Common name	Legal / conservation status	Latest year recorded
Animals - Insects - Ants, bees, sawflies and wasps			
<i>Diplolepis rosae</i>	Rose bedeguar causer	-	2019
<i>Myrmica ruginodis</i>	-	-	1993
<i>Vespa crabro</i>	The hornet	-	2018
Animals - Insects - Butterflies and moths			
<i>Aglais urticae</i>	Small tortoiseshell	-	2019
<i>Anthocharis cardamines</i>	Orange-tip	-	2018
<i>Argynnis paphia</i>	Silver-washed Fritillary	-	2018
<i>Callimorpha dominula</i>	Scarlet tiger	-	2019
<i>Gonepteryx rhamni</i>	Brimstone	-	2018
<i>Maniola jurtina</i>	Meadow brown	-	2000
<i>Pararge aegeria</i>	Speckled wood	-	2019
<i>Pieris brassicae</i>	Large white	-	2000
<i>Polygonia c-album</i>	Comma	-	2019
<i>Polyommatus icarus</i>	Common blue	-	2018
Animals - Insects - Dragonflies and damselflies			
<i>Aeshna mixta</i>	Migrant hawker	-	2007
<i>Calopteryx virgo</i>	Beautiful demoiselle	-	2009
<i>Enallagma cyathigerum</i>	Common blue damselfly	-	2010
<i>Libellula quadrimaculata</i>	Four-spotted Chaser	-	2010
Animals - Insects - Bush crickets, crickets and grasshoppers			
<i>Conocephalus discolor</i>	Long-winged Conehead	Na	2000
<i>Pholidoptera griseoaptera</i>	Dark bush cricket	-	2017
Animals - Vertebrates - Amphibians			
<i>Bufo bufo</i>	Common toad	Schedule 5, S41	2019
<i>Rana temporaria</i>	Common frog	Schedule 5	2009
<i>Triturus cristatus</i>	Great crested newt	Annex II, Schedule 5, S41	2018
Animals - Vertebrates - Reptiles			
<i>Natrix natrix</i>	Grass snake	Schedule 5, S41	2019
Animals - Vertebrates - Birds			
<i>Accipiter nisus</i>	Sparrowhawk	-	2019
<i>Aegithalos caudatus</i>	Long-tailed tit	-	2019
<i>Alauda arvensis</i>	Skylark	BOCC Red, S41	2019
<i>Anas platyrhynchos</i>	Mallard	BOCC Amber	2019
<i>Buteo buteo</i>	Buzzard	-	2019
<i>Carduelis cannabina</i>	Linnet	BOCC Red, S41	2019
<i>Carduelis carduelis</i>	Goldfinch	-	2019
<i>Carduelis chloris</i>	Greenfinch	-	2019
<i>Carduelis spinus</i>	Siskin	-	2019
<i>Certhia familiaris</i>	Treecreeper	-	2019
<i>Chroicocephalus ridibundus</i>	Black-headed gull	BOCC Amber	2019
<i>Columba oenas</i>	Stock dove	BOCC Amber	2019
<i>Columba palumbus</i>	Woodpigeon	-	2019

Scientific name	Common name	Legal / conservation status	Latest year recorded
<i>Corvus corax</i>	Raven	-	2019
<i>Corvus corone</i>	Carrion crow	-	2019
<i>Corvus monedula</i>	Jackdaw	-	2019
<i>Cuculus canorus</i>	Cuckoo	BOCC Red, S41	2019
<i>Cyanistes caeruleus</i>	Blue tit	-	2019
<i>Dendrocopos major</i>	Great spotted woodpecker	-	2019
<i>Emberiza schoeniclus</i>	Reed bunting	BOCC Amber, S41	2019
<i>Erithacus rubecula</i>	Robin	-	2019
<i>Falco tinnunculus</i>	Kestrel	BOCC Amber	2019
<i>Fringilla coelebs</i>	Chaffinch	-	2019
<i>Gallinago gallinago</i>	Snipe	BOCC Amber	2019
<i>Gallinula chloropus</i>	Moorhen	-	2019
<i>Garrulus glandarius</i>	Jay	-	2019
<i>Milvus milvus</i>	Red kite	Schedule 1	2019
<i>Parus major</i>	Great tit	-	2019
<i>Parus palustris</i>	Marsh tit	BOCC Red, S41	2019
<i>Periparus ater</i>	Coal tit	-	2019
<i>Phasianus colchicus</i>	Pheasant	-	2019
<i>Phylloscopus collybita</i>	Chiffchaff	-	2019
<i>Pica pica</i>	Magpie	-	2019
<i>Picus viridis</i>	Green woodpecker	-	2019
<i>Prunella modularis</i>	Dunnock	BOCC Amber, S41	2019
<i>Pyrrhula pyrrhula</i>	Bullfinch	BOCC Amber, S41	2019
<i>Regulus regulus</i>	Goldcrest	-	2019
<i>Sylvia atricapilla</i>	Blackcap	-	2019
<i>Tachybaptus ruficollis</i>	Little grebe	-	2019
<i>Troglodytes troglodytes</i>	Wren	-	2019
<i>Turdus iliacus</i>	Redwing	BOCC Red, Schedule 1	2019
<i>Turdus merula</i>	Blackbird	-	2019
<i>Turdus philomelos</i>	Song thrush	BOCC Red, S41	2019
Animals - Vertebrates - Mammals			
<i>Capreolus capreolus</i>	Roe deer	-	2019
<i>Meles meles</i>	Badger	-	2019
<i>Micromys minutus</i>	Harvest mouse	S41	2019
<i>Muntiacus reevesi</i>	Chinese muntjac	Schedule 9	2019
<i>Myodes glareolus</i>	Bank vole	-	2019
<i>Oryctolagus cuniculus</i>	Rabbit	-	2019
<i>Sciurus carolinensis</i>	Grey squirrel	-	2019
<i>Talpa europaea</i>	Mole	-	2019
<i>Vulpes vulpes</i>	Red fox	-	2019