

# Stansfeld Park Biodiversity Review and Management Plan

Final Draft  
April 2017

## Foreword

This document comprises the plan for the improvement of the ecology, habitats and species diversity at The Oxford Trust (TOT)'s **Stansfeld Park** site. It is TOT's vision to rejuvenate the site creating a resource for the long-term delivery of its charitable aims in science education, engagement and enterprise for the benefit of Oxfordshire and the surrounding region.

We recognise that this previously neglected, and largely isolated, location has unique potential as a hub of biodiversity within the Oxford ring road but that it will take many years of work to maximise this through our own efforts, those of similar minded partners and volunteers.

As an organisation and individuals, we are also committed to enhancing biodiversity as an end in itself; it is just our responsibility as guardians of funds raised towards our charitable objectives that require us to conduct ourselves with a sense of balance in deploying our resources.

It is within this context that this plan has been written; has started to and will continue to be implemented; and will be regularly monitored and reviewed: delivering a location that the city can be proud of and one that will act as an exemplar of how to manage an urban woodland for educational and ecological benefit.



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## 1. Executive Summary

To be written prior to final issue after consultation, however will include the following information

- Summary of the site history and the state in which TOT took ownership
- Summary of key habitats and species of interest existing and planned
- Summary of required steps and timescales.

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## 2. Introduction

In Stansfeld Park, TOT realises it has a site with huge educational and ecological potential, and looks forward to rising to the challenge of realising this in the short, medium and long term. In and through its Science Oxford activities, and with the development of the proposed science education and innovation centres on the site, TOT is in a perfect position to embrace the unique offering of the natural and built environment to deliver science education, engagement and enterprise activities long into the future.



*Figure 1: Becoming one with nature*

The co-location of a primary focussed science education centre in a woodland site with large ecological potential is a unique proposition for the UK, and will put Oxford at the forefront of primary science education. While the enhancement of biodiversity is upper most in our minds, we are also acutely aware of the challenges of doing so in balance with this educational outcome and the effect this might have for future generations.

We are committed to giving every schoolchild in our region the opportunity to be exposed to and inspired by both the hands on science activities at the centre, and the biodiversity and environmental science activities we will make available. In so doing, our intentions for biodiversity improvement are much grander than ‘just’ this site in Headington.

We aim to allow every local child to become more ecologically engaged and conservationally curious – done right our true impact on biodiversity will be delivered by a stream of environmentally concerned citizens and generations of STEM professionals in the Oxfordshire and beyond, be they bioscience academics, renewable energy engineers or council ecology officers.

However, we are very aware that to achieve this aim, we need a site that is operating at its full ecological potential. We need to exhibit environmental best practice, not just to be an example to our audiences, but also to enable us to offer an experience of the widest range of biodiversity we can as part of our activities.

As an organisation and individuals, we are also committed to enhancing biodiversity as an end in itself; it is just our responsibility as guardians of funds raised towards our charitable objectives that require us to conduct ourselves with a sense of balance in deploying our resources.



*Figure 2: Outdoor learning opportunities*

## The Site

Stansfeld Park comprises a unique assemblage of woodland, open water and grassland habitats, which are themselves important, but when considered in combination with the adjacent Glebe Land pasture and the fact that it lies within the Oxford ring road, assign it value considerably greater than the sum of its parts. Furthermore, it forms part of a wild corridor from Shotover Country Park, itself a SSSI, and the CS Lewis LWS managed by BBOWT, outside the ring road, on to other urban sites such as Rock Edge SSSI, the Lye Valley SSSI and down towards the Thames Valley.



Figure 3: Stansfeld site location

The park's location within the busy ring road and nestled into a largely residential space within easy access of some of the more deprived areas of Oxford, make it a hugely important resource. However, this resource does not come without constraints due to this location, its undulating topography, complicated hydrology, recent periods of neglect and long term and future uses. It is The Oxford Trust's aim to maintain and enhance the wild space around the proposed development site to ensure continuous corridors in all directions. Re-development of the existing buildings will occur alongside the wider site enhancements that are the primary focus of this document.

### 2.1. History

The site was originally part of what is now known as Shotover Country Park to the east of Oxford, but was believed to have been cleared of trees in the Middle Ages. Following the felling, clay was extracted for brick production creating the undulating topography that now exists. The earthen bank to the east was deposited during the excavation of the eastern by-pass in the 1950's. The more mature trees to the northern extent are thought to be in excess of 100 years old, but much of the site is more recent growth.

The grounds were originally purchased by Reverend John Stansfeld in 1918 to provide an area of countryside for children from the urban slums of St Ebbe's (Friends of Stansfeld, 2015). Through Stansfeld's link with St Saviour's Parish in Birmingham, the land was bequeathed to the Birmingham Education Committee (latterly the City Council) in 1933 and has been used for educational purposes ever since. In 1976 the Field Study Centre was established and was occupied until 2014, when Birmingham City Council put a 250-year lease on the site up for sale.

During the more recent history of the site, residential and day visiting groups of school children spent time exploring the woodland, following an established network of paths (including an orienteering course). They also had the opportunity to play in an adventure activity area within the woods, utilise the recreational field and investigate the various habitats on site as part of GCSE and A-Level field

courses or outdoor activity sessions. As such, the site was managed for safe access, educational purposes and within strict financial restraints.

Few documents pertaining to any management of the site have been tracked down, but in the 2006/7 Grounds Management Plan (Corps, 2006) the author states that “[previous management plans] do not appear to have been implemented and at present the centre has a very ‘wild’ feel to it. In fact, it requires careful management to reverse a number of years of what can only be seen as neglect!” There is little evidence of any of Corps’ plans being put into action either, and the site remains in need of urgent management and enhancement with the establishment of an ongoing maintenance programme. This document will describe the current status of the biodiversity at Stansfeld Park and detail immediate management objectives in addition to ongoing management actions.

## 2.2. Designated Status

The park is a Site of Local Importance to Nature Conservation (SLINC) and has been on a list of proposed Oxfordshire Local Wildlife Sites (LWS) for a number of years. It is understood that Oxford City Council are currently undergoing a review of LWSs and it is hoped that the biodiversity information that the Oxford Trust have provided them relating to Stansfeld Park will facilitate this process (Julie Kerrans, TVERC pers com.).

The park is within 1km of a number of Sites of Special Scientific Interest (SSSI) including Magdalen Quarry, Rock Edge, Lye Valley, Brasenose Wood and Shotover Hill. Furthermore, the site lies within the Shotover Conservation Target Area (CTA) which extends off Shotover Hill encompassing areas of heathland, woodland, meadow grassland, fen and standing water with a number of Biodiversity Action Plan Targets.

There are three UK Priority Biodiversity Action Plan (BAP) Habitats supported on the Stansfeld Park site following the last surveys carried out in 2001/2 (TVERC, 2015):

- Lowland calcareous grassland,
- Ponds,
- Lowland mixed deciduous woodland.

The composition of each of these habitats will be discussed in Chapter 4, with future management aims and objectives being outlined in Chapters 5-6.

## **3. Existing Biodiversity**

Ecological records prior to ownership by The Oxford Trust (TOT) are limited, but those that have been accessed are summarised below. In general, it appears that the biodiversity was considered poor, especially given the size and potential of the site. Since TOT acquired the site in 2016, surveys conducted by Ecoconsult for the planning application and additional surveys co-ordinated by TOT’s in-house ecologist have confirmed this initial assessment and provide a detailed baseline upon which we can base our management aims and objectives. Species lists from previous surveys including the TVERC (2015), Ecoconsult (2016a,b,c,d) and specialist ecologists (Baker, 2015 & 2016), Steele (2015), Wright (2008), and Gosler & Candelin (2016) are provided as an appendix to this report. These more recent data have all been provided to the TVERC to inform their current review of Local Wildlife Sites in Oxfordshire. Work to add to this diversity is ongoing, and will continue through the monitoring and assessment procedures outlined in Section 8.

### 3.1. Habitats

The 7.3 ha site has been mapped and an assessment of the habitats within the park determined them to fall into one of five broad categories:

- Buildings/Hard Standing
- Semi-Improved Grassland
- Ponds
- Lowland Calcareous Grassland
- Lowland Mixed Deciduous Woodland

The management aims and objectives (Chapters 5-7) will focus on the latter three of these, which fall outside the proposed development area, while any mitigation or remediation for any habitat lost from the former two during the development will be included in Chapter 5.

#### 3.1.1. Buildings/ Hard-Standing

The existing buildings have been independently assessed and are believed to contribute minimal importance to the site's biodiversity. In particular, thorough surveys were undertaken of the buildings and no evidence was found of bird nests and bat roosts. The structures were considered to have low bat roosting potential (Ecoconsult, 2016a). The area immediately surrounding the buildings was found to provide refuge for slow worm and potential access routes for hedgehog; records for both species are held by the TVERC (2015). A species list for the buildings and immediate surrounds is provided in the appendix Section 11.3.

#### 3.1.2. Semi-Improved Grassland

This grassland has been surveyed and found to be of low ecological value, dominated by perennial grasses and specialists of road verges and wasteland (Ecoconsult, 2016b). This area had historically been used as a recreation area and as such was subject to regular disturbance and mowing; for recreation, this variety of hardy resilient species was desirable. A species list for the former recreation field is provided in the appendix Section 11.2.

The Grounds Management Plan 2006/7 (Corps, 2006) refers to a region of the site that had until recently been grassland, located to the north of the compost bins and recreation field. Corps states that this area had become encroached by brambles and it was their intention to remove these to reinstate this grassland. This region remains heavily overgrown but might, with the correct management, still be reinstated with a return of some species that may survive within the seedbank.



Figure 4: Stansfeld Field Centre and recreation area - winter 2015

### 3.1.1. Ponds

The 2006/7 Grounds Management Plan (Corps, 2006) describes the two main centre ponds as having been created in the late 1970's. They are described as being (as of 2006) "in a very poor state" due to tree and bramble encroachment, siltation and eutrophication. These ponds remain in a similarly poor condition with limited invertebrate assemblages (Baker, 2015 & 2016) and dubious water quality. Small to medium Great Crested Newt populations were recorded in summer 2016, along with medium Smooth Newt populations (Ecoconsult, 2016c). Shallow water overlies deep silt in both ponds and vegetation chokes large parts of the habitats. They continue to be heavily shaded, with leaf litter contributing to the high silt loading.

The TVERC records of the site, surveyed in 2001/2, mention only two of the four larger ponds. They are described as having well established marginal species including branched bur-reed, Greater Reed-mace and Yellow Flag iris. The presence of Great Crested Newt was also recorded in 2001/2 (TVERC, 2015). In his 2015 survey of the largest centre pond, Baker found a total of 14 macroinvertebrate taxa and six species of aquatic plants. This is considered to be an impoverished fauna for a pond of this type with all being considered tolerant of organic enrichment. One species of dragonfly the Southern Hawker (*Aeshna cyanea*) and seven species of beetle were recorded but all in low densities. In a repeat survey in 2016, the number of recorded macroinvertebrate taxa had fallen slightly but comprised largely the same tolerant species (Baker, 2016). A full species list for the Pond 1 is provided in the appendix Section 11.1.

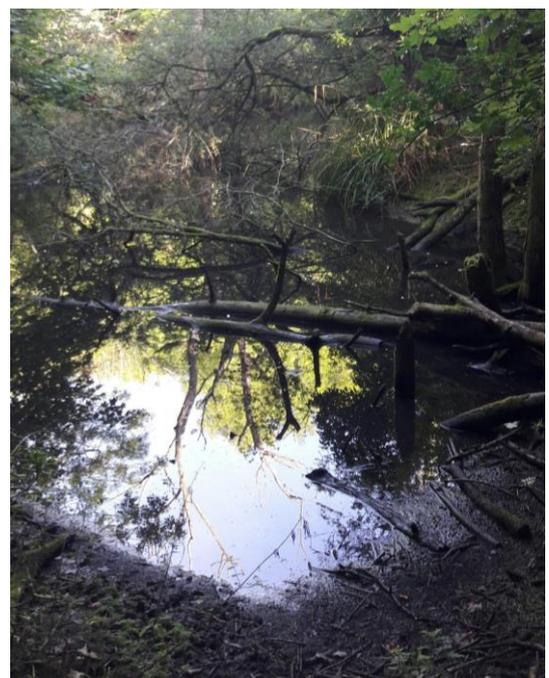


Figure 5: Stansfeld Pond 4 – winter 2015

Two further ponds are described in the 2006/7 Plan (Corps, 2006), these being the small ponds to the west of the recreation field. One was considered in good condition (as of 2006), the lining of the other had been pierced by vandals. Both of these ponds are now compromised and only hold open water after heavy rainfall. The lining of both is exposed and torn and they are choked with sedges and rushes.

While not mentioned in the Grounds Management Plan 2006/7 (Corps, 2006) or in the TVERC surveys of 2001/2, there are an additional two areas of open water which have been identified within the woodland; one to the south of the two main centre ponds and one further north. Only one of these two ponds was found to have GCN and only a small population, probably due to the absence of any aquatic vegetation (Ecoconsult, 2016c). The other is shallow and dominated by floating duck weed. It is unclear if these ponds remain wet all year round since both have large established trees growing from the centre of the open water and are heavily shaded on all sides with abundant coarse woody debris and leaf litter visible. The macroinvertebrate faunal assemblage is particularly poor in both (Baker, 2016).

### 3.1.2. Lowland Calcareous Grassland



Figure 6: Stansfeld grassland – winter 2015

The calcareous grassland to the east of the site has a history of mowing and raking by local conservation volunteers (The OCV) with the intention of maximising the biodiversity of this locally rare habitat. Due to recent inactivity on site, this grassland has become overgrown and encroached by scrub on all sides. As such any calcareous species will have been overshadowed by uncut grasses and higher vegetation.

Very limited data exists to show the diversity of this area with the exception of some recent observations of the water tolerant Wood and Hairy Sedges (*Carex sylvatica* and *C. hirta*) and Field Horsetail (*Equisetum arvense*). The TVERC (2015) records for this habitat include typical calcareous species such as Common Spotted Orchid (*Dactylorhiza fuchsii*), Hoary Plantain (*Plantago media*), Common Centaury (*Centaureum erythraea*), Yellow Rattle (*Rhinanthus minor*) and Fairy Flax (*Linum catharticum*). With appropriate management it might be hoped to see a return/recovery of these and other indicator species such as Red fescue (*Festuca rubra ssp. commutata*), Common bent (*Agrostis capillaris*), Sheep's fescue (*Festuca ovina*), Oxeye Daisy (*Leucanthemum vulgare*), Meadow Buttercup (*Ranunculus acris*) and other orchids.

### 3.1.3. Lowland Mixed Deciduous Woodland

Currently the woodland comprises a semi-mature canopy of Ash (*Fraxinus excelsior*) and occasional Oak (*Quercus robur*) and Horse Chestnut (*Aesculus hippocastanum*); a secondary canopy composed of Willow (*Salix spp.*), Silver Birch (*Betula pendula*) and Sycamore (*Acer pseudoplatanus*); and an understorey dominated by Hawthorn (*Crataegus monogyna*) but with occasional Holly (*Ilex*

*aquifolium*), Willow (*Salix spp.*), Elder (*Sambucus nigra*), Yew (*Taxus baccata*) and Hazel (*Corylus avellana*). In particular, the Ash has poor form and there is the real threat of ash dieback. Some planting with mixed broadleaves and conifers has been undertaken in the past. The ground vegetation includes Nettle (*Urtica dioica*) with Bramble (*Rubus fruticosus*), Bluebell (*Hyacinthoides non-scripta*) and Redcurrant (*Ribes rubrum*). The ground is subject to seasonal water-logging and flooding. The NVC classification is types W8 (*Fraxinus excelsior* - *Acer campestre* - *Mercurialis perennis* woodland) and W10 (*Quercus robur* - *Pteridium aquilinum* - *Rubus fruticosus* woodland), both of which fall under the broader “mixed deciduous and oak/birch woodlands” group (Nicholsons, 2016).



Figure 7: Stansfeld woodland – winter 2015

Historic data include the records of 13 ancient woodland species, among them Hornbeam (*Carpinus betulus*), Spurge Laurel (*Daphne laureola*), Sanicle (*Sanicula europaea*), Bluebell, and Hart’s Tongue Fern (*Asplenium scolopendrium*) (TVERC, 2015). The Grounds Management Plan 2006/7 (Corps, 2006) also refers to a historic record of the soft shield fern (*Polystichum setiferum*) also an ancient woodland indicator species and locally scarce. It is understood that management of the wood included the clearing and planting of three small areas, one with native broadleaved species, the others with conifers including an area of larch that failed due to waterlogged soil (TVERC, 2015). Birds recorded include the red listed species Bullfinch and Song thrush, and the amber listed Marsh Tit and Willow Tit (TVERC, 2015).

### 3.2. Species Groups of Interest

The Oxford Trust have researched historic records and commissioned further field surveys in an effort to fill any lacuna. Some records date back over a decade and as such might be treated with some caution. In many cases surveys are ongoing to ensure that the seasonality of species distribution does not lead to an under or over representation of their contribution of the biodiversity of the site. The flora are largely discussed within the relevant habitats in Section 4.1. Special reference is made here to those groups of species which may live across more than one of the habitats already described above, including:

- Birds

- Reptiles
- Bats
- Badgers
- Invertebrates
- Bryophytes
- Amphibians

### 3.2.1. Birds:

Historic records exist (TVERC, 2015) for 33 species of bird on site, including Goshawk (*Accipiter gentilis*), Kingfisher (*Alcedo atthis*), Fieldfare (*Turdus pilaris*), Redwing (*Turdus ilacus*) and Brambling (*Fringilla montifringilla*). A local ornithological group, led by ringing team instructors Dr Andrew Gosler and Mr George Candelin, have been carrying out mist net surveys at the site and ringing individuals since September 2016. During this period the team have recorded the presence of 45 species, including repeat catches (suggesting resident individuals) for 19 individuals from eight species. The list of visitors includes threatened migratory species such as Fieldfare, Redwing and Goldcrest; other red listed species found include Mallard, Herring Gull, Starling, Song Thrush and Skylark whose UK numbers have crashed in recent years (Candelin & Gosler, 2016).



Figure 8: Goldcrest ringed at Stansfeld 15/10/16

### 3.2.2. Reptiles:

Reptile surveys were undertaken in spring/summer of 2016 yielding several records of slow worm (*Anguis fragilis*) equating to a small/medium population (Ecoconsult, 2016d). Historic records of slow worm and a single record for grass snake (*Natrix natrix*) were provided by the TVERC (2015).

### 3.2.3. Bats:

A daytime bat inspection survey of the existing buildings was carried out by Ecoconsult in November 2015 following the Bat Conservation Trust's Best Practice Guidelines. Further dusk emergence

surveys were carried out in June 2016. Assessments of any trees identified for removal have been carried out and none were considered to have for bat roost potential (Iain Corbyn - Ecoconsult, pers comm.). Neither survey technique yielded any evidence of bats using the existing buildings at Stansfeld Park (Ecoconsult, 2016a). Historic records (TVERC, 2015) are held for common pipistrelle (*Pipistrellus pipistrellus*) on the site, with further records for Brandt's bat, noctule bat, common pipistrelle and brown long-eared bat within 500m of the site boundary.

#### 3.2.4. Badgers:

A visual inspection for badger (*Meles meles*) setts within 30m of the proposed development site was carried out by Ecoconsult in January 2016, but none were found (Ecoconsult, 2106b). TVERC (2015) hold historic records for badger at Stansfeld Park. There is an active badger sett approximately 100m into the woodland away from the development site. IR cameras have been used to observe the occupants and records have been made throughout the site over the winter of 2016/7. Records of badger activity, along with that of all mammals on site, have been logged with the Oxfordshire Mammal Group. These data are shared with the British Mammal Society and local Environmental Records Centre.



Figure 9: Badger (*Meles meles*) observed at Stansfeld 23/02/17

#### 3.2.5. Invertebrates:

Single historic records (TVERC, 2015) exist for Small Heath butterfly (*Coenonympha pamphilus*) and Grey Dagger moth (*Acronicta psi*) dating back to pre-1985. A survey carried out by C. Steele on behalf of Butterfly Conservation in September 2015, recorded only Speckled Wood butterfly (*Pararge aegeria*) but noted that the habitat might be suitable for up to 25 species (Steele, 2015). Surveys are planned from April 2017 to increase our understanding of the species that exist here and to inform how the habitat might be enhanced to increase biodiversity further.

Surveys of the aquatic invertebrates were carried out in the ponds during autumn of 2015 and 2016 (Baker, 2015 & 2016). These revealed an impoverished fauna including only four beetle species, and in low numbers, and one species of dragonfly, the Southern Hawker. The organisms recorded were nationally common invertebrate species, all of which are considered tolerant of organic enrichment.



Figure 10: Southern Hawker dragonfly (*Aeshna cyanea*) observed 23/08/16

### 3.2.6. Bryophytes:

A survey of the bryophyte flora of Stansfeld Park was carried out by seven recorders in 2008 (Wright, 2008) during which they found a “fairly diverse bryoflora of 38 species comprising 29 mosses and 9 liverworts”. All of these species are considered to be nationally common while a few were locally common.

The large amount of fallen wood, and the wet nature of the woodland, with wet flushes and open pools, provides a diverse range of bryophyte habitats. In particular, one of the pools that has standing trees within it yielded the locally uncommon epiphytic moss *Ulota phyllantha*, *Orthotrichum lyelli* and *Orthotrichum pulchellum*. Another locally rare liverwort *Chiloscyphus polyanthus* was found around a nearby pool. The moss *Totula marginata*, a rare record for Oxfordshire was found on a stony outcrop within the woodland (Wright, 2008).



Figure 11: Wet woodland with diverse fungal and bryophyte communities

### 3.2.7. Amphibians:

Recent surveys (Ecoconsult, 2016c) of the amphibian community on site reveal small to medium populations of Great Crested Newt (*Triturus cristatus*), in addition to recent records of Smooth Newt (*Lissotriton vulgaris*) and historic records (TVERC, 2015) of Palmate Newt (*Lissotriton helveticus*), Common Frog (*Rana temporaria*) and Common Toad (*Bufo bufo*). Historic records (TVERC, 2015) suggest that the small ponds to the west of the site, that have fallen into disrepair, were a favoured newt habitat. More recently these have been observed to remain dry for long periods and newt populations were low in 2016 (Ecoconsult, 2016c).



Figure 12: Common frog (*Rana temporaria*) observed at Stansfeld 03/03/17

## 4. Impact of Development and Mitigation Within the Developed Area

As part of The Oxford Trust's plans for the site, the existing buildings will be replaced with a new combined science education centre (schools and families of primary aged children) and an innovation centre (for start-up technology based companies). In tandem with this redevelopment there will be some landscaping of the wider site to enhance the education potential and resolve some of the long term problems that are known to have existed (Corps, 2005; Lamberth, 2017). This report focusses on the parts of the site not specifically related to the physical build, of which plenty of information is available elsewhere, however a summary of these impacts are included for completeness below. The majority of the site is located outside of the development area; mitigation of any impacts and enhancement of this region is considered in Section 6.

### 4.1. Potential Impact

The Phase 1 survey conducted by Ecoconsult (2016b) concluded that the habitats directly affected by the development site are not of high ecological value, and none of the additional surveys conducted since this date have altered this conclusion. All required precautionary measures will be taken throughout the development to minimise the impact of the construction programme on the areas wildlife, with particular, but not exclusive, consideration to Great Crested Newts, hedgehogs, bats, birds and reptiles.

The major impacts during this development phase are likely to include loss of habitat, production of light and noise pollution, disruption of transitory pathways and localised increase in sediment production. These fall outside of the scope of this report, however background studies have been carried out and mitigation measures have planned to satisfy the planning authorities that these will be minimised throughout this phase of work. Some of these are included below for completeness, particularly where they apply to species that use the woodland as a whole and not just the immediate development area.

### 4.2. Mitigation

As a result of the development, areas of grassland and small areas woodland will be lost. The region of grassland in question was being used as a recreation area for children attending the education centre in the past and was maintained by regular mowing. It supports poor semi-improved grassland and is considered to be of low ecological value (Ecoconsult, 2016b).

The immediate woodland affected by the proposals is dominated by hawthorn scrub and bramble and also of low ecological value (Ecoconsult, 2016b). Much of this young woodland has established around historic structures that have since been removed and following clay working in the past. Spoil has also been deposited on the site from the construction of the eastern bypass in the late 1950s. As such the woodland is largely secondary and species-poor and is likely to benefit considerably from enhancement. The loss of this small area of habitat is to be offset by the creation of new areas of carefully managed habitat within the site and through the enhancement of habitat that has become neglected in recent years.

The schedule of development works has been carefully designed around the nesting and breeding seasons of all key species included in this report. Hand searches and trapping will be carried out to remove key species and their return will be prevented through the erection of barriers. It is hoped that improvements, including the creation of habitat piles, construction of hibernacula and maintenance of diverse habitats, will further improve the biodiversity of the wider site.

### 4.3. Habitat Creation and Enhancement

The development area will benefit from a number of ecological improvements. In addition to improvements to the neglected woodland surrounding the driveway through to the main site, there will be diverse and high quality woodland inspired planting throughout the carpark and in the immediate vicinity of the centre.



*Figure 13: Architect's impression of the new development*

The small compromised ponds with artificial liners to the west of the development will be reinstated with new liners, re-profiled and replanted with native species of local provenance. These ponds will be sited so they receive rainwater and are not intercepting any runoff from nearby hardstanding which might bring with it contaminated sediments. Where possible any water, and organisms therein, will be pumped out and retained to repopulate the ponds once they have been re-established. Works to the main ponds, covered later in this report, will also benefit these ponds through the provision of a network of high quality open water habitats from which organisms can migrate.

It is intended that the loss of the poor semi-improved grassland habitat is offset through the enhancement and increase of areas of lowland calcareous grassland including those along the eastern edge of the site. Additionally the construction of a sedum and wildflower green roof on part

of the development (637m<sup>2</sup>) will significantly improve on the limited biodiversity that was previously to be found in the grasslands that made up the recreational field.

Furthermore, areas of grassland that, according to Corps, 2006, previously existed that are now dominated by high bramble growth will be cut back to allow the seedbank to re-establish. Some shrubby margins will be retained to promote the fruit bearing scrub species (Hawthorn, Blackthorn and Bramble) that will benefit invertebrate and bird populations. Should the seedbank be impoverished then it is our intention to reseed using seeds obtained from local wildflower meadows to improve survival rates and ensure those species that establish are of benefit to the local ecosystem.

Habitat piles will be created as amphibian and reptile refugia within the woodland and along the sunny boundaries between the landscaped grassland and woodland habitats. Such creations will include woody piles for burrowing and feeding amphibians and their prey species, and basking banks for cold blooded reptiles.

Additional habitat enhancements for birds and bats will be provided in the shape of nesting/roosting boxes affixed to the new building. Further work will be carried out along, and within the woodland, to retain as many natural nesting and roosting sites within trees as is possible for those species less likely to benefit from artificial alternatives.

## **5. Impact of Development and Mitigation Within the Wider Woodland**

As well as having a plan for the development area that is sensitive to the biodiversity implications, The Oxford Trust appreciate that the majority of the value of the site for biodiversity is found in the remainder of the 7.3 ha site. It is acknowledged that there is considerable scope for improvement following the recent history of uncertainty, neglect and consequentially poor state in which it is found.

### **5.1. Potential Impact**

The majority of the 7.3 ha Stansfeld Park site will remain undeveloped and, due to the development area being located close to the site entrance, largely unaffected by the construction works during 2017/8. However, the scale of the works that are planned will provide the opportunity for mitigation and enhancement works to both offset any small amount of habitat loss that occurs, and improve the status of the existing habitats from the impoverished state in which they are currently found.

The intended uses of the wider site are largely in line with the historic activity at Stansfeld (see Section 3.1), with managed access to the wider woodland/grassland/open water habitats for visiting groups of school-aged children and occasional family events. Other occupants of the site will be the innovation centre staff who will also have managed access to an established path network. It is not envisaged that the intensity of use of the woodland will be significantly different to that experienced previously. It is hoped that any impact on the more intensively used areas of the site around the development, will be more than made up for by the active management that will occur through the site as a whole. Some landscaping of the main area of the educational activity has been planned. This is intended to both update some of the existing dilapidated infrastructure and to create a more resilient environment for the future.

A short pathway will be created into the woodland to facilitate disabled and emergency access. The region to the east of the education centre will be the most utilised, but we intend to retain areas that will remain inaccessible to act as havens for wildlife. Access to the wider woodland will be limited to an established network of paths that will enable allow areas of non-intervention to be developed, thus offsetting any disturbance to other areas. Particular care will be taken when establishing these paths to avoid any sensitive species or habitats. Access to the ponds will be carefully managed so that areas remain undisturbed offsetting more intensive use that may arise due to their educational value.

There is inevitably likely to be some small impact on the woodland regions of the site due to the ongoing development works. These may include some disturbance to organisms due to changes in light regimes, a temporary increase in noise levels at certain times, the generation of some particles and a change to the connectivity of the site. Consideration has been given to this disturbance in the planning process and, as such, these are considered in more detail separately to this report. In addition to this disturbance, there will be a small amount of habitat loss in the immediate vicinity of the development site. This will be offset through the creation and enhancement outlined in Section 6.3.

## 5.2. Mitigation

The development timetable has been carefully planned to avoid any impacts on the wider woodland and its inhabitants during the development phase of the project. Due to the focus of the works being on the development area, the impacts on the wider woodland are considered minimal, however consideration to these are given below. Works have been scheduled to avoid nesting and breeding seasons; exclusion fencing is to be erected around the development site; and the production of excessive artificial light, noise and dust will be avoided. Mitigation measures for each of the species groups of interest are included below.

### 5.2.1. Species Groups of Interest

#### 5.2.1.1. Birds:

Any works likely to cause disturbance on site will be undertaken outside of the nesting season (March to August inclusive). Monitoring will be carried out to ensure that any birds that remain outside the main nesting season have fledged before works commence. In this way, it is not anticipated that any significant disturbance will be experienced by birds inhabiting the wider woodland during the construction phase of this project. Substantial improvements are planned through the habitat creation and enhancement discussed in Section 6.3 below.

#### 5.2.1.2. Reptiles:

To mitigate against reptile and amphibian disturbance during construction, a herpetile fence will be erected around any area in which disturbance is likely to be caused. Artificial refuges will be laid and

any reptiles using them, or uncovered through hand and destructive searches as appropriate, will be captured and translocated outside of the location. This capture process will be carried out between March and October in warm temperature (>10 °C) in sunny conditions. Searches will be made for a minimum of 30 days, followed by five days with no captures or observations. In this way, it is not anticipated that any significant disturbance will be experienced by reptiles inhabiting the wider woodland during the construction phase of this project. Substantial improvements are planned through the habitat creation and enhancement discussed in Section 6.3 below.

#### 5.2.1.3. Bats:

All bats and their roosts are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and by The Conservation of Habitats and Species Regulations 2010. Further enforcement has been provided by The Countryside and Rights of Way Act 2000. Regulation 41(1) of The Conservation of Habitats and Species Regulations 2010. Through careful timetabling of works, it is not anticipated that any disturbance will be experienced by any bats inhabiting the wider woodland. Substantial improvements are planned through the habitat creation and enhancement discussed in Section 6.3 below.

#### 5.2.1.4. Badgers:

Care will be taken to avoid any disturbance of the badger setts during both the works and in future operation. Access to this region of the woodland will be via established paths and always supervised by centre staff. In this way, it is not anticipated that any significant disturbance will be experienced by the badgers inhabiting the wider woodland during the construction phase of this project.

#### 5.2.1.5. Invertebrates

It is not anticipated that any significant disturbance will be experienced by invertebrates inhabiting the wider woodland during the construction phase of this project. Substantial improvements are planned through the habitat creation and enhancement discussed in Section 6.3 below.

#### 5.2.1.6. Bryophytes

It is not anticipated that any significant disturbance will be experienced by invertebrates inhabiting the wider woodland during the construction phase of this project. Substantial improvements are planned through the habitat creation and enhancement discussed in Section 6.3 below.

#### 5.2.1.7. Amphibians:

The Great Crested Newt is a protected species under Schedule 5 of the Wildlife and Countryside Act 1981. It is also a European Protected Species and as such, it has additional protection in the UK under Regulation 39 of the Conservation (Natural Habitats etc.) Regulations 1994 (the Habitats Regulations), as amended by the Conservation (Natural Habitats, &c.) (Amendment) Regulations 2007.

Like most amphibians, GCN normally live on land but within 200m of open water in which they breed in the spring/summer, typically wrapping their eggs in the leaves of submergent aquatic vegetation. Between spring and autumn, the developing larval and adult newts will feed on tadpoles, froglets and aquatic invertebrates before usually returning to the terrestrial habitat to hibernate.

Major demolition and construction work will only be completed upon the receipt of suitable licences and once netting and trapping has been carried out to translocate any individuals from the immediate area. A detailed mitigation strategy has been included in the Natural England licence application. This includes the erection of a herpetile fence around the boundary of any works, followed by trapping of individuals from the location for a duration of 30 days or if nets continue to be recorded, until five suitable days yield negative results. Further destructive searches may be needed after trapping has been completed. In this way, it is not anticipated that any significant disturbance will be experienced by amphibians inhabiting the wider woodland during the construction phase of this project. Substantial improvements are planned through the habitat creation and enhancement discussed in Section 6.3 below.

### 5.3. Habitat Creation and Enhancement

The Oxford Trust appreciate the huge potential of the Stansfeld Park site and, in addition to the planned mitigation against the relatively small impacts the development is anticipated to have discussed in Section 5.2.2., intend to enhance the biodiversity potential of the entire site over the months and years ahead. This section outlines these plans for the broad habitats and the species of interest across the site as a whole.

As part of their assessment, Ecoconsult (2016b) used a Biodiversity Impact Assessment Calculator (Warwickshire, Coventry and Solihull) to assess the biodiversity impact of the proposed development. With proposed enhancements, there was a calculated net gain score of +11.31, a 27.2% gain from the biodiversity score of the current site (41.61). This improvement in biodiversity is achieved in part through enhancement but also through habitat creation and diversification. There is considerable potential to restore and enhance the existing habitats that are currently in poor condition to increase their ecological value. Some of the key areas discussed in more detail below include:

- Restoration of the ponds that are silted and shaded through dredging, re-profiling and replanting
- Returning areas of grassland to active management, expanding these where possible and creating new areas within the wider site
- Actively thinning neglected areas of monoculture woodland and replanting to introduce a diverse and resilient structure. Opening areas of dense aged woodland to promote the development of ground flora. Management of small areas of coppice to introduce a range of age structures and associated habitat
- Creation of artificial habitat for species in need, including bird boxes, bat boxes, reptile refugia and amphibian hibernacula
- Removal and/or control of invasive or nuisance species alongside careful management to encourage species diversity and ecosystem resilience
- Where appropriate, careful reintroduction of native species that are known to have populated the site in the past.

### 5.3.1. Habitats

#### 5.3.1.1. Ponds

When the Trust acquired the site, it was immediately apparent that the ponds were in need of some drastic management to resolve an, at the time, undiagnosed water quality issue and make up for a period of minimal conservation management. An extensive investigation which included analysis of local drains, geological and hydrological surveys, and historical research discovered that the cause of the poor water quality was a previously unknown subsurface drain, owned by Oxfordshire County Council (OCC) Highways, running west from the ring road to a soakaway through the surface clay geology into the underlying Beckley Sands. Due to a blockage, this soakaway system has been discharging surface water into the pond system for an unknown period, estimated to be at least two decades (Lamberth, 2017).



*Figure 14: Stansfeld Pond 2 - spring 2017*

Now that the source and owner of the water input to the ponds has been established and once it has been resolved, it is intended that the two main centre ponds (Ponds 1 and 2) are dredged to remove some of the historic sediments that have infilled these water bodies over the last few decades. These sediments are high in nutrients and contribute towards low oxygen conditions within the water column; limiting diversity of the floral and faunal assemblages. They cause further harm through the direct toxicity of the particulates that are transported from the road surface into the ponds. After dredging, the water bodies will be re-profiled to ensure a combination of deeper areas, favoured by breeding amphibians, and shallower areas that will benefit invertebrate populations.

Replanting will be carried out using a diverse range of native species with local provenance that will further enhance the habitat and promote biodiversity. Many aquatic species rely on submerged and emergent aquatic plants for parts of their lifecycle and the former are largely lacking at present. Established stands of emergent vegetation will provide bird and invertebrate habitats, while also processing some of the nutrients that may be in the incoming water.

Further work will be carried out to open up some of the surrounding margins to increase the sunlight reaching the water and reduce the deposition of detritus. Areas of shade and inputs of detritus will be retained through the establishment of an island and through some managed vegetation, particularly around the northern end where it will also act as a physical barrier to prevent children entering the water. Initial concept diagrams have been drawn up by our landscape architects; an early draft is shown in Figure 15 below.

Ponds 1 and 2 will be the main focus for management since their intended use is for conservation and education. For the other ponds on site, no immediate action is planned due to their inaccessible locations; one has extremely steep sided banks, the other is set deep into the woodland. Furthermore, they are believed to have a more varied hydrological regime and may dry out entirely in the summer months. Ongoing monitoring will determine the future management plans for these regions and a passive management approach is to be adopted in the short term. As such they will

provide distinctly different open water habitats to the aforementioned ponds and contribute to the overall diversity of the site.

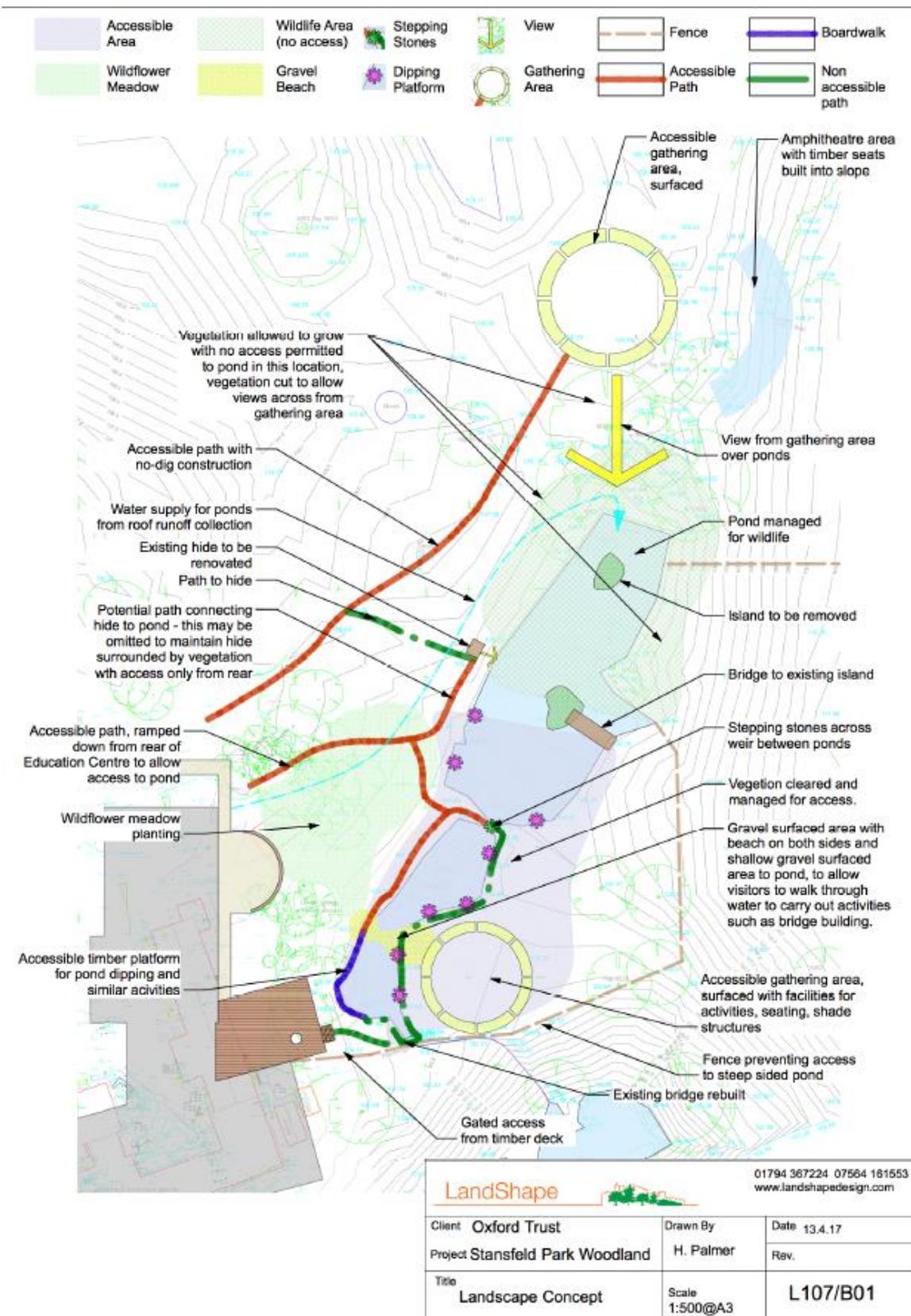


Figure 15: Draft concept for pond landscaping

### 5.3.1.2. Grasslands (including Lowland Calcareous)

Following the development of the new buildings, the remaining grassland surrounding the development will be selectively reclaimed and managed for education and conservation. It is anticipated that this will involve strategic tree and shrub planting, seeding of wildflowers and the use of an appropriate mowing regime. As part of the woodland management, new glades will be created to create a diverse range of habitats for typical woodland floral species such as Bluebell (*Hyacinthoides non-scripta*), Wood Anemone (*Anemone nemorosa*) and Primrose (*Primula vulgaris*).



Figure 16: Stansfeld grassland - spring 2017

In respect of the Lowland Calcareous Grassland, through the reinstatement of a regular mowing regime with careful removal of nutrients, it is hoped that the existing natural seedbank will result in the return of any species that have historically been found. Due to the recent lack of maintenance and previous unknown management regime, it is appreciated that the establishment of a diverse community may take several years, during which time mowing will need to be maintained to reduce competition from rank species and prevent further scrub encroachment (Ashwood, 2014). Mowing should occur after the flowers and grasses have set seed, and cuttings must be raked and removed, ensuring the timing does not conflict with any ground-nesting birds.

Clearance of encroached grassland mentioned in previous management plans (Corps, 2005) has already begun. The removal of fast growing scrub species is allowing the development of grassland species that were previously out competed. It is intended that the seedbank will be given the opportunity to re-establish through careful mowing regimes in Year 1, followed, as necessary by the use of wildflower seed and careful planting in Year 2. The margins of this wildflower area will be landscaped to provide habitat refuges for other organisms and a diverse range of flora alongside the woodland boundary.

### 5.3.1.3. Lowland Mixed Deciduous Woodland

A woodland management plan (Nicholson, 2016) has been developed that sets out the short, medium and long term intentions for the site. The management plan has a number of aims and objectives, among them the provision of a safe environment for educational purposes, the enhancement of the biodiversity and habitat resilience and ongoing monitoring and assessment. These aims will be achieved in a variety of ways including the following:

- Thinning
- Replanting
- Tree Health Assessment
- Deer Control
- Grey Squirrel Control
- Climate Change Resilience



Figure 17: Stansfeld woodland - spring 2017

**Thinning:** It has been determined that the canopy of mature trees requires thinning over the short to medium term. Wood will be removed in a number of ways, both through the construction of dead wood/habitat piles which will provide further habitat, but it may also be necessary to burn some due to the likely volume produced. The use of the 'Lop and Top' (cutting and piling) approach will also protect new growth from grazing animals. Larger cut wood may be incorporated into the landscaping throughout the woodland. Where any wood does have to be removed due to the volumes being cut, appropriate sized machinery and good planning will be required.

Targeted thinning will be carried out on an annual basis in areas no greater than 0.25 ha, and located where they will have maximum benefit. Rotation will ensure that the at least 2-3 years passes before an area adjacent to a thinned area is worked so as to minimise disturbance to the wider ecosystem and ensure refugia remain. It is intended that, in addition to the one region of hazel coppice that

currently exists, further coppice coups will be created which will further open the canopy, provide useful resources for the management of the wood and interesting educational opportunities.

**Replanting:** Once thinning has been undertaken, replanting of native species will be carried out to add diversity and alter the structure of the woodland. This will have the additional benefit of increasing the resilience to climate change and disease. Diversity will be enhanced through introducing a wider range of tree and shrub species including, but not limited to: Oak, *Quercus robur*, Sweet chestnut, *Castanea sativa*, Small leaved lime, *Tilia cordata*, Wild cherry, *Prunus avium*, Alder, *Alnus glutinosa*, Birch, *Betula pendula*, Field maple, *Acer campestre*, Wild Service Tree, and *Sorbus torminalis*. Shrub species may include, Hazel, *Corylus avellana*, Spindle, *Euonymus europaeus*, Wayfaring tree, *Viburnum lantana* and Dogwood, *Cornus sanguinea*. Responsible and, where possible local, sources will be found for these specimens to minimise any risks to existing plants. New trees and shrubs will be protected from grazing animals including squirrel and deer. Protection will include shielding with brash, tree guards and, in areas where natural regeneration will be promoted such as coppice coups, temporary fencing.

**Tree health assessment:** An initial Tree Health and Safety inspection has already been completed and all those trees identified as dangerous have been managed. Further tree inspections will be carried out every two years or on a more frequent basis where deemed necessary.

Wherever possible deadwood will be retained as a habitat for invertebrates, fungi and birds etc. Standing, (if safe) and fallen deadwood will be retained. Log piles will also be created to provide valuable habitats while further brash can be used to deter browsing of regrowth by deer.

**Deer:** Muntjac deer (*Muntiacus reevesi*) are known to be present on site and nationally populations have increased dramatically over the last decade (BBOWT, 2017). Due to the relatively high density of muntjac, and the damage they can do to tree regrowth, woodland wildflowers and consequently the whole ecosystem, it is considered necessary to control deer numbers. In the short term a cull has been undertaken using an experienced deer stalker to control numbers. However, since the deer are not believed to be resident, further work with neighbouring landowners may be necessary to control the population.

**Squirrels:** Squirrel are known to be present on site are believed to have caused some damage to trees that were planted a few years ago. Control of squirrels will need to be considered in the future to prevent populations from developing and to mitigate damage to regrowth and newly planted trees.

**Resilience:** The woodland is predominantly mature Ash with a “weak” understory of Hawthorn and other species. Whilst the onset of Ash dieback disease (*Chalara fraxinea*) cannot be predicted, management objectives must consider total loss of the existing mature woodland canopy. To mitigate for this, areas within the woodland will be thinned and replanted with a wide range of primarily native species.

In addition to protecting against serious consequences from Ash dieback, increasing the diversity of the woodland would provide resilience to climate change or any future disease outbreaks. Further gain will be achieved through the increase in biodiversity of the woodland and associated ecosystems and educational opportunities that come with it.

## Compartmentalisation

The woodland has been divided into five management compartments and actions will be carried out across these over the short to medium term. Some of these compartments are earmarked for action earlier than others due to the education aims and/or due to the current status of these areas. Regions of non-intervention will be established where access will be excluded and wildlife left undisturbed. These five compartments are shown in Figure 18.

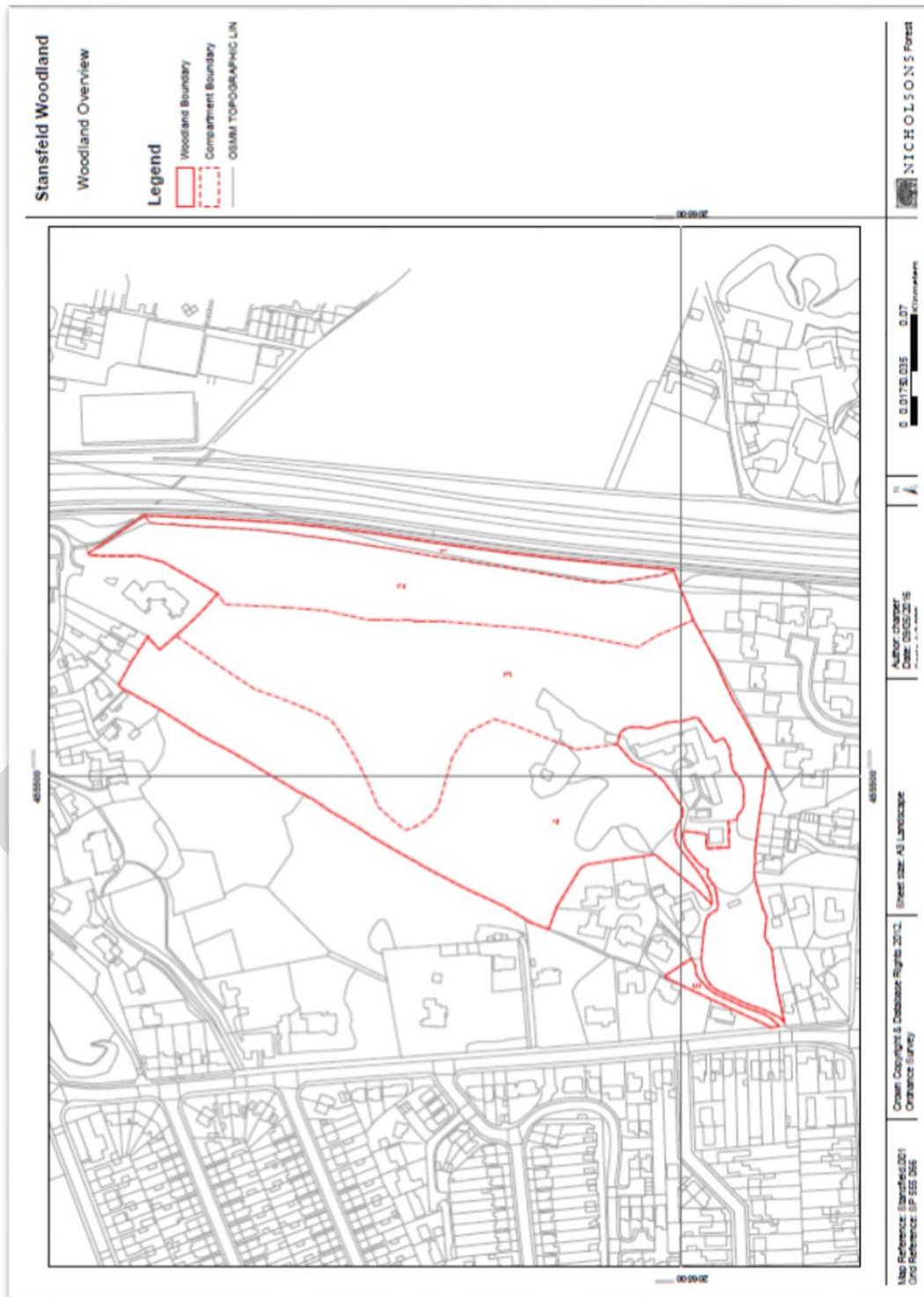


Figure 18: Stansfeld woodland compartments

The following compartment descriptions are taken directly from the Woodland Management Plan (Nicholsons, 2016):

Compartment 1: Comprises 0.27 ha of mixed broadleaved woodland. It is situated along the eastern side of the woodland the area is adjacent to the Oxford Eastern By-Pass. A fence forms the most easterly boundary; it is likely that this belt of trees was established to mitigate the effect of the construction of the by-pass on the local environment. The area has quite a steep slope and comprises dense areas of hawthorn natural regeneration with ash, hazel, field maple and hornbeam. The area forms a buffer between the main woodland block and the By-pass (Nicholson, 2016).

**Management:** In the medium to short term no work is proposed within Compartment 1 since it screens the site from the ring road and site boundary. Tree health and safety requirements will be monitored as appropriate, but at least every two years. In the medium to long term coppicing may be undertaken to maintain a dense understorey. Some additional planting, including blackthorn (*Prinus spinosa*) to maintain the screen, protect the site from unwanted visitors and provide valuable wildlife habitat may be carried out.

Compartment 2: Comprises 1.43 ha of mixed broadleaved woodland. Like Compartment 1, this area runs along the whole length of the woodland. Tree species include a few semi mature ash with some Silver birch and willow species. The understorey is not quite as dense as Compartment 1 but variable aged Hawthorn is found throughout. The hawthorn is quite mature and a number of the trees have died or are showing signs of decline. Some of the hawthorn are large and attractive specimens. There are three or four grassy areas in this Compartment which provide a different habitat for many species of flora and fauna. The terrain slopes downwards to the west from the edge of Compartment 1; slopes are quite steep in places, particularly to the south. Previous volunteer activity is evident in this Compartment. Coppicing and hedge laying plus evidence a few other activities are still present. There are a number of wooden structures, including steps and hand rails which are in a state of decline (Nicholson, 2016).

**Management:** This compartment requires significant work due to the domination of mature hawthorn which are in decline. It is proposed that the trees are thinned to favour the best specimens and allow the replanting of a diverse range of trees and shrubs, probably in 1.2m tree guards supported by a wooden tree stake. Species could include oak, wild cherry, hornbeam, lime, silver birch, wild service tree and sweet chestnut. Other species may include hazel, dogwood, field maple, spindle and viburnum species. This additional planting would strengthen the eastern side of the wood to help mitigate noise from the road whilst diversifying the aged tree structure currently found. Areas of scrub encroachment around the open grassland will be cut back to open this existing habitat and encourage wildflower growth. Reconnecting the relatively small openings in the tree canopy around these grasslands to create a continuous grassland may be carried out if considered in keeping with the education aims. Previous areas of coppicing and hedging should be maintained and further areas created. It is proposed that the operations within this compartment are completed over a 2-5 year period and beyond.

Compartment 3: Comprises 2.93 ha of predominantly Ash mixed broadleaved woodland. This area comprises semi mature/mature ash with generally poor form and moderate vigour. Many of the trees have a number of structural defects. Crowns are broad which suggests that the trees are of natural origin and have established at wide centres. The understorey comprises hawthorn, but not as dense as Compartments 1 and 2 with holly and some yew scattered throughout. Other species include elder, hazel and willow and silver birch. There are a few areas of broadleaves and conifers that were planted

around 10-15 years ago. These have not fared particularly well, with the broadleaves having some squirrel damage. The ground is very undulating with steep slopes and plateau areas. Some of the ground is quite boggy and marsh like and many areas are subject to seasonal water-logging. There are also 4 attractive pond areas within this Compartment, primarily situated to the south. The ponds provide interesting features and valuable habitats for wildlife. There is a stream that runs along the southern boundary that runs from west to east. The ground vegetation is generally bramble with bluebells and grasses (Nicholson, 2016).

**Management:** This compartment requires management and thinning of the canopy and underwood. Gaps will be created to allow planting as per Compartment 1. These operations need to be completed in a sympathetic manner and at a scale appropriate to the size of woodland. Furthermore, the trees around the open water regions will be cut back to create buffer zones of 5-10m reducing shading, and detrital input. New glades and rides may be created between ponds to enhance habitats, increase educational opportunities and create attractive diversity to the woodland area. Particular attention should be taken to bramble and scrub to prevent encroachment. Specific treatment of larger trees within close proximity of ponds will be considered on a tree by tree basis. A Duty of Care Survey will be carried out for the trees that boarder the entrance road and any necessary safety works to trees and dismantle/remove any unsafe wooden structures. The area of woodland nearest the site entrance has a Tree Preservation Order placed upon it. This part of the woodland was previously used as a forest school site (Corps, 2006). Some tree safety work has already been carried out here but the intention is to maintain the current tree structure.

Compartment 4: Comprises 2.52 ha of predominantly Ash mixed broadleaved woodland. Similar to Compartment 3 in structure and forming the western boundary of the woodland. Mature/semi mature ash with a light understorey of holly, elder and hawthorn. There is a significant and active badger sett within this area. Care will need to be taken not to disturb the sett during woodland operations. The terrain is quite undulating with some steep slopes. There is old wooden infrastructure throughout and a significant, but dilapidated "activity area" to the south. There are two small ponds in this area (Nicholson, 2016).

**Management:** This compartment requires management and thinning of the canopy and underwood. Gaps will be created to allow planting as per Compartment 1. These operations need to be completed in a sympathetic manner and at a scale appropriate to the size of woodland. The badger sett will need to be protected at all time during woodland operations. No works activity with machinery should happen within 20m of any sett entrance. If works are required on or close to the sett, a licence will be necessary. Carry out any necessary safety works to trees and dismantle/remove any unsafe wooden structures.

Compartment 5: Comprises 0.05 ha of predominantly Ash mixed broadleaved woodland. This small belt borders residential properties to the north/west and the of the entrance road to the south/east. It consists of ash, sycamore and mixed broadleaves with a bramble and ash understorey. The terrain is again undulating with slope falling away to the north (Nicholson, 2016).

**Management:** This compartment will only require some gentle thinning to favour the best specimens. There will be difficulties due to the undulating ground, working with the vicinity of the entrance road and residential properties to the north.

## 5.3.2. Species Groups of Interest

### 5.3.2.1. Birds:

It is hoped that the health, diversity and size of the bird population throughout the site can be improved in a number of ways. The deployment of bird nesting boxes, including two tawny owl boxes and a barn owl box at the northern end of the site will provide suitable nesting habitat for those species that are known to utilise it. Since not all species make use of artificial sites, standing dead wood with cavities will also be retained where it is not deemed a risk to visitors to the site.

The assessment of bird health, carried out by Candelin and Gosler (2016), suggests that despite the ample feeding opportunities on site, the current populations are not carrying the fat reserves that might be expected. The woodland will be managed to ensure a diverse range of fruiting species for the bird population and bird feeders will be provided to encourage birds to visit the centre for education purposes whilst also providing food for these individuals. Wood piles of fallen and felled wood will be maintained within the woodland to ensure a diverse population of terrestrial invertebrates. Planned improvements to the grassland and open water habitats and construction of sedum and green roofs will further increase the population of invertebrate species available to the birds.

Maintaining safe access to visiting groups of school children is a priority and as such some ruderal species will be landscaped where appropriate. However, important fruiting species such as bramble, hawthorn, holly, yew, blackthorn, rowan, beech and hazel will be incorporated within the woodland and along its margins.

### 5.3.2.2. Reptiles:

To improve the currently modest population of reptiles found onsite, a number of improvements are planned. Reptiles require areas to gain warmth from their external environment so work on habitats for these species will be concentrated in parts of the site that receive plenty of sunlight (Edgar *et al.*, 2010). By maintaining and increasing the open areas within and around the woodland and open water, and by building good hibernacula using rotting wood, soil, compost, logs and brash mixed with clean hard-core, we hope to enhance the existing habitat for all reptile species.

General improvements to the overall biodiversity will also increase the density and diversity of prey for these species. Reptile refuges will also be positioned around areas of grassland to provide suitable habitat and increase the educational opportunities for visiting children. Ongoing management of these areas, involving mowing and cutting, will be carefully timed and carried out to remove scrub and trees but retain important characteristics of the habitat.

#### 5.3.2.3. Bats:

There is no evidence to suggest that bats are currently using the site for roost, so it is intended that bat boxes (e.g. four Schwegler 1FF) are to be installed on buildings and within the woodland to encourage bat roosting after the development phase. General enhancement of the woodland, open water and grassland habitats will have the effect of increasing the density and diversity of invertebrates thus providing a greater diversity of prey species for bats.

A number of precautions will be adopted to encourage the use of the site by bats including the use of the lowest LUX possible and only from narrow spectrum light sources. Where possible light sources will emit minimal UV and avoid the white and blue wavelengths of the spectrum. Lights will be positioned as low as possible, using bollard or road studs and motion sensors where feasible. Light spill will be minimised by using directional lights with hoods. Sodium lamps will be used rather than LEDs where possible and hard surfaces will be designed to be non-reflective.

#### 5.3.2.4. Badgers:

No specific enhancement is planned for the badgers; however the site management will be sympathetic to their requirements. Badgers have a varied diet, including fruit, invertebrates and small mammals and it is hoped that the general enhanced biodiversity that is planned for Stansfeld Park will indirectly benefit the badger population significantly. The area around their sett will be established as a non-intervention zone to minimise disturbance during daily operation.

#### 5.3.2.5. Invertebrates:

It is anticipated that ongoing enhancement of the calcareous grassland and construction of green sedum and wildflower roofs on buildings will increase terrestrial lepidopteran biodiversity. Of particular focus will be the Brown Hairstreak butterfly (*Thecla betulae*) that lays its eggs on blackthorn and is a local species, which is widespread in a few regions in England and Wales including Oxfordshire. Blackthorn will be one of the species used to plant up boundary hedges. The composition of the green roof and any wildflower seeds used will be selected to maximise the benefits for invertebrates notably, but not exclusively, bees and butterflies, and also the birds that feed on them.

Thinning operations and an increase in areas of grassland and woodland glades will increase the diversity and density of wildflowers, with benefits to the invertebrate communities. There is currently a proliferation of deadwood on site, and further deadwood piles will be created through ongoing management of the woodland to the benefit of terrestrial invertebrates.

Since many invertebrate species have an aquatic life stage, it is to be expected that the enhancement of the open water habitats will bring considerable improvements to the overall diversity of invertebrate communities with the site. At present, the ponds have an impoverished diversity and are dominated by a few species with a particular tolerance to organic enrichment (Baker, 2015 & 2016). It is hoped that by enhancing the physical habitat and dramatically improving the chemical

composition of the incoming water, more of the sensitive species will be recorded, including water beetles, caddis-, may- and dragonflies.

#### 5.3.2.6. Bryophytes:

Beneficial to the diversity of the bryophyte community of the site will be retention of, if not an increase in, the amount of dead wood, particularly in the damp areas. Within the calcareous grassland it will also be beneficial to maintain the thin grassy sward with bare patches of soil for bryophytes to colonise. Recreational use by visiting children and families is seen as a good way to provide such habitat (Wright, 2008).

#### 5.3.2.7. Amphibians:

The conditions in the ponds at Stansfeld are currently suitable for a small to medium population of GCN, but through the pond enhancement works outlined above it is hoped that the populations of this protected species, along with those of other amphibians present, can be increased. Increasing the diversity of the open water habitat, with areas of deeper water and increasing submergent aquatic vegetation will create a favourable habitat for amphibians and for their prey species. Further work will be carried out to create suitable terrestrial hibernacula around the open water habitats for overwintering adults.

The extent to which the site is accessible to transitory organisms will change due to the creation of hardstanding upon what was previously a recreation field. It is anticipated that the woodland margins and extensive woodland immediately to the north of this area will be instead be utilised by newts moving from ponds. Drainage from any new areas of hard standing will utilise newt friendly Sustainable Urban Drainage designs rather than gully pots that might trap newts. Further details of habitat enhancement that will benefit the amphibian population is given within the Open Water Habitat Section 6.3.1.1.

## 6. Management Plan

Due to the ongoing planning application process, The Oxford Trust have only been permitted and able to carry out minimal management of the site to date. However this management has included an investigation of the pond water quality (Baker, 2015 & 2016; Lamberth, 2017), clearance of scrub around, and scything of the calcareous grassland in late 2016, clearance of encroaching scrub around the ponds in autumn 2016, and a plant health assessment (Nicholsons, 2016). As part of the planning process and in preparation for this report, a large amount of historical ecological data has been collected and is presented in the appendix to this report.

The woodland, grassland and open water habitats, if left unmanaged, would all naturally succeed into later transitional stages. As such, regular management and maintenance are required of any conserved habitat in order to routinely reset this transitional process, for example, through the mowing of grassland, thinning and replanting of new trees, or the dredging of ponds.

In this way the ecology of such environments can be preserved and enhanced in perpetuity. A well-managed diverse habitat is considered far more resilient to perturbation, be it from anthropogenic or natural sources, such as climate change, disease, recreational use or pollution.

By involving local environmental groups such as *Oxford Conservation Volunteers*, and nationally recognised expert institutions such as *The Freshwater Habitats Trust* and *Sylva Foundation*, the site will be managed to ensure it creates an ecological reservoir within the city – one that can enhance education, research and community value sympathetic to the needs of a vibrant ecosystem. We hope it will be an exemplar of how to manage such wild urban landscapes and precious resources in a sustainable and economic way.

Given the poor state of the site, significant remedial work will be required over the coming 5 years to regain the lost biodiversity capacity. Initially, work will focus on reversing the recent period of neglect, gradually carrying out further tasks to enhance and protect the woodland as time and budget allow.

As the scope of the development has become more certain, TOT have been able to consider this future management of the site and begin to timetable the works over the coming years. This management plan will be revised annually and informed by ongoing monitoring and changing needs, however the activities have been divided into **Short Term** (the next 12-18 months), **Medium Term** (the next 2-5 years) and **Long Term** (beyond five years) aims and actions, which are summarised below.

#### 6.1. Short-Term Management (Prior to opening in September 2018)

The immediate plan of activities has the following key aims ahead of the scheduled Education Centre opening date in September 2018:

- Reverse the period of neglect over the preceding five plus years due to little or no management.
- Ensure the safety of future users of the woodland areas through Tree Health Assessment and selective felling
- Rectify historic problems inherited with the pond network
- Establish a network of pathways through the woodland for access
- Enhance existing and increase overall area of grassland
- Provision of fencing to limit access to non-intervention and potentially hazardous areas of the site

These aims will be achieved through the following actions, which will involve the use of contracted and volunteer labour as necessary:

- End the input of surface water into the pond system
- Engineering supply of freshwater from building roofs to ponds
- Remove potentially contaminated sediments from the ponds by dredging
- Re-profile, refill and repopulate the newly deepened ponds
- Further and regular reduction of encroaching scrub to return overgrown sections of grassland
- Improvement of existing core (including lowland calcareous) grasslands by active management to enhance quality

- Seeding of grasslands where natural seedbank is impoverished
- Secure clear pathways (improved quality but existing routes) within the site to manage visitor impact, including boardwalks where appropriate
- Erection of fencing around hazardous regions of the site, using undergrowth as a softer barrier elsewhere to restrict entry to non-intervention areas
- Creation of managed 'education' areas to maximise learning potential and minimise impact on wildlife
- Creation of an expertly specified green roof as a specific ecological feature of the site and an incubator for further enhancements elsewhere on the site.
- Identify specimens for thinning in woodland Compartments 1 and 2 in the first instance

## 6.2. Medium-Term Management (2-5 Years)

In the medium term, the plan of activities has the following key aims over the four years after the Education Centre opens in September 2018:

- Introduce diversity to the age structure and species composition of the woodland for resilience and resistance
- Establish diverse habitat structures throughout the site including grassland and wetland regions
- Ensure the intensity of education and other activities are sympathetic to the biodiversity needs
- Maximise the educational opportunities that the site provides
- Using expert guidance at all times make introductions of selected species to the woodland
- Establishment of a regular inspection and maintenance schedule of the site's infrastructure

These aims will be achieved through the following actions, which will involve the use of contracted and volunteer labour as necessary:

- Establishment of new aquatic habitats on site including marshland and open water elements using the clay pits that exist and relining them if appropriate
- Ongoing introduction of native plant species to ponds with the aim of providing a botanical collection site
- Regular scrub clearance to prevent encroachment of grasslands
- Establishment of mowing regimes (possibly varied) in grassland regions
- Collection of seed heads from wildflower regions for seeding other areas on site
- Ongoing invasive and nuisance species control through trapping (squirrels) shooting (deer) or plant removal as required
- Completion of Tree Health Assessments every 2 years
- Selective thinning in all woodland compartments for safety and conservation, and creation of habitat piles
- Active replanting of major native tree species in Compartments 2 and 3
- Creation of an on-site nursery as space allows

- Creation of regions of coppice within the woodland to introduce

### 6.3. Long-Term Management (5+ Years)

Once the Education Centre opens in September 2018, there will be a regular inspection and maintenance schedule established which will continue to be revised using input from ongoing monitoring and assessment. The plan of activities has the following key long term aims:

- Routine inspection and maintenance of site access and infrastructure following an established schedule
- Regular woodland management on a rotational basis
- Regular pond maintenance to retain open water habitat for conservation and education
- Regular grassland management to promote wildflower species and prevent encroachment
- Control of nuisance and invasive species as deemed necessary by monitoring

These aims will be achieved through the following actions, which will involve the use of contracted and volunteer labour as necessary:

- Completion of Tree Health Assessments every 2 years
- Selective thinning in all woodland compartments for safety and conservation and creation of habitat piles on a rotational basis ensuring adjacent areas are undisturbed for 2-3 year periods
- Active replanting of major native tree species in Compartments 1, 4 and 5 initially and then on rotation on an ongoing basis
- Regular scrub clearance to prevent encroachment of grasslands
- Continuation of mowing regimes in grassland regions
- Collection of seed heads from wildflower regions for reseeded as required
- Ongoing invasive and nuisance species control through trapping (squirrels) shooting (deer) or plant removal as required
- Regular pond maintenance, including dredging on 5-10 yearly basis, removal of encroaching aquatic and terrestrial vegetation annually and creation of newt hibernacula

## **7. Expected Benefits and Ongoing Monitoring**

TOT anticipate the biodiversity benefits of our plans for the site to be large and, due to the important geographical placement of the park, far reaching. While the biodiversity management has already begun on a small scale, the works will increase considerably in the lead up to the intended development completion date of September 2018. After this time, the buildings will be occupied and the site attended the local community, centre staff and school visitors.

Annual assessments will be made by us to track progress and inform the evolution of this biodiversity plan; reactive management will be taken as and when required. Due to the seasonality of the inhabitants, this monitoring and assessment will be carried out at key points throughout the year, with reporting occurring in November. In this way planning decisions can be made in advance of the following spring when much of that year's work would begin in earnest. The responsibility of ongoing monitoring will fall to the Outdoor Education Manager allowing it to be completed with the education

aims in mind. Our current business model allows for an appropriately significant sum assigned to environmental management at the site each year.

The annual report will provide a summary of the site management over the previous reporting period and include details of the volunteer and contractor activities. It will include an assessment of the diversity and density of the key species on site, and identify any losses or gains that year with due consideration of these in context of the site management. Progress made on the previous actions will be recorded, particularly on those elements that are completed on rotation across several years. The report will also identify desirable actions for the year ahead (short term) as well as medium (2-5 years) and long terms (5+ year).

## **8. Acknowledgements**

The writing of this report and plans therein have been made possible by contributions from a large number of people who have offered practical advice, data or labour to the project. We hope that many of these contributors will continue their involvement in the site over the coming years and witness the changes we have planned for themselves.

Many thanks all those who have been involved including Judy Webb; Chris Skepper and Phil Hunter on behalf of the Oxford Conservation Volunteers (OCV); Andy Gosler and George Candelin on behalf of the Oxfordshire Bird Ringers; Pascale Nicolet from the Freshwater Habitats Trust; Rob Davis and Tom Wickens from the Environment Agency; Mark Bradfield and Neil Clennell from BBOWT; Richard Bradley on behalf of the Friends of Stansfeld; Caroline Steele on behalf of Butterfly Conservation Upper Thames Branch; Julie Kerrans and Rachael Clemson on behalf of the Thames Valley Environmental Records Centre.

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## 10. Appendices

### 10.1. Pond Survey Data:

Species lists from Baker 2015 & 2016.

Macroinvertebrate survey August 2015 (Baker, 2015)			
Freshwater group	Species name	Common name	Numbers
Aesnidae	<i>Aeshna cyanea</i>	Southern Hawker dragonfly larvae	6
Gammaridae	<i>Crangonyx pseudogracilis</i>	Freshwater shrimp	530
Gerridae	<i>Gerris sp.</i>	Pond Skater	1
Notonectidae	<i>Notonecta glauca</i>	Backswimmer	23
Corixidae	<i>Corixa punctata</i>	Lesser water boatman	8
Haliplidae	<i>Haliplus rufficollis grp.</i>	Water beetle	2
Dytiscidae (Noteridae)	<i>Noterus clavicornis</i>	Water beetle	1 (+larvae?)
	<i>Illybius subaenus</i>	Water beetle	1 (+larvae?)
	<i>Acilius sulcatus</i>	Lesser diving beetle	1
	<i>Colymbetes fuscus</i>	Water beetle	1
	<i>Hydaticus seminiger</i>	Water beetle	1
Hydrophilidae (Hydraenidae)	<i>Heleophorus sp.</i>	Water beetle	1
Baetidae	<i>Cloeon dipterum</i>	Pond Olive mayfly larvae	68
Sphaeridae	<i>Sphaeridium</i>	Pea mussel	1
Glossiphonidae	<i>Glossiphonia complanata</i>	Leech	3
	<i>Helobdella stagnalis</i>	Leech	49
Asellidae	<i>Asellus aquaticus</i>	Water hoglouse	670
Oligochaeta		Segmented worm	5
Chironomidae		Non-biting midge larvae	1300
Chaoboridae	<i>Chaoborus sp.</i>	Phantom midge larvae	5
Culculidae		Mosquito larvae	17
Cladocera		Water fleas	2
Copepoda		Water fleas	2

<b>Macroinvertebrate survey October 2016 (Baker, 2016)</b>			
<b>Freshwater group</b>	<b>Species name</b>	<b>Common name</b>	<b>Number</b>
Limnephilidae	<i>Glyptotaelius pellucidus</i>	Caddis fly larvae	1
Gammaridae	<i>Crangonyx pseudogracilis</i>	Freshwater shrimp	170
Gerridae	<i>Gerris sp.</i>	Pond Skater	1
Notonectidae	<i>Notonecta glauca</i>	Backswimmer	3
Corixidae	<i>Corixa punctate</i>	Lesser water boatman	19
Baetidae	<i>Cloeon dipterum</i>	Pond Olive mayfly larvae	265
Sphaeridae	<i>Sphaeridium</i>	Pea mussel	2
Physidae	<i>Physella acuta</i>	Water snail	9
Glossiphonidae	<i>Glossiphonia complanata</i>	Leech	4
	<i>Helobdella stagnalis</i>	Leech	14
Asellidae	<i>Asellus aquaticus</i>	Water hoglouse	305
Oligochaeta		Segmented worm	2
Chironomidae		Non-biting midge larvae	220
Chaoboridae	<i>Chaoborus sp.</i>	Phantom midge larvae	15
Cladocera		Water fleas	2
Copepoda		Water fleas	4
Hydracarina		Water mite	1

<b>Aquatic macrophyte survey August 2015 (Baker, 2015)</b>		
<b>Emergent plants</b>		
<i>Equisetum fluviatile</i>	<i>Glyceria maxima</i>	<i>Iris pseudacorus</i>
<i>Solanum dulcamara</i>	<i>Typha latifolia</i>	
<b>Floating leaved plants</b>		
<i>Lemna minor</i>		
<b>Submerged plants</b>		
<i>Callitriche sp.</i>		

From Ecoconsult, 2016c

		Newt numbers recorded per visit by torching and trapping methods combined	
Pond	Survey Date	Great Crested Newts	Smooth Newts
1	21/03/16	14	11
	04/04/16	5	29
	19/04/16	5	51
	03/05/16	11	57
	12/05/16	16	26
	27/05/16	3	42
2	21/03/16		5
	04/04/16	3	44
	19/04/16	10	98
	03/05/16	19	140
	12/05/16	13	119
	27/05/16	8	132
3	21/03/16		3
	04/04/16		16
	19/04/16		1
	03/05/16		9
	12/05/16		11
	27/05/16		29
4	21/03/16		3
	04/04/16		10
	19/04/16	1	6
	03/05/16	1	10
	12/05/16	2	21
	27/05/16		6
5	21/03/16	4	8
	04/04/16	10	28
	19/04/16	4	25
	03/05/16	1	20
	12/05/16	1	21
	27/05/16	2	8
6	21/03/16	9	16
	04/04/16	11	14
	19/04/16	4	7
	03/05/16	4	7
	12/05/16	2	23
	27/05/16	2	12

10.2. Bird Survey Data

Species recorded at Stansfeld 17/09/16 to 17/12/16 from Gosler & Candelin (2016)	Occasions Recorded
Black-headed Gull	2
Blackbird	9
Blue Tit	9
Bullfinch	8
Buzzard	7
Carrion Crow	6
Chaffinch	8
Chiffchaff	1
Coal Tit	2
Collared Dove	2
Dunnock	7
Fieldfare	4
Goldcrest	8
Goldfinch	3
Great Spotted Woodpecker	7
Great Tit	9
Green Woodpecker	7
Greenfinch	1
Grey Heron	4
Grey Wagtail	7
Herring Gull	1
Jay	7
Lesser Black-backed Gull	1
Lesser Whitethroat	1
Long-tailed Tit	3
Magpie	7
Mallard	8
Meadow Pipit	1
Moorhen	7
Pied/White Wagtail	2
Raven	2
Red Kite	9
Redwing	2
Robin	8
(Feral Pigeon)	3
Siskin	1
Skylark	2
Snipe	1
Song Thrush	1
Sparrowhawk	3
Starling	5
Stock Dove	4
Tawny Owl	2
Woodpigeon	8
Wren	9

10.3. Terrestrial Survey Data

Scientific name	Common name	2002 Survey Presence/Absence	2015 Survey DAFOR
<i>Agrimonia eupatoria</i>	Agrimony	P	
<i>Agrostis stolonifera</i>	Creeping bent	P	O
<i>Anisantha sterilis</i>	Barren brome	P	O
<i>Arctium minus</i>	Lesser burdock		R
<i>Arrhenatherum elatius</i>	Oat grass	P	F
<i>Artemisia vulgaris</i>	Mugwort		R
<i>Bellis perennis</i>	Daisy	P	
<i>Centaurea nigra</i>	Black knapweed		LF
<i>Cerastium fontanum</i>	Common mouse-ear	P	O
<i>Cirsium arvense</i>	Creeping thistle	P	R
<i>Cirsium vulgare</i>	Spear thistle		R
<i>Crepis capillaries</i>	Smooth hawks-beard	P	
<i>Cynosurus cristatus</i>	Crested dogstail		O
<i>Dactylis glomerata</i>	Cocksfoot	P	O
<i>Festuca rubra</i> agg.	Red Fescue agg.	P	LD-A
<i>Holcus lanatus</i>	Yorkshire fog	P	O
<i>Hordeum secalinum</i>	Meadow barley	P	O
<i>Hypericum hirsutum</i>	Hairy St John's Wort	P	
<i>Lathyrus pratensis</i>	Meadow vetchling	P	
<i>Lolium perenne</i>	Perennial rye-grass	P	O
<i>Lotus corniculatus</i>	Common bird's-foot-trefoil		O
<i>Medicago lupulina</i>	Black medick	P	+
<i>Phleum bertolonii</i>	Smaller cat's-tail	P	O
<i>Plantago lanceolata</i>	Ribwort plantain	P	LF
<i>Plantago major</i>	Broad-leaved plantain	P	
<i>Poa annua</i>	Annual meadow-grass	P	
<i>Poa pratensis</i>	Smooth meadow-grass		O
<i>Potentilla reptans</i>	Creeping cinquefoil	P	O
<i>Prunella vulgaris</i>	Self-heal	P	O
<i>Ranunculus acris</i>	Meadow buttercup	P	
<i>Ranunculus repens</i>	Creeping buttercup	P	O
<i>Rubus fruticosus</i> agg.	Bramble agg.	P	R
<i>Rumex conglomeratus</i>	Clustered dock		R
<i>Rumex obtusifolia</i>	Broad-leaved dock	P	
<i>Senecio jacobaea</i>	Common ragwort	P	
<i>Sisymbrium officinale</i>	Hedge mustard	P	
<i>Taraxacum officinale</i> agg.	Dandelion	P	O
<i>Trifolium pratense</i>	Red clover	P	R
<i>Trifolium repens</i>	White clover	P	O
<i>Trisetum flavescens</i>	Yellow oat grass	P	
<i>Urtica dioica</i>	Common nettle	P	R

Ecoconsult (2016b) – floral diversity of recreation ground (Area 4 on Figure 18).

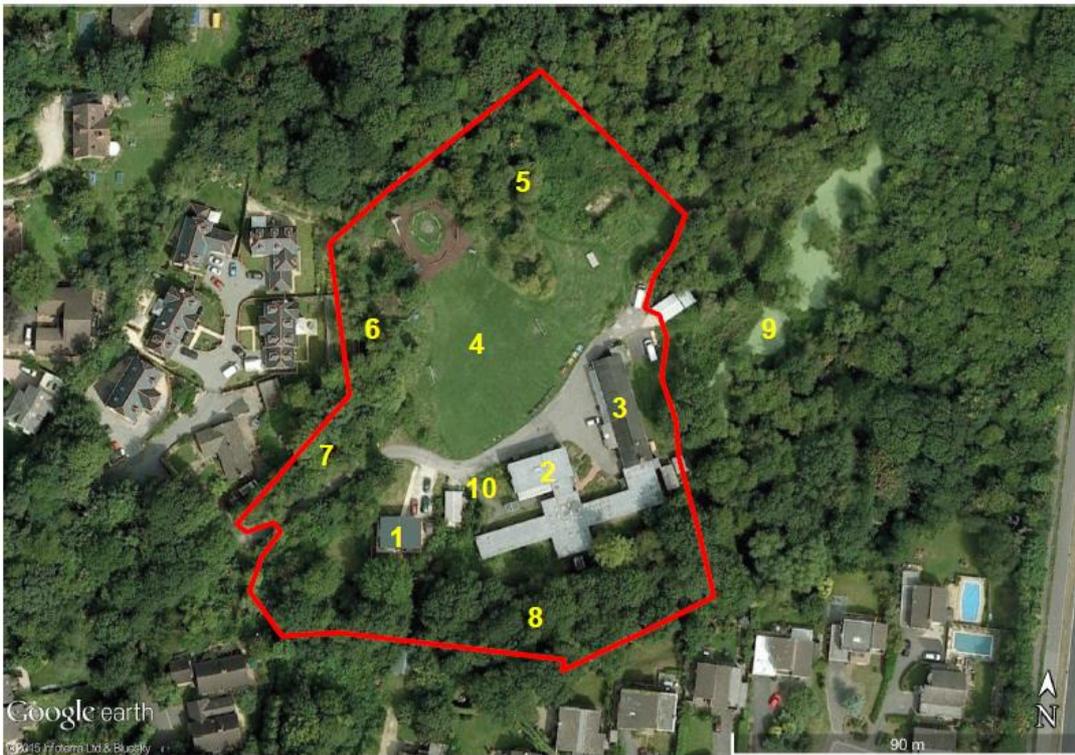


Figure 19: Habitat areas described by Ecoconsult in 2016 (Ecoconsult, 2016b)

Woodland regions surrounding the recreation area:

Ecoconsult (2016b) Woodland regions floral species lists

Scientific name	Common name	Area 5*	Area 7*
<i>Acer pseudoplatanus</i>	Sycamore	F	O
<i>Arrhenatherum elatius</i>	Oat grass	R	
<i>Betula pubescens</i>	Downy birch	R	O
<i>Bromopsis ramosa</i>	Hairy brome	R	
<i>Carex sylvatica</i>	Wood sedge	R	
<i>Crataegus monogyna</i>	Hawthorn	A	A
<i>Cupressus sp.</i>	Cypress species	R	
<i>Dactylis glomerata</i>	Cock's-foot	O	
<i>Fagus sylvatica</i>	Beech	R	
<i>Fraxinus excelsior</i>	Ash	O	O
<i>Glechoma hederacea</i>	Ground ivy	O	
<i>Hedera helix</i>	Common ivy	F	A
<i>Ilex aquifolium</i>	Holly	R	O
<i>Ligustrum vulgare</i>	Wild privet	R	R
<i>Myosotis sp.</i>	forget-me-not	R	
<i>Pinus sp.</i>	pine	R	
<i>Prunus domestica</i>	Plum	R	
<i>Rosa canina agg.</i>	Dog rose agg.	R	
<i>Rubus fruticosus agg.</i>	Bramble agg.	A	LA
<i>Sambucus nigra</i>	Elder	R	O
<i>Stachys sylvatica</i>	Hedge woundwort	R	
<i>Urtica dioica</i>	Common nettle	F	
<i>Cedrus deodara</i>	Deodar	R	

\*Areas refer to Figure 18

TVERC records for Stansfeld Field Study Centre– report generated 01/02/15 (TVERC, 2015)

Common Name	Scientific name	Date(s) observed
Sea-buckthorn	<i>Hippophae rhamnoides</i>	1976 - 1991
Sea-buckthorn	<i>Hippophae rhamnoides</i>	1992
Sea-buckthorn	<i>Hippophae rhamnoides</i>	04/06/2002
Bluebell	<i>Hyacinthoides non-scripta</i>	1976
Bluebell	<i>Hyacinthoides non-scripta</i>	07/07/2002
Small Heath	<i>Coenonympha pamphilus</i>	Pre 1985
Grey Dagger	<i>Acronicta psi</i>	Pre 1985
Palmate Newt	<i>Lissotriton helveticus</i>	2004
Smooth Newt	<i>Lissotriton vulgaris</i>	25/05/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	24/05/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	25/05/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	25/05/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	2004
Smooth Newt	<i>Lissotriton vulgaris</i>	01/06/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	07/06/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	06/06/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	07/06/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	01/06/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	01/06/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	25/05/2005
Smooth Newt	<i>Lissotriton vulgaris</i>	25/05/2005
Great Crested Newt	<i>Triturus cristatus</i>	25/05/2005
Great Crested Newt	<i>Triturus cristatus</i>	24/05/2005
Great Crested Newt	<i>Triturus cristatus</i>	25/05/2005
Great Crested Newt	<i>Triturus cristatus</i>	2004
Great Crested Newt	<i>Triturus cristatus</i>	24/05/2005
Great Crested Newt	<i>Triturus cristatus</i>	25/05/2005
Common Toad	<i>Bufo bufo</i>	2004
Common Frog	<i>Rana temporaria</i>	25/05/2005
Common Frog	<i>Rana temporaria</i>	2004
Common Frog	<i>Rana temporaria</i>	07/06/2005
Common Frog	<i>Rana temporaria</i>	01/06/2005
Common Frog	<i>Rana temporaria</i>	24/05/2005
Common Frog	<i>Rana temporaria</i>	25/05/2005
Common Frog	<i>Rana temporaria</i>	07/06/2005
Common Frog	<i>Rana temporaria</i>	24/05/2005
Common	<i>Rana temporaria</i>	19/08/2005
Mallard Anas	<i>Anas platyrhynchos</i>	1976
Goshawk	<i>Accipiter gentilis</i>	1976
Kestrel	<i>Falco tinnunculus</i>	1976
Lapwing Vanellus	<i>Vanellus vanellus</i>	1976
Common Gull	<i>Larus canus</i>	1976 - 1991
Lesser Black-backed Gull	<i>Larus fuscus</i>	1976 - 1991
Herring Gull	<i>Larus argentatus</i>	1976 - 1991

Black-headed Gull	<i>Chroicocephalus ridibundus</i>	1976 - 1991
Cuckoo	<i>Cuculus canorus</i>	1976 - 1991
Swift	<i>Apus apus</i>	1976 - 1991
Kingfisher	<i>Alcedo atthis</i>	1976 - 1991
Green Woodpecker	<i>Picus viridis</i>	1976 - 1991
Lesser Spotted Woodpecker	<i>Dendrocopos minor</i>	1976 - 1991
Wood Warbler	<i>Phylloscopus sibilatrix</i>	1976 - 1991
Willow Warbler	<i>Phylloscopus trochilus</i>	1976 - 1991
Swallow	<i>Hirundo rustica</i>	1976 - 1991
House Martin	<i>Delichon urbicum</i>	1976 - 1991
Grey Wagtail	<i>Motacilla cinerea</i>	1976 - 1991
Dunnock	<i>Prunella modularis</i>	1976 - 1991
Nightingale	<i>Luscinia megarhynchos</i>	1976 - 1991
Fieldfare	<i>Turdus pilaris</i>	1976 - 1991
Song Thrush	<i>Thrush Turdus</i>	1976 - 1991
Redwing	<i>Turdus iliacus</i>	1976 - 1991
Mistle Thrush	<i>Turdus viscivorus</i>	1976 - 1991
Pied Flycatcher	<i>Ficedula hypoleuca</i>	1976 - 1991
Whitethroat	<i>Sylvia communis</i>	1976 - 1991
Willow Tit	<i>Poecile montana</i>	1976 - 1991
Marsh Tit	<i>Poecile palustris</i>	1976 - 1991
Starling	<i>Sturnus vulgaris</i>	1976 - 1991
House Sparrow	<i>Passer domesticus</i>	1976 - 1991
Tree Sparrow	<i>Passer montanus</i>	1976 - 1991
Brambling	<i>Fringilla montifringilla</i>	1976 - 1991
Bullfinch	<i>Pyrrhula pyrrhula</i>	1976 - 1991
Slow-worm	<i>Anguis fragilis</i>	2004
Grass Snake	<i>Natrix natrix</i>	2004
Eurasian Badger	<i>Meles meles</i>	1976 - 1992
Eurasian Badger	<i>Meles meles</i>	2004
Eurasian Badger	<i>Meles meles</i>	2007
West European Hedgehog	<i>Erinaceus europaeus</i>	1976 - 1992
Common Pipistrelle	<i>Pipistrelle Pipistrellus</i>	1976 - 1992

Survey carried out in autumn 2014

Common name	Scientific name	Buildings and surrounds	TPO region	Recreation field
Sycamore	<i>Acer pseudoplatanus</i>		*	
Yarrow	<i>Achillea millefolium</i>	*		*
Common horse chestnut	<i>Aesculus hippocastanum</i>		*	
Agrimony	<i>Agrimonia eupatoriua</i>			*
Creeping bent grass	<i>Agrostis stolonifera</i>			*
Garlic mustard	<i>Alliaria petiolate</i>		*	
Ornamental alder	<i>Alnus sp.</i>			*
Cow parsley	<i>Anthriscus sylvestris</i>		*	
Burdock	<i>Arctium sp.</i>			*
False oat grass	<i>Arrhenatherum elatius</i>			*
Common daisy	<i>Bellis perennis</i>			*
Silver birch	<i>Betula pendula</i>			*
False brome	<i>Brachypodium sylvaticum</i>		*	
Buddleia	<i>Buddleja davidii</i>	*		
Hairy sedge	<i>Carex hirtum</i>			*
Pendulous sedge	<i>Carex pendula</i>			*
Wood sedge	<i>Carex sylvatica</i>		*	
Common knapweed	<i>Centaurea nigra</i>			*
Creeping thistle	<i>Cirsium arvense</i>	*		*
Hazel	<i>Corylus avellana</i>		*	
Common hawthorn	<i>Cratagegus monogyna</i>		*	*
Cock's foot grass	<i>Dactylis glomerata</i>			*
Wild carrot	<i>Daucus carota</i>			*
Field horsetail	<i>Equisetum arvense</i>	*		*
Tall fescue	<i>Festuca arundinacea</i>			*
Red fescue	<i>Festuca rubra</i>	*		*
Ash	<i>Fraxinus excelsior</i>		*	
Cut leaved crane's bill	<i>Geranium dissectum</i>			*
Dove's foot crane's bill	<i>Geranium molle</i>			*
Herb Robert	<i>Geranium robertianum</i>		*	
Ivy	<i>Hedera helix</i>		*	
Hogweed	<i>Heracleum sphondylium</i>			*
Yorkshire fog	<i>Holcus lanatus</i>			*
Meadow barley	<i>Hordeum secalinum</i>			*
Holly	<i>Ilex aquifolium</i>		*	
Hard rush	<i>Juncus inflexus</i>			*

Variegated yellow archangel	<i>Lamium galeobdolon v. argentatum</i>		*	
Autumnal hawkbit	<i>Leontodon autumnalis</i>			*
Wild privet	<i>Ligustrum vulgare</i>		*	
Perennial ryegrass	<i>Lolium perenne</i>			*
Bird's foot trefoil	<i>Lotus corniculatus</i>			*
Domestic apple	<i>Malus domestica</i>	*		
Crab apple	<i>Malus sylvestris</i>		*	
Ornamental crab apple	<i>Malus sp.</i>	*		*
Red Bartsia	<i>Odontites verna</i>			*
Timothy	<i>Phleum pratense</i>			*
Ribwort plantain	<i>Plantago lanceolata</i>			*
Greater plantain	<i>Plantago major</i>			*
Silverweed	<i>Potentilla anserina</i>			*
Cinquefoil	<i>Potentilla reptans</i>			*
Self heal	<i>Prunella vulgaris</i>	*		*
Wild cherry	<i>Prunus avium</i>		*	
Ornamental flowering cherry	<i>Prunus sp.</i>	*		
Blackthorn	<i>Prunus spinosa</i>		*	
Common pear	<i>Pyrus communis</i>	*		
Pedunculate oak	<i>Quercus robur</i>		*	
Creeping buttercup	<i>Ranunculus repens</i>			*
Meadow buttercup	<i>Ranunculus acris</i>			*
Bulbous buttercup	<i>Ranunculus bulbosus</i>			*
Redcurrant	<i>Ribes rubrum</i>		*	
Gooseberry	<i>Ribes uva-crispa</i>		*	
Dewberry	<i>Rubus cespitosus</i>	*	*	
Bramble	<i>Rubus fruticosus</i>	*	*	*
Broad leaved dock	<i>Rumex obtusifolius</i>			*
Goat willow	<i>Salix caprea</i>		*	
Grey willow	<i>Salix cinerea</i>			
Crack willow	<i>Salix fragilis</i>			*
Elder	<i>Sambucus nigra</i>		*	*
Hoary ragwort	<i>Senecio erucifolius</i>			*
Stone parsley	<i>Sison amomum</i>	*		*
Hybrid whitebeam	<i>Sorbus sp.</i>	*		
Hedge woundwort	<i>Stachys sylvatica</i>		*	
Snowberry	<i>Symphoricarpos alba</i>		*	
Dandelion	<i>Taraxacum sp.</i>			*
Large leaved lime	<i>Tilia platyphyllos</i>		*	
Upright hedge parsley	<i>Torilis japonicas</i>	*		
Strawberry clover	<i>Trifolium fragiferum</i>			*

Red clover	<i>Trifolium pratense</i>			*
White clover	<i>Trifolium repens</i>			*
Wych Elm	<i>Ulmus glabra</i>		*	
Common nettle	<i>Urtica dioica</i>	*	*	*
Germander speedwell	<i>Veronica chamaedrys</i>			*
Tufted vetch	<i>Vicia cracca</i>			*
Leyland Cypress cf	<i>Cupressocyparis leylandii</i>	*		
Unidentified ornamental conifer		*		*
Rough stalked feather moss	<i>Brachythecium rutabulum</i>	*		*
Common spear moss	<i>Calliergonella cuspidate</i>	*		*
A pocket moss species	<i>Fissidens sp.</i>		*	
Spiky wall feather moss	<i>Homalothecium sericum</i>	*		
Common feather moss	<i>Kindbergia praelonga</i>		*	
Crescent cup liverwort	<i>Lunularia cruciate</i>	*		
Endive pellia liverwort	<i>Pellia endiviifolia</i>	*		
Springy turf moss	<i>Rhytidiadelphus squarrosus</i>	*		*
Foxtail feather moss	<i>Thamnobryum alopecurum</i>		*	
Trooping crumble cap	<i>Coprinellus disseminates</i>		*	
An encrusting fungus	<i>Coniophora puteana</i>			*
Cramp ball	<i>Daldinia concentrica</i>		*	
Jelly ear	<i>Auricularia auricular judae</i>		*	
Brown lipped banded snail	<i>Cepaea nemoralis</i>			*
Yellow slug	<i>Limax flavus</i>			*
Orange ladybird	<i>Halysia sedecimguttata</i>			*
Grey squirrel	<i>Sciurus carolinensis</i>		*	
European robin	<i>Erithacus rubecula</i>		*	*
Reeve's muntjac deer	<i>Muntiacus reevesi</i>		*	
Woodlouse	<i>Oniscus asellus</i>			*
Pheasant	<i>Phasianus colchicus</i>			*