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ENVIRONMENT & LANDSCAPE
Environmental Statement

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**A40 NORTH OF OXFORD IMPROVEMENT –
ENVIRONMENTAL STATEMENT: ECOLOGICAL
ASSESSMENT 01/92**



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DEPARTMENT OF TRANSPORT
SOUTH EAST CONSTRUCTION PROGRAMME DIVISION

A40 North of Oxford Improvement

Environmental Statement: Ecological Assessment

*Mr. R. Reut
May we have any
comments please
early soon*

Rand Gillin

17/2/92

R/OXOO/17

January 1992

Main Consultant
Rendel Palmer & Tritton

Landscape Subconsultant
Derek Lovejoy Partnership

Ecological Input by
International Centre of Landscape Ecology

Rendel

REPORT CONTROL SHEET

DEPARTMENT OF TRANSPORT
South East Construction Programme Division

A40 NORTH OF OXFORD IMPROVEMENT

ENVIRONMENTAL STATEMENT :
ECOLOGICAL ASSESSMENT

Report No: R/OXOO/17

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Issue No	Status	Description of Amendments	Sub-Cons Prepared by Sign & Date	Sub-Cons Proj.Dir Sign & Date	Proj.Mgr Sign & Date	Proj.Dir Sign & Date

AN ECOLOGICAL ASSESSMENT OF THE A40 NORTH OXFORD IMPROVEMENT

(Based upon Phase 1 Habitat Survey and Review of the Records of the
Berkshire, Buckinghamshire and Oxfordshire Naturalists' Trust)

JANUARY 1992

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1. INTRODUCTION

Derek Lovejoy Partnership have been instructed by Rendel Palmer and Tritton, for the Department of Transport, to prepare landscape assessments and proposals for the Environmental Statement for the A40 north Oxford improvement. As part of this, the International Centre of Landscape Ecology (ICOLE) at Loughborough University was requested by the Derek Lovejoy Partnership, London, in September 1991 to undertake an ecological assessment of the proposed route. This was to be carried out primarily by means of a Phase 1 habitat survey of the route corridor and a review of nature conservation information held by the Berkshire, Buckinghamshire and Oxfordshire Naturalists' Trust (BBONT).

The corridor along the proposed route was surveyed in the field following Phase 1 methodology (NCC, 1990) between 14th and 18th October, 1991. Certain limitations were imposed by the lateness of the season and by surveying mainly from public rights of way. Collation of background information from BBONT was undertaken in October and November, 1991.

1.1 Location

The corridor through which the proposed A40 North Oxford improvement runs is shown in Figure 1. It covers the existing A40 between Cassington and Oxey Mead before departing to the north-east and crossing the A44, A4260, A34 and A4165 south of Kidlington. The corridor then turns south-east, passing to the east of Cutteslowe Park, before re-joining the route of the existing A40 just north of Marston.

This is a predominantly agricultural area situated on low-lying, relatively level land in the Thames and Cherwell valleys. It is criss-crossed by roads, railways, and a number of watercourses.

1.2 Soils

The route corridor study area is underlain mainly by neutral to calcareous clays, some originating either from a fine loamy drift or alluvium.

In the Thames valley in the west of the route corridor the soils are mainly brown calcareous clayey soils in river alluvium. These soils, called the Thames association, are strongly affected by groundwater and occasional flooding. The rest of the soils west of the Oxford Canal are of the Kelmscot association. These are calcareous fine loamy soils over sand and gravel which are currently in the process of being quarried around the area known as Oxey Mead (SP 477108).

From the Oxford Canal to the village of Marston the Wickham 2 association is dominant. These slowly permeable soils are developed in a thin loamy drift over clays. However, in the floodplain of the River Cherwell the deep clayey, slowly permeable, alluvial soils of the Fladbury 1 association are present underlain by alluvial sand and gravels.

Finally, a small area of the Shabington association can be found in the route corridor east of Marston village. The soils here are developed in fine loamy drifts.

The fairly uniform soil types present in the route corridor contribute to the fact that there is little of special ecological interest in the area, with the notable exception of Yarnton Mead. This botanically rich meadow is located on the Thames floodplain and is developed on alluvium over calcareous clays.

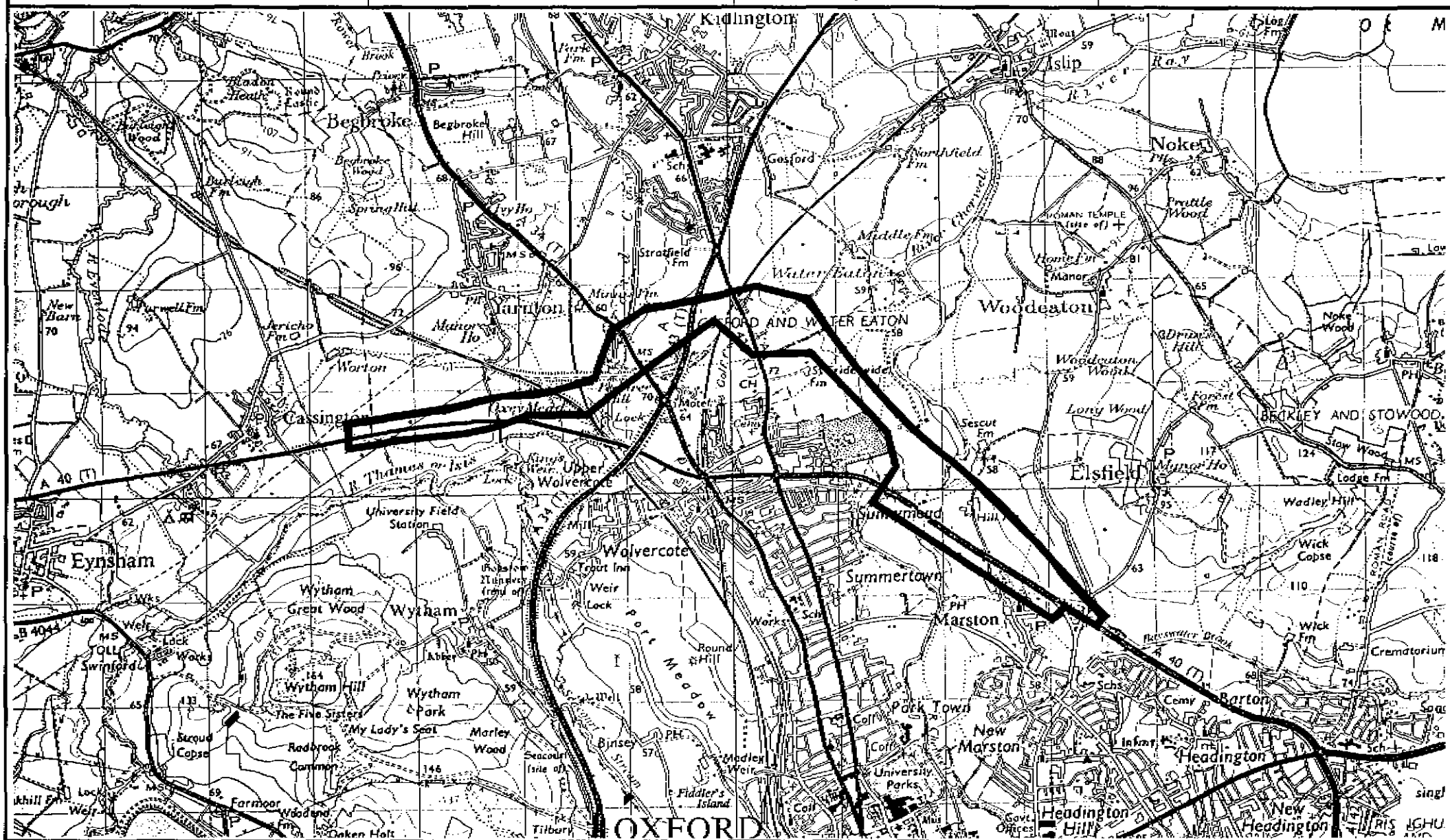
Location of The A40 North Oxford Route Corridor

Date 22nd November 1991

Drawn by SD

Ref. no. Figure 1

Scale 1: 50 000



2. PHASE 1 HABITAT SURVEY

The aim of a Phase 1 habitat survey is to provide, relatively rapidly, a record of the location, extent and distribution of semi-natural vegetation and wildlife habitat over large areas of the countryside*.

The origins of the survey go back to the 1970's, when the system was devised by the Nature Conservancy Council (NCC) for the rapid mapping of wildlife habitats over large areas of south-east Scotland, Cumbria and West Yorkshire. A draft manual on habitat survey was produced in 1986 and has been used as a basis of most of the Phase 1 surveys of the late 1980's in England, Wales and Scotland. Such surveys are therefore compatible with one another in most respects.

The Phase 1 habitat classification is based principally on vegetation, as this is relatively simple to observe, identify and record and can thus be surveyed fairly rapidly over large areas without much difficulty. The nature and condition of the vegetation embodies information about many of the living and non-living components of the environment. A study of the vegetation can thus provide an effective means of classifying and surveying habitats.

Briefly, the recommended method of Phase 1 survey is as follows. Every parcel of land in the entire survey area, in this case the route corridor, is visited by a trained surveyor and the vegetation is mapped on to Ordnance Survey maps in terms of some ninety available specified habitat types, using standard codes. The maps are usually, as here, at a scale of 1:10,000. In practice much of the mapping can be carried out from public rights of way, using binoculars at relatively short ranges to identify the vegetation. Aerial photographs may also be useful as an adjunct to ground survey. In this instance, supplementary data was selectively extracted from BBONT's own Phase 1 survey produced in 1989 and based entirely upon aerial photography taken in 1983.

Further information is gained during Phase 1 survey from the use of dominant species codes within many habitat types and from descriptive 'target notes' which give a brief account of particular areas of ecological interest.

* = The following information is derived from the Nature Conservancy Council's publication 'Handbook for Phase 1 Habitat Survey' (1990) (see Bibliography).

The end products of a Phase 1 survey are generally habitat maps and target notes on sites of wildlife interest, with the generation of statistics being a further option.

Ideally, a Phase 1 habitat survey should be followed up by a Phase 2 survey. This defines the vegetation of selected areas more precisely in terms of its plant communities and may include surveys of animal species and communities. The sites at which Phase 2 surveys are to be targeted can be identified from the Phase 1 survey information.

2.1 Summary of Results

The results of the Phase 1 habitat survey are presented in Figures 2 to 5, and explanations of the vegetation types commented upon below are available in **Appendix 1**.

In the west of the route corridor a wedge of arable fields occurs between the unimproved neutral grassland of Yarnton Mead and the routes of the existing and proposed A40 (Figure 2). To the north of the present carriageway is an active gravel quarry. This has resulted in the creation of a pond and the neglect and disturbance of some land, which is vegetated by ruderal plants and a poor semi-improved grassland.

Many of the hedges in this area near the River Thames have dry ditches alongside them.

Further east, the route corridor is crossed by a number of linear habitats (ie. roads, railways and a canal). Around the Oxford Canal, a segment of generally poor semi-improved pastures exist (Figures 2 and 3), and east of this a single large arable field has been created by the grubbing-up of several hedges (Figure 3).

The recent development of a western by-pass for Oxford has disturbed soils in its vicinity so that there now exists several habitats adjacent to the road and within the route corridor which are co-dominated by colonising ruderal and ephemeral plant species (Figure 3).

Between the A4165 Oxford Road and the River Cherwell the route corridor is dominated by arable agriculture (Figures 3 and 4). There has been some hedgerow loss in this area although relatively large numbers of mature hedgerow and free-standing trees have been retained.

Grasslands predominate south of the River Cherwell and the existing A40 carriageway as far as Hill Farm (Figure 4). Some of these are semi-improved neutral but the majority are improved or poor semi-improved. A number of fences have been erected which has further decreased the relatively low average field size in this area.

Figure 5 shows that the eastern extreme of the route corridor is primarily arable, although several small plantations of young broad-leaved trees have been established to landscape the Marston road interchange.

Key to Phase 1 Habitat Survey, Figures 2 to 5


Date	26.11.91	Drawn by	LdW	Ref. no.	Part 1 of 3	Scale:	N.A.
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Notes: The survey was confined to the route corridor, which is shown bounded by the blue line.

Definitions of Phase 1 terms are given in **Appendix 1**.

The following codes may be used in combination.

Area Codes:

A	Arable
AM	Amenity grassland
BW	Semi-natural broadleaved woodland
DS	Dense or continuous scrub
SWE	Eutrophic standing open water
I	Improved grassland
NG	Unimproved neutral grassland
OO	Orchard
PBW	Plantation of broadleaved species
SD	Swamp (dominated by single species)
SI	Poor semi-improved grassland
SNG	Semi-improved neutral grassland
SP	Ephemeral/short perennial vegetation
TR	Tall ruderal vegetation
R	Refuse-tip
S	Spoil
Q	Active quarry
	Built-up

Boundary Codes:

D	Ditch (dry or with standing open water)
F	Fence
H	Intact hedge
H-	Defunct (grown-out) hedge
HG	Incomplete hedge
HF	Incomplete hedge with fence
T	Line of mature trees
X	Boundary removed

Other Codes:

<	Direction of flowing open water
•	Standard (mature) tree

Key to Phase 1 Habitat Survey, Figures 2 to 5

Date	26.11.91	Drawn by	LdW	Ref. no.	Part 2 of 3	Scale:	N.A.
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Dominant species codes:

Ac	<u>Acer campestre</u>	Field Maple
Av	<u>Artemisia vulgaris</u>	Mugwort
Civ	<u>Cirsium vulgare</u>	Spear Thistle
Cm	<u>Crataegus monogyna</u>	Hawthorn
Com	<u>Conium maculatum</u>	Hemlock
Fe	<u>Fraxinus excelsior</u>	Ash
Gm	<u>Glyceria maxima</u>	Reed Sweet-grass
Md	<u>Malus domestica</u>	Cultivated Apple
Pop	<u>Populus</u> sp(p).	Poplar species
Qr	<u>Quercus robur</u>	Pedunculate Oak
Rf	<u>Rubus fruticosus</u> agg.	Bramble
Sx	<u>Salix</u> sp(p).	Willow species
Ud	<u>Urtica dioica</u>	Common Nettle
Ump	<u>Ulmus procera</u>	English Elm
Exos	Exotic shrub sp(p).	-----

Key to Phase 1 Habitat Survey, Figures 2 to 5

Date	26.11.91	Drawn by	LdW	Ref. no.	Part 3 of 3	Scale:	N.A.
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The Sites of Ecological Significance

Note: Areas shown **red** are sites of national ecological significance, **orange** are of county significance and **yellow** are of local significance.

<u>Ref. No.</u>	<u>Site Name</u>	<u>Grid Reference</u>
1	Yarnton Mead	SP 474103
2	Duke's Lock Pond & Grassland	SP 487108
3	Oxey Hedges	SP 474106
4	Wolvercote Junction Meadow	SP 485107
5	Oxford Canal	SP 488112
6	Stratfield Brake	SP 496118
7	North Oxford Golf Course Hedge and Drains	SP 501116
8	St. Frideswide Farm Orchard	SP 506112
9	Cotteslowe Park Hedge	SP 514104
10	River Cherwell	SP 517100
11	Cherwell Old Channel	SP 522101
12	Sunnymead Grassland	SP 515098
13	Cherwell Farm Grassland	SP 521097
14	Marston Meadow	SP 529089
15	Bayswater Brook Hedges	SP 534089

3. SITES OF ECOLOGICAL INTEREST

A total of fifteen sites of ecological interest situated in the route corridor have been identified from the Phase 1 habitat survey and review of BBONT's records. They comprise one site of national significance and one of importance in a county context, with the others being of local interest. The location of the sites is shown in Figures 2 to 5.

3.1 Sites of National Significance

The one site of national nature conservation importance that overlaps with the proposed route corridor is **Yarnton Mead** (Figure 2; Ref. No. 1). This is an alluvial meadow that is one of the best neutral grasslands in lowland England and is of international renown.

It is known that Yarnton Mead has been cut annually for hay and the aftermath grazed for well over a thousand years, and that no artificial herbicides or fertilisers have been applied in order to improve the yield. This regime has produced a grassland that is extremely rich botanically, with over 150 species recorded. A host of locally characteristic old meadow plants are present, including Ophioglossum vulgatum (Adder's Tongue), Silene silene (Pepper Saxifrage), Thalictrum flavum (Meadow Rue) and an outstanding abundance of Sanguisorba officinalis (Greater Burnet).

Yarnton Mead has been the subject of detailed botanical research and hydrological investigation stretching back at least as far as the 1920's. In 1955, the Nature Conservancy, which was the Government's statutory body for nature conservation*, notified the Mead as a Site of Special Scientific Interest (SSSI). This is a legal designation applied to land of a special nature conservation value and one that it still retains. Yarnton Mead is also categorised as a wildlife habitat of the highest grade in D. A. Ratcliffe's 1977 publication 'A Nature Conservation Review', which describes the key nature conservation sites in Great Britain.

The northern boundary of Yarnton Mead is also included within the SSSI designation and is partly within the route corridor. It consists of a tall hedge with abundant Salix cinerea (Grey Willow) and many mature trees next to a well vegetated ditch (Plate 1).

* = It later became the Nature Conservancy Council (NCC) and is now English Nature.

3.2 Sites of County Significance

Duke's Lock Pond and Grassland (Figure 2; Ref. No. 2) is the only site of county nature conservation importance which the corridor of the proposed route impinges upon.

The area consists of a mosaic of wildlife habitats (Plate 2) including open water, mature trees, scrub and wet grassland. It also contains one of the largest beds of Phragmites australis (Common Reed) in Oxfordshire, a type of habitat that is particularly valuable as it is used by a variety of birds for breeding and roosting. Indeed, this site represents a possible breeding location for Water Rails (Rallus aquaticus), a scarce wetland species that has fewer than five confirmed breeding areas in the county.

The northern end of Duke's Lock Pond and Grassland extends into the proposed route corridor. This part consists of a damp grassland and forms an integral part of the whole wetland complex. It contains a number of Juncus (Rush) and Carex (Sedge) species, as well as wetland herbs like Caltha palustris (Marsh Marigold), Senecio aquaticus (Marsh Ragwort) and Lychnis flos-cuculi (Ragged Robin).

3.3 Sites of Local Significance

Thirteen sites graded of local ecological interest occur wholly or partly within the corridor of the proposed road. Each of these contains a recognisable nature conservation value above that of the ungraded surrounding countryside and together they contribute greatly to the ecological diversity of the route corridor.

Moving from west to east along the proposed route corridor, the first features of local ecological interest encountered are the **Oxey Hedges** (Figure 2; Ref. No. 3). These are well-developed field boundaries dominated by Salix fragilis (Crack Willow).

The **Wolvercote Junction Meadows** (Figure 2; Ref. No. 4) lie across the proposed route corridor and contain a number of plant species indicative of old grasslands, including Sanguisorba officinalis (Greater Burnet), Silaum silaus (Pepper Saxifrage) and Trisetum flavescens (Yellow Oat-grass). The hedges on the site are generally well-

An Ecological Assessment of The A40 North Oxford Improvement

Date
22nd November 1991

Drawn by
SD

Ref. no.
Plates 1 & 2

Scale:
None

Plate 1. Yarnton Mead SSSI (Ref. No. 1), showing northern boundary hedge



Plate 2. Duke's Lock (Ref. No. 2), showing a variety of wildlife habitats



developed with a diversity of shrubs, including Rhamnus catharticus (Buckthorn) and Viburnum opulus (Guelder Rose), two species that are not ubiquitous in hedgerows and are of value to wildlife. The western boundary of the meadows, Kingsbridge Brook, has been disturbed by the adjacent active gravel quarry.

The corridor of the proposed route encompasses a length of the **Oxford Canal** (Figures 2 and 3; Ref. No. 5) that displays a typical range of aquatic and emergent plants, before infringing upon the southern edge of **Stratfield Brake** (Figure 3; Ref. No. 6). This is a mature woodland with a canopy composed primarily of Quercus robur (Pedunculate Oak), with some Fraxinus excelsior (Ash), and a notable ground flora typical of older plantations, such as Rumex sanguineus (Wood Dock) and Scrophularia nodosa (Common Figwort).

Part of the **North Oxford Golf Course** is included in the proposed route corridor. The eastern boundary hedge and nearby drains (Figure 3; Ref. No. 7) are of local ecological significance. Dragonflies (Odonata) are present in the wetlands, for instance, whilst the mature hedge is botanically diverse and has, in places, been allowed to form scrub. It contains Euonymus europaeus (Spindle), a shrub rather uncommonly found in hedges.

As the proposed route bends south and east, most of **St. Frideswide Farm Orchard** (Figure 3; Ref. No. 8) is included in the corridor. The BBONT Phase 1 survey, based on aerial photography from 1983, and initial field investigations made during this survey revealed that this site consists of mature fruit trees and/or scrub over grassland.

The corridor then passes to the east of **Cotteslowe Park** and includes its eastern boundary hedge (Figure 4; Ref. No. 9). This is tall and thick with a diverse complement of shrubs -at least 12 species - and numerous standard trees adjacent to a shallow watercourse.

The route corridor then incorporates lengths of the **River Cherwell** (Figure 4; Ref. No. 10) and the **Cherwell Old Channel** (Figure 4; Ref. No. 11). The former is a relatively clean river with several beds of emergent plants and a thin periphery of riparian vegetation, whilst the latter is choked with Glyceria maxima (Reed Sweet-grass), is a locality for Kingfishers (Alcedo atthis) and has numerous pollarded Salix fragilis (Crack Willow) on its banks. Pollarding is the practice of cutting a tree above ground level and allowing it to regrow to produce a crop of branches. It results in a

distinctive tree structure (Plate 3) that is attractive to a variety of wildlife, including several species of birds and insects.

Towards the east of the route corridor and south of the existing A40 are the **Sunnymead Meadows** (Figure 4; Ref. No. 12). These are well-established meadows of local significance with an association of grasses and herbs that is characteristic of older grasslands.

Preliminary surveys undertaken for the production of this report, together with supporting data from BBONT's records, suggest that the **Hill Farm Grasslands** (Figure 4; Ref. No. 13), situated wholly within the corridor, contain an interesting plant community that is rich in herbs.

Part of **Marston Meadow** (Figure 5; Ref. No. 14), located between the village and the existing A40, also occurs in the route corridor. Archaeological and botanical evidence in the forms of ridge and furrow patterns and a diverse range of grass species suggest that this is an old and ecologically interesting grassland.

A complex of **hedges** centred around **Bayswater Brook** (Figure 5; Ref. No. 15) in the far south-east of the route corridor is also of local value. These contain a particularly notable amount of Cornus sanguinea (Dogwood), as well as Corylus avellana (Hazel) and a variety of other shrub species.

Date 22nd November 1991

Drawn by SD

Ref. no. Plates 3 & 4

Scale: None

Plate 3. Pollarded trees of Salix fragilis (Crack Willow) in the Cherwell Valley



Plate 4. Hedge comprised of Ulmus procera (English Elm)



4. CONCLUSION

4.1 Further Study

The Phase 1 survey and review of BBONT records has provided an objective basis for determining which sites are of ecological interest and which of these deserve further, more detailed Phase 2 surveys.

Access restrictions during field survey corresponded with a paucity of BBONT data for two sites of local interest, St. Frideswell Farm Orchard (Ref. No. 8) and Hill Farm Grasslands (Ref. No. 13). They would therefore benefit from further fieldwork in order to better assess their relative ecological importance.

Although no evidence of the presence of any species protected by law in the route corridor was found during the Phase 1 fieldwork and collation of BBONT records, a more thorough search for protected species, such as badgers and bats, should be undertaken. The local badger group, in particular, is an active one and should have data on the local distribution of this mammal. Contact addresses are given in Appendix 2.

4.2 Summary

An ecological assessment of the route corridor of the proposed A40 North Oxford improvement was undertaken. This comprised a Phase 1 habitat survey (NCC, 1990) and a review of the nature conservation data held by the Berkshire, Buckinghamshire and Oxfordshire Naturalists' Trust (BBONT) and provided a record of the location, extent and distribution of vegetation types and wildlife habitat in the route corridor.

A number of sites of ecological interest were identified, including one of national importance (Yarnton Mead; Ref. No. 1) and one of significance in a county context (Duke's Lock Pond and Grassland; Ref. No. 2), with the others being of more local value.

Suggestions for further field study and research are presented.

Appendix 1

Explanation of Phase 1 Terms

Semi-natural Broadleaved Woodland (BW)	Semi-natural woodland comprises all stands which do not obviously originate from planting. The distribution of species will generally reflect natural variations in the site and its soil. Both ancient and more recent stands are included. Woodland with both semi-natural and planted trees should be classified as semi-natural if the planted trees account for less than 30% of the canopy composition, but as plantation if more than 30% is planted. Broad-leaved woodland has 10% or less conifer in the canopy.
Unimproved Neutral Grassland (NG)	Unimproved grasslands are likely to be rare, especially in the lowlands. They may be rank and neglected, mown or grazed. They may have been treated with low levels of farmyard manure, but should not have had sufficient applications of fertiliser or herbicide, or have been so intensively grazed or drained, as to alter the sward composition significantly. Species diversity is often high. Neutral grasslands encompasses a wide range of communities occurring on neutral soils (pH 5.5-7.0), including hay meadows, water meadows and inundated grasslands.
Semi-improved Neutral Grassland (SNG)	Semi-improved grassland is a transition category made up of grasslands which have been modified by artificial fertilisers, slurry, intensive grazing, herbicides or drainage, and consequently have a range of species which is less diverse and natural than unimproved grasslands. Such grasslands are still of some conservation value. Neutral grasslands encompasses a wide range of communities occurring on neutral soils (pH 5.5-7.0), including hay meadows, water meadows and inundated grasslands.

Poor Semi-improved Grassland (SI)	Poor semi-improved grassland will have a much more restricted list of species than semi-improved neutral grassland (above) and, being more modified by artificial fertilisers, slurry, intensive grazing, herbicides, or drainage, it is more likely to resemble a species-poor neutral grassland, irrespective of its acid, neutral and calcareous origin.
Improved Grassland (I)	Improved grasslands are those meadows and pastures which have been so affected by heavy grazing, drainage, or the application of herbicides, inorganic fertilisers, slurry or high doses of manure that they have lost many of the species which one could expect to find in an unimproved sward. They have only a very limited range of grasses and a few common broad-leaved herbs, mainly those demanding of nutrients and resistant to grazing.
Amenity Grassland (AM)	This comprises intensively managed and regularly mown grasslands, typical of lawns, playing fields, golf course fairways and many urban "savannah" parks. The sward composition will depend on the original seed mixture used and on the age of the community.
Tall Ruderal Vegetation (TR)	This category comprises stands of tall perennial or biennial herbs, usually more than 25cm high, and is often applied to waysides and wasteground.
Ephemeral/Short Perennial (SP)	Short, patchy plant associations typical of disturbed land such as derelict urban sites, quarries and railway ballast. The land must be freely draining, and usually has shallow stony soil. The vegetation typically lacks a clear dominant species, but consists of a mixture of low-growing plants, often less than 25 cm high or of certain taller species.
Swamp (SD)	Swamp contains tall emergent vegetation typical of the transition between open water and exposed land. Swamps are generally in standing water for a large part of the year, but may occasionally be found on substrates that are seldom immersed, as in the later stages of succession to marshy grassland.

Eutrophic Standing Open Water (SWE)	Open standing water is defined as water lying beyond the limits of swamp or emergent vegetation, although it may contain submerged, free-floating or floating-leaved vegetation, including lakes, reservoirs, pools, flooded gravel pits, ponds, water-filled ditches, canals and brackish lagoons. Eutrophic water is high in levels of nutrients, often strongly discoloured by algae, pH usually over 7 and substrate often highly organic mud.
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(Derived from the 'Handbook for Phase 1 Habitat Survey', NCC, 1990)

Appendix 2

Protected Species - Useful Addresses

Oxfordshire Badger Group,
c/o Mrs. Heather Whetter,
Assistant Conservation Officer (Oxon),
English Nature (South Region),
Foxhold House,
Crookham Common,
Newbury,
Berkshire.
RG15 8EL
Tel. (0635) 268881
Fax. (0635) 268940

Oxfordshire Bat Group,
Mr. David Endicott,
27 Hedgehill Road,
East Challow,
Wantage,
Oxon.
Tel.(023 57) 4832

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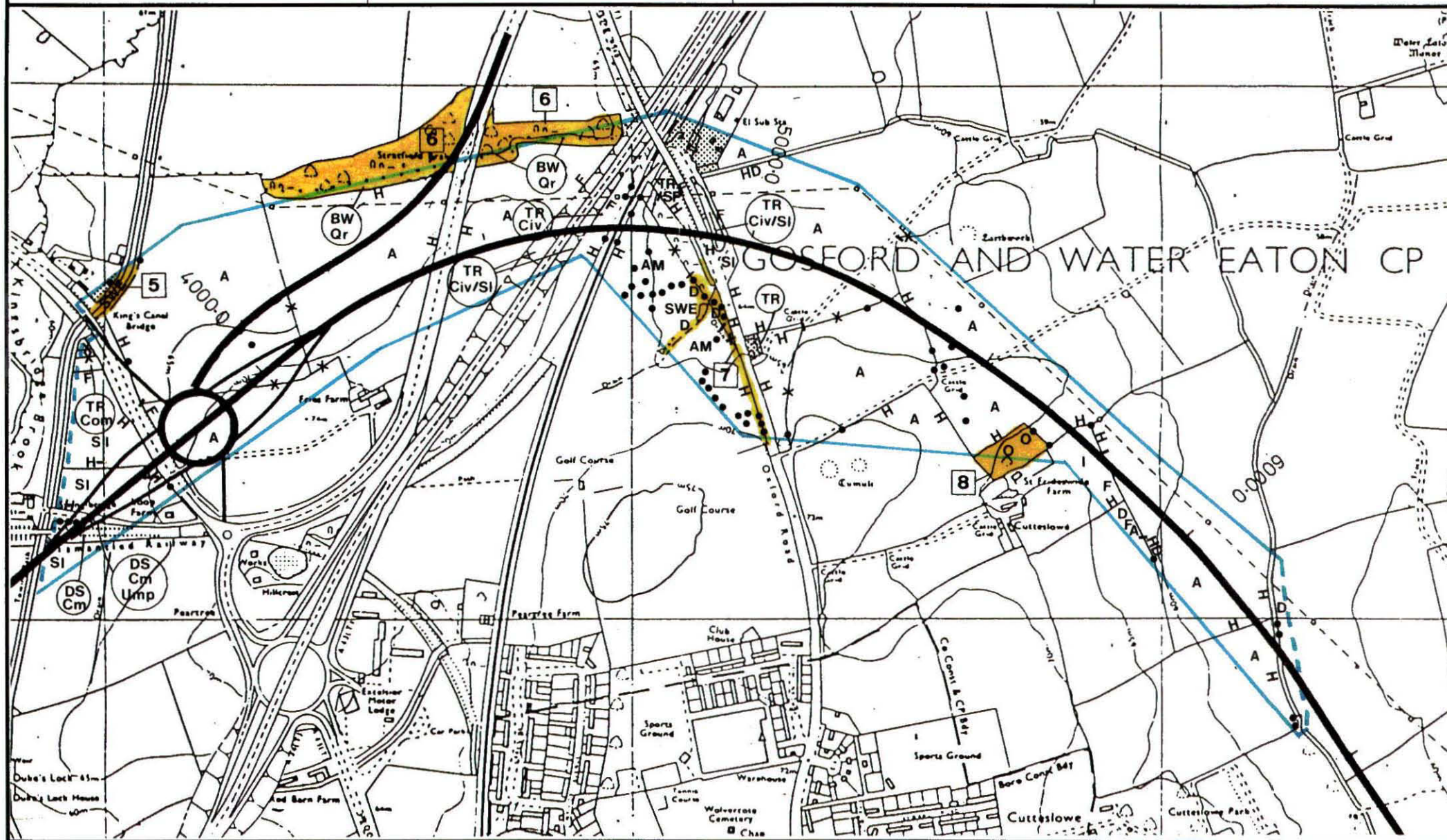
A40 North of Oxford - Phase One Habitat Survey

Date 21st November 1991

Drawn by EKM

Ref. no. Fig. 3

Scale 1:10 000



Area of route corridor (see also Key, Part 1)

A40 North of Oxford - Phase One Habitat Survey

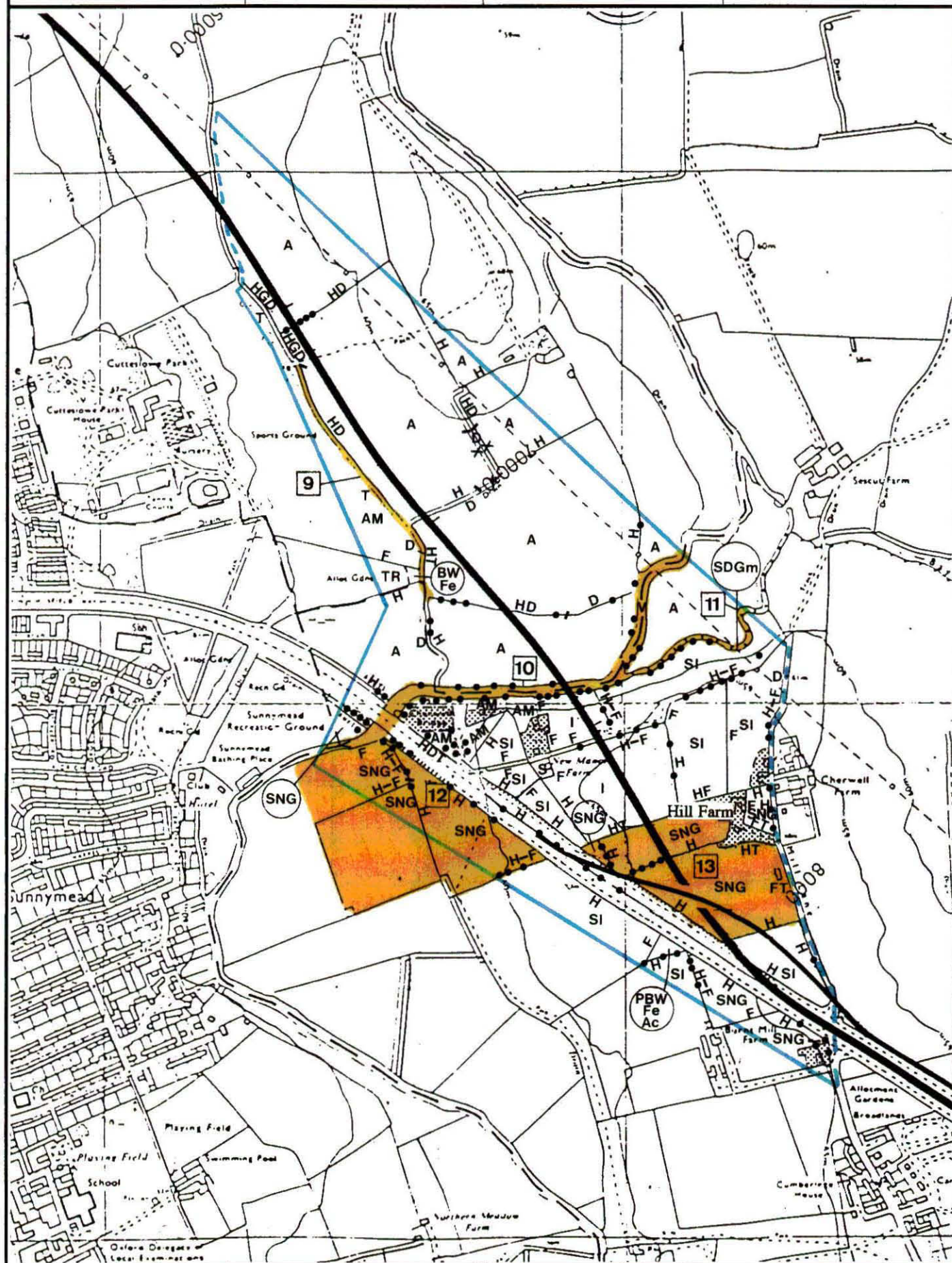
Date 21st November 1991

Drawn by EKM

Ref. no.

Fig. 4

Scale: 1:10 000



Area of route corridor (see also Key, Part 1)

