

**Investigation of the possible ecological effects on
the Lye Valley Sites of Special Scientific Interest
and the riparian zones of the Lye and Boundary
Brooks as a result of development on Southfield
Golf Course**

A pre –EIA assessment

Report to Oxford City Council

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The Author:

Dr Judith A Webb is an ecologist with 30 years experience of habitats in the Oxford area and has known the Lye Valley since 1989. She specialises in the identification of higher plants, mosses and liverworts, fungi and insects. She regularly surveys habitats and contributes records to the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT), the Thames Valley Environmental Records Centre, the Botanical Society of the British Isles (BSBI) and the Rare Plants Register; as well as advising local groups on management for wildlife sites. She is the recorder for the Fungus Survey of Oxfordshire and a committee member of the Dipterists Forum (national group concerned with recording and conservation of flies). Dr Webb also has 23 years of experience teaching biology to A-level and in running ecology field courses for A-level students. She regularly leads walks and gives talks to the public locally on a range of wildlife themes.

SUMMARY

Oxford City Council recently consulted on '**Oxford 2026 Core Strategy Preferred Options Document**', which contained options for possible housing development of 380 dwellings on Southfield Golf course East and 1,260 dwellings on Southfield Golf Course West in the Lye Valley. The proposed development areas are located in the proximity of the riparian corridors of the Boundary and Lye Brooks, which contain very environmentally sensitive sites including a SSSI, Sites of Local Importance for Nature Conservation and Wildlife Corridor areas which adjoin Southfield golf course. The SSSI comprises two units (the North Fen and South Fen) which are examples of the rare habitat described as spring-fed, calcareous, valley fens. Many species of conservation importance are found here which are highly dependent on the unusual local hydrology. Numerous calcareous springs are also important in the SLINC and corridor areas. This study has confirmed the importance of the SLINC and corridor areas for wildlife with the discovery of species of conservation status not previously recorded on site. It has also confirmed the importance of the SSSI areas at a national level, even though one (the South Fen) is currently not in optimal condition.

The conclusions regarding the impacts of the proposed developments are as follows.

The Boundary Brook wildlife corridor in Area B will be at serious risk of damage from the West development. The North Fen and corridor of Area A will be at moderate risk. Corridor and SLINC areas E and F will also be at severe risk of damage. See Figure 1.

The South Fen SSSI unit and the wildlife corridor in Area D (wooded zone around the Lye Brook and mown golf course area around the Lye Brook) will be at serious risk of damage from the East development. Damage to SLINC and corridor areas E and F (mown golf course with copses and rough grassland, scrub and wet areas) will be moderate to slight.

If both West and East housing developments go ahead, all areas except G (Cowley Marsh) are expected to suffer at least slight damage. This is expected to be severe to moderate in the riparian corridor of the Boundary Brook, the South Fen and the riparian corridor below the South Fen down to Barracks Lane. Damage to the North Fen and corridor would be moderate.

For all areas, predicted damage depends critically on limitation of access and the siting of access positions to the green areas. Predicted damage also depends on whether or not the Golf club can continue to function in the area.

This study has also shown that the grassland areas of the proposed East development (Area H) have relict dry calcareous grassland of conservation value.

The idea of ecological buffer zones for the protected SSSI and SLINC areas has been discussed. Possible mitigation measures are mentioned including: re-wetting of the North and South fens, indian balsam eradication from the valley, restoration of calcareous grassland, encouragement of flower-rich hay-meadow areas, provision of areas for ground nesting bees and wasps, increase in wetland provision and increase of tree provision on site.

Suggestions for further investigations are given.

1.0 Introduction

Oxford City Council recently consulted on '**Oxford 2026 Core Strategy Preferred Options Document**', which contained options for possible housing development on Southfield Golf course East and West. See the map in Figure 1.

The estimated numbers of dwellings that these two sites could accommodate are:

- Southfield Golf Course East: 380
- Southfield Golf Course west: 1,260

The proposed development areas are located in the proximity of the riparian corridors of the Boundary and Lye Brooks, which contain very environmentally sensitive sites including two Sites of Special Scientific Interest (SSSIs), Sites of Local Importance for Nature Conservation (SLINCs) and a County Wildlife Site.

The SSSIs are noted for their rare valley fen habitats that are dependent on special local hydrology

1.1 Scope of the study

- Concentration on the *off-site* ecological impacts of the proposed developments on the SSSI, SLINC and CORRIDOR areas in the Lye Valley and not on the areas of development themselves.
- An outline of the possible ecological impacts on these areas in the Lye Valley as a result of development on sites Southfield Gold Course East and West.
- Identification of areas of concern such as:
 - a. recreation pressures including vandalism
 - b. effect on species of changes in the hydrology
 - c. loss of habitat in the vicinity of the Lye Valley fens
 - d. impacts of the development on important species during pre and post construction
 - e. size of any buffer zones between developments and protected wildlife areas
 - f. Identification of possible methods to mitigate adverse impacts.
 - g. comments on possible habitat 'creation' opportunities and 'enhancements' to biodiversity of the Lye Valley
- This study is not designed to be a full EIA but will be written as a part basis for an EIA and recommendations for the full EIA are given.

1.2 BAP Habitats in the Lye Valley

The Lye Valley contains the following BAP (Biodiversity Action Plan) Priority Habitats – **Lowland Fen** and **Wet Woodland** well represented; with small representations of **Lowland Calcareous Grassland** and **Wood Pasture and Parkland**. The reader is referred to the **New UK Priority Habitat List** for full details of the new names and descriptions of the relevant habitats (1).

1.3 Ecological history

For centuries, until the 1930s, the main area of the Lye Valley was rough grassland, marsh or fen maintained by grazing, with very few trees. Management by Southfield Golf Club maintains the short grassland element of this history, in the fairways and greens. Wet woodland is a fairly recent development by succession in some of the fen and marsh areas; as a consequence of the cessation of grazing sometime in the first half of the twentieth century. However, the rich calcareous fen areas remain much as they have always been, because of the continuity of the low nutrient, high calcium spring water that controls their development. They are habitats therefore of great **antiquity**. The plant and animal species of each of the fens have been *on that spot* for perhaps the last 8,000-10,000 years, since they colonised the spring areas after the retreat of the ice at the end of the last glaciation.

1.4 Historic species recording

The value of the wildlife habitats in the Lye Valley is enhanced by the fact that they have a long historical history of species recording in particular by famous early botanists and entomologists based at Oxford University. The '*Draft Management Plan for the Lye Valley*' (2) produced by Oxford City Council around 1986, contains research drawing together many of the previous species records for the site. A few centuries ago, the site was mostly grazed with some reed cutting, had few trees and had extensive areas of calcareous fen and calcareous grassland with many attractive plant species which drew the attention of early botanists at the Oxford University, right from the 1600s to the 1920s. Historic records show the site was known variously as **Bullington Bog, Hockley-in-ye-hole, Hogley Bog or Ogley Bog** as well as **Lye Valley**. Over 300 species of vascular plants are recorded from the site. The first botanical record of the attractive, white-flowered **grass-of-Parnassus** (*Parnassia palustris*) in the whole of Britain was made from the fen area here.



Parnassia palustris, Lye Valley South Fen

2.0 Investigation Methodology

2.1 Consultation with stakeholders

Discussions have taken place with representatives of Natural England and Oxfordshire County Council (County Ecologist). Unfortunately no discussions were possible with the Oxford Countryside Service Ranger (OCSR) with most knowledge of the site (Anthony Roberts) due to his absence on sick leave during the study time of this project. However I have drawn on extensive previous discussions with OCSR's Antony Roberts over a six-year period regarding this site. Other consultees have included representatives of the Rare Plants Group of the Ashmolean Natural History Society, TVERC, invertebrate specialists at the Oxford University Museum and invertebrate specialists who have previously recorded at the site.

2.2 Field Survey Methods:

2.2.1 Timing

8 site visits of part days were made to the Lye Valley on the following dates: 2nd, 7th, 11th, 13th, 15th, 18th, 20th and 21st September 2007. Good weather was encountered on all days and considerable quantities of records were achieved.

2.2.2 Data collection

On each visit to a study area, the plant and animal species were identified by observation, signs of animal activity were noted and invertebrates were collected by sweep netting or by hand searching. Fungi were noted and some collected for the rearing of invertebrates which breed in the caps.

2.2.3 Survey areas:

For ease of description and discussion I have divided up the area covered in this report into the following zones (see Figures 1 and 2 for annotated map and annotated aerial photograph):

Area A: Riparian Corridor to the Lye Brook (SLINC areas and LNR) encompassing and including the North Fen SSSI unit

Area B: Riparian Corridor to the Boundary brook (SLINC) adjacent to the Churchill Hospital to the NE and Southfield golf course to the SW

Area C: Riparian Corridor to the Lye Brook (SLINC) south of confluence of Lye and Boundary Brooks down to, and encompassing, the South Fen SSSI unit

Area D: Riparian Corridor and portion of golf course along Lye Brook south of the South Fen SSSI unit down to Barracks Lane (NE. 20 Wildlife Corridor)

Area E: Golf course portion to west of the South Fen and north west of area D. (NE. 20, Wildlife Corridor)

Area F: Land East of Oxford Community School playing field, adjacent to Barracks Lane (SLINC)

Area G: Cowley Marsh (County Wildlife Site/SLINC) across Barracks Lane from Area F

Area H: Golf Course area adjacent to Hollow Way and Barracks Lane. No conservation designation.

Figure 1: Annotated map showing study areas

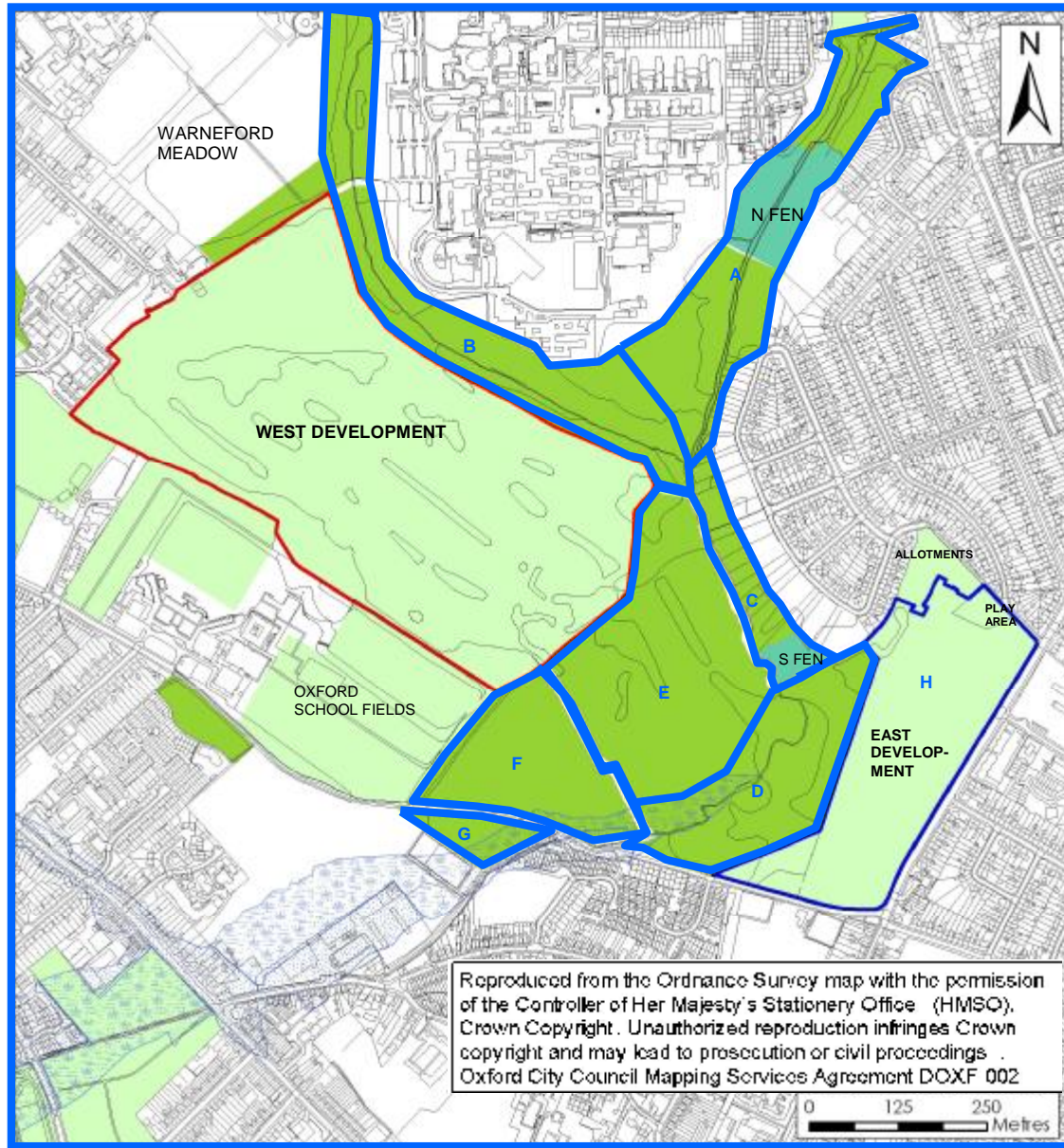


Figure 2: Annotated Aerial photograph showing study areas



3.0 Oxford Local Plan 2001-2016 – Designations of the survey areas:

3.1 SSSI, SLINC and Wildlife Corridors (Policies NE.18, NE19, NE.20)

Area A includes a designated Site of Special Scientific Interest (SSSI) unit (North Fen), with the remainder designated a Site of Local Importance for Nature Conservation (SLINC). Area C also includes a SSSI unit (South Fen), with the remainder also designated as a SLINC. Areas B and D – G are designated either as SLINCs or as Wildlife Corridors, in recognition of their significance in protecting or enhancing biodiversity.

3.2 Other designations

Area H (Golf Course East) is currently designated as land protected for open air sports facilities (Policy SR.2).

4.0 Results – Current status of the Ecology of the Lye Valley

The full data set of species observed in this survey is to be found in the tables in the **Appendix**. I have still an ongoing survey contract for the Oxford City Council concerned specifically with the identification of invertebrates captured throughout this year in the two SSSI unit areas of the Lye Valley. This is not due for report until January 2008, therefore the invertebrate data in this present document is by no means the full results expected for this site. Readers are also referred to the invertebrate report of S. Gregory for this site in 2001 (14). My full invertebrate report will compliment this present report and will confirm the continued presence on site of many of the historic uncommon to rare species, together with significant new discoveries.

4.1 Results of research on historic data at the Oxford University Museum

I visited the Hope Department of Entomology at the museum and found many old insect specimens captured in the Lye Valley/ Cowley Marsh area particularly by A. H. Hamm who lived in Southfield road and visited the area regularly between 1894 and the 1920s. The range of specimens indicates an extremely rich insect fauna. Some of his records from this site are the first in the whole country for a particular species e.g. the crane fly *Dicranomyia lucida* in 1915 (my survey shows still present and now of **Notable** status) and the soldier fly *Stratiomys chameleon* in 1894 (may have disappeared from the site, as it has not been recorded since the early 1900s; now extremely rare in the whole country, **RDB 1**). This site is thus historically important.

4.2 Field Survey Results

Before commenting on the likely impact of the proposed housing developments, it is important to have a good idea of the **current wildlife value** of the SSSI, SLINC and corridor areas. The findings of my September surveys are detailed below, and species lists are presented in the tables in the Appendix. The areas are identified on the accompanying map and aerial photograph (Figures 1 and 2).

4.2.1 Area A: Riparian Corridor to the Lye Brook (SLINC areas and LNR) encompassing, and including, the North Fen SSSI unit

This area comprises a good deal of scrub, mature deciduous trees, large bramble patches, wet woodland, reed bed and calcareous fen, some on sloping ground, some on more level terrain. Numerous tufa depositing springs occur at the junction of the permeable Corallian limestone with impervious clays below. The main public access point is at the northern end of the site from the Slade. The only grassland now in this area is that mown by the City Council near the entrance and along the central pathway. This grassland shows considerable nutrient enrichment due to dog excrement and resultant paucity of plant species. Two small ponds have been dug to the south of the area adjacent to the path. They are overgrown and one is colonised by the alien **Azolla fern**.

A small area of dry, **species-rich, calcareous grassland** used to remain on the east bank to the fen, below the Peat Moors recreation field, until at least 1985 (2). My surveys in this area show there are now none of the species that characterise this vegetation type (some may survive within the seed bank in the soil). Without grazing or mowing management the area has progressed to **willow** (*Salix* sp) and **hawthorn** (*Crataegus monogyna*) scrub with some aliens like **buddleia** (*Buddleja davidii*) and other species such as **ground elder** (*Aegopodium podagraria*). This means that the

only reasonable quality calcareous grassland in the whole Lye Valley area now exists in the golf course-managed **Area H** discussed below.

The calcareous spring-fed fen vegetation on a layer of peat of the North Fen SSSI unit (1.8 ha) was classified by Natural England (3) in the National Vegetation Classification system (4) as **M13 - the black bog rush- blunt flowered rush community** i.e. *Schoenus nigricans*-*Juncus subnodulosus* mire grading to **M22 *Juncus subnodulosus* -*Cirsium palustre* fen meadow**. Today it still contains a good range of important and attractive species particular to this community (which is mostly on the east side of the Lye Brook). Examples are: **marsh lousewort (*Pedicularis palustris*) devil's-bit scabious (*Succisa pratensis*) bog pimpernel (*Anagallis tenella*) parsley water-dropwort (*Oenanthe lachenalii*) marsh pennywort (*Hydrocotyle vulgaris*)** and the orchid **marsh helleborine (*Epipactis palustris*)**. Important calcareous fen mosses and *Chara* stonewort algae still survive in small pools on the surface and tufa deposition occurs on them.

Despite the losses from the site of: **black bog rush, butterwort (*Pinguicula vulgaris*) grass-of-Parnassus (*Parnassia palustris*) and sundew (*Drosera* sp)** there are still a total of 17 plant species on site that are on the draft **Rare Plant Register** for Oxon (5). This still remains a valuable habitat on a national level. My recent studies of other important Oxfordshire fen sites indicate some are declining in quality and have lost even more species than this site due to scrub invasion or drying-out (e.g. the comparable Spartum Fen, Weston Fen and Barrow Farm Fen). Appropriate reed cutting and willow scrub removal management by the City Council Countryside Service in the Lye Valley North Fen is responsible for the current survival of many important species. However there is some contraction of the area of highest quality fen vegetation in the marginal zone adjacent to the Lye Brook due to drying-out by the lowering of the Lye Brook stream bed. This is resulting in the invasion of dry land plant species (e.g. **garlic mustard, *Alliaria petiolata***) in the marginal peat zone adjacent to the Lye Brook. The hydrological report of Curt Lamberth will discuss this problem further.



Devil's bit scabious (Succisa pratensis) North Fen

The reed bed areas on the western bank are plant species-poor, but cutting-back and removing the reeds in June by the Countryside Service has resulted in the reappearance and increase of such valuable species as **marsh lousewort** and **bog pimpernel**. Cutting the reeds regularly also reduces the risk of **arson** incidents (see discussion below in section 5.2.2.5). Pollarding of willows adjacent to the brook has also helped reduce shading to the fen vegetation. Natural England assesses the condition of the SSSI unit in this area as '**Recovering**'.

To the south and north of the main fen areas, but still on the spring line, succession to wet **crack willow** (*Salix fragilis*) or **grey willow** (*Salix cinerea*) woodland has occurred, which is valuable in its own right. This area has been little studied but is expected to be very good for invertebrates, fungi and bryophytes. Some of this wet woodland is still invaded by **japanese knotweed** (*Fallopia japonica*) despite annual control measures by the Countryside Service. See discussion below on '**Alien species**'. It is significant that **Area A** is the one section of the riparian corridor in the Lye valley that is not yet invaded by the alien **indian balsam** (*Impatiens glandulifera*) and it is very important that it is kept from colonising the area.

The brook suffers flash flooding and bank erosion, meaning a poor range of aquatic plant life, as plants cannot establish on the stones of the bed. A poor range of aquatic invertebrates was observed, perhaps connected to my past observation of occasional sewage contamination (evidenced by condoms and plastic sanitary towel strips stranded on the bank side vegetation on at least one occasion in the past 6 years). The banks are vertical and deep, meaning it is difficult for marginal vegetation to establish, but there are some important **pendulous sedge** (*Carex pendula*) tussocks which are home to the rare small fly *Stenomicroa cogani* (**RDB 3**) discovered in 2003 by John Ismay (28). Sections of bank carrying these sedge tussocks were observed torn from the brook edges and were seen to be washed down the brook during the course of this study.

Many of the important insect species historically recorded from this site have been re-found during the course of this year and new uncommon to rare species have been recorded. Details of these discoveries will be reported to the City Council by winter 2007.

I have observed the effects of public pressure on this site over the last 6 years; for more details see discussion on arson and fly tipping below in section 5.2.2.

4.2.2 Area B: Riparian Corridor to the Boundary brook (SLINC) up from the confluence with the Lye Brook; adjacent to the Churchill Hospital to the NE and Southfield golf course to the SW

The main habitats here are wet woodland of crack willow and alder with reed bed and scrub. This alternates with drier sections of woodland and grassland. There are numerous flush/spring areas on the eastern bank to the Churchill and Park hospital sites. The steep banks of the Boundary Brook are obviously subject to some erosional processes, but some areas had an established flora of mosses and liverworts including *Pellia endiviifolia*, restricted to calcareous sites. Amongst more common ferns, the **soft shield fern** (*Polystichum setiferum*) occasionally is found. This species is on the draft **Rare Plants Register for Oxon** (5). The shaded and the more

open, spring or flush areas will be valuable for invertebrates and a full survey is recommended.

Many of the crack willows are old and in various stages of collapse and decay. Some have fallen completely. Fungi on these, as well as dead wood on the ground, were very noticeable (particularly *Ganoderma* and *Phellinus* sp.) and apart from the fact that some of them are uncommon, these fungi will be important breeding sites for specific beetles and flies. Collection of a cap of *Pluteus cervinus* has already produced 2 species of flies not previously recorded from the Lye Valley.



Boundary Brook corridor- veteran collapsed crack willow (Salix fragilis)

Of particular value in this corridor, is the mosaic of conditions formed by the alternation between wet and dry soils and between tall trees, scrub and lower grassy, reedy areas. This mosaic means a greater diversity of animal life can be supported than if the site were, say, only wet woodland or only dry woodland. Unfortunately much of this corridor is extensively colonised by **indian balsam** which forms dense uniform stands in some areas adjacent to the golf course. See section 5.2.2.3 for discussion of this alien species. The wooded nature of this corridor means it is likely to be an important bat hunting ground.

The Churchill/Park Hospital field

The grassy field situated in the fork of the Boundary Brook and the Lye Brook south east of the hospital complex, was not studied due to time constraints. It lies on dry free-draining sands derived from the Corallian beds. It appeared fairly poor in variety of plant species, but further study is recommended. This is particularly so in the light of observations from a local resident of a number of **slow worms, grass snakes** and **common lizards** (including juveniles) basking on the numerous ant hills in this warm field in April and September 2007 (28)

4.2.3 Area C: Riparian Corridor to the Lye Brook (SLINC) south of confluence of Lye and Boundary brook down to, and encompassing, the South Fen SSSI unit

The main interest in this area is the South Fen and the strip of mainly wet woodland (formerly open fen on the old maps of 1900) running north west from it on the east bank of the Lye Brook. The wet woodland is mostly on private land in the bottoms of the long gardens of the houses on Lye Valley Road. I viewed it as well as I could from the brook. There is much variation in the treatment of the bottoms of the private gardens – a few are ‘gardened’ and managed by mowing etc. almost to the edge of the brook, but by far the majority are unmanaged and abandoned, at least in the very lowest sections adjacent to the brook. These unmanaged areas are full of mature secondary woodland of willow, alder, ash and hawthorn, with scrub areas of blackthorn and bramble. Extensive patches of redcurrant were visible over the wettest zones and much deadwood covered by mosses and liverworts on the ground.

Dog’s mercury (*Mercurialis perennis*) is present, but no other ancient woodland indicators detected. Soil conditions alternate between drier areas and wetter portions over springs. This undisturbed and secluded mosaic of communities is expected to be valuable to birds (a good number of **wrens** and a **song thrush** were seen) and very valuable to invertebrates, particularly those of the wet areas and those that breed in fungi. Sweeping the accessible portions of vegetation on the west bank here produced the fly *Paraclusia tigrina* (**RDB2**). The larvae of this breed in decaying wood of broad leaved trees. It is currently highly scattered across S. Britain, but turning up more often these days (6). Grey squirrels, molehills and small piles of **deer** droppings were noted and, on the west bank, near the confluence of the Lye and Boundary Brook, some possible **badger** diggings and latrine area. These areas need checking by a mammal specialist. The invading alien **Harlequin ladybird** beetle species *Harmonia axyridis* was also noted. The large amount of mature trees means this is bound to be a good hunting ground for bats.

South Fen SSSI unit (0.54 ha)

I had access to only part of the South Fen due to the private nature of much of the land (it is contained within the bottoms of the gardens of houses on Lye Valley Road). It is much changed since 1989, when I first visited it. Significant drying-out has occurred, especially in the zone adjacent to the bank of the Lye Brook. Lack of grazing, mowing or scrub removal has resulted in thick, dense, rush and sedge growth and the invasion of willow and alder scrub. Nevertheless, my on-going study of the invertebrates of this site indicates many of the important insect species are still present and important plant species like **marsh lousewort**, **devil’s bit scabious**, **bog pimpnel** and numerous **marsh helleborine orchids** are still present.



Marsh helleborine orchids in the South Fen

In particular it is now the only site in the Lye Valley where the **grass-of-Parnassus** (*Parnassia palustris*) survives (see introduction). Counts of the plant this summer revealed 76 flowers, which does not sound much. However in preparation for this study, I surveyed all other fens in Oxfordshire where *Parnassia* might be considered to still exist. Of these, Parsonage Moor in Cothill had only 120 flowers, Frilford Heath fen had only 12 flowers and all other likely fen sites, including the North Fen SSSI unit, now have no *Parnassia* at all. The three sites in which *Parnassia* survives, are actually the most southerly populations of *Parnassia* in the whole country – it is a species that has suffered a drastic national decline which started well before 1962; see the plant distribution maps accessible on the Botanical Society of the British Isles (BSBI) website (7). The south fen *Parnassia* population is obviously very important locally and for the southern part of Britain as a whole.

Natural England assesses the condition of the South Fen SSSI unit as currently ‘**Unfavourable, declining**’ and I would agree. It urgently needs actions to halt further drying-out and bring about re-wetting. The drying-out appears to be a consequence of: lack of water from the calcareous springs that feed it, water removal by large trees and water removal as a consequence of the lowering of the bed of the adjacent Lye Brook by erosion. See the report of C. Lamberth for more detail on this. It also needs cutting management to remove scrub and simulate grazing to give small plants like bog pimpernel and grass-of-Parnassus a chance to compete against tall rush and reed. Indian balsam has colonised the borders of the site along the brook and will be a serious threat to the fen in a few years time if not controlled.

4.2.4 Area D: Riparian Corridor along Lye Brook and portion of golf course south of the South fen SSSI, down to Barracks Lane. Wildlife corridor, part in the floodplain

In the first part of this corridor, the stream travels through woodland of ash, alder, hawthorn and very large crack willows. On the steep south east bank to the brook

several calcareous tufa depositing springs will form a very valuable habitat for invertebrates specific to such shaded sites, including certain craneflies (**Tipulids**). The large willows were often split and collapsed; in addition bank erosion on the south eastern bank has resulted in trees falling into and over the brook making access difficult.



Collapse of bank in area D due to erosion

The large old fallen trees form a good habitat for fungi, bryophytes and birds. Drier mixed deciduous woodland and scrub with much hedgerow plum (damson) occurs on the more level ground on the north west bank of the brook. The large amount of mature trees means that this will be a good hunting ground for bats.

This corridor woodland has been colonised by **indian balsam**, though it does not here yet form dense stands as in the Boundary Brook corridor. At the first bridge point going south from the woodland, the brook now travels between the closely mown golf course grassland. Despite the steep banks, some marginal emergent vegetation is able to grow on the streamside and amongst the rushes, sedges and flag iris, I recorded a plant of the **cyperus sedge** (*Carex pseudocyperus*) which is on the Oxon Draft Rare Plants Register. Adjacent to the roots of a young alder tree on the very edge of the brook I found several caps of the rare mycorrhizal fungus known as the **alder bolete** (*Gyrodon lividus*). This is on the new Red Data List produced by the British Mycological Society (BMS) as '**Near Threatened**'. The records database of the BMS shows this species occurring in only 11 other sites nationally (8). Two spring areas emerge from the closely mown south eastern banks, but the plant species here showed that neither spring had highly calcareous water. One of these is dominated by **water-cress** (*Rorippa nasturtium-aquaticum*) and will be important for different invertebrates to the shaded spring areas in woodland.



Mown section of Lye Brook, position of alder bolete and cyperus sedge

On examining the large trees in the mown regions on either side of the brook I found a large hybrid black poplar (*Populus* sp) which had, at the base, emergence holes and pupal skins of the **hornet clearwing moth** (*Sesia apiformis*) which is designated **Nationally Scarce B**. The old area map of 1886 map shows trees all along the brook in this region, but they are scarce now. The above new records indicate that this tightly mown area of the golf course adjacent to the brook is of considerable conservation value. Any increased erosion of the banks of the watercourse will threaten both the alder bolete and the cyperus sedge.

4.2.5 Area E: Golf course portion to west of South Fen SSSI and north of area D. Wildlife Corridor

This closely mown area of the golf course has most wildlife interest in the long grass roughs with some flowers like **field scabious** (*Knautia arvensis*) and in the copses of scrub and trees between the fairways. However, the short grass areas would be the preferred feeding area for birds like **green woodpeckers** and **starlings**. It is noted that a footpath crosses the top of this site and that this footpath has been in use for a long time – appearing on the old map of 1886. All of this area lies on the free draining Beckley Sands derived from the Corallian Beds. The copses are mostly composed of extensive suckering patches of **hedgerow plum/damson** (*Prunus domestica*) with hawthorn, elder, holly and large bramble patches, in some areas invaded by indian balsam. Occasional crab apples, oaks and hazels occur. Extensive ivy growths on the ground and up the trees are important for invertebrates for breeding and feeding– the ivy flowers were alive with bees. The scrub areas will be important for birds and the plum flowers maybe attractive to bullfinches in the spring. The dropped plum fruit were certainly food for mammals as they were seen in droppings that were possibly from foxes or badgers.



Fungi on dead wood in the plum copse areas

Grey squirrels, mole hills and deer dropping were seen. In the large copse at the top north eastern corner of this area (on higher ground near to the Lye Brook) many diggings attributed to the activities of **badgers** plus latrine areas were seen. Quite a lot of dead wood produced by the plums, hawthorns and old elders showed a good variety of fungi which will be important for invertebrates. In fact under one dead log with fungi I caught the fungus gnat *Keroplatus testaceus* (**Nationally Scarce**). Occasional elm suckers indicate that some of these copses may be on old hedge lines. The copses are often used as dumping areas for logs, brash, grass clippings and excavated soil by the golf course management. These piles add variety to the habitats available for wildlife.

Isolated trees in the grassland rough areas are very valuable for invertebrates (9).

4.2.6 Area F: Land East of Oxford Community School playing field, adjacent to Barracks Lane (SLINC). Part flood plain.

In this field, the higher ground lies on dry free-draining sands derived from the Corallian beds and is dominated by rough, tussocky grassland with **thistles** (*Cirsium* sp) and small amounts of **field scabious** (*Knautia arvensis*), **meadow crane's-bill** (*Geranium pratense*) and **knapweeds** (*Centaurea nigra*, *Centaurea scabiosa*). Unusual plants noted were the **red bartsia** (*Odontites verna*) and some **orchids** with spotted leaves, but as these last were in the seed pod stage, no identification was possible. This field was obviously originally grazed, but has been ungrazed and unmanaged for a number of years. Molehills and deer droppings were present. Numerous vole tunnels and droppings were observed between the tussocks and a short-tailed vole (*Microtus agrestis*) was observed running in one. This area is therefore likely to be good hunting ground for raptors such as **sparrow hawk, kestrel** and **owls**. There is considerable scrub invasion by **hawthorn, hazel, grey willow, blackthorn, elder, dogwood, brambles** and the occasional **oak** tree. It is thick and dense towards Oxford Community School. There is no fence between this area and

the playing field of Oxford Community School. Study of the thick scrub zone on the side nearest the school revealed a quantity of dumped bicycles, heaps of bottles and a fire was actually burning in the scrub on the day of my visit.



Scrub and tussocky grass – land east of Oxford Community School

Scrub on most of this site is considered to be an important bird habitat providing a great many nesting opportunities. The lower part of this field has a series of flushed areas/springs where impervious clays are exposed on lower ground beside the brook. Here tall-herb fen vegetation with **great willow herb** (*Epilobium hirsutum*), **meadowsweet** (*Filipendula ulmaria*) and **sedges** from thick patches. Lower vegetation in these damp areas includes **amphibious bistort** (*Persicaria amphibia*) and **silverweed** (*Potentilla anserina*). These areas could be very important for invertebrates. This is also indicated by the study focused on invertebrates by Steve Gregory, 2001(14). To the southern border of this area adjacent to the Lye Brook and Barracks Lane, several large, old, decaying **poplar** pollards or tall stumps were seen; showing woodpecker holes and extensive invertebrate borings. These are very valuable trees for the habitat they provide.

Adjacent to the Lye Brook and Barracks Lane was a small C- shaped cut-off meander of the brook, presumably formed when the brook was straightened. Despite the presence of a shopping trolley and some rubbish, this water body has the characteristics of a shaded pond and may be valuable for aquatic invertebrates in a way that the more polluted main brook is not. I had very limited time to study this area and my species list is very incomplete, but it is obvious to me that it is a valuable area. It needs a much more detailed study to have any idea of the full range of species living there.

4.2.7 Area G: Cowley Marsh (SLINC & County Wildlife Site) across Barracks Lane from Area F Part floodplain

A very brief visit was made to this area. The soils are the damp, heavy clays and marshy mown marshy areas with a fairly nutrient rich plant flora are found, probably

as a result from enrichment by dog excrement. Mixed scrub and some valuable large trees, especially an enormous old poplar, are present.

4.2.8 Area H: Golf Course East area adjacent to Hollow Way and Barracks Lane (proposed for development with 380 houses). No conservation designation, but SR. 2 Land used for open air sports.

From the map I noted that this proposed area of development for housing is, at its north western limit, only approximately **42 metres** from the boundary of the South Fen SSSI (see further discussion below on buffer zones for SSSIs). Invertebrate species from the fen might be dependent on plants in an area so near, therefore I examined Area H in some detail. Apart from the fertilized, watered and closely mown tees, I was surprised to find considerable areas of **species-rich dry calcareous grassland** – both on the closely mown fairways and the rough areas on the site margins and in a strip running down the centre of the site from NE to SW.

These areas had a suite of species characteristic of calcareous soils such as **upright brome**, (*Bromopsis erecta*) and other grasses including **sheep's fescue** (*Festuca ovina*), **crested hair grass**, (*Koeleria macrantha*) **meadow oat grass** (*Helictotrichon pratense*) and **hairy oat grass** (*Helictotrichon pubescens*). Mown areas showed abundant sheets of **rest harrow** (*Ononis repens*) and numerous **stem-less thistle** (*Cirsium acaulon*) in the short sward. Here and in the roughs were **lady's bedstraw** (*Galium verum*), **burnet-saxifrage** (*Pimpinella saxifraga*), and **bird's foot trefoil** (*Lotus corniculatus*). Mostly confined to the taller vegetation in the roughs were **field scabious** (*Knautia arvensis*), **black knapweed** (*Centaurea nigra*) and **greater knapweed** (*Centaurea scabiosa*) and **small scabious** (*Scabiosa columbaria*). A few plants of **sainfoin** (*Onobrychis viciifolia*) were in the rough adjacent to Hollow Way. The characteristic mosses *Homalothecium lutescens* and *Campylium chrysophyllum* were present in small amounts.



Common rest harrow, abundant in Area H

Small amounts of **hairy violet** (*Viola hirta*) were present in the children's play area adjacent to Dene Road. All these species occur on the old lists for the Lye Valley, and it had been thought that they had disappeared. No **rock rose**, **harebell** or **fairy flax** were found, but the search was not exhaustive and they may turn up with more study at times of year when these are in flower. I note **meadow oat-grass** (*Helictotrichon pratense*) on the Oxon Draft Rare Plant List (5) restricted to grazed or mown calcareous soils and **sainfoin** (*Onobrychis vicifolia*) on the national Vascular Plants Red Data List as **NT (Near Threatened)** (29).

Such relict fragments of calcareous grassland are now very rare within Oxford City, though they are present at far distant sites such as the Chilterns and Cotswolds. Many of the plants listed here support a very rich invertebrate fauna and a full study of this at appropriate times of year is recommended. Low nutrient calcareous grasslands can be very good for fungi, including **waxcaps** (*Hygrocybe* sp.) and a survey for grassland fungi is recommended in October.



Area H hybrid black poplars with important sap flows

In the centre of the south end of this area I noted 3 planted **hybrid black poplar trees** with about 8 **sap flows** from cut branch ends. Numerous invertebrate larvae were seen occupying the sugary exudate in the sap flows including at least 4 different sorts of dipteran (fly) larvae. The fauna of sap flows is very specific and can include many uncommon to rare species (9). Trees with sap flows are a rare and very important wildlife resource for particular species of beetles and flies. I removed portions of the exuded material for rearing the larvae to adult hood. The first resulting flies emerging have proved to be the tiny black sap-run fly *Aulacigaster leucopeza* (**Notable** status). It is highly likely further notable species will emerge from this sap flow material. These trees are therefore very important and should have special protection measures in any future development of this site. There is an elm sucker thicket in hedge along Hollow Way at corner with Barracks Lane indicating remains of old hedgerow (elms are only in the oldest hedgerows, often important boundary ones).

4.3 Ecological Survey Summary – Valuable habitats still remaining in the Lye Valley today:

Lowland Calcareous Fen

Despite species losses over the last centuries since recording started, the calcareous fen areas in the Lye Valley are still a very good example of such habitat in comparison with other high grade fen areas in Oxfordshire, and may still be considered Nationally Important. In the case of the South Fen, which is currently in unfavourable condition (Natural England assessment) due to some drying out, there are still important species present and much of the interest can be regained if some scrub and reed control management can be achieved and measures taken to re-wet the fen (see hydrological report of C. Lamberth).

Wet Woodland

A significant proportion of the areas of lowland calcareous fen in the Lye Valley have been lost since the 1930s through successional processes to wet woodland. This current study has shown that this habitat is very valuable in its own right and should be regarded as an important gain in the face of the very apparent loss of other priority habitat in the area. The alternation between wet woodland in the spring areas and drier woodland between them is particularly valuable as it creates a mosaic of habitats, meaning more organisms can use the area. This is particularly true for invertebrates (9).

Wood-pasture and Parkland, including Veteran trees

Some areas of the golf course in Areas D, E and H fall into this category, if they have mature trees.

Calcareous grassland

Areas of calcareous grassland are a rare habitat in Oxford City and remnants have previously been preserved as SLINCs in previous developments. Area H of the golf course is shown in the present study to have a good sized portion of relict dry calcareous grassland.

5.0 Ecological Risk Assessments

There are many possible impacts on a wildlife site as a result of a housing development nearby. They will be dealt with under separate headings in sections 5.1 to 5.6 below.

5.1 Introduction and historical perspective - How development has already affected the Lye Valley, site history

In many ways the Northern End of the Lye Brook including the North Fen SSSI provides a model for the possible future of other areas in the Lye Valley that would be adjacent to the proposed housing in the southern and western portions of the site. The northern end became hemmed in by housing and hospital development to the NW and SE between the 1930s and 1950 (2). Thus it has been subject to the pressures involved for more than 70 years (although pressure in the early part of this time would have been somewhat different to the pressures of a modern day development). House back gardens of Peat Moors, Warren Crescent and Heath Close and allotments actually abut the boundary of the SLINC/LNR/ SSSI areas in the northern section. Only the in the area known as the Peat Moors recreation field does a grass field lie alongside the

SSSI. Initially there were no fences at all around the wildlife areas. In addition, there has always been a public footpath alongside the Lye Brook, going through the centre of the SSSI unit and SLINC/LNR.

After urbanisation around this northern section of the Lye Valley by the end of the 1950s, rubbish tipping and dumping was carried out to such an extent that in 1978 a removal operation was launched. The Oxford City Council workforce in conjunction with a Manpower Services Commission team removed (via Peat Moors and Warren Crescent) 15 skip loads of non-combustible material and approximately the same quantity of combustible material was burned on site (about 50 tons). To reduce any further tipping, fencing was erected all around this top end of the valley. In spite of this a further rubbish clearance operation was needed in 1983 and regular clearance on a small scale has to take place to this day (information from OCC management plan (2) and pers. Comm. Anthony Roberts, Countryside Ranger).

By 1985 dumping of garden rubbish had resulted in an extensive growth of the Schedule 9 Invasive Alien plant **Japanese Knotweed**, (*Fallopia japonica*) (10) in the SSSI on the west bank of the valley adjacent to the end of Heath Close. Control by weed killer has had to be used from that year on. Since then the area of this plant has been drastically reduced, but it is still present and still needs yearly attention from the City Council Countryside Service, a testament to the difficulty of eradicating some of these aliens once established.

The public footpath through the centre of the site allows many people to enjoy the wildlife and a walk through this green area, but the footpath is also a focus for **arson attacks** in the North Fen area, which happen on an almost yearly basis (Anthony Roberts, pers. comm.). I observed the two most recent in 2007. Early Spring of this year saw an extensive fire in the reed bed area on the NE bank of the fen, whilst there was a circular bonfire/barbeque burn site damaging the actual North Fen vegetation by the path in May 2007 (see photo below). This did not spread due to the wet soil underneath. Fires in the reed bed spread more easily due to the easily combustible litter.



Arson damage actually on the North Fen SSSI, May 2007

The report of C. Lamberth will comment on the effect that development has already had on the **hydrology** of the North Fen and the north end of the Lye Brook generally.

5.2 Types of impact that will be expected with development of the West and East areas of the golf course

5.2.1 Impacts of the construction phase of housing development

The impacts of the construction phase of any housing development may be significant in the Lye Valley and are fully dealt with in the report of C. Lamberth. They cover: **disposal of excess soil and excavated material; temporary dumping of such material to prevent accidental and unintentional burial of fragile habitats; control of surface water run-off and restriction of sediment entering watercourses; ground compaction with possible killing of trees; pollution from spilt hydrocarbons.**

No incursions into the designated adjacent SLINC and corridor wildlife areas by vehicles for access to the construction site should be allowed. Neither should any temporary buildings be placed in the protected wildlife areas during the construction phase. Both of these actions would cause unacceptable ground compaction or smothering of plant species.

If balancing ponds or swales are suggested as part of the run-off control measures for the development areas, these must be placed within the development zone and not in the adjacent designated wildlife SLINC or corridor areas, as these will be damaging to the wildlife and not enhance the biodiversity of the area (see comment of C. Lamberth in his report, page 36)

Noise and light pollution from the construction phase could be significant. See points 5.2.2.7 below for further discussion of the effects of these on wildlife. During the construction phase there would be reduced foraging opportunity for mobile animals, but this is dealt with fully below.

5.2.2 Impacts of the post construction phase (housing estate in place)

5.2.2.1 Loss of foraging area for mobile animals

Many species may live in the fens and wildlife corridors, yet range widely in the whole area to feed. Examples are birds, badgers, hedgehogs, deer, and foxes. Grass snakes are regularly found in gardens of local residents as far away as Dene Road, yet the rotting vegetation heaps in damp areas they need for breeding are most likely to be found in the riparian corridors to the Boundary and Lye Brooks.

5.2.2.2. Fly tipping and Drugs related litter/activities

Nearness of the wildlife area to a road is the defining factor for fly-tipping, as people do not carry heavy waste very far and most tipped material is therefore from vehicles. Dumped household rubbish is extremely visually unattractive and even a small amount of such material encourages the increased dumping of more unless it is cleared immediately. Damage to wildlife areas may come from nutrient enrichment

from decomposable dumped material such as food waste, or from damage by toxic chemicals such as oil and paint. Vegetation may also be smothered, especially by building rubble, old furniture and vehicle parts such as tyres.

Research evidence suggests that discarded intravenous needles are most commonly found in parks and playing fields, when compared with residential areas (11). Account should be taken of the increased risk of hazardous litter arising from drug abuse, in wild areas (consisting of secluded, dense scrub and tall fen vegetation) close to new residential development. This in turn can increase public pressure to remove screening scrub and vegetation, hence there arises an indirect risk to the wildlife habitats.

Methods to deter fly tipping may be found at '*Tackling Fly-tipping*' by the **Environment Agency** (12) but I note that some of the suggestions for reducing fly-tipping include extra lighting, clearing scrub and trees from areas and the construction of bunds or the placing of stones. These measures may have deleterious effects on wildlife.

5.2.2.3. Dumping of garden waste/ Alien Species

A number of **alien** (i.e. non-British native) invasive plant species are already established in the Lye Valley. Such species can cause major problems to important habitats by forming monoculture stands and shading out and eliminating valued native plant species and their associated dependent animal fauna. Most of them will have come to the Lye Valley by means of the dumping of garden rubbish waste by the public, usually close to housing or site access points. The costs of removal of such species must be considered. Further development of the Lye Valley with housing is predicted to increase the problem of alien plant invasion of the valuable wildlife areas. Typically, dumping of garden waste happens over the back garden fence of nearby houses, or people will walk a short way into a wild area to dump bags of garden waste. This still happens even in areas with a good green waste collection service, for instance if they have too much waste one week for the capacity of the bin provided.

The most problematic, already established, alien plants in the Lye Valley include:

Japanese Knotweed (*Fallopia japonica*) is present on the west and east steep banks to the Lye Brook near the North Fen. A Schedule 9 plant under the Wildlife and Countryside Act (1981) it is a serious threat to all the wetland areas and had well colonised the northern end of the Lye Brook by 1985, when the first cutting and herbicide control measures were started by Oxford City Council. Since then annual visits have been necessary by Oxford City Council staff who spend a good deal of time and effort keeping this species in check and working towards its eradication from the site.

Indian balsam (*Impatiens glandulifera*). This is an annual plant which can grow to 3m height, producing approx. 800 seeds per plant and these seeds can be projected 7 metres (13). Originally it was grown around garden ponds for its attractive pink flowers that look like policemen's helmets. As it likes wet conditions, it can be spread by water, so colonisation downstream happens quickly. It is currently patchily present in the stream corridor wetland marginal vegetation right from Cowley Marsh in the south up to the confluence of the Boundary Brook and the Lye Brook in the North, and then up both sides of the Boundary Brook to the North as far as the Warneford Meadow site. As yet indian balsam has not colonised the Lye Brook

branch above the confluence and thus does not threaten the North Fen SSSI, but it is only a matter of few years before it gets there, unless there is some control of its spread. The South Fen SSSI has indian balsam on its very margins along the Lye Brook and in a garden to the North. As yet none on the fen itself, but again colonisation is only a matter of a few years time if there is no control. Indian balsam is a plant of wet conditions and spreads quickly by seed, so it is a big threat to the important wetland habitats of the SSSI and SLINC areas in the Lye Valley. Indian balsam currently threaten native species at these other important fen sites in Oxon: **Dry Sandford Pit, Gozzard's Ford Fen, Frilford Heath Fens, the Marcham Farm fens** (personal observation or personal communication with Steve Gregory(25) and Alison Muldal of Natural England).



Indian balsam (Impatiens glandulifera) in the Lye Valley

Indian balsam may exacerbate **erosion** along a watercourse. It does this by out-competing native perennial plants like sedges along the banks of a watercourse. Thus it forms uniform dense stands along the bank. Being an annual, it dies back in the winter, so there is nothing to stabilise the bank if there are any water surges due to heavy rainfall events. Perennial sedges and rushes would have good growing root mats that would have held the bank soil in place during the flooding events.

Michaelmas-daisies (*Aster* sp., most likely *A. x salignus*) present in the North Fen area near the footpath through the middle of the SSSI. Again forming dense monoculture swards which exclude native vegetation.

Ground Elder (*Aegopodium podagraria*) is present adjacent to the northern end of the North Fen SSSI, and in some areas of the Lye Brook and Boundary Brook corridors, but does not threaten the SSSI fen because it is not a plant of wet conditions, so will not be able to invade the fen. Whilst it does form uniform patches excluding native flora, its flowers do provide a useful source of pollen and nectar to insects breeding in the adjacent fen or marsh areas, in the absence of native species that are good nectar sources.

Tiny floating alien *Azolla* ferns are established in a pond just below the south end of the North Fen SSSI. The nearer a wild pond is to housing, the more likely it is that aquatic foreign plants like this will be transferred to it. Sometimes householders may clear excess vegetation from a garden pond and then go to the nearest wild pond to place the plants there, perhaps holding the erroneous view that they are giving the plants a good home and helping the wild pond. I have personally removed the alien pond plants *Gunnera* and **Parrots' Feather** from wild ponds where people had obviously walked some distance to deliberately place the plants in the ponds.

Russian vine (*Fallopia baldschuanica*) is established in scrub near to gardens next to the South Fen, adjacent to a tee on the golf course. This aggressive climber can cover large areas of scrub and hedgerow very quickly.

More information on other alien species, the problems they cause and control measures may be found at the website of the charity '**Plantlife**' under '**Non-native Invasive plants**' (13).

Alien animals may come with the garden waste. The alien invertebrates known as the **Harlequin Ladybird** (*Harmonia axyridis*) and the **Girdled Snail** (*Hygromia cinctella*) have been shown by the present survey to be already established in the Lye Valley. These are not thought to be much of a threat to wildlife yet. A more serious threat would be the introduction of various **alien flatworm** species that predate native earthworms (15).

5.2.2.4. Dumping of garden waste/nutrient enrichment

Grass clippings, shrub prunings and dead leaves are examples of garden waste that may be dumped. Although these are natural materials and people often have no idea that they are a problem to wild areas (some people actually think these materials are *good* for wildlife in the way that such organic material may enhance vegetable growth on an allotment) they can be very damaging. All such materials decompose, releasing nutrients which stimulate the growth of certain coarse plants at the expense of others (see discussion under '**Dog faeces and urine**'). Low nutrient ecosystems are particularly at risk. Garden waste materials may be higher in nutrients than other plant material due to the use of fertilizers on crops and lawns etc. Such dumping of garden waste happens more if nearby housing has gardens too small for compost heaps and if there is not a good uptake of any green waste recycling scheme in operation.

The distance near a development that garden waste dumping occurs is not likely to be great, as people don't like to carry bags far. A rough estimate would be not more than 10 metres from the nearest road or residence, but this could be easily quantified by taking measurements at a selection of sites around Oxford. However it must be remembered that alien plant species spread, and have an effect, that extends way beyond the original dump site.

5.2.2.5 Arson

It has already been stated that arson attacks are an almost annual occurrence in the North Fen area. Dry reed litter, deadwood and hollow old trees are a magnet for fire setters. Accidental fire damage can result from barbecues and picnic fires. There are several adverse effects burning. Firstly, eggs, larvae or over wintering pupae of

invertebrates in the reeds, litter, deadwood or surface peat are killed. This may also apply to grass snakes, slow worms, lizards and hedgehogs if it is winter and they are hibernating in the material. Bird and mammal nesting sites will be destroyed. Combustion of plant material releases a flush of plant nutrients to the soil, which may stimulate coarse common species at the expense of rare ones, resulting in their loss by competition. If the peat is quite dry, the fire may actually get into the peat and burn slowly for months (3).

Arson incidents commonly occur near footpaths or den areas, so ideally after a development, footpaths should be routed well away from the most sensitive wildlife areas. This can work, but it is in human nature to take the shortest route, so diverting a footpath only works if it is a sensible and obvious route. There have been no arson incidents on the South Fen for at least the last 6 years due to its protected position in private gardens and in the private section of the golf course site with no official footpaths near. With a projected housing development in Area H, only 42 metres away from the South Fen, the likelihood of arson incidents on this SSSI increases dramatically.

5.2.2.6. Recreation

Soil compaction – walking, mountain bike, motor cycle scrambling

Developing areas of the Lye Valley for housing will increase the demand on the green areas of the SLINC and corridor for recreation. Walking, jogging, and illegal motor cycle scrambling are all possible. Quantifying the effects of increased use is difficult as the effects depend on many factors. There has been a good study compiled by Asken Ltd for the implementation of multi-use routes in Pembrokeshire (16). Findings from this study can be used here.

The path system in the valley is already used by cyclists and pedestrians so a small increase in pedestrian traffic will cause a small increase in the percentage of bare ground on and around paths, especially on sloping ground. Increased damage will occur for example if motorbikes have access, especially if off-path incursions occur into wet areas where damage to soil would be significant. The fen areas, if they are kept wet, will deter most access, but if they are trampled, the species there have no tolerance to it, so severe damage will happen in a short time.

Trampling causes direct damage to plants through abrasion of leaves, and stem breakage. The damage may influence the performance of plants - growth rates, leaf size, flowering potential, carbohydrate storage, etc. Biomass and cover will generally decrease. Plants are eventually killed. Some plants are more susceptible to damage (low resistance) and some recover more rapidly (high resilience) than others. Species can be ranked in terms of their tolerance to trampling.

The least tolerant species will tend to decrease in abundance most rapidly. The more tolerant species may increase in abundance with low levels of trampling due to reduction in competition but will also decline at high impact levels. Grasslands sown with resistant species (e.g. perennial rye mixes on football pitches) are very resistant to trampling. Grasses of natural areas are less resistant and woodland floor herb layers with e.g. bluebells, primroses and anemones are very sensitive. A visit to Shotover Country Park illustrates this very well. The grassland near the car park on the Plain does not show much damage but the woodland immediately adjacent to the car park shows great compaction of the soil and it is bare - almost no ground flora as a result.

Compaction of soil around trees may actually kill them because of direct root damage or exclusion of oxygen from the roots– especially vulnerable are old (veteran) trees that may be most valuable for wildlife. More information on this is available from the **Ancient Tree Forum website** (17).

Trampling causes disturbance to soil structure and hydrology. Leaf litter and soft organic soils (such as in the corridor areas) are the more susceptible to direct damage from trampling than stony soils. Wet soils are more susceptible to damage than dry soils. Exposure of soil surfaces changes the microclimate, increases needle-ice formation and permits water and wind movement of soil particles i.e. erosion. Small soil particles are more susceptible than large, and soils on steep slopes are more susceptible than those on low slope angles. There are substantial areas of steep slope adjacent to the east proposed housing development, in Area D on the south east bank of the Lye Brook. Trampling in these areas will quickly result in considerable soil erosion.

Re-establishment of vegetation on bared sites depends on the availability of seed from nearby undamaged areas and whether or not the soil structure and quality is suitable (germination may not be possible in very compacted areas). The more common plants are better colonisers than rarer ones.

Den making/tree damage/bank damage

Areas with scrub and trees are very attractive to children from nearby housing as play areas and climbing of trees and den-making may be expected. Old, collapsed and rotting willows will have no tolerance for climbing, branches will easily be broken and damage to this important habitat for invertebrates, mosses and lichens will soon occur. Roosting sites for bats and nesting sites for birds will be affected. Compaction around favoured climbing trees happens. There may be a public perception that the rotting/collapsed trees are dangerous, and pressure brought on authorities to remove and tidy them on health and safety grounds. Den making is also associated with **arson** (see section 5.2.2.5) and old hollow trees are a major target for fire setting. Small shallow water courses such as the brooks in the Lye Valley are also very attractive for young people as play areas for activities such as dam-making. Whilst it might seem dams might be actually be helpful, they may be in the wrong places and a lot of scrambling up and down banks adds to their erosion.

5.2.2.7. Light and noise

Housing developments increase the light level in wildlife areas adjacent. The following is based on information from the website of the **British Astronomical Society** (18). Lights attract and disorientate animals, for example bats. Birds may be greatly affected. In a light polluted site, birds are continuous chirping throughout the night, in anticipation of a dawn that will not arrive for many hours. This seriously disrupts their sleep patterns, preventing them from resting. The dawn chorus from a dark site begins much earlier than the dawn chorus under light polluted skies. Under dark skies, birds begin singing the dawn chorus as soon as dawn begins. However, under light polluted skies, birds do not begin singing until the dawn Sun has finally overpowered the light pollution. This restricts the bird's ability to be the *early bird that catches the worm*. In the UK, Owl numbers are falling. Light pollution reduces the suitable area of feeding habitat for owls and other night-hunting birds. Light pollution may be the reason for the large decline in UK Sparrow and Thrush numbers. This decline of both species may also be due to light pollution assisting birds of prey.

Glow worms are historically recorded in the Lye Valley until 1985 and may still survive there (survey is needed) as they are present in the Trap Grounds in N. Oxford. These are severely affected by ambient light and glare caused by light pollution which reduces their ability to seek and find mates using their own much dimmer bio-luminescence. That threatens species' survival at the very core. Other invertebrates like Moths are also affected (19).

Noise from nearby developments will disturb shy nesting birds and animals such as badgers. Foraging will be restricted and breeding success reduced. Much more information on this from Noise Pollution Clearinghouse online library (20).

5.2.2.8. Dog faeces and urine/nutrient enrichment

One of the most depressing aspects of entering a wildlife area subject to public pressure is the sight and smell of dog excrement. This will be concentrated at the access points to the site, but the influence of the faeces and urine of dogs can extent a long way into the wildlife area. In small wildlife areas surrounded by housing, virtually the whole site can be adversely affected. I have observed this effect in the nearby **Rock Edge SLINC/geological SSSI** in Headington where the plant species interest of the previous calcareous grassland has disappeared due to nutrient enrichment from dogs. The flora of **Dunstan Park** in the Northway is similarly adversely affected, but to a lesser extent because it is slightly larger and not completely surrounded by dense housing. This happens despite the provision of dog waste bins at access points. Only a proportion of responsible owners pick up faeces after their dog. There is no way that dog **urine** can be collected and prevented from affecting the soil of a site. The Plain area near the car park at Shotover Country Park is another good local example.

Characteristically, the nitrates and phosphates released from the decomposition of faeces and urine encourage the growth of just a few species of common coarse grasses and herbs, which grow tall, lush and deep green. Smaller, less vigorous and more visually attractive, flowering plants are out-competed and die. A plain, dense, deep green carpet of a few common species of grass eventually replaces an attractive, diverse flowery community of rarer plants. The effect is particularly damaging to naturally very low nutrient ecosystems, like the calcareous fen areas in the Lye Valley and the dry calcareous grasslands of some areas of the golf course. The width of this enriched (and thus damaged) vegetation zone, will vary with the type of housing nearby. Family homes with gardens are more likely to have pets than a large concentration of smaller flats. In the case of dogs it will also vary with the nearness of alternative exercise and defaecation areas, such as road verges and other parks.

Quantities produced are estimated at an average of 100-200g faeces and 0.25-1.25litres of urine per dog per day (21). One recent study (22) puts the proportion of dog owning households in a semi rural area at 24%. This high level might not be expected in a more urban context, but the nearness to a green area encourages some people to consider owning a dog, when they might not if there were no green area nearby. Dog owners moving into the area, will choose a house near a green area with the specific aim of being able to exercise it there (personal observations from discussions with dog owners in Oxford).

In the previously mentioned study, some of these houses (23% of dog owning households) had more than one dog. As a very rough calculation, assuming each house had only one dog, 24% of 1260 houses would mean 302 dogs and 24% of 380

houses would mean 91 dogs. The total of 1640 houses in the proposed developments might mean 394-395 dogs. At the above mentioned output per day, this would mean a maximum of **79 kg of faeces and 494 litres of urine a day**. Of course, only a proportion of this might be expected to impact on any wildlife area nearby to the housing, but this calculation gives some idea of the size of the problem that might be expected. In addition, once there are access roads into the Lye Valley area from e.g. Hollow Way, dog owners from adjacent roads and estates where there is little green area, might be expected to walk their dogs onto the site, so the dog pressure may be much greater than from the proposed developments alone.

The behaviour of dog owners is complex. Whilst most dog faeces seem to be deposited near paths, observation anecdotally suggests that owners can encourage their dogs to foul in longer grass areas preferentially away from short mown paths. Thus long grass and scrub may be affected when this might not be expected.

It is therefore very difficult to predict a distance that this enriched zone will damage near a housing development. In addition to people walking their dogs to the area for exercise, sometimes dogs are driven in cars to a green area for exercise if parking nearby is available and there are no green areas where the dog owners live; so the amount of dog pressure may not be directly related to the number of houses nearby. Measures have been tried on sites to try and control dog defaecation and urination; thus to restrict it to particular areas, away from critical wildlife sites. Access points to the wildlife area from the housing development need to be as far away from the SSSIs as possible. The area near the access point should be the area of lowest conservation value, as it will have to be sacrificed to enrichment. *Siting of access points is therefore critical.*

Examination of the ground flora at a site enables very rough calculations to be made of the distances excrement damage occurs from an access point. At nearby Rock Edge, nearly all areas show some enrichment and the site is small, with many access points. Thus damage extends at least 120m in from the edges of the site. Looking at the north end of the Lye Brook, the enriched area along the footpath down from the Slade towards the North Fen extends approximately 160m, further perhaps because it is a narrow site and dogs are channelled down and along the footpath - they cannot range far to the sides into impenetrable bramble scrub or into the brook. The zone of enrichment damage will not happen immediately upon access. It will take years (perhaps many) to develop, but it will happen.

5.2.2.9. Pet animal (Dog and Cat pressure) – disturbance and predation

Many houses in a development will own cats and the natural tendency of a cat as a predator will be to range from its home into the area to hunt small mammals and birds as well as amphibians and reptiles. Local residents in the Lye Valley have shown me grass snakes brought in by their cats. Dog owners like to release their animal from the leash in open and wild areas so they can run and get exercise. The activities of both animals will disturb nesting birds and mammals resulting in reduced breeding success. The Churchill hospital field between Areas A and B has been observed to be a good basking site for **grass snakes, common lizards and slow worms** (27). Being 'cold-blooded' (more properly 'ectothermic') these animals need to warm up in order to be able to move, hunt and obtain enough food. If they cannot bask undisturbed, they cannot hunt and eat, or indeed digest their food. In addition, common lizards are viviparous, meaning the females bear live young and need to spend a lot of time

basking to provide enough heat for development of the embryos inside their bodies. Disturbance from basking will reduce reproductive success.

In the case of cats, they will reduce the bird, small mammal, amphibian and reptile population by direct predation. A recent study puts the proportion of cat-owning households in a semi-rural area at 22% (22). This is possibly an upper limit for the development in the Lye Valley, but assuming this proportion, 1260 houses in the West development might generate 277 extra cats. Both developments might generate an extra 361 cats. Not all of these would be out hunting birds, reptiles, amphibians and small mammals in the Lye Valley, but this calculation gives some idea of the potential size of the problem.

5.3 Consequences of a reduction in water quantity and quality to the springs

This would be occasioned by the developments causing reduction in rain water infiltration in the catchment areas of the springs, discussed in the accompanying report of C. Lamberth. Reduction in flow has already happened due to surrounding developments but any further reduction in flow of the water from the springs will result in the serious drying of the fen areas and the dying-out of plant and invertebrate species which are totally dependent on this water supply (which is very unusual in its quality - high calcium in combination with extremely low nitrate and phosphate values). If the flow continues, but the water is polluted by nutrients, including nitrates and phosphates, the plant community of the wet areas will change, as commoner, fast growing species like rank grasses, reeds and nettles will be favoured at the expense of the rare short herbs and mosses, which will eventually die out. As the plant community changes, so the associated invertebrate community will change, with the elimination of rare species.

5.4 Consequences of increased run-off from development areas

Assuming drainage from these sites will be directed to the Boundary Brook and the Lye Brook below the confluence, this will lead to increased erratic flash-flood type water flow in the Lye Brook and Boundary Brook. Increased bank erosion will result (see the report of C. Lamberth for more details on this). In the watercourses on this site, the banks are already so steep from prior erosional events (banks vertical or undercut for some stretches) only temporary plant growths are possible. A short term community of mosses and liverworts is quite often present, with some occasional ferns. Collapsed portions of banks bearing such communities are a common sight and sometimes ripped-off portions of bank-side sedge vegetation are seen as islands in the middle of the brooks – observed to be there one week then washed further down by the next week. The bank-side **pendulous sedge** (*Carex pendula*) community is known to be home to at least one rare invertebrate in Area A (fly *Stenomicroa cogani*, **RDB3**). This may well occur in other areas downstream, further studies are needed.

5.5 Effects of Climate Change

For full discussion of this, see the report of C. Lamberth. I am in full agreement with his conclusions that the predicted reduction in rainfall by 2050 will cause summer lowering of water levels in the fen areas, with consequent problems for the plants and animals there. The increase in intense rainfall events predicted, will exacerbate the erosion problems the valley already suffers. I therefore endorse his conclusions that:

‘it is very important that the size of the groundwater catchment zone is not reduced and that run-off from the urban catchment is diverted away from the Lye and Boundary Brooks’.

5.6 Habitat Fragmentation

There are numerous ecological studies on the effect of breaking-up a continuous area of wildlife habitat into island areas separated by unsuitable conditions. The result is that biodiversity declines in the isolated portions that remain. The minimum area for the survival of a certain species in a habitat fragment varies with the species; no estimate can be made of what would be a generally applicable minimum size. Mobile species like butterflies, birds and bees might be able to cross from one scrub area across a close mown area to the next suitable scrub patch, but it depends on the flight ability. **Black hairstreak** butterflies are poor fliers, **red admirals** are strong fliers, the first might not be able to cross a 10m unsuitable area but the second would be able to do so easily.

Rare species tend to be those with very specific habitat requirements and little colonising ability. For example, small rare woodland or fenland snails might travel only a few metres in their whole life and so are locked into a particular tiny area. Some plants are similar. Both the north and the south fen areas used to have **grass-of-Parnassus**. Some time in the 1990s, it was lost from the North Fen and despite good management recently, it has not reappeared from any seed bank in the peat. The population of this plant in the South Fen is now completely isolated and has no chance of re-colonising the North Fen because of the 550m of now unsuitable habitat (too shaded, or too dry or too mown) between the one site and the other. This is because of its very poor seed dispersal ability (seeds simply fall from the pods to the ground under the plant). A dandelion, with its airborne seeds, would have no trouble with this distance. Orchid seed can travel even farther.

Metalled roads can be a huge barrier to some species, and even wide trodden footpaths can fragment habitat for very immobile species. Some species can move through housing areas if gardens with gappy fencing are present (e.g. hedgehogs, mice). However housing, walls, impenetrable fences and unsuitable tidy gardens would block even those. Allotments are easier for some mobile species to travel through because of the lack of fencing and the persistence of weedy unmanaged areas providing cover.

There is considerable loss of habitat actually under the proposed developments. A block of apparently continuous green down the centre of the Lye Valley would remain after development. However the western proposed development isolates the Boundary Brook riparian corridor from the green areas on the grounds of Oxford Community School. The eastern development isolates allotments in the NW corner from the golf course and corridor (Area D).

After development, fragmentation of the remaining green areas in the Lye Valley may happen due to development of new hard, bare, trodden paths, arson attacks destroying scrub plus the possible necessity of scrub clearance to reduce drug-taking activities. Dog excrement-enriched grassland may be unsuitable for some invertebrates, therefore presenting a barrier that is not at all obvious. If the site hydrology is damaged, damp areas may dry out, presenting an impassable barrier to small species like rare snails or plants of damp areas with poor seed dispersal. If the development results in increased erosion along the stream banks, continuous streamside vegetation areas might be broken up into isolated patches and specific invertebrates may find it difficult to get from one patch to the next one 20m upstream.

6.0 Buffer zones necessary for SSSI areas

Consideration of the hydrological protection zones for the SSSI fens is dealt with in the report of C. Lamberth. I will, however note that a substantial area of lesser conservation interest grassland may need to be preserved simply to allow the rainwater infiltration and lack of nutrient enrichment of the water that is needed for the fen area to survive. Wanda Fojt (3) in her study of Oxfordshire fens, urged that the catchment of an SSSI fen be secured by agreements and the land use management in the catchment area be sympathetic to the needs of the fen. Her words: *'The ecology of most fens and therefore their scientific value for nature conservation, is strongly influenced and even dependent, on the catchment and associated land-use activities.'*

Regarding ecological matters not dependent on water flow and quality, discussion will include the effect of public pressure and buffer zones that may be appropriate. I would argue that for a very fragile habitat such as fen, buffer zones need to be wide. I consulted with Natural England on the width of buffer zones that they might think necessary for these sites in this case and the reply was that no definitive distance could be given in this case (see discussion in **Consultation section** and email correspondence in the **Appendix**).

The Woodland Trust have indicated a distance of **100m** around an ancient woodland is the minimum buffer zone required (23). Fens are more fragile than even ancient woodland, so the width should be more than this; how much more is difficult to decide.

A boundary line which indicates the limits of the hydrological influence on a site is much easier to calculate and draw than a boundary for the all the biological entities (including all the uncommon to rare invertebrates) on site. The zone for one species might be three times that for another and many species are involved. From the section on **'Buffer land'** in a **Joint Nature Conservation Committee** document where the discussion is about whether foreseeable human impact on the surrounding land could damage or destroy the special interest of the 'core' area and the resultant ability to draw a boundary line which defines the limits of the ecological influence:

'In some situations elaborate, lengthy and costly research would be needed before well-informed judgements could be made, but there will always be cases where ecological influence declines slowly across a wide gradient, so that any judgement has to be somewhat arbitrary' (24).

7.0 Projected Ecological Impacts of the Proposed Housing Development

Introduction

The first two sections of this study investigated the current status of the ecology of the Lye and Boundary Brooks and local area as well as types of impact they might be subject to as a result of housing developments.

This section describes the specific predicted effects of land use changes on the riparian zones that contain the SSSI, SLINC and wildlife corridor areas. The scope of this study was to investigate the possible ecological effects on the riparian corridor and broader off-site areas if two portions of Southfield Golf Course were developed for housing. The estimated numbers of dwellings that these two sites could accommodate are 380 for Southfield Golf Course East and 1,260 for Southfield Golf Course west.

7.1 Ecological Impacts of the Construction Phase of both the Developments

The report of C Lamberth deals very fully with these. My main concern is the long term ecological effects of the development.

7.2 Ecological impacts post construction as a result of housing development on Southfield Golf Course West

Loss of the Golf Club

If this area is developed for housing, the first obvious implication is that Southfield Golf Club will no longer operate and its mowing management of areas E, D and H will cease. Thus the vegetation and animal community of these areas will slowly change over time as natural successional processes occur, much as is seen in Area F already. Grass will get long and thick, scrub will invade and eventually trees, leading to secondary woodland. This development can be arrested if the private owners of the land agree to some management by mowing and scrub control. Such management may make the areas F, E, D and H more attractive for public informal recreation, but this depends on the private owners agreeing to such access.

Loss of foraging opportunities for mobile animals

The west development area may be an important foraging area for the animals in the wildlife corridor of Areas B and D. This needs much further investigation in order to be quantified.

Public pressure

If public access from the west development to areas F,E,D and H is allowed, damage will happen to these areas by public pressure of recreation and vandalism like arson. Also the effect of nutrient damage, disturbance and predation due to pet animals like dogs and cats from the development; also fly-tipping, including the dumping of garden rubbish and the risks of the introduction of alien plants and animals. All these are dealt with fully in sections 5.2.2.2 to 5.2.2.9 above. For all of these, damage will be greatest nearest the public access points to the land, therefore siting of these access points is critical and they should be the furthest away from the SSSI units as possible.

This means access points from the West development area that would be *least* damaging to the SSSI units, should be at the **northern-most point**, adjacent to the Warneford Meadow and at the **southern-most point**, into area F, behind Oxford

Community School. An obvious access point from the development would be near the confluence of the Lye and Boundary Brooks, but I would **strongly recommend against this** as it will direct unacceptable amounts of public pressure directly up towards the North Fen and naturally down the watercourse to the South fen area. As this is such an obvious entry point from the development, people may create their own access, whether this is allowed or not. Strong measures, such as a chain link fence and/or thick hedge planted with native spiky species (hawthorn/ blackthorn) may work (see suggestion from Natural England in **Consultation section**) but this will not prevent people creating their own access points to this area if their back garden fences actually abut the green area.

A lot depends on whether an access road to the development is allowed to go around the perimeter of the development site or whether the gardens of houses will actually abut the wildlife corridor. If a road goes around the perimeter, fly tipping is more likely due to the ease of vehicle access. If gardens abut the site, dumping of garden rubbish over back fences is more likely.

If a vehicle access road is sited into the development from Barracks Lane along the south eastern boundary of the Oxford School playing field, then one should consider the increased pressure from people living in the neighbourhood of Barracks Lane, Crescent Road etc. for access to the green area for recreation, dog exercise and so on. Considering the south and east side of the whole site, it would be reasonable to expect there to be a public demand for access for recreation from the areas of: Dene Road, Hollow Way, the east end of Barracks Lane and Horspath Road. **Again the siting of such public access points in these areas will be critical** and should be as far from the SSSI areas as is possible. The low-nutrient relict calcareous grassland discovered in Area H adjacent to Hollow Way, will be particularly at risk from nutrient enrichment resulting from dog excrement and dumping of garden waste materials.

Regarding **Area B, the riparian corridor to the Boundary Brook**, from the map it would appear that the limit of the proposed development approaches to about 25m from the actual brook west bank. This close site limit applies over a broad zone of approximately 670m of the riparian corridor. Even if no public access points are allowed along this length, there will be greatly increased pressure from the Warneford end along the footpath near the brook. If house gardens fences actually abut this site limit, which is only 25m from the brook, it is predicted that the whole thin strip forming the wildlife corridor on the south eastern bank of the brook will be damaged by such activities as garden waste dumping, with the introduction of alien plant species. Some people make their own access points, by putting gates into their back garden fences. Considering this, I predict that Area B will be subject to a very heavy and unacceptable human pressure from all that I have discussed in sections 5.2.2.2 to 5.2.2.9, resulting in the loss of much of the wildlife interest of the site. The value of this area as a wildlife corridor will be much diminished. This problem will be exacerbated if the proposed development on the Warneford Meadow goes ahead. The important basking area for common lizards, grass snakes and slow worms on the Churchill Hospital field will be also be particularly at risk because of disturbance.

Balance ponds and swales

These may be measures suggested to mitigate surface run off from the Western proposed development. These are not features that enhance the wildlife of a site, therefore it is important that these should *not be sited in Area B, the riparian corridor of the Boundary Brook or in areas E and F*, but should be located within the development zone limits. Such structures, if allowed, for example, in the riparian corridor; would effectively reduce the width of that corridor to wildlife travelling along it (an open water area in the narrow corridor adjacent to the brook will not make the area easier for badgers, voles, mice, shrews, hedgehogs or deer to pass through, but would rather constrict the corridor, inhibiting the passage of such animals).

See **Table 1** for a summary of all these discussed effects.

Table 1 Ecological impact-receptor effects post construction of housing on Southfield Golf Course WESTNote: some of these effects may take years to fully develop. *Hydrological effects NOT considered*

Impact	Area A, riparian corridor to the Lye Brook including the N fen SSSI	Area B, riparian corridor of Boundary Brook to confluence	Area C, riparian corridor to Lye Brook south of confluence and including S Fen SSSI	Area D, riparian corridor and golf course portion from S Fen to Barracks Lane	Area E, golf course portion to west of S Fen and NE of Area D	Area F, land east of Oxford Community School and adjacent Barracks Lane	Area G, Cowley Marsh County Wildlife Site
Dumping of garden waste/alien plant species	Slight , to S end	Severe	nil	nil	Severe adjacent to devel within 10m, then slight unless aggressive alien involved	Severe adjacent to devel within 10m, then slight unless aggressive alien involved	nil
Fly tipping, litter, drugs	Slight , to S end	severe	nil	Nil unless access point from Barracks La.	Severe within 10m, then slight further away	Severe within 10m, then slight further away	nil
Dogs and cats-excrement & disturbance	Slight, moderate to the S end esp. Churchill field	severe	slight	Slight-mod depending on footpath position and access points	severe within 10m of development then slight except along paths where moderate	severe within 10m of development then slight except along paths where moderate	nil
Recreation pressure, ground compaction, tree damage, arson	moderate	severe	Slight – moderate	Slight unless access point created from Barracks lane	Severe within 50m then moderate depending on access points and footpaths	Severe within 50m then moderate depending on access points and footpaths	nil
Light & noise	Slight , S end	severe	Slight, N end	nil	Moderate at N end, then slight	Moderate at N end, then slight	nil
Habitat fragmentation	Slight , south end	severe	Slight, N end	Nil-slight , depending on access points	Maybe severe at N end depending on access points	Maybe severe at N end depending on access points	nil

7.3 Ecological impacts post construction as a result of development on Southfield Golf Course East

Continuation of the Golf Club

The loss of the east area to development may still allow the Golf Club to operate in the western portion of the site. If this is the case, areas A, B and E will benefit from the protection of private land with reduced official public access. They will also benefit from the management activities of the club in mowing to control the development of scrub and woodland. If the golf club control of the land were to operate up to the boundary of the proposed east development, some protection to Area D and to the South Fen SSSI unit may result, although the South Fen will still be at risk.

Loss of foraging opportunities for mobile animals

The east development area may be an important foraging area for the animals in the wildlife corridor of Areas C and D. This needs much further investigation in order to be quantified.

Public pressure

If public access from the east development to areas E and D is allowed, damage will happen to these areas by public pressure of recreation and vandalism like arson. Also the effect of damage due to pet animals like dogs and cats from the development; fly-tipping, including the dumping of garden rubbish and the risks of the introduction of alien plants and animals. All these are dealt with fully in sections 5.2.2.2 -5.2.2.9 above. For all of these, damage will be greatest nearest the public access points to the land, therefore siting of these access points is critical and they should be the furthest away from the South Fen SSSI unit as possible. The edge of the South Fen is only 42m from the border of the projected development, therefore it will be subject to heavy pressure, the most serious of which is **arson**. Area C encompasses the South Fen and the wildlife corridor at the bottoms of the long gardens on Lye Valley Road. All these areas are privately owned and thus should not have any public pressure. In practice the areas are not fenced off from the brook and there is no barrier to persons entering these areas by crossing the brook. There are obvious incursion paths and it would not be realistic to assume there will be no increased pressure.

Access points to the wild area D from the east development that would be *least damaging* to the South Fen SSSI unit, should be at the **south-western most point**, of the development, adjacent to Barracks Lane. I would **strongly recommend against any access points along the whole western border of the development site** as it will direct unacceptable amounts of public pressure towards the South Fen and naturally up the watercourse to the North Fen area. People, may, of course, create their own access, whether this is allowed or not by, for example, constructing doors in their back garden fences if they abut the area. Strong measures, such as a chain link fence and/or thick hedge planted with native spiky species (hawthorn/ blackthorn) may work.

A lot depends on whether an access road to the east development is allowed to go around the perimeter of the development site or whether the gardens of houses will actually abut the wildlife corridor. If a road goes around the perimeter, fly tipping is

more likely due to the ease of vehicle access. If gardens abut the site, dumping of garden rubbish over back fences is more likely.

Hydrology

The report of C. Lamberth deals in detail with the hydrological protection zone necessary for the South Fen SSSI unit. As his calculated catchment for the South Fen includes a substantial portion of Area H, I would re-enforce his conclusions and state it is critical that the soil area in H remain fully permeable and the vegetation remains low-nutrient to ensure continuation of a high quality (high calcium, low nitrate and phosphate) water supply to the South Fen. The comment about balance ponds and swales discussed for the west development applies equally here. They should be within the development zone and not in the wildlife corridor area D for the reasons discussed above.

Conservation value of Area H

Area H adjacent to Hollow Way is important because of its ecological and hydrological relationship to the South Fen and to the wildlife corridor of Area D. Mobile animals from the fen and brook corridor may move out to feed over a much larger zone, including Area H. This brief study has shown that, in addition, Area H has some conservation interest in its own right as a relict fragment of calcareous grassland with a diversity of herb species and important poplar trees with sap runs. The plant species in this calcareous grassland have survived only because of the mowing regimes operated by the golf club (which mimic the grazing which operated in past centuries). If mowing ceases, much of the special plant interest in this area (e.g. rest harrow, scabious, sainfoin and knapweeds) will eventually be lost due to succession through to thick tussocky grass with few flowers, scrub and secondary woodland. Further study of the plants, invertebrates and fungi of Area H is needed in order that it can be better evaluated.

In my view, much of this grassland in Area H is needed to form an ecological buffer zone to protect the South Fen SSSI unit and the wildlife corridor of Area D, but exactly how much, is difficult to calculate.

See **Table 2** for a summary of these discussed effects.

Table 2 Ecological impact-receptor effects post construction of housing on Southfield Golf Course EASTNote: some of these effects may take years to fully develop. *Hydrological effects NOT considered*

Impact	Area A, riparian corridor to the Lye Brook including the N fen SSSI	Area B, riparian corridor of Boundary Brook to confluence	Area C, riparian corridor to Lye Brook south of confluence and including S Fen SSSI	Area D, riparian corridor and golf course portion from S Fen to Barracks Lane	Area E, golf course portion to west of S Fen and NE of Area D	Area F, land east of Oxford Community School and adjacent Barracks Lane	Area G, Cowley Marsh County Wildlife Site
Dumping of garden waste/alien plant species	nil	nil	Moderate to S Fen only , (invasion by aliens) rest slight	severe for 10m along edge of devel. site boundary then slight unless aggressive alien involved	nil	nil	nil
Fly tipping, litter, drugs litter	nil	nil	Nil-slight , depending on access point	Moderate-severe	slight	nil	nil
Dogs and cats-excrement & disturbance	slight	Very slight	Slight , depending on access point	Moderate-severe , depending on footpath position and access points	Moderate-slight	Slight , depending on access point	nil
Recreation pressure, ground compaction, tree damage, arson	slight	slight	Moderate , depending on access. Arson risk to S Fen may be severe due to v. combustible reed	Moderate-severe depending on access points and foot-paths	moderate	slight	nil
Light & noise	nil	nil	Moderate to S Fen, slight to rest	Slight-moderate	slight	nil	nil
Habitat fragmentation	nil	nil	Nil- severe to S Fen, depending on whether access controlled or not Rest slight	Slight-moderate , depending on access points	slight	slight	nil

7.4 Ecological impacts as a result of development on Southfield Golf Course West and East COMBINED

Development on both west and east sides of the golf course would leave a green strip of maximum 425m and minimum 350m between each of the two housing developments. If access is allowed to the green area from both developments, damage zones, (looking 10 years into the future) will extend a long way into this 'sandwiched' strip.

Loss of Golf course

Without the golf club occupying the area, the protection of the private nature of the remaining green area disappears. The worst case scenario is unlimited public access. This may put unacceptable pressure on the wildlife of the area in between.

The Golf Club mowing management of areas E and D will cease. Thus the vegetation of these areas will slowly change over time as natural successional processes occur, much as is seen in Area F already. Grass will get long and thick, scrub will invade and eventually trees, leading to secondary woodland. This development can be arrested if the private owners of the land agree to mitigation management (see suggested mitigation) by mowing and scrub control and are willing for areas F, E and D to have some public access for recreation. In other words, if nothing is done, the character of the area left will unavoidably change over the next 50 years.

Strong access control measures to the green area and extensive mitigation measures in place might limit the damage, but a significant amount will occur and it is impossible to predict exactly how much. **Mitigation Measures** have to actually **work long term (in perpetuity)** and not be short term '**quick fixes**'. For example, any access control fencing needs to be strong and replaced regularly as soon as breached,. Any mitigation mowing regimes must be adhered to annually and not be allowed to lapse.

See **Table 3** for a summary of the discussed effects.

Table 3 Ecological impact-receptor effects post construction of housing on Southfield Golf Course W & E COMBINEDNote: some of these effects may take years to fully develop. *Note Hydrological effects NOT considered*

Impact	Area A, riparian corridor to the Lye Brook including the N fen SSSI	Area B, riparian corridor of Boundary Brook to confluence	Area C, riparian corridor to Lye Brook south of confluence and including S Fen SSSI	Area D, riparian corridor and golf course portion from S Fen to Barracks Lane	Area E, golf course portion to west of S Fen and NE of Area D	Area F, land east of Oxford Community School and adjacent Barracks Lane	Area G, Cowley Marsh County Wildlife Site
Dumping of garden waste/alien plant species	Slight, to S end	Severe	Moderate to S Fen only, (invasion by aliens) rest slight	severe for 10m along edge of E. devel. site boundary then slight unless aggressive alien involved	Severe adjacent to W. devel within 10m, then slight unless aggressive alien involved	Severe adjacent to W devel. within 10m, then slight unless aggressive alien involved	nil
Fly tipping, litter, drugs	Slight, to S end	severe	Nil-slight, depending on access point	Moderate-severe	Severe within 10m of W devel. then slight further away	Severe within 10m of W devel. then slight further away	nil
Dogs and cats-excrement & disturbance	Slight, moderate to the S end esp. Churchill field	severe	Slight, depending on access point	Moderate-severe, depending on footpath position and access points	severe within 10m of each devel. then slight except along paths where moderate	severe within 10m of W devel. then slight except along paths where moderate	nil
Recreation pressure, ground compaction, tree damage, arson	moderate	severe	Moderate, depending on access. Arson risk to S Fen may be severe due to v. combustible reed	Moderate-severe depending on access points and foot-paths	Severe within 50m of each devel. then moderate depending on access points and footpaths	Severe within 50m of W devel. then moderate depending on access points and footpaths	nil
Light & noise	Slight, S end	severe	Moderate to S fen, rest slight	Slight-moderate	Moderate	Moderate at N end then slight	nil
Habitat fragmentation	Slight, south end	severe	Nil- severe to S Fen, depending on whether access controlled or not Rest moderate	Slight-moderate, depending on access points	Maybe severe at N end depending on access points	Maybe severe at N end depending on access points	nil

8.0 Mitigation measures after development

8.1 Green space and recreation provision

Loss of green areas of Southfield Golf Course to development would mean that an equal area of green space for public recreation should be provided, in order to reduce the demand for public access for recreation on the SSSI areas in the Lye Valley (see Natural England comment in email in Appendix). In this already heavily urbanised area of Oxford City, provision of this green space nearby will be difficult, if not impossible.

Provision of open green space areas within the development itself will reduce the demand for access to the SLINC and SSSI areas outside the development. It is suggested this green open space be more than the value of 10% of the gross site area stipulated by some local authorities with regard to new developments.

I note that, in addition to the loss of recreation area on the golf course, the east projected development means the loss of the Dene Road children's play area which has relict limestone grassland flora. Provision of a green children's play area within the development will be necessary as replacement, since no other suitable area exists in the neighbourhood.

8.2 Wildlife

It is impossible to mitigate for any damage to the calcareous spring fen areas as these are dependent on very special hydrological conditions that are not re-creatable.

In addition, the community of species on these sites has taken thousands of years to develop. There are many rare species that are essentially locked into these areas and have no ability to go anywhere else. Preventing loss, or reduction in quality, of this highest value habitat, should have the highest priority.

The veteran trees on site are important and as discussed, would be vulnerable to arson attacks from the nearby developments. To quote the opinion of Oliver Rackham (famous woodland historian) *“It is not possible to mitigate for the loss of an ancient veteran tree, hollowed and rotting, with a whole assemblage of fungi and invertebrates living within it, nor can one re-create the habitat it represents by planting a young tree (or even 10,000 young trees) elsewhere”* (26). There are ancient, veteran willows and lesser numbers of other old trees such as poplars and alders in the Lye Valley.

Some mitigation for loss of lower quality habitat in other areas of the site, i.e. areas of the west portion of the golf course, is possible and some suggestions are below.

8.2.1 Re-wetting of Lye Valley North and South fens - see the report of C Lamberth for details of this option. This would greatly benefit those species already under stress from the fens drying out.

8.2.2 Indian balsam eradication. Money (a ring fenced annual budget) for **yearly eradication** of indian balsam from the whole of the green areas remaining after development in the Lye Valley. This species will keep coming back, as it is now so widespread in the countryside and moves extremely easily by seed. It will need the pulling-out of every plant as it is just coming into flower in June. Initially this will be a lot of work but after 2-3 years, when the seed bank in the soil is reduced, less time and effort will be needed. If this is not done, the remaining wild areas after development will lose much of their value. There will not be a point when this activity can cease, as the species will keep re- invading via the water courses.

8.3 Habitat creation and Biodiversity Enhancement Opportunities

8.3.1 Calcareous grassland

As some of the golf course areas projected for development have been found to also have substantial wildlife interest, creation of equal areas of wildlife interest will therefore be necessary. There is no possibility of creating low nutrient calcareous dry grassland (to replace that lost in Area H) if the soil is not suitable, so it would have to be on an area of the Corallian limestone. All areas of this within the city seem already under housing or roads.

However, bringing back the calcareous grassland which used to exist on the east bank above the North Fen SSSI unit is a possibility. This would need the removal of the secondary scrub and trees developed on this bank and then the enriched topsoil needs to be scraped-off to lower nutrient levels. Then the area could be re-seeded with seed collected from characteristic plant species in Area H, with the aim of restoring the range of species originally on site. This would have to be carried out with due regard to no damage happening to the hydrology of the North Fen, so consultation with C Lamberth and Natural England would be necessary. Following creation, money should be set aside into the future for the essential yearly mowing of this steep bank with the removal of all cuttings away from the Lye Valley site (no dumping on site). This flowery, sunny, dry bank would attract butterflies and may also be a useful basking area for reptiles like common lizards.

8.3.2 Encouragement of flower-rich hay meadow grassland areas by mowing regimes

The institution of a hay meadow mowing regime in areas that were fairways of the golf course in Area E may result in the spreading of flowery species prevented from seeding by the close mowing currently in place. This will benefit a whole range of invertebrates as well as being more visually attractive. Colonisation of the damper areas by species of orchids, such as the **common spotted orchid** and the **green winged orchid** (*Orchis morio*) may happen. This last species used to be on this site and is currently present only a short distance away in the grounds of Helen Douglas House, in Leopold Street, off the Cowley Road (information from Oxford Urban Wildlife Group). Colonisation by wind transport of the small, light seed is possible. Such hay meadow areas must be kept low nutrient by the removal of all cut hay from the site (no dumping on site, or allowing hay to lie on the cut grass). Currently the management of the rough areas of the golf course leads them to be poor in flower species, because the grass is cut, but hay is allowed to lie on the surface. If the hay is not removed, smothering and nutrient enrichment will occur and no flowery meadow will result. Money for this annual essential mowing and hay removal management needs to be assured into the future. No footpaths should be routed through or even near this area, because of all the problems previously discussed.

8.3.4 Bare sandy areas for ground-nesting bees and wasps

The drier, sandy areas of the golf course in area E may be suitable for these invertebrates. They may be encouraged to breed by scraping-off the surface vegetation in the appropriate soil areas. **Ivan Wright** of **Shotover Wildlife** might be consulted on the appropriate methods and area. These need to be near good sized areas of flower-rich vegetation so that the bees can forage for nectar and pollen. This is not just a one-off action, as this scraping management will need to be repeated every few years as the areas re-vegetate, so money needs to be set aside for this management into the future. Maintenance of the flowery foraging areas need to be considered as well.

8.3.5 Enhancement of tree provision on site

The golf course has a number of ageing poplar trees which are very valuable for wildlife. Currently there are young, non-native poplars planted in several areas which are not as useful. Opportunities exist in areas E, D and F and G for the planting of true native black poplars, *Populus nigra ssp. betulifolia*, especially in the wetter areas, to provide continuity for the poplar-dependent species on site (like the hornet clearwing moth).

With due consideration to the soil type, other native tree species could be introduced which would benefit wildlife. Money for the essential maintenance of the valuable veteran trees (may need some tree surgery to ensure they remain safe) and for an ongoing planting programme of appropriate young trees, needs to be assured into the future and not just a one-off thing.

8.3.6 Enhancement and extension of wetland provision on site in Areas E and F

The report of C. Lamberth details how this kind of thing may be achieved and the reader is referred to his document. '*Bringing the marsh back to Cowley Marsh*' might be the aim of this. 'Cowley Marsh' once occupied a much larger area than the small triangle of green (Area G) that currently has that name. Increasing the wetness (marsh re-creation) of some of Areas E and F should go hand in hand with rotational cutting and hay removal management annually. Money for this should be assured into the future.

9.0 Recommendations for further investigations

9.1 Quantification of damage zones expected from human pressure

It would be useful to have some quantification of the distances from a development that damage zones exist due to the dumping of garden rubbish and the deposition of dog excrement. This could be easily done by measurements on a series of sites around Oxford. However it must be remembered that alien plants spread to varying distances beyond the immediate dump site.

9.2 Full Environmental Impact Assessment

In the event of a planning application for housing in the areas indicated being lodged, the ecological angle would need a full EIA with very specific surveys at certain times of the year. Answering the first question (*what species already live in/use in the proposed development areas and the nearby wildlife sites?*) will take specific targeted surveys by specialists at different times of year. Minimal surveys by general ecologists over a couple of days in midsummer will not suffice for a site as complex as this with areas of **nationally important habitat**. A good evidence base for the answer is needed because there is still incomplete knowledge of species of animals and plants which live in the high grade SSSI fen areas, let alone the corridor SLINCs and the golf course areas. There are quite a lot of old (pre 1938) historical records of important species from this whole area. My own recording effort has resulted in the refinding of several that were considered to have maybe gone extinct on site and many new records of previously unrecorded invertebrate species. Therefore a lot more work is required.

Invertebrates may have very specific emergence times and thus be only catchable/recordable for a certain 3-4 week slot in the whole year. The following addresses the needs of the species most likely to be important on this site (all groups quoted in past records of species on site from OCC management plan, approx 1986):

Invertebrates

- **Molluscs** A survey by hand searching and sweep netting of all sedge dominated wet areas in **October** to check for important small snails for example *Vertigo moulinsiana* (Desmoulin's Whorl Snail, BAP species) by a competent mollusc expert. This snail is not recorded from this site, but there have been no adequate surveys and it is found in other Oxon fens with similar vegetation and water regimes.
- **Spiders and beetles** by pitfall trapping in 2 sessions – a week in **May** and another in **October**, supplemented by hand searching/sweep netting for rare and uncommon species. The survey by S Gregory in 2001 is a start point, but was carried out at the wrong time of year for the assessment of rare species presence and may now be out of date. **Glow worms** were recorded on this site as recently as 1985, so a survey specifically for these will be needed in July. Competent arachnologist and entomologist needed.
- **Ground nesting hymenoptera (aculeates -bees and wasps)** a survey of these in the drier, sandy, short grassland areas of all of the golf course will be necessary as these are just the sort of places favoured by these animals. This will need to be done in 3 sessions: **April, end of May and June**, to cover all likely species - by competent entomologists.
- **Flies (Diptera)** There are many historic records of uncommon to rare flies from this site and my records from this survey have added new important species to the list. Therefore all suitable wet and dry areas need to be surveyed by competent entomologists (dipterists). Minimum requirement is 3 visits: **late May, late June-early July** and one in **late Sept-early Oct**.
- **Butterflies and moths:** My own surveys indicate only relatively common butterflies are present in the SSSI areas, but there are past (1985) records of, for example, the **dark green fritillary** (*Argynnis aglaja*) possibly from non SSSI areas in the Lye Valley. This current survey revealed the presence of its food plant (**hairy violet**) in the golf course area adjacent to Hollow Way and it may be that rough areas of the golf course may present breeding opportunities for this butterfly and others, therefore butterfly surveys should happen in **May, June and July**. Moth surveys by light trapping for both **macro-** and **micro-moths** will be necessary, (approximately 6 trapping nights spaced during the season, complemented by sweep netting for day flying moths in **May/June**).
- **Other invertebrates** other minor orders should be studied including Orthoptera (**grasshoppers and crickets**) and Odonata (**dragonflies and damselflies**)

Plants

Botanical surveys at a more appropriate time of year than the current one are needed. In particular the timing needs to encompass the need to identify **orchids** likely to be flowering in these areas. There are historic records of **early purple orchid**, and **southern marsh orchid** on this site necessitating an **April** visit, and further visits in **June, July and August** are recommended to cover flowering and fruiting times of the range of species expected.

Herpetiles (amphibians and reptiles)

I have personally observed the following BAP species on this site over the last 6 years: **common toad, grass snake and common lizard**. Local residents also report **slow worms** therefore a survey for all these and other herpetiles, should be undertaken in **mid April-mid May** for amphibians and in **September-October** for reptiles.

Birds and Mammals

The large quantity of woodland and scrub in the whole area mean a full **bird** survey will be very important. Due to the abundance of many mature and old trees in the whole area a full **bat** survey would be necessary and my findings of possible **badger latrine** evidence in areas C and E warrants a full **badger** survey. I saw no evidence of **water vole** or **otter** activity and the poor water quality in the Lye and Boundary Brook make it unlikely either species would use the areas, but **water voles** certainly occurred on the banks to both Lye and Boundary brooks prior to 1986 (OCC draft management plan) so a survey specific to both mammals would be needed. Otters are returning to the Oxfordshire watercourses. It is noted that **west European hedgehog** now appears on the new BAP list and therefore efforts should be made to assess the site's importance for this species.

Fungi

My results during the present survey work reveal areas of low-nutrient plant species-rich grassland in the short and long grass areas adjacent to mown/watered/ fertilized greens and tees of the golf course. Because of their low nutrient status, these areas are likely to support a diverse flora of grassland fungi, especially waxcaps (*Hygrocybe* sp) **clavarioids** and *Entolomas*. In addition the wet woodland along the Boundary and Lye Brook will need a survey of fungi living on the trees and deadwood, as well as mycorrhizal species associated with tree roots (in particular to search for alders with other examples of the red listed **Alder Bolete**, *Gyrodon lividus*, which I discovered in the present survey). Therefore a survey by a mycologist competent in the identification of all these groups in **October** will be necessary.

10.0 Consultation summary

The County Ecologist, Craig Blackwell, was not available at the time of this study for comment; similarly the Countryside Ranger with most knowledge of the site (Anthony Roberts) was not available, being on sick leave. Discussions with representatives of Natural England indicate their concerns are the impact of the proposed developments on the hydrology of the SSSI fen areas and the pressure of increased public access to the sites (trampling vegetation/ fires), dumping of garden and other waste. They suggest the buildings in each development be sited as far as possible from the SSSI areas and a landscape buffer zone of native planting should be provided. Also structures like a chain link fence or hedge planted with native spiky species between the development areas and the SSSIs, to prevent access to the areas by the public. They also comment that after development, in order to reduce the demand on the SSSI areas for access, provision should be made for alternative green space/ recreation grounds for the public.

Verbal consultation with various invertebrate experts, notably John and Barbara Ismay (30) was helpful in formulating my recommendations for a full Environmental Impact Assessment. Thames Valley Environmental Records Centre and Natural England provided full access to all the species records they hold on this site, which enabled me to gain a good ecological perspective of the area, in combination with my own studies over the last few years.

Details of emails relating to consultation with Natural England representatives are to be found in the Appendix.

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APPENDIX 1

Text of emails sent and received as part of Consultation:

To

Alison Muldal
Natural England
11 Fenlock Court
Blenheim Office Park
Long Hanborough
Oxford, OX29 8LN

Dear Alison

Curt has passed on to me the discussion below. As my brief in this project is to look at the potential impact of the housing developments on the ecology of the SSSI and SLINC/County Wildlife sites in the map he sent you, I wonder if you have any further comments relevant to my angle (basically I'm asking the same questions as Curt did below). Apart from the water supply and quality issue, I am particularly looking at the increases in the effects of vandalism (including arson) recreation and dog walking, loss of habitat adjacent to the SSSIs (reduction in buffer zones) and constructional phase impacts.

I'm particularly interested in your view on the width necessary for any buffer zones to be left around SSSIs with habitats of such fragility and rarity as the Lye Valley fens (quoted as M13 Schoenus nigricans-Juncus subnodulosus mire grading to M22 Juncus subnodulosus -Cirsium palustre fen meadow) even though they are at the moment not in ideal condition. The potential exists for getting them in really good condition within a few years. My reading of the literature suggests a distance of 250m from the border of such an SSSI for no development, but is there any different, more recent, figure that Natural England would require?

Thanks

Regards

Judy

Alison consulted with colleague Sarah Mansbridge of Natural England and her reply:

Alison Muldal
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Alison.muldal@naturalengland.org.uk

From: Mansbridge, Sarah (NE)
Sent: 27 September 2007 10:29
To: Muldal, Alison (NE)
Subject: Lye Valley - Planning

Hi Alison

It is hard to know how wide a buffer strip should be between a development and a sensitive feature habitat/ species, in this instance we would have concerns about access to the site (trampling vegetation/ fires), dumping of garden and other waste, but also impacts of the development itself on hydrology. It would make sense if they planned the site so that the buildings were further away from the SSSI and that the landscaping (should all be native planting) is located nearer to the SSSI to act as a further buffer.

Things to consider;

- They must make provision for alternative green space/ recreation grounds, this should reduce the demand on the SSSI for access
- A chain link fence and/ or hedge planted with native spiky species (hawthorn/ blackthorn)
- Methods to prevent access from the public should not prevent access for SSSI management, gates may need to be put in to allow access for machinery etc.

Hope this helps, sorry I couldn't be more specific!

Sarah Mansbridge
Cotswolds & Clay Vales
Natural England
11 Fenlock Court
Blenheim Office Park
Long Hanborough
Oxford, OX29 8LN

APPENDIX 2 - TABLES 4A-H OF SPECIES RECORDED IN THIS SURVEY

(Note: only a limited range of invertebrates are recordable at this time of year, so the following lists for this group are very incomplete. My full year's worth of invertebrate records for the SSSI fen areas will be reported to Oxford City Council in a separate document, in January 2008).

TABLE 4A

LYE VALLEY SURVEY RECORDS J A Webb September 2007		Survey locations (see key at bottom of table)								Status	
Latin Name	Common name	Date	A	B	C	D	E	F	G	H	
Trees, Shrubs & climbers											(common unless otherwise stated)
<i>Alnus glutinosa</i>	alder	2-21.9.07	+	+	+	+		+	+		
<i>Acer campestre</i>	field maple	2-21.9.07	+					+			
<i>Betula pendula</i>	siver birch	2-21.9.07						+	+		
<i>Bryonia dioica</i>	white bryony	2-21.9.07	+	+	+	+	+				
<i>Buddleja davidii</i>	butterfly bush	2-21.9.07	+								garden escape
<i>Cornus sanguinea</i>	dogwood	2-21.9.07			+			+			
<i>Corylus avellana</i>	hazel	2-21.9.07	+	+	+	+	+	+	+		
<i>Crataegus monogyna</i>	common hawthorn	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Fallopia baldschuanica</i>	russian vine	2-21.9.07			+						garden escape
<i>Fallopia japonica</i>	Japanese knotweed	2-21.9.07	+								garden escape, schedule 9 plant
<i>Fraxinus excelsior</i>	ash	2-21.9.07	+	+	+	+	+	+	+		
<i>Hedera helix</i>	ivy	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Humulus lupulus</i>	hop	2-21.9.07			+						
<i>Hypericum androsaemum</i>	tutsan	2-21.9.07	+	+							
<i>Ilex aquifolium</i>	holly	2-21.9.07			+		+				
<i>Ligustrum vulgare</i>	wild privet	2-21.9.07	+	+	+	+		+			
<i>Lonicera nitida</i>	shrubby honeysuckle	2-21.9.07	+								garden escape
<i>Malus domestica</i>	cultivated apple	2-21.9.07					+				
<i>Malus sylvestris</i>	crab apple	2-21.9.07			+	+	+				
<i>Populus canescens</i>	grey poplar	2-21.9.07									+
<i>Populus nigra hybrids</i>	hybrid black poplars	2-21.9.07		+			+	+	+	+	
<i>Prunus domestica</i>	hedgerow plum/damson	2-21.9.07		+		+	+	+			
<i>Prunus spinosa</i>	sloe/blackthorn	2-21.9.07	+	+	+	+	+	+	+		
<i>Quercus robor</i>	pedunculate oak	2-21.9.07			+	+	+	+			
<i>Ribes nigrum</i>	blackcurrant	2-21.9.07		+	+						garden escape
<i>Ribes rubrum</i>	redcurrant	2-21.9.07	+	+	+	+		+			? garden escape
<i>Ribes uva-crispa</i>	gooseberry	2-21.9.07		+	+	+					garden escape
<i>Rosa canina</i>	dogrose	2-21.9.07	+	+	+	+		+			
<i>Rubus caesius</i>	dewberry	2-21.9.07	+	+	+	+		+	+		
<i>Rubus cf armeniacus</i>	cf 'Himalayan Giant' blackberry	2-21.9.07	+	+			+				garden escape
<i>Rubus fruticosus agg.</i>	bramble	2-21.9.07	+	+	+	+	+	+	+		
<i>Rubus idaeus</i>	raspberry	2-21.9.07	+	+	+	+					garden escape
<i>Salix cinerea</i>	grey willow	2-21.9.07	+	+	+	+	+	+	+		
<i>Salix fragilis</i>	crack willow	2-21.9.07	+	+	+	+	+	+	+		
<i>Sambucus nigra</i>	elder	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Symphoricarpos albus</i>	snowberry	2-21.9.07			+						garden escape
<i>Tamus communis</i>	black bryony	2-21.9.07			+		+				
<i>Ulmis glabra</i>	wych elm	2-21.9.07		+							
<i>Ulmus procera</i>	English elm	2-21.9.07					+			+	
<i>Viburnum opulus</i>	guelder rose	2-21.9.07	+	+	+	+		+			

TABLE 4B

Latin Name	Common name	Date	A	B	C	D	E	F	G	H	Status
Broad leaved flowering plants											
<i>Achillea millefolium</i>	yarrow	2-21.9.07					+			+	
<i>Aegopodium podagraria</i>	ground elder	2-21.9.07	+	+	+	+					garden escape
<i>Agrimonia eupatoria</i>	agrimony	2-21.9.07								+	
<i>Ajuga reptans</i>	bugle	2-21.9.07	+		+	+		+			
<i>Alliaria petiolata</i>	garlic mustard	2-21.9.07	+	+	+	+	+	+	+		
<i>Anagallis tenella</i>	bog pimpernel	2-21.9.07	+		+						draft RPR Oxon
<i>Angelica sylvestris</i>	wild angelica	2-21.9.07	+	+	+	+		+	+		
<i>Anthriscus sylvestris</i>	cow parsley	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Apium nodiflorum</i>	fool's water-cress	2-21.9.07		+		+					
<i>Arum maculatum</i>	cuckoo pint	2-21.9.07	+	+	+	+	+	+			
<i>Aster sp</i>	michaelmas daisy	2-21.9.07	+								garden escape
<i>Ballota nigra</i>	black horehound	2-21.9.07	+							+	
<i>Bellis perennis</i>	common daisy	2-21.9.07				+	+			+	
<i>Calystegia sepium</i>	great bindweed	2-21.9.07	+	+	+	+		+	+	+	
<i>Cardamine flexuosa</i>	wavy bittercress	2-21.9.07	+								
<i>Cardamine pratensis</i>	cuckoo flower	2-21.9.07	+	+	+	+		+			
<i>Centaurea nigra</i>	common knapweed	2-21.9.07						+		+	
<i>Centaurea scabiosa</i>	greater knapweed	2-21.9.07						+		+	
<i>Cerastium fontanum</i>	common mouse-ear	2-21.9.07								+	
<i>Circaea lutetiana</i>	enchanter's nightshade	2-21.9.07	+	+	+	+	+				
<i>Cirsium acaulon</i>	stemless thistle	2-21.9.07								+	
<i>Cirsium arvense</i>	creeping thistle	2-21.9.07	+	+	+	+	+	+			
<i>Cirsium palustre</i>	marsh thistle	2-21.9.07	+	+	+	+		+	+		
<i>Cirsium vulgare</i>	spear thistle	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Crepis capillaris</i>	smooth hawk's-beard	2-21.9.07					+			+	
<i>Dactylorhiza fuchsii</i>	common spotted orchid	2-21.9.07	+		+			?			
<i>Epilobium hirsutum</i>	great willow-herb	2-21.9.07	+	+	+	+		+	+		
<i>Epilobium parviflorum</i>	hoary willow-herb	2-21.9.07	+								
<i>Epipactis palustris</i>	marsh helleborine	2-21.9.07	+		+						draft RPR Oxon
<i>Eupatorium cannabinum</i>	hemp agrimony	2-21.9.07	+	+	+	+		+	+		
<i>Filipendula ulmaria</i>	meadowsweet	2-21.9.07	+	+	+	+		+	+		
<i>Galium aparine</i>	cleavers	2-21.9.07	+	+	+	+	+	+	+		
<i>Galium verum</i>	lady's bedstraw	2-21.9.07								+	
<i>Galum uliginosum</i>	fen bedstraw	2-21.9.07	+		+						draft RPR Oxon
<i>Geranium molle</i>	dove's foot crane's-bill	2-21.9.07								+	
<i>Geranium pratense</i>	meadow crane's-bill	2-21.9.07						+			
<i>Geranium pyrenaicum</i>	hedgerow crane's-bill	2-21.9.07								+	
<i>Geum urbanum</i>	wood avens	2-21.9.07	+	+	+	+		+			
<i>Glechoma hederacea</i>	ground ivy	2-21.9.07	+	+	+	+	+	+	+		

TABLE 4C

Latin Name	Common name	Date	A	B	C	D	E	F	G	H	Status
<i>Heracleum sphondylium</i>	hogweed	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Hordeum murinum</i>	wall barley	2-21.9.07	+								
<i>Hydrocotyle vulgaris</i>	marsh pennywort	2-21.9.07	+		+						draft RPR Oxon
<i>Hypericum perforatum</i>	perforate St John's-wort	2-21.9.07								+	
<i>Hypericum tetrapterum</i>	square-stalked St John's-wort	2-21.9.07	+	+	+	+		+			
<i>Hypochoeris radicata</i>	cat's ear	2-21.9.07								+	
<i>Impatiens glandulifera</i>	indian balsam	2-21.9.07		+	+	+	+	+	+		
<i>Iris pseudacorus</i>	yellow flag	2-21.9.07	+	+	+	+		+			
<i>Knautia arvensis</i>	field scabious	2-21.9.07		+				+		+	
<i>Lamium album</i>	white dead-nettle	2-21.9.07	+	+		+	+	+	+		
<i>Lathyrus pratensis</i>	meadow vetchling	2-21.9.07	+	+	+			+			
<i>Leontodon hispidus</i>	rough hawkbit	2-21.9.07						+		+	
<i>Leontodon taraxacoides</i>	lesser hawkbit	2-21.9.07								+	
<i>Leucanthemum vulgare</i>	oxeye daisy	2-21.9.07	+	+							
<i>Lotus corniculatus</i>	bird's foot trefoil	2-21.9.07								+	
<i>Lotus pedunculatus</i>	greater bird's-foot-trefoil	2-21.9.07	+		+	+					
<i>Lychnis flos-cuculi</i>	ragged robin	2-21.9.07	+	+	+	+		+			
<i>Lythrum salicaria</i>	purple loosestrife	2-21.9.07	+		+	+		+			
<i>Medicago lupulina</i>	black medick	2-21.9.07								+	
<i>Mentha aquatica</i>	water mint	2-21.9.07	+	+	+	+		+	+		
<i>Menyanthes trifoliata</i>	bogbean	2-21.9.07			+						draft RPR Oxon
<i>Odontites vernus</i>	red bartsia	2-21.9.07						+			
<i>Oenanthe lachenalii</i>	parsley water-dropwort	2-21.9.07	+		+						draft RPR Oxon
<i>Onobrychis viciifolia</i>	sainfoin	2-21.9.07								+	Red List 'Near Threatened'
<i>Ononis repens</i>	common rest-harrow	2-21.9.07								+	
<i>Parnassia palustris</i>	grass-of-Parnassus	2-21.9.07			+						draft RPR Oxon
<i>Pedicularis palustris</i>	marsh louse-wort	2-21.9.07	+		+						draft RPR Oxon
<i>Persicaria amphibia</i>	amphibious bistort	2-21.9.07						+	+		
<i>Pilosella officinarum</i>	mouse-ear-hawkweed	2-21.9.07								+	
<i>Pimpinella saxifraga</i>	burnet saxifrage	2-21.9.07								+	
<i>Plantago lanceolata</i>	ribwort plantain	2-21.9.07	+	+				+	+	+	
<i>Plantago media</i>	hoary plantain	2-21.9.07								+	
<i>Potentilla anserina</i>	silverweed	2-21.9.07	+	+	+	+		+	+		
<i>Potentilla erecta</i>	tormentil	2-21.9.07	+		+						
<i>Potentilla reptans</i>	cinquefoil	2-21.9.07								+	
<i>Prunella vulgaris</i>	self-heal	2-21.9.07	+		+	+		+	+	+	
<i>Pulicaria dysenterica</i>	common fleabane	2-21.9.07	+	+	+	+		+			
<i>Ranunculus acris</i>	meadow buttercup	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Ranunculus bulbosus</i>	bulbous buttercup	2-21.9.07						+		+	
<i>Ranunculus ficaria</i>	celandine	2-21.9.07	+								

TABLE 4D

Latin Name	Common name	Date	A	B	C	D	E	F	G	H	Status
Broad leaved flowering plants											
<i>Ranunculus flammula</i>	lesser spearwort	2-21.9.07	+		+						
<i>Ranunculus repens</i>	creeping buttercup	2-21.9.07	+	+	+	+	+	+	+		
<i>Rorippa microphylla</i>	narrow-fruited water-cress	2-21.9.07	+								
<i>Rorippa nasturtium-aquaticum</i>	water cress	2-21.9.07				+					
<i>Rumex obtusifolius</i>	broad-leaved dock	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Sanguisorba minor ssp minor</i>	salad burnet	2-21.9.07								+	
<i>Scabiosa columbaria</i>	small scabious	2-21.9.07								+	
<i>Scrophularia auriculata</i>	water figwort	2-21.9.07	+	+	+	+		+	+		
<i>Senecio erucifolius</i>	hoary ragwort	2-21.9.07	+								
<i>Senecio jacobaea</i>	common ragwort	2-21.9.07	+	+			+	+		+	
<i>Solanum dulcamara</i>	bittersweet	2-21.9.07	+	+	+	+	+	+	+		
<i>Sonchus asper</i>	prickly sow thistle	2-21.9.07	+					+			
<i>Stachys palustris</i>	marsh woundwort	2-21.9.07	+		+						
<i>Stachys sylvatica</i>	hedge woundwort	2-21.9.07	+	+	+	+	+	+	+		
<i>Stellaria graminea</i>	lesser stitchwort	2-21.9.07	+					+			
<i>Succisa pratensis</i>	devil's-bit scabious	2-21.9.07	+		+						draft RPR Oxon
<i>Taraxacum officinale</i> agg.	dandelion	2-21.9.07	+	+		+	+	+	+	+	
<i>Trifolium dubium</i>	lesser yellow trefoil	2-21.9.07				+				+	
<i>Trifolium pratense</i>	red clover	2-21.9.07				+				+	
<i>Trifolium repens</i>	white clover	2-21.9.07				+				+	
<i>Tussilago farfara</i>	colt's-foot	2-21.9.07	+								
<i>Urtica dioica</i>	common nettle	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Valeriana dioica</i>	marsh valerian	2-21.9.07	+		+						draft RPR Oxon
<i>Veronica beccabunga</i>	brooklime	2-21.9.07	+	+	+	+		+	+		
<i>Vicia cracca</i>	tufted vetch	2-21.9.07	+		+						
<i>Vicia sativa</i>	common vetch	2-21.9.07	+	+	+						
<i>Viola hirta</i>	hairy violet	2-21.9.07								+	
<i>Viola odorata</i>	sweet violet	2-21.9.07	+								
Grasses, sedges and rushes											
<i>Agrostis sp.</i>	bent grass	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Anthoxanthum odoratum</i>	sweet vernal grass	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Arrhenatherum elatius</i>	false oat-grass	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Brachypodium sylvaticum</i>	false brome	2-21.9.07			+	+					
<i>Briza media</i>	quaking grass	2-21.9.07	+		+						
<i>Bromopsis erecta</i>	upright brome	2-21.9.07								+	
<i>Calamagrostis epigejos</i>	wood small-reed	2-21.9.07	+								draft RPR Oxon
<i>Carex acutiformis</i>	lesser pond-sedge	2-21.9.07	+	+	+	+		+	+		
<i>Carex distichia</i>	brown sedge	2-21.9.07	+								
<i>Carex flacca</i>	glaucous sedge	2-21.9.07	+		+					+	
<i>Carex hirta</i>	hairy sedge	2-21.9.07	+		+			+	+		
<i>Carex hostiana</i>	tawny sedge	2-21.9.07			+						draft RPR Oxon

TABLE 4E

Latin Name	Common name	Date	A	B	C	D	E	F	G	H	Status
Grasses, sedges and rushes											
<i>Carex nigra</i>	common sedge	2-21.9.07	+		+						
<i>Carex panicea</i>	carnation sedge	2-21.9.07	+		+						draft RPR Oxon
<i>Carex paniculata</i>	greater tussock sedge	2-21.9.07	+		+						draft RPR Oxon
<i>Carex pendula</i>	pendulous sedge	2-21.9.07	+	+	+	+		+			
<i>Carex pseudocyperus</i>	cyperus sedge	2-21.9.07				+					draft RPR Oxon
<i>Carex pulicaris</i>	flea sedge	2-21.9.07			+						draft RPR Oxon
<i>Carex rostrata</i>	bottle sedge	2-21.9.07	+								draft RPR Oxon
<i>Carex viridula ssp brachyrrhynca</i> (<i>Carex lepidocarpa</i>)	long-stalked yellow-sedge	2-21.9.07	+		+						draft RPR Oxon
<i>Dactylis glomerata</i>	cock's-foot grass	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Deschampsia cespitosa</i>	tufted hair-grass	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Eleocharis quinqueflora</i>	few-flowered spike-rush	2-21.9.07	+		+						draft RPR Oxon
<i>Elymus caninus</i>	bearded couch	2-21.9.07	+	+	+	+		+	+		
<i>Equisetum palustre</i>	marsh horsetail	2-21.9.07	+		+			+			
<i>Eriophorum angustifolium</i>	common cottongrass	seen 2006	(+)								draft RPR Oxon
<i>Eriophorum latifolium</i>	broad-leaved cottongrass	seen 2006	(+)								draft RPR Oxon
<i>Festuca arundinacea</i>	tall fescue	2-21.9.07	+	+		+	+	+	+	+	
<i>Festuca ovina</i>	sheep's fescue	2-21.9.07								+	
<i>Festuca sp.</i>	fescue	2-21.9.07	+		+	+	+	+			
<i>Glyceria cf notata</i>	plicate sweet grass	2-21.9.07	+								
<i>Glyceria fluitans</i>	floating sweet grass	2-21.9.07	+								
<i>Helictotrichon pratense</i>	meadow oat grass	2-21.9.07								+	draft RPR Oxon
<i>Helictotrichon pubescens</i>	hairy oat grass	2-21.9.07								+	
<i>Holcus lanatus</i>	yorkshire fog	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Juncus articulatus</i>	jointed rush	2-21.9.07	+		+						
<i>Juncus inflexus</i>	hard rush	2-21.9.07	+	+	+	+		+	+		
<i>Juncus subnodulosus</i>	blunt-flowered rush	2-21.9.07	+		+						draft RPR Oxon
<i>Koeleria macrantha</i>	crested hair grass	2-21.9.07								+	
<i>Lolium perenne</i>	perennial rye-grass	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Molinia caerulea</i>	purple moor-grass	2-21.9.07	+		+						draft RPR Oxon
<i>Phalaris arundinacea</i>	reed canary-grass	2-21.9.07				+					
<i>Phragmites australis</i>	common reed	2-21.9.07	+	+	+	+		+	+		
<i>Poa trivialis</i>	rough-stalked meadow-grass	2-21.9.07	+	+	+	+	+	+	+	+	
<i>Triglochin palustre</i>	marsh arrow-grass	2-21.9.07	+		+						draft RPR Oxon
Bryophytes (Liverworts and mosses)											
<i>Brachythecium albicans</i>	a moss	2-21.9.07								+	
<i>Brachythecium rutabulum</i>	a moss	2-21.9.07	+	+	+	+		+		+	
<i>Bryum pseudotriquetrum</i>	a moss	2-21.9.07	+		+						rare in Oxon
<i>Calliergonella cuspidata</i>	a moss	2-21.9.07	+	+	+	+		+	+	+	
<i>Campylium chrysophyllum</i>	a moss	2-21.9.07								+	

TABLE 4F

Latin Name	Common name	Date	A	B	C	D	E	F	G	H	Status
Bryophytes (Liverworts and mosses)											
<i>Campylium stellatum</i>	yellow starry feather-moss	2-21.9.07	+		+						rare in Oxon
<i>Conocephalum conicum</i>	a liverwort	2-21.9.07	+	+	+	+					
<i>Cratoneuron filicinum</i>	a moss	2-21.9.07	+		+						
<i>Ctenidium molluscum</i>	a moss	2-21.9.07	+								
<i>Fissidens adianthoides</i>	a moss	2-21.9.07	+								
<i>Fissidens viridulus</i>	a moss	2-21.9.07	+	+	+						
<i>Homalothecium lutescens</i>	a moss	2-21.9.07								+	
<i>Homalothecium sericeum</i>	a moss	2-21.9.07	+	+	+	+					
<i>Kindbergia praelonga</i>	a moss	2-21.9.07	+	+	+	+					
<i>Lunularia cruciata</i>	a liverwort	2-21.9.07	+	+	+	+					
<i>Palustriella falcata</i> (<i>Cratoneuron commutatum</i> var <i>falcatum</i>)	a moss	2-21.9.07	+		+						rare in Oxon
<i>Pellia endiviifolia</i>	a liverwort	2-21.9.07	+	+	+	+					
<i>Plagiomnium elatum</i>	a moss	2-21.9.07	+								rare in Oxon
<i>Plagiomnium undulatum</i>	a moss	2-21.9.07	+	+	+	+					
<i>Rhytidiadelphus squarrosus</i>	a moss	2-21.9.07								+	
<i>Scleropodium purum</i>	a moss	2-21.9.07								+	
Ferns											
<i>Dryopteris dilatata</i>	broad buckler-fern	2-21.9.07	+	+	+	+	+	+	+		
<i>Dryopteris filix mass</i>	male fern	2-21.9.07	+	+	+	+	+	+	+		
<i>Phyllitis scolopendrium</i>	hart's tongue fern	2-21.9.07	+	+	+	+					
<i>Polystichum setiferum</i>	soft shield fern	2-21.9.07		+	+	+					draft RPR Oxon
Algae											
<i>Chara vulgaris</i>	a stone-wort	2-21.9.07	+								rare in Oxon
Fungi											
<i>Agaricus silvicola</i>	wood mushroom	2-21.9.07				+					
<i>Auricularia auricula judae</i>	jew's ear	2-21.9.07		+	+	+	+				
<i>Coprinus atramentarius</i>	an ink cap	2-21.9.07		+							
<i>Coprinus disseminatus</i>	fairly's bonnets	2-21.9.07	+	+							
<i>Daedaleopsis confragrosa</i>	blushing bracket	2-21.9.07	+	+	+	+					
<i>Gyrodon lividus</i> (confirmed A Hills)	alder bolete	2-21.9.07				+					Red List 'Near Threatened'
<i>Kuehneromyces mutabilis</i>	toadstool	2-21.9.07	+								
<i>Laccaria laccata</i>	the deceiver	2-21.9.07						+			
<i>Lycoperdon perlatum</i>	a puffball	2-21.9.07					+				
<i>Meripilus giganteus</i>	giant polypore	2-21.9.07					+				
<i>Merullius tremellosus</i> (<i>Phlebia tremellosa</i>)	encrusting jelly fungus	2-21.9.07	+								
<i>Mycena galericulata</i>	bonnet mycena	2-21.9.07	+	+	+	+					
<i>Naucoria sp</i>	a toadstool	2-21.9.07				+					
<i>Phellinus cf. conchatus</i>	a bracket fungus	2-21.9.07		+							uncommon
<i>Phellinus ignarius</i>	a bracket fungus	2-21.9.07	+	+	+	+					

TABLE 4G

Latin Name	Common name	Date	A	B	C	D	E	F	G	H	Status
Fungi											
<i>Phellinus pomaceus</i>	an encrusting porate mat	2-21.9.07					+				
<i>Pholiota squarrosa</i>	a toadstool	2-21.9.07					+				
<i>Pluteus cervinus</i>	a toadstool	2-21.9.07		+							
<i>Polyporus badius(durus)</i>	bay polypore	2-21.9.07		+							
<i>Polyporus tuberaster</i>	a toadstool	2-21.9.07		+							uncommon
<i>Postia sp</i>	a bracket fungus	2-21.9.07			+						
<i>Ramaria decurrens (det P Roberts)</i>	a clavarioid (coral) fungus	2-21.9.07				+					
<i>Schizopora paradoxa</i>	encrusting porate mat	2-21.9.07		+		+					
<i>Scleroderma ?bovista</i>	an earth ball	2-21.9.07					+				
<i>Scutellina sp</i>	eyelash fungus	2-21.9.07	+								
<i>Stereum hirsutum</i>	a bracket fungus	2-21.9.07		+			+				
<i>Trametes gibbosa</i>	a bracket fungus	2-21.9.07		+							
<i>Trametes versicolor</i>	a bracket fungus	2-21.9.07	+	+	+	+	+				
Invertebrates (only those found in Sept and so far identified)											
<i>Keroplatus testaceus</i>	a fungus gnat	2-21.9.07					+				Nationally Scarce
<i>Aulacigaster leucopeza</i>	a sap fly	2-21.9.07								+	Notable
<i>Paraclusia tigrina</i>	a clusiid deadwood fly	2-21.9.07			+						RDB 2
<i>Aelia acuminata</i>	bishop's mitre bug	2-21.9.07	+		+					+	
<i>Pholidoptera griseoptera</i>	dark bush cricket	2-21.9.07	+	+	+						
<i>Meconema thalassinum</i>	oak bush cricket	2-21.9.07			+						
<i>Harmonia axyridis</i>	harlequin ladybird	2-21.9.07	+	+	+						alien
<i>Sesia apiformis</i>	hornet clearwing moth (holes and puparia)	2-21.9.07				+					Notable
<i>Lasius flavus</i>	yellow meadow ant	2-21.9.07	+		+	+	+	+			
<i>Androniscus dentiger</i>	common rosy woodlouse	2-21.9.07			+						
<i>Apis mellifica</i>	honey bee	2-21.9.07	+	+	+	+	+				
<i>Inachis io</i>	peacock butterfly	2-21.9.07	+								
<i>Polygonia c-album</i>	comma butterfly	2-21.9.07			+						
<i>Parage aegeria</i>	speckled wood butterfly	2-21.9.07	+	+	+						
<i>Bombus pascuorum</i>	ginger bumble bee	2-21.9.07	+		+						
<i>Hygromia cinctella</i>	girdled snail	2-21.9.07	+		+						alien
<i>Arianta arbustorum</i>	copse snail	2-21.9.07	+	+	+	+					
<i>Monacha cantiana</i>	kentish snail	2-21.9.07	+	+	+	+	+	+		+	
<i>Cepaea nemoralis</i>	brown-lipped banded-snail	2-21.9.07	+	+	+	+		+			
<i>Candidula intersepta</i>	wrinkled snail	2-21.9.07								+	
<i>Ceriuella virgata</i>	striped snail	2-21.9.07								+	
Amphibians and Reptiles (Herpetiles)											
<i>Anguis fragilis</i>	slow worm (obs by local resident)	Sept '07	+	+							BAP
<i>Natrix natrix</i>	grass snake (obs. by local resident)	April '07	+	+							BAP
<i>Rana temporaria</i>	common frog	2-21.9.07	+	+	+	+		+			
<i>Zootoca vivipara</i>	common lizard (obs. by local resident)	Sept. '07	+	+							BAP

TABLE 4H

Latin Name	Common name	Date	A	B	C	D	E	F	G	H	Status
Birds											
<i>Aegithalos caudatus</i>	long-tailed tit	2-21.9.07			+						
<i>Alcedo atthis</i>	kingfisher	2-21.9.07	+								
<i>Corvus corone corone</i>	carrion crow	2-21.9.07					+			+	
<i>Erithacus rubecula</i>	robin	2-21.9.07	+	+	+	+					
<i>Garrulus glandarius</i>	jay	2-21.9.07			+	+					
<i>Pica pica</i>	magpie	2-21.9.07					+			+	
<i>Picus viridis</i>	green woodpecker (heard calling)	2-21.9.07				+	+				
<i>Prunella modularis</i>	dunnock/hedge accentor	2-21.9.07	+		+	+					BAP
<i>Troglodytes troglodytes</i>	wren	2-21.9.07	+	+	+	+					
<i>Turdus merula</i>	blackbird	2-21.9.07	+	+	+	+					
<i>Turdus philomelos</i>	song thrush	2-21.9.07			+		+				BAP
Mammals(records from signs mostly)											
<i>Meles meles</i>	badger, diggings and latrine areas	2-21.9.07				+	+				
<i>Microtus agrestis</i>	short-tailed vole	2-21.9.07						+			
<i>Muntiacus reevesii?</i>	deer signs- (muntjac?) droppings	2-21.9.07	+	+	+	+	+	+			
<i>Oryctolagus cuniculus</i>	wild rabbit	2-21.9.07				+	+				
<i>Sciurus carolinensis</i>	grey squirrel	2-21.9.07		+		+	+				
<i>Talpa europaea</i>	mole (hills seen)	2-21.9.07	+	+	+	+	+	+	+		
<i>Vulpes vulpes</i>	fox (droppings seen)	2-21.9.07	+	+	+	+	+	+			

KEY**LOCATIONS:**

Area A: Riparian Corridor to the Lye Brook (SLINC areas and LNR) encompassing and including the North Fen SSSI

Area B: Riparian Corridor to the Boundary brook (SLINC) adjacent to the Churchill Hospital to the NE and Southfield golf course to the SW

Area C: Riparian Corridor to the Lye Brook (SLINC) south of confluence of Lye and Boundary Brooks down to, and encompassing, the South Fen SSSI

Area D: Riparian Corridor and portion of golf course along Lye Brook south of the South Fen SSSI down to Barracks Lane (NE. 20 Wildlife Corridor)

Area E: Golf course portion to west of the South Fen and north west of area D. (NE. 20, Wildlife Corridor)

Area F: Land East of Oxford Community School playing field, adjacent to Barracks Lane (SLINC)

Area G: Cowley Marsh (County Wildlife Site/SLINC) across Barracks Lane from Area F

Area H: Golf Course area adjacent to Hollow Way and Barracks Lane. No conservation designation.

Draft RPR' = Draft Rare Plants Register for Oxon, Ashmolean Natural History Society

BAP = UK Biodiversity Action Plan Priority Species

RDB - Red Data Book listed

RDB1 - Endangered (at risk of extinction)

RDB2 - Vulnerable (species declining or in vulnerable habitats, or with low populations, likely to move to Endangered due to things like habitat destruction)

RDB3 - Rare/Lower Risk (Near threatened) (small populations, at risk, species estimated to exist in only 15 or fewer modern 10km squares nationally)

Notable - Lower Risk (Nationally Scarce) species estimated to occur within the range of only 16-100 modern 10km squares nationally