

		but with other habitats including wetlands and quarry workings.	
Woodland Trust Reserve	Stratfield Brake	A small area of mature woodland and larger areas of young planted woodland. Includes an extension area to the north.	80 m E
LWS	Meadows west of Oxford Canal 41V18	Two fields adjacent to Oxford Canal containing lowland meadow and fen.	0.35 km S
LWS	Begbroke Wood 41 R03	Oak woodland with abundant bluebells, silver-washed fritillary butterfly, damp areas and an area of calcareous grassland.	0.47 km E
LWS	Langford Meadows 41S02	An area of tall herb fen, lowland meadow and rough grassland, supporting a range of plant species, and a locally important site for birds including reed bunting and snipe.	0.85 km N
LWS	Bladon Heath 41L02	A former heath that has been planted with conifers but retains some of its distinctive plant and invertebrate species, and has areas of semi-natural woodland, and fragments of slightly acid open ground along its rides.	0.90 km E
CTA	Oxford Meadows and Farmoor	A large area of lowland meadows, Farmoor Reservoir and gravel workings north and west of Oxford. It includes part of the Oxford Meadows SAC. It includes wetland habitat.	1.3 km S
LWS	Loop Farm Flood Meadows 41V02	Two wet species-rich floodplain fields with species-rich hedgerows and a small area of reedbed between the railway line and Oxford canal and adjacent to Duke's Cut Pond.	1.3 km S
LWS	Wet Wood and Swamp Near Yarnton 41V08	Two small borrow pits either side of the railway line, supporting wet woodland, tall wetland vegetation and sedges. Also some drier ash woodland.	1.3 km S
LWS	Wet Woodland and Swamp south west of Yarnton 41V08	Two small borrow pits containing tall wetland vegetation, wet willow woodland, and a bank of ash woodland.	1.4 km S
LWS	Cassington to Yarnton Gravel Pits 41Q11	A series of river terrace gravel pits, with areas of silt bed, developing reed beds, and young plantation woodland. It has considerable bird interest, particularly for wintering waterfowl.	1.4 km S
LWS	Cassington to Yarnton Pits East Extension	Meadows adjacent to the east of the existing LWS. Supports elements of lowland meadow habitat.	1.4 km S
PLWS	Kidlington Meadows 41X02	A large site on the floodplain of the River Cherwell, containing former pasture on which scrub and young plantation woodland is developing. The site also has some local bird interest.	1.5 km NE
PLWS	Branson's Lake and Scrub	Lake with reedbed and adjacent woodland and scrub along the river Cherwell. Attracts wildfowl.	1.5 km NE
LWS	Duke's Lock Pond 41V13	A pond providing a substantial area of reedbed north of Duke's Lock on the Oxford Canal. Abundant sedge and reed warbler present, and reed bunting.	1.5 km S
BBOWT Reserve	Oxey Mead	A field forming part of Pixey and Yarnton Meads SSSI. Supports invertebrates, wet meadow plants, skylark and wading birds.	1.8 km S
Oxford City SLINC	Linkside Lake	Lake on the site of an old clay pit.	1.9 km SE
LWS	Canalside Meadow (Oxford Canal Marsh)	Wet meadow grading into sedge-dominated fen alongside the Oxford Canal. Important for birds.	2.0 km S



## Habitats

- 6.8 The Site is dominated by arable fields with an extensive network of hedgerows. A stream, Rowel Brook, passes across the north of the site. There is an associated corridor of woodland, and an inflowing stream. There is a small block of mixed plantation woodland around several barns (Parker's Farm), east of the Science Park. Areas of species-poor semi-improved grassland and amenity grassland are present at the Science Park, and there are small areas of damp semi-improved neutral grassland in the north-east of the Site, east of the railway line. Ditches are mainly present east of the railway line. A number of buildings are present, including large modern buildings and an old stone farmhouse and associated buildings at Begbroke Science Park.
- 6.9 A Phase 1 habitat plan of the Site is provided in Figure 2. Habitats present at the Site are listed in Table 13. Related target notes are included in Appendix 4. The full botanical survey data is provided in Appendix 5.

Table 13: Phase 1 habitats at the Site.

Habitat	Description
Arable land	The Site is dominated by large arable fields (Photographs 1 and 2). During the visits carried out in 2015 and in 2018, these were observed to support crops of winter wheat, barley and oilseed rape. Field boundaries are formed by hedgerows (see below). There is also an area of public allotments in current use in the north-west of the Site adjacent to the A44 Woodstock Road. Widespread arable weeds noted include field pansy <i>Viola arvensis</i> , field poppy <i>Papaver rhoeas</i> , hedge mustard <i>Sisymbrium officinale</i> , spear thistle <i>Cirsium vulgare</i> , prickly sow-thistle <i>Sonchus asper</i> , and mugwort <i>Artemisia vulgaris</i> . Two arable weeds with more restricted national distributions (corn marigold <i>Glebionis segetum</i> and common cudweed <i>Filago vulgaris</i> ) were also recorded during the botanical survey, being present on arable field margins in the north-west and centre-south of the Site, respectively. For more details on these two species at the Site, see the section <i>Plants</i> below. <b>This habitat is not a HPI since it does not conform to the description of the Habitat of Principal Importance <i>Arable Field Margins</i> in BRIG (2011).</b>
Good semi-improved neutral grassland	<p><u>Field A</u> in the north-east of the Site (Photograph 3) is dominated by the coarse grass false oat-grass <i>Arrhenatherum elatius</i>, and much of the margins are dominated by ruderals (e.g. common nettle <i>Urtica dioica</i>) and bramble <i>Rubus fruticosus</i> agg. scrub. These characteristics indicate a lack of recent management, and there was no evidence of mowing or other management on visits throughout 2018. The sward contains a number of other grass and forb species, including species such as tufted hair-grass <i>Deschampsia cespitosa</i>, meadowsweet <i>Filipendula ulmaria</i> and wild angelica <i>Angelica sylvestris</i>, that are indicative of damp conditions.</p> <p><u>Field D</u> in the east of the Site (Photograph 4) is dominated by a mix of false oat-grass and Yorkshire fog <i>Holcus lanatus</i>. Various other grasses are present including red fescue <i>Festuca rubra</i>, meadow foxtail <i>Alopecurus pratensis</i> and smooth meadow-grass <i>Poa pratensis</i>. A range of forbs is present, including hogweed <i>Heracleum sphondylium</i>, germander speedwell <i>Veronica chamaedrys</i>, common sorrel <i>Rumex acetosa</i>, creeping buttercup <i>Ranunculus repens</i>, lesser stitchwort <i>Stellaria graminea</i> and greater burnet <i>Sanguisorba officinalis</i>. Several of these species are indicative of damp conditions. However, most of these forbs are present at relatively low abundance, and much of the sward is grass-dominated and not species-rich. This field was mown between July and August 2018.</p> <p>Fields A and D were subject to detailed botanical survey in May 2018. The results are provided in Appendix 5. Based on the description in JNCC (2010) these fields support good semi-improved neutral grassland. Based on the Natural England (2010) <i>Farm Environment Plan</i> grassland keys, fields A and D support good quality semi-improved grassland in some areas and species-poor semi-improved grassland in others. Due to the dominance of false oat-grass, the grassland in these two fields is considered most closely-related to the MG1 <i>Arrhenatherum elatius</i> community. <b>Based on the description in BRIG (2011), Fields A and D do not support the Habitat of Principal Importance (HPI) <i>Lowland Meadows</i>, or any other HPI.</b> The <i>Lowland Meadows</i> HPI includes only unimproved grassland of the MG4, MG5 of MG8 communities. However, the grassland here may have been derived from more species-rich communities in the recent past (such as MG4 <i>Alopecurus pratensis</i>-<i>Sanguisorba officinalis</i> grassland, damp MG5 <i>Cynosurus cristatus</i>-<i>Centaurea nigra</i> grassland, or MG6 <i>Cynosurus cristatus</i> grassland). These two fields have some potential for ecological restoration through</p>



	<p>appropriate management.</p> <p><u>Begbroke Science Park</u> has a small area of semi-improved neutral grassland in the north. This grassland was subject to detailed botanical survey in July 2015 (BSG, 2015), the results of which are provided in Appendix 5. Since this area will not be directly affected by the PR8 development, this area was not subject to detailed botanical survey in 2018.</p> <p>This grassland has an open sward with areas of bare ground visible, indicating that it is of relatively recent origin. It is present on a flat area with a sandy soil. Online aerial imagery shows that a row of two to three residential buildings (and associated gardens) were present in this area until at least 2004. A list of plant species present in this area was collected by BSG Ecology surveyors during grassland monitoring surveys carried out in 2014 and 2015. This list is provided in Appendix 5. Based on the description in JNCC (2010) this grassland has been classified as good semi-improved grassland, though due to its recent origin, it also has some similarity with ephemeral/short perennial habitat. Based on the Natural England (2010) <i>Farm Environment Plan</i> grassland keys, this grassland is good quality semi-improved grassland. From the species present and the recent origin of this grassland, it does not have affinity to National Vegetation Classification communities MG4, MG5 or MG8. <b>This area does not support the Habitat of Principal Importance <i>Lowland Meadows</i>, or any other HPI, based on the descriptions in BRIG (2011).</b></p> <p><u>Lawn at Begbroke Hill Farmhouse.</u> Although closely-mown, this is relatively species-rich, containing a number of grass, forb and bryophyte species (e.g. common bent <i>Agrostis capillaris</i>, red fescue <i>Festuca rubra</i>, yarrow <i>Achillea millefolium</i> daisy <i>Bellis perennis</i>, common cat's-ear <i>Hypochoeris radicata</i> and springy turf-moss <i>Rhytidiadelphus squarrosus</i>). Since this area will not be directly affected by the PR8 development, this area as not subject to detailed botanical survey. <b>This area does not support the Habitat of Principal Importance <i>Lowland Meadows</i>, or any other HPI, based on the descriptions in BRIG (2011).</b></p>
<p>Poor semi-improved neutral grassland</p>	<p>Two fields in the north-east of the Site (fields B and D on Figure 4) and a small area of a third field that is dominated by scrub (field E on Figure 4) support relatively species-poor grassland, though the species composition of these differs:</p> <p><u>Field B</u> (Photograph 5) is dominated by Italian ryegrass <i>Lolium multiflorum</i> in most areas, with some areas dominated by Yorkshire fog (Photograph 4). A few other grass species are present but forbs are rare. This field was observed to be in a ploughed state during a visit by BSG Ecology in 2015 (BSG Ecology, 2015), and it is assumed that it was sown to Italian ryegrass at or shortly after this time, and that this species has persisted through self-seeding. This field was mown between July and August 2018.</p> <p>This field was subject to detailed botanical survey in May 2018. The results are provided in Appendix 5. Based on the description in JNCC (2010) this field support poor semi-improved neutral grassland. Based on the Natural England (2010) <i>Farm Environment Plan</i> grassland keys, field B supports species-poor improved grassland. <b>This grassland does not resemble any recognised NVC communities and is clearly not a HPI, based on the descriptions in BRIG (2011).</b></p> <p><u>Field C</u> (Photograph 6), adjacent to the South of Field B, has a sward consisting almost exclusively of tall fescue <i>Schedonorus arundinaceus</i>. Some Yorkshire fog is also present, as are a few other grasses and forbs including creeping cinchfoil <i>Potentilla reptans</i>, creeping buttercup <i>Ranunculus repens</i> and a little wild angelica. This field was noted to be very wet during site visits in early 2018. This grassland was mown between July and August 2018. The dominance of tall fescue is likely to have resulted from seeding (this species is occasionally grown as a hay crop in damp situations). Ploughing is likely to have occurred following January 2015, since this field was observed (on a visit by BSG Ecology) to support a rough mixed grass sward at that time (BSG Ecology 2015).</p> <p>This field was subject to detailed botanical survey in May 2018. The results are provided in Appendix 5. Based on the description in JNCC (2010) this field support poor semi-improved neutral grassland. Based on the Natural England (2010) <i>Farm Environment Plan</i> grassland keys, field A and D supports species-poor improved grassland. <b>This grassland does not resemble any recognised NVC communities and is clearly not a HPI, based on the descriptions in BRIG (2011).</b></p> <p><u>Field E</u> in the south of the Site (Photograph 7) is dominated by dense hawthorn <i>Crataegus monogyna</i> scrub, but the periphery appears to be mown annually (mowing occurred between July and August in 2018), resulting an outer strip of common nettle and coarse grassland</p>



	<p>dominated by false oat-grass and cock's-foot (Photograph 6). Several forb species are occasionally present, including hogweed <i>Heracleum sphondylium</i>, perforate St. John's-wort <i>Hypericum perforatum</i>, hairy tare <i>Vicia hirsuta</i>, curled dock <i>Rumex crispus</i> and tufted vetch <i>Vicia cracca</i>. The dominance of grasses and relatively low abundance and diversity of forb species makes this grassland poor rather than good semi-improved neutral grassland. Because of the dominance of false oat-grass, this grassland shows similarity to MG1 <i>Arrhenatherum elatius</i> grassland.</p> <p>This field was subject to detailed botanical survey in May 2018. The results are provided in Appendix 5. Based on the description in JNCC (2010) grassy area of this field support poor semi-improved neutral grassland. Based on the Natural England (2010) <i>Farm Environment Plan</i> grassland keys, grassy areas of this field support species-poor semi-improved grassland. <b>This grassland is not a HPI, based on the descriptions in BRIG (2011).</b></p> <p>Several further small areas of species-poor semi-improved grassland are present at the site, including areas at the Science Park (for which data from 2015 is provided in Appendix 5) and on road verges on Sandy Lane. These areas are grass-dominated, with relatively few forb species. <b>This grassland in these areas is not a HPI, based on the descriptions in BRIG (2011).</b></p>
Improved grassland	An area of improved grassland dominated by perennial rye-grass <i>Lolium perenne</i> with some creeping buttercup <i>Ranunculus repens</i> is present in the south-west of the site. This grassland has a short sward and is used for deer farming. <b>This habitat does not represent the Habitat of Principal Importance Lowland Meadows, based on the description in BRIG (2011).</b>
Amenity grassland	Various areas of amenity grassland (lawn) are present around the Science Park and on associated road verges (Target Notes 29, 32). These are closely mown, and species-poor, being dominated by perennial rye-grass, or in some areas, by red fescue <i>Festuca rubra</i> . <b>This habitat does not represent the Habitat of Principal Importance Lowland Meadows, based on the description in BRIG (2011).</b>
Broad-leaved semi-natural woodland	A corridor of semi-natural woodland follows the Rowel Brook in the north of the Site (Target Note 3; Photograph 10), and also follows a smaller stream which flows into this at the northeast of the Site (Target Note 9). This woodland is dominated by pedunculate oak <i>Quercus robur</i> (but also contains ash <i>Fraxinus excelsior</i> , sycamore <i>Acer pseudoplatanus</i> , alder <i>Alnus glutinosa</i> and crack willow <i>Salix fragilis</i> ). Where present, the shrub layer is dominated by hazel <i>Corylus avellana</i> , and the field layer by bramble and ivy <i>Hedera helix</i> . This woodland is natural in character and has distinct shrub and field layers of native species. <b>This habitat is considered to conform to the description of Lowland Mixed Deciduous Woodland in BRIG (2011) and therefore is a HPI.</b> The non-native invasive plant species variegated yellow archangel <i>Lamium galeobdolon</i> ssp. <i>argentatum</i> is present in the western part of this woodland, presumably having escaped from a garden at Begbroke (Target note 4).
Plantation woodland	A small area of planted woodland containing mixed mature trees including Italian alder <i>Alnus cordata</i> and Scots pine <i>Pinus sylvestris</i> is present around modern and old barns at Parker's Farm, east of the Science Park (Target Note 7, Photograph 2). There is also a belt of young deciduous planted woodland surrounding the Science Park (Target Note 1); this contains a range of native broad-leaved species such as hazel, silver birch <i>Betula pendula</i> and osier willow <i>Salix viminalis</i> . <b>Due to its young age and lack of mature canopy or woodland ground flora, this habitat is not considered to conform to the description of Lowland Mixed Deciduous Woodland in BRIG (2011) and therefore is not a HPI.</b>
Hedgerow	There is a network of agricultural hedgerows across the site (e.g. Photographs 1 and 8), mostly dominated by hawthorn but containing a range of native shrub species (including blackthorn <i>Prunus spinosa</i> , spindle <i>Euonymus europaeus</i> , buckthorn <i>Rhamnus cathartica</i> , dogwood <i>Cornus sanguinea</i> , hazel, elder <i>Sambucus nigra</i> , English elm <i>Ulmus procera</i> , crab apple <i>Malus sylvestris</i> , and dog rose <i>Rosa canina</i> ), and in some cases, trees (such as ash, crack willow <i>Salix fragilis</i> , pedunculate oak and (on the northern boundary of the Site) turkey oak <i>Quercus cerris</i> ). The majority of the hedgerows are species-rich, containing five or more woody species. Some are defunct (i.e., not stock-proof). Because they are all composed of 80% or more of native species, <b>all of the hedgerows at the Site represent the HPI Hedgerows.</b> For further details of hedgerows at the Site, see the section <i>Hedgerows</i> below.
Scrub	Several areas of the Site support areas of dense scrub, either dominated by hawthorn (with other woody species) or by bramble <i>Rubus fruticosus</i> agg. <b>This habitat does not conform to any of the habitat descriptions in BRIG (2011) and is therefore not a HPI.</b>
Introduced Shrub	Small areas of introduced ornamental shrubs are present within the Science Park. <b>This habitat does not conform to any of the habitat descriptions in BRIG (2011) and is</b>



	<b>therefore not a HPI.</b>
Tall Ruderal vegetation	Tall ruderal vegetation is present as stands of common nettle in the north-east of the Site, and of hemlock <i>Conium maculatum</i> and other species on bunds just east of Parker's Farm. <b>This habitat does not conform to any of the habitat descriptions in BRIG (2011) and is therefore not a HPI.</b>
Swamp	A small area of swamp dominated by common reed <i>Phragmites australis</i> and lesser pond sedge <i>Carex acutiformis</i> surrounds part of pond P1 in the North of the Site (Photograph 11). A further area of swamp dominated by reed sweet-grass <i>Glyceria maxima</i> is present on the eastern edge of the Site (Target Note 26; Photograph 10); adjacent to an artificial stream associated with a canal lock). <b>This habitat does not conform to any of the habitat descriptions in BRIG (2011) and is therefore not a HPI.</b>
Running water	A small stream, the Rowel Brook, flows west to east across the north of the Site (Target Note 2; Photograph 9 and see also photographs in Appendix 4). The channel has a depth of ca. 0.5 to 1.2 m with relatively steep soil banks. The water depth was observed to vary between approximately 0.1 and 0.5 m during 2018. The river flows into the Oxford Canal on the north-eastern boundary of the site.  A smaller stream flows north-west and enters the Rowel Brook towards the north-east of the Site (Target Note 8).  A short artificial stream is present at the east of the Site flowing around a lock on the Oxford Canal (Target Note 25).  <b>This habitat does not conform to any of the habitat descriptions in BRIG (2011) and is therefore not a HPI.</b>
Ditches	Ditches are present adjacent to many of the hedgerows at the Site, particularly in the east of the Site. Many of these ditches held water during survey visits early in 2018, but all were dry by June 2018. Aquatic plants were present in some ditches, including fool's water-cress <i>Apium nodiflorum</i> (e.g. Target Note 20, Target Note 24; Photographs 7 and 10).  <b>This habitat does not conform to any of the habitat descriptions in BRIG (2011) and is therefore not a HPI.</b>
Ponds	Six ponds are present within the Site (labelled P1 to P6 on Figure 10). Further details of these are provided in the section <i>Ponds</i> below. See Photographs 11, 13, 14, 15, 16, 17 and 18).  <b>The presence of great crested newt makes pond P4 at Begbroke Science Park a HPI. The other ponds within the Site do not conform to any of the habitat descriptions in BRIG (2011) and are therefore not HPis.</b>
Trees	In addition to the woodland described above, there are various mature and semi-mature trees at the Site. The Science Park itself has some mature trees (e.g. Scots pine <i>Pinus sylvestris</i> , Austrian pine <i>Pinus nigra</i> , and grey poplar <i>Populus × canescens</i> ). There are also abundant semi-mature trees, including an avenue of walnut <i>Juglans regia</i> along the former access road south of the Science Park (Target Note 5). In the remainder of the Site, mature trees are only present in woodland or hedgerows (e.g. Tree T9 in Figure 6b; Photograph 19) except for a mature poplar in the south-west of the Site (Tree T10 on Figure 6b). The potential of trees at the Site to support roosting bats is described in the section <i>Bats</i> below. <b>Individual trees do not conform to any of the habitat descriptions in BRIG (2011) and are therefore not a HPI. However, in most cases, trees at the Site form part of woodland or hedgerow habitat which are HPis.</b>
Buildings and hard standing	A range of buildings is present at Begbroke Science Park; these include a stone farmhouse and associated buildings (Photograph 20) and various modern buildings (Photograph 21). The only buildings at the Site outside the Science Park are two large modern agricultural barns (Photograph 22) and a low stone barn or animal shelter (Photograph 23), all at Parker's Farm. Further details of buildings at the site, including an assessment of their potential to support roosting bats, is provided in the section <i>Bats</i> below. This also covers several other buildings that are outside the Site, but close or directly adjacent to it.  <b>This habitat does not conform to any of the habitat descriptions in BRIG (2011) and is therefore not a HPI.</b>

## Hedgerows

6.10 Hedgerows (some with accompanying ditches) separate the majority of the fields at the Site and are present adjacent to various roads and footpaths. These hedgerows comprise almost entirely



native species and have varying species-richness. Many hedgerows are somewhat overgrown, with sections that are defunct (i.e. no longer stock-proof). The locations of the hedgerows at the Site are shown on Figure 3.

- 6.11 A total of 53 hedgerows were identified within the Site. Of these, 37 (i.e. 67%) are species-rich and the remainder are species-poor. A total of 30 may be classified as 'Important' under the criteria listed under 'Wildlife and Landscape' in Schedule 1 of the Hedgerow Regulations 1997. This is summarised in Table 14.

Table 14: Summary of hedgerow survey results.

Hedgerow categories	Important	Not Important	Total
Species-rich	28	9	37
Species-poor	2	14	16
<b>Total</b>	<b>30</b>	<b>23</b>	<b>53</b>

- 6.12 The total number of woody species in each hedgerow varies between one (i.e. hawthorn only in Hedgerow H17) and 14 (in Hedgerow H46). The average number of woody species per hedgerow (based on one or more 30 m sample lengths) varies between 1 (for hedgerow H17) and 10 (for hedgerow H49). Hedgerows in the east of the Site, east of the railway line were particularly rich in woody species and trees. Hedgerow H39, which forms part of the southern boundary of the Site, also contains abundant trees. The dominant hedgerow shrub across the Site is hawthorn, and the dominant hedgerow tree is pedunculate oak. Other woody species present include ash, English elm, spindle, elder, honeysuckle *Lonicera periclymenum*, hazel, dog rose, crack willow, goat willow *Salix caprea*, wild privet *Ligustrum vulgare*, crab apple, blackthorn, guelder rose, dogwood, buckthorn, and holly *Ilex aquifolium*.

- 6.13 Woodland ground flora species noted growing in hedgerow bases, particularly towards the east of the Site include dog's mercury *Mercurialis perennis*, lords-and-ladies *Arum maculatum*, and herb Robert *Geranium robertianum*.

- 6.14 A summary of the criteria under 'Wildlife and Landscape' in Schedule 1 of the Hedgerow Regulations which are met by Important hedgerows at the Application is provided in Table 15.

Table 15: Summary of Important hedgerows.

Criteria for Important hedgerows	Qualifying hedgerows
Average of seven woody species.	H1, H4, H9, H16, H25, H31, H34, H35, H36, H42, H44, H45, H46, H47, H48, H49, H50, H51
Average of six woody species plus three additional features (as defined in Section 6 of Schedule 1 of the Hedgerow Regulations).	H33, H37, H39, H40, H41, H43
Average of five woody species plus four or more additional features.	H8, H52
Present adjacent to a public road or other right of way and with an average of four woody species plus two or more additional features.	H5, H10, H23, H24

- 6.15 Further details of all of the hedgerows at the Site are included in Appendix 6.

### Ponds

- 6.16 Six ponds are present within the Site, these are indicated as Ponds P1–P6 on Figure 10. Descriptions of these ponds are provided in Table 16, along with all other ponds within 250 m of the Site. Ponds P10, P11, P12 and P13 were not accessed: the information presented for these was obtained from Ordnance Survey mapping and aerial photographs.



Table 16: Description of Ponds. Details for ponds within the Site are highlighted in grey.

Pond ID	Description	Approximate Distance and Direction from Site	Approximate distance from development (excluding greenspace)
P1	Shaded pond with some lesser duckweed <i>Lemna minor</i> , and abundant leaf litter and some dead wood. Margins support areas of swamp dominated by common reed and lesser pond sedge. Concrete dam and weir fitted, with metal outlet pipe. Size ca. 9 m × 6 m, with channel extending north-east. Depth to ca. 35 cm. The facilities manager mentioned that this pond was created as a water source for irrigation at the Weeds Research Organization which formerly occupied the Science Park. Almost dry in July 2018, and western part heavily dominated by common reed.	Within Site	80 m
P2	Series of four artificial rectangular ponds separated by narrow earth dams. Total size ca. 10 m × 4 m. Shaded by trees with abundant leaf litter. No vegetation. Maximum water depth noted. 25 cm. Dry by late May 2018.	Within Site	80 m
P3	Series of three artificial rectangular ponds separated by narrow earth dams. Total size ca. 10 m × 4 m. Shaded by trees with abundant leaf- litter. No marginal or aquatic plants visible. Maximum water depth noted ca. 25 cm. Dry by late May 2018.	Within Site	60 m
P4	Formal pond within Science Park. Paved margins. Abundant marginal plants at southern end, including reedmace <i>Typha latifolia</i> , unbranched bur-reed <i>Sparganium erectum</i> , bogbean <i>Menyanthes trifoliata</i> , water horsetail <i>Equisetum fluviatile</i> , lesser duckweed <i>Lemna minor</i> , and water mint <i>Mentha aquatica</i> . Abundant aquatic plants, including hornwort <i>Ceratophyllum demersum</i> and Canadian pondweed <i>Elodea canadensis</i> . Large external filter. Ornamental fish present (many goldfish <i>Carassius auratus</i> and one large carp <i>Cyprinus carpio</i> ), filtration system. Size ca. 5 m × 15 m.	Within Site	20 m
P5	Pond under large multi-stemmed crack willow. Leaf litter present. Minimal wetland vegetation present. Shaded. Depth to ca. 25 cm. Size ca. 11 × 6 m. Dry by late May 2018.	Within Site	220 m
P6	Pond forming part of ditch network, adjacent to canal towpath. Bramble scrub adjacent. Minimal wetland vegetation noted. Shaded. Size ca. 12 × 4 m. Dry by mid-June 2018.	Within Site	320 m
P7	Large pond within grounds of the Ley Community residential centre in Yarnton. Turbid water and no aquatic plants noted. Banks steep/engineered in places. Population of large koi carp present. Ca. 35 × 15 m.	80 m W	80 m
P8	Large naturalistic landscape pond surrounded by mature crack willows within a modern housing development. Various marginal vegetation present, including water mint. Ca. 80 m x 18 m.	10 m W	40 m
P9	Farm field pond surrounded by mature crack willows. Ca. 22 × 10 m.	50 m W	80 m
P10	Large pond in school grounds. Ca 85 × 20 m. Rowel Book flows through this pond. Not accessed.	260 m N	260 m
P11	Presumed to be a defunct settlement pond or similar, located at a defunct water treatment works. Now supports willow woodland. Ca 70 m × 10 m. Not accessed.	40 m E	40 m
P12	Presumed to be a defunct settlement pond or similar, located at a defunct water treatment works. Now supports willow woodland. Ca 70 m × 10 m. Not accessed.	60 m E	60 m
P13	Small farm field pond associated with field ditch network. Visible from, but located outside the Site. Ca. 10 m × 8 m.	10 m S	530 m

## Plants

- 6.17 The desk study returned records of 38 species of higher plants from the search area. None of the records are from within the Site itself, the closest being from Rushy Meadows SSSI to the north-east.



- 6.18 The records include four Species of Principal Importance in England (SPI): Marsh stitchwort (in addition to records from Rushy Meadows SSSI, this is recorded from two locations south of the Site the closest being around 0.4 km distant; records were from 1986–2010); tubular water-dropwort *Oenanthe fistulosa* (two records, 2007 and 2010 from ca. 1.4 km from Site); white helleborine *Cephalanthera damasonium* was recorded (in 2015) along a bridleway from Yarnton to Oxey Mead, ca. 1.5 km from Site; and there was an old (1990) record of corn buttercup *Ranunculus arvensis* from 1.6 km south of the Site. The latter species is listed as *Endangered* (and the above species as *Vulnerable*) in the England red list for vascular plants (Stroh et al., 2014).
- 6.19 There were records of a further six species listed as *Vulnerable* in the England red list, including round-fruited rush *Juncus compressus*, bladder sedge *Carex vesicaria*, lesser spearwort *Ranunculus flammula*, strawberry clover *Trifolium fragiferum*, water violet *Hottonia palustris* and corn marigold *Glebionis segetum*.
- 6.20 There were records of a further four species listed as *Nationally Rare* or *Nationally Scarce* (in Stewart et al. 1994) including wood barley *Hordelymus europaeus*, stinking hellebore *Helleborus foetidus*, Jacob's-ladder *Polemonium caeruleum* and large-leaved lime *Tilia platyphyllos*.
- 6.21 Remaining native species for which records were obtained in the desk study are all listed as *Near Threatened*.
- 6.22 There were desk study records (from 1987 to 2016) for seven non-native invasive plant species (none of which were from within the Site): Canadian waterweed *Elodea canadensis*, Nuttall's waterweed *Elodea nuttallii*, New Zealand pygmyweed *Crassula helmsii*, buddleia *Buddleija davidii*, orange balsam *Impatiens capensis*, Himalayan balsam *Impatiens balsamifera* and rhododendron *Rhododendron ponticum*. Of these, Canadian waterweed was recorded from pond P8, ca. 40 m from the Site, New Zealand pygmy weed was recorded from within 300 m of the site (at Stratfield Brake nature reserve, beyond the Oxford Canal), and orange balsam was recorded from fields 500 m south of the Site.
- 6.23 During the botanical and hedgerow survey, carried out in May and October 2018, corn marigold and common cudweed were recorded in the margins of arable fields at the Site. Their locations are shown in Figure 4. Corn marigold is listed as *Vulnerable* in the England Red List. It is listed as “not scarce in Oxfordshire” and is described as “still widely found in Oxfordshire on non-calcareous soils” in *Oxfordshire's Threatened Plants* (Erskine et al, 2018). Common cudweed is listed as *Near Threatened* in the England Red List. In *Oxfordshire's Threatened Plants* it is listed as “not scarce in Oxfordshire” but “scarce in vice county 23” (vice county 23 covers Northern and Eastern Oxfordshire and includes the Site), the description reads “In vice county 23 there is not much suitable habitat and it has declined here steadily”.

### **Badgers**

- 6.24 A total of 15 records of badger were obtained in the desk study (from 1981 to 2013), with the closest from around 0.5 km north-west of the Site and the majority from further north or south of the site. There were no records from with the Site.
- 6.25 The Site provides suitable habitat for badger, and the desk study clearly indicates that this species is present in the local area.
- 6.26 In the 2018 badger survey, three active main setts were found within or close to the boundary of the Site. Their locations are indicated on Figure 5. They are all located west of the railway line. There are also three outlier setts and one subsidiary setts on this side off the Site. The part of the Site to the east of the railway line is lower lying and subject to wetter conditions in winter, making it much of it less suitable for main setts. Two outlier setts are present here, within a hedgerow.

### **Main Sett 1 (4 holes)**

- 6.27 This is located in an area of scrub just outside the Site boundary and close to the Begbroke Science Park access road, on mounded soil and waste material. The sett has four visible active holes, and potential for further holes in bramble scrub on land outside the site. A well-trodden area



around the holes was noted, along with bedding material and a heavily scratched trunk of a small elder tree in amongst the holes. This Sett was also reported as active in the 2010 and 2015 badger surveys. Active annexe or subsidiary setts are present to the north (two holes), south-west (one hole), and east of this sett.

#### **Main Sett 2 (3 holes)**

- 6.28 This is located on the railway embankment, outside, but close to, the Site boundary. There are three visible active holes.

#### **Main Sett 3 (8+ holes)**

- 6.29 This extensive sett or group of setts occupies an area of scrub adjacent to the Site and part of an arable field within the Site, south of Sandy Lane. The exact number of holes could not be determined because the sett straddles the Site boundary, but there are 8 active holes within the Site. These extend into the ploughed areas of the arable field by around 5 m. Another active sett is present ca. 200 m to the west, just outside the Site. This is assumed to be a subsidiary sett due to its proximity and smaller number of holes.

#### **Outlier Setts in east of Site**

- 6.30 There are three active holes that had limited signs of activity in January 2018. It may be that this sett is only used during drier periods (the east of the Site has relatively wet ground compared with the east).
- 6.31 No other badger setts were found during the survey.

#### **Other observations**

- 6.32 A badger fence is present in the vicinity of Main Sett 1 along both sides of the access road between the A44 Woodstock Road and the Science Park. This was installed during construction of the access road in order to reduce the risk of badgers being killed on this road. It was specified as mitigation in the 2010 ecology survey, due to the proximity of the sett to the proposed road, and due to the presence of a well-used path leading north from the sett (across the route of the proposed road). A concrete badger tunnel was also installed under the access road at the location of this track and is still present. The fence is a three rail wooden post and rail fence, with coated chain-link wire. The tunnel appears to be in use by badgers: well-used paths lead from the badger sett through the tunnel and along the hedgerow to the north of the road. A hole has been made (presumably by badgers) at the base of the fence close to the northern tunnel entrance, allowing access to the road.
- 6.33 Relatively few badger dung pits or foraging diggings / snuffle holes were noted at the Site. These are indicated on Figure 5. Dung pits are located between the main setts, as would be expected (dung pits are often used to mark territory boundaries).
- 6.34 Rabbit burrows were abundant in some parts of the Site, including adjacent to the allotments in the west around Parker's Farm and in some areas south of Sandy Lane.

#### **Bats**

- 6.35 The desk study returned 97 records of bats (from 1980 to 2015) from the search area. Of these, 73 are from 2008 or later. Three records are from within the Site boundary: these were records of an injured pipistrelle *Pipistrellus* sp. (species not specified) from towards the centre of the Site, a Leisler's *Nyctalus leisleri* bat from the north of the Site and an injured soprano pipistrelle *Pipistrellus pygmaeus* from the east of the Site. There were no records of bat roosts within the Site.
- 6.36 Most of the other records were from around Kidlington and Yarnton; they included records of *Myotis* species, Natterer's bat *Myotis nattereri*, noctule *Nyctalus noctula*, common pipistrelle *Pipistrellus pipistrellus*, brown long-eared bat *Plecotus auritus* and soprano pipistrelle. Roosts



mentioned in the data include roosts of common pipistrelle and Leisler's bat on the north-east side of Kidlington and of pipistrelle in North Oxford.

- 6.37 The above records indicate that a number species of bats are present in the local area of the Site. BSG Ecology has also confirmed the presence of at least 11 species of bats from the Woodstock area during surveys at other sites, including roosts of pipistrelle, soprano pipistrelle, Nathusius' pipistrelle *Pipistrellus nathusii*, barbastelle bat *Barbastella barbastellus*, Natterer's bat, Daubenton's bat *Myotis daubentonii*, noctule, brown long-eared bat and lesser horseshoe *Rhinolophus hipposideros*.
- 6.38 All bat species in the UK are European Protected Species. Seven species (barbastelle, Bechstein's bat, noctule, soprano pipistrelle, brown long-eared bat, and greater and lesser horseshoe) are also Species of Principal Importance (SPIs).
- 6.39 The Site is located adjacent to the Oxford Canal, which is likely to provide important local foraging and commuting habitat for bats. Wet grassland at Rushy Meadows SSSI, to the north of the Site may also provide valuable foraging habitat, and woodland at Bladon Heath and Begbroke Wood to the west, and Blenheim Park to the north is likely to provide valuable foraging and roosting habitat. Buildings at Yarnton, Begbroke and Kidlington may provide roosting sites.
- 6.40 The Site provides habitat suitable for foraging bats, particularly the woodland along the Rowel brook in the north of the Site and areas of damp grassland in the east of the Site. The network of hedgerows provide potential commuting routes across the Site, between the above foraging areas and may link roosting sites within and around the Site with foraging areas within and near the Site. The Site is currently not subject to a high level of lighting, except around Begbroke Science Park which has a number of floodlights.

#### **Roost Potential of Buildings**

- 6.41 The Site contains six buildings or clusters of buildings. Two of these (Begbroke Science Park and Parkers Farm) are within the PR8 Site. The buildings were divided into 26 separate buildings for the purposes of the roost potential survey, listed in Table 17 and indicated on Figures 6c and 6d. The condition of buildings ranges from good to poor. A number of the buildings have potential egress and access points, and may be expected to support bat roosts, possibly including maternity roosts.

*Table 17: Potential of buildings to support roosting bats.*

<b>Location</b>	<b>Building Number</b>	<b>Description</b>	<b>Bat Suitability</b>
Parkers Farm (on-Site)	A1	Large agricultural barn. Concrete block lower walls and corrugated metal upper walls and roof.	Negligible
	A2	Large agricultural barn. Concrete block lower walls and corrugated asbestos upper walls and roof.	Negligible
	A3	Low stone barn/animal shelter with corrugated metal roof. Open side to south.	Moderate
Begbroke Science Park (surrounded by the Site)	B1	Single-storey office building. 20 <sup>th</sup> Century. Block walls and corrugated metal pitched roof. Some gaps under fascia on northern elevation.	Low
	B2a	Single storey brick and stone farm outbuildings, refurbished to offices. Pitched roof with slate tiles. Small gaps present under ridge tiles.	Low
	B2b	Single-storey stone farm outbuildings, refurbished to offices. Pitched roof with slate tiles.	Low
	B2c	Two storey stone farm outbuildings, refurbished to offices/reception. Pitched roof with uneven limestone slate tiles. Multiple potential bat access points. Also gaps under fascia and under soffit box.	High
	B2d	Small single-storey stone and brick building. Date plaque indicates 17 <sup>th</sup> century. Pitched roof with stone tiles. Gaps behind fascia on both gable ends. Moss on roof limits access under tiles.	High



Location	Building Number	Description	Bat Suitability
	B2e	Begbroke Hill Farmhouse. Large three-storey 17th century farmhouse. Gaps under fascia on west elevation. Some gaps under tiles.	High
	B2f	Single-storey stone building with slanted and pitched roof. With concrete tiles. Gaps behind fascia and soffit box into roof space on North-west elevation.	Moderate
	B3	Large modern two storey office building. 21 <sup>st</sup> century. Clad with wood and metal.	Negligible
	B4	Hirsch Building. Late 20 <sup>th</sup> century office building of brick, metal, glass and stone. Metal roof.	Negligible
	B5	Institute of Advanced Technology. 21 <sup>st</sup> century. Metal and wood cladding.	Negligible
	B6	Store building. Late 20 <sup>th</sup> century. Stone walls and asbestos and metal roof.	Negligible
	B7	Store building. 21 <sup>st</sup> century later. Metal walls and roof.	Negligible
Two semi-detached houses on Sandy Lane (off-Site)	C1	Two two-storey semi-detached houses south of Sandy Lane. Rendered wall, pitched tile roofs with some missing tiles. Gaps under ridge tiles. Loft space may be present. Property and grounds not accessed, viewed from within the PR8 Site.	High
Buildings at College Farm Barns (off-Site)	D1	North cottage. Two-storey brick and stone cottage. Small block extension. Wood-clad porch. Pitched tile roof. Gaps under tiles on all elevations. Gaps under fascia on south and south-west. Gaps under soffit.	High
	D2a	Recently refurbished/modernised farmhouse. Stone wall, wood cladding and pitched tile roof. One or two gaps at gable ends on west and south elevations.	Low
	D2b	Open sided brick shed with corrugated metal roof.	Low
	D3	Complex of three open-sided wood-clad sheds built on steel frame.	Low
	D4	Corrugated metal shed. Open sided to north.	Negligible
	D5	Corrugated metal shed.	Negligible
	D6	Barn/shed of block construction with pitched corrugated metal roof. And some wood cladding in poor condition.	Low
Houses near level crossing (off-Site)	E1	Stone two-storey cottage east of level crossing. Pitched slate roof. Loft space. Property and grounds not accessed, viewed from within the PR8 Site/Sandy Lane.	Moderate
	E2	Two modern mobile homes. Property and grounds not accessed, viewed from within the PR8 Site/Sandy Lane.	Negligible
House on Woodstock Road (off-Site)	F	Blenheim Edge Guest House. Modern two-storey brick house. Tiled roof with some missing tiles and gaps under ridge. Plastic soffit boards. Appears to have loft space, but no obvious access points for bats. Property and grounds not accessed, viewed from within the PR8 Site.	Moderate

6.42 The building assessment found five buildings to have high, four to have moderate, seven to have low and 10 to have negligible suitability to support roosting bats.

### ***Emergence/re-entry survey of Buildings***

6.43 Results of emergence and re-entry surveys of buildings are provided in Table 18. These indicate that day roosts of small numbers of common bat species are present in buildings at Begbroke Science Park.

*Table 18: Results of emergence surveys of buildings. Results refer to bats seen emerging or re-entering buildings).*

Location	Building Number	Bat Suitability	Survey Visit 1	Survey Visit 2	Survey Visit 3	Roost Type*
Stone Barn at Parkers	A3	Moderate	None	None	N/A	N/A