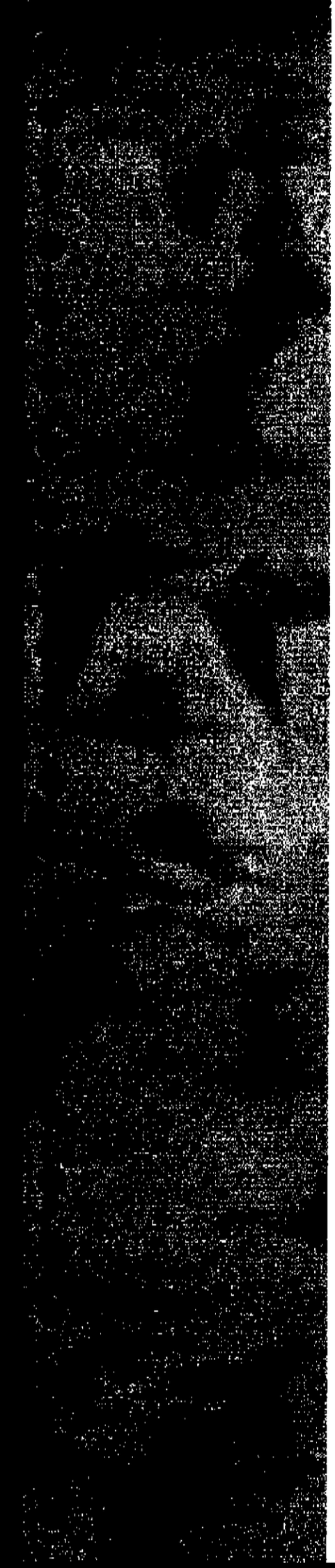

Terrestrial Ecology

A228 Leybourne & West Malling Bypass
Environmental Statement
Volume 2 (part)

Kent County Council

July 1995

Kent County Council
HIGHWAYS & TRANSPORTATION

A228 Leybourne and West Malling Bypass
Environmental Statement
Part of Volume 2

Contents

1. SUMMARY AND OVERVIEW

1.1 INTRODUCTION

This specialist report forms part of Volume 2 of the Environmental Statement for the A228 Leybourne and West Malling Bypass. It contains surveys and information on the ecology and nature conservation interest which exists within the study area. It considers the main potential environmental impacts arising from the proposed improvements.

1.1.1 An overview of the ecological interest within the study area was carried out by Kent Property Services Landscape Branch to establish the specific areas which required closer examination.

1.1.2 As a result of this overview, specific studies were commissioned on Higher Plants, Birds, Mammals and Insects. A specialist study of Aquatic Ecology was undertaken in conjunction with those on Water Quality, and this is covered in a separate section.

1.1.3 The data collected from these surveys is contained within this part of the Environmental Statement and the information is summarised in Volume 1.

1.1.4 The ecological studies have been undertaken over a number of years to provide information appropriate for each level of the project and includes information collected for consultation purposes on other options which have subsequently been discarded.

1.2 AIMS OF THE REPORT

The proposed improvements have a number of important implications for local terrestrial and aquatic environments. The key issues have already been presented and discussed in Volume 1. It is the aim of this specialist report to bring together and provide in detail the findings of the specialist ecological surveys undertaken as part of the environmental assessment.

1.3 STRUCTURE OF THE REPORT

A number of specialist surveys and studies have been undertaken, as follows:

SECTION 1 GENERAL ECOLOGY

This section contains general information about the nature conservation interest of the area and includes:

- A general introduction to the ecological survey work undertaken for this project.
- Kent Trust for Nature Conservation's schedule for the Leybourne Wood site of Nature Conservation Interest (SNCI).
- Kent Trust for Nature Conservation's schedule for the Leybourne Lakes site of Nature Conservation Interest.
- English Nature's survey of Ancient Woodland 1990, annotated extract of OS 1:50,000 map sheet 188. (Maidstone and The Weald of Kent.)

SECTION 2 HIGHER PLANTS

This section contains two surveys. The first was undertaken by Henderson Ecological Consultants and the second by Kent Property Services Landscape branch.

SECTION 3 BIRDS

This section contains winter and summer bird surveys undertaken by Mr N C Tardivel.

SECTION 4 MAMMALS

This section contains a mammal survey undertaken by the Kent Trust for Nature Conservation.

SECTION 5 INSECTS

This section contains insect surveys undertaken by Mr N Heal. It also contains a supplemental survey, also undertaken by Mr Heal, that investigates the occurrence of glowworms in Leybourne Wood.

1.4 Each of these studies examines the existing conditions, effects and possible mitigation of the effects of the published scheme. In some cases reference has been made to the alternative routes considered since these were also surveyed during the initial stages of the planning process.

1.5 Aquatic Ecology is covered in a separate report.

SECTION 1

GENERAL ECOLOGY

1. INTRODUCTION

A number of sites designated for their nature conservation interest are found within or close to the study area. This section contains the published information on these sites which should be read in conjunction with the detailed studies.

KENT TRUST FOR NATURE CONSERVATION

SITES OF NATURE CONSERVATION INTEREST

Site:	Leybourne Wood etc.	Site reference no:	TM 15
		Map reference:	TQ 683585
		AONB:	No
LPA:	Tonbridge & Malling	SLA:	No
Parish:	Leybourne	AHNCV:	No
Owner:	Private	TPO:	No
		ASSA:	No
KTNC Grade:	II	Grade I/II Agricultural Land:	No
Category :	Grassland, woodland, derelict orchard, scrub	Scheduled species:	
Area:	15.5 ha/38 acres	Public rights of way:	Yes

1. DESCRIPTION

1.1 WOODLAND

The area consists of former mixed broadleaved woodland on acid soils, now mainly converted to chestnut coppice which is actively managed. Other tree and shrubs occur especially along the margins where remains of the older woodland can be seen. Hornbeam, hazel, birch and occasional oak standard are present. The ground flora is dominated by bluebells (***Endymion non-scriptus***) and bramble . Bracken also occurs and many common woodland plants such as anemone (***Anemone nemorosa***), woodrush (***Luzula pilosa***), yellow arch-angel (***Galeobdolon luteum***) etc. occur. There are old records for ***Arabis glabra***, a rare alien in the cut coppice.

Other habitats include secondary woodland developing around derelict old orchard, a stream with associated damp marshy areas and a small rough meadow. The site is likely to have an interesting invertebrate fauna. Many warblers were present on day of visit including nightingale, willow warbler, chiffchaff etc. Evidence of woodpeckers was observed.

Other sites nearby:

(Note: KTNC holds more detailed information)

KENT TRUST FOR NATURE CONSERVATION

SITES OF NATURE CONSERVATION INTEREST

Site:	Leybourne Lakes etc, Snodland	Site reference no:	TM 30
		Map reference:	TQ 709605 TQ 694598 TQ 692592
		AONB:	No
LPA:	Tonbridge & Malling	SLA:	No
Parish:	East Malling & Larkfield, Snodland	AHNCV:	No
Owner:	Private	TPO:	Yes
		ASSA:	No
KTNC Grade:	I	Grade I/II Agricultural Land:	No
Category :	Grassland, open water, scrub woodland, stream	Scheduled species:	Yes
Area:	105.6 ha/260 acres	Public rights of way:	Yes

1. DESCRIPTION

An area lying to the south of Snodland on the western side of River Medway, consists of a series of water-filled gravel pits, a calcareous stream, dykes, rough grassland, scrub and woodland. The whole area supports a wide range of wildlife including many species associated with damp, marshy conditions of the Lower Medway which were present in greater numbers before gravel extraction began many years ago. The lakes, many of which are used by fishing clubs, are colonised by a range of aquatic and emergent plants, the degree of colonisation varying according to length of time since gravel extraction ceased and leisure activities now pursued.

The site is important for wintering and breeding water fowl, passerines etc. Over 90 species have been recorded recently; at least 24 of these are breeding species including Cetti's and grasshopper warbler, nightingale and yellow wagtail. Large numbers of wintering wildfowl requiring open water and little disturbance are present in all years, particularly on Abbey Meads Lake.

Botanical interest is high. The streams and dykes have good marginal and aquatic flora including flowering rush (***Butomus umbellatus***), water violet (***Hottonia palustris***), water speedwell (***Veronica anagallis-aquatica***), water crowfoot (***Ranunculus sp***), marsh sow-thistle (***Sonchus palustris***) and the very uncommon fen rush (***Juncus subnodulosus***). Damp grassy areas still contain colonies of early marsh orchid (***Dactylorhiza incarnata***), southern marsh orchid (***D praetermissa***), common spotted orchid (***D fuchsii***) and many hybrids. The scrubby area contains a variety of willow species including almond willow (***Salix triandra***), (which is very uncommon in Kent and mentioned in the Flora of Kent 1890s), alder and hawthorn etc. There are a few areas of relict woodland.

The entomological interest has not been investigated in detail but the area is known to contain several uncommon species including a ground beetle (***Benbidium maritimum***) at its only Kent site. Over 20 species of butterfly have been recorded many species of dragonfly are common.

Other sites nearby: (NB: KTNC holds more detailed information)

Holborough to Burham Marshes SSSI (Burham Marsh KTNC Reserve.

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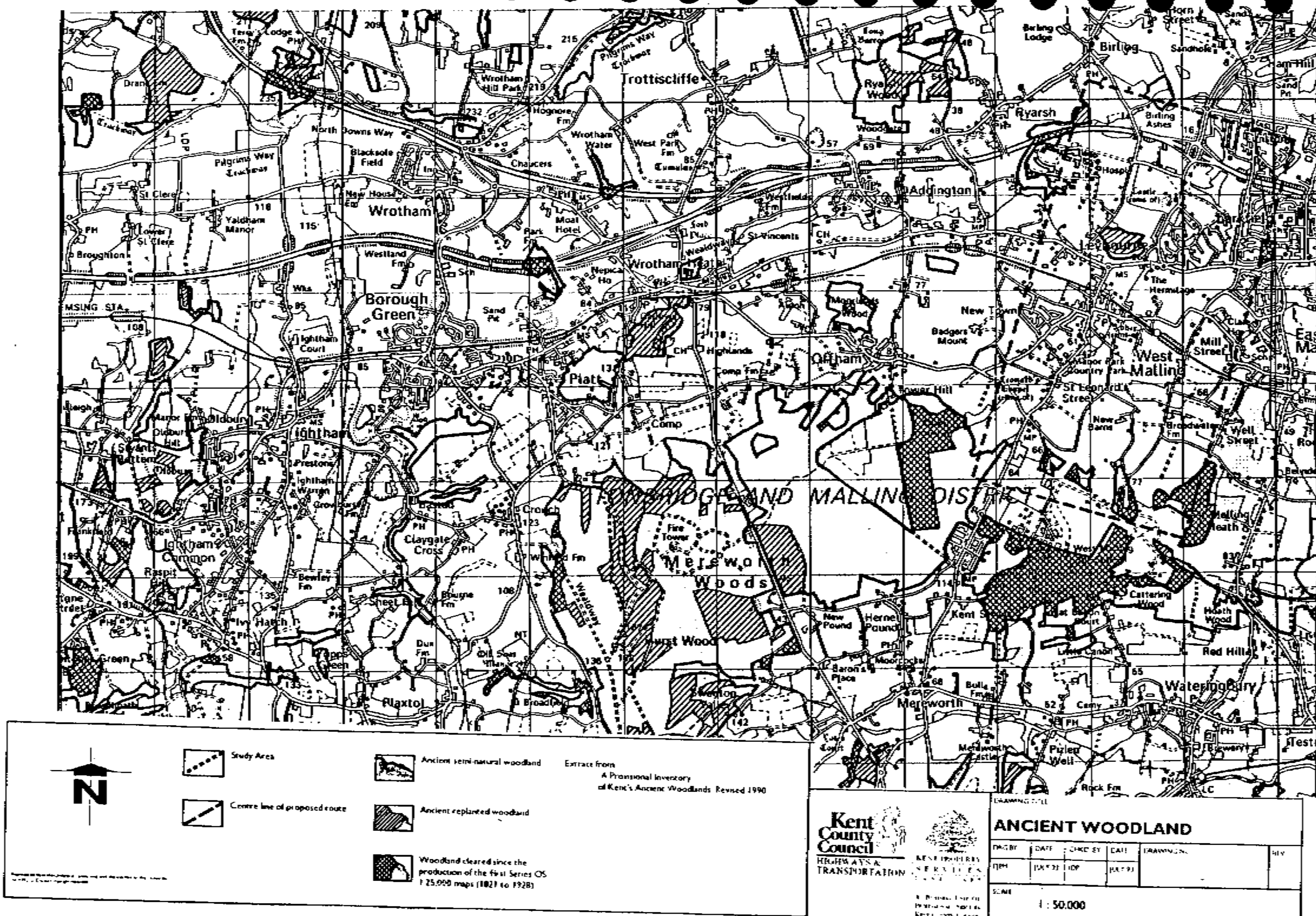
EXTRACT FROM ENGLISH NATURE'S:

PROVISIONAL INVENTORY OF KENT'S ANCIENT WOODLANDS – REVISED 1990

Ancient woods are those which have had a continuous woodland cover since at least 1600 AD and have only been cleared for underwood or timber production.

A provisional inventory of Kent's ancient woodland has been undertaken by English Nature and was revised in 1990. This inventory considered the origins of woodlands over two hectares in extent and those classified have been recorded on the following diagram.



Study Area

Centre line of proposed route

Ancient semi-natural woodland

Ancient replanted woodland

Woodland cleared since the production of the First Series OS 1:25,000 maps (1823 to 1928)

Extract from A Provisional Inventory of Kent's Ancient Woodlands Revised 1990

Kent County Council
HIGHWAYS & TRANSPORTATION

Kent Property Services

ANCIENT WOODLAND

SCALE 1:50,000

SECTION 2

VEGETATION SURVEY

ANDREW HENDERSON 1991

1. INTRODUCTION

1.1 This report, commissioned by Kent County Council, Land and Property Department, describes the results of vegetation surveys along the routes of proposed road improvements at Leybourne and West Malling, Kent. The survey was undertaken during September-October 1991.

1.2 Three options for the Castle Way, Leybourne, were considered. From east to west, these are known as the red (following the existing Castle Way), the blue and the orange. For West Malling bypass, the land surveyed was that to the west of the existing single carriageway road, which would be affected by the proposed dualling of this road.

1.3 The objectives of the survey were as follows:

- To provide descriptions of the vegetation types occurring along the route options, exrending to 10m either side of the proposed highway boundary (and to 30m of the boundary in Leybourne Wood).
- To list plant species occurring along the route options, with special attention to scarce or rare species.
- To examine the effects of the route options in relation to the vegetation and plant species, and to suggest possible measures to mitigate significant adverse effects.

2. SURVEY METHODS

2.1 The survey work was undertaken on the following dates:

Red Route	27 & 30 September
Blue Route	30 September & 1 October
Orange Route	30 September, 1 & 11 October
West Malling Bypass	11 October

2.2 Each route was walked, and the principal vegetation types were mapped at a scale of 1:2500. Notes were made of the dominant species in each vegetation type and land parcel.

2.3 The layout of vegetation was too complex to permit recording of the plant species occurring in each land parcel, but each Castle Way route option was sub-divided into a number of sections which had broadly similar characteristics. The route of the West Malling bypass improvements was treated as one unit for species listing.

3. RESULTS

3.1 Sections 4-7 of the report describe the vegetation along each route in turn, drawing attention to important features. They should be read in conjunction with the maps, one for each of the Castle Way options and one for West Malling bypass, which accompany the report.

3.2 The maps show the main vegetation types, but some comment is needed on the conventions used in preparing the plans. It was not possible to show all minor variations in vegetation clearly, and the categories indicated (bounded by broad lines) are those which differ strongly from adjoining areas in structure or species composition. For some vegetation, the type is given on the maps. Two vegetation types indicated by abbreviations are rdl (= ruderal vegetation) and gn(s) (= garden(s)). Areas which consist almost or entirely of road verges are not labelled.

3.3 Smaller areas are given code letters (A-R) which are used to correlate between the maps and the report. A separate series of code letters is used for each option, although (by omitting H from the orange route) the two off-line routes have the same lettering for features at the southern end where they follow similar courses.

3.4 A series of tables at the end of the report (Appendix 1) contains the lists of plant species recorded in each section of the three routes. The extent of each section is indicated on the maps by numbers and arrows. The following descriptions deal with each route, section by section.

3.5 Attention is drawn to species or communities which are unusual. Plants are described as scarce in Kent if they occur in 10% or fewer of the 1044 tetrads (2x2km grid squares) in Kent in the Atlas of the Kent Flora (Philp 1982). Introduced species are ignored in this respect.

3.6 In the descriptions, the convention is followed of referring to trees and shrubs by their common names, but all other plant species by scientific names. Appendix 2 lists all of the plant species recorded during the survey, giving both scientific and vernacular names.

4. Vegetation Descriptions: Red Route (Figures 7-11)

Section 1

4.1 This section comprises mainly the road verge on the western side of Castle Way at its junction with the M20. It includes a steeply sloping bank as shown on the map. The vegetation over much of the verge is dominated by tall grasses especially ***Arrhenatherum elatius*** and includes typical tall herbaceous species of such grasslands, e.g. ***Rumex crispus, Heracleum sphondylium, Cirsium arvense*** and ***Equisetum arvense***. There is scattered young scrub of sycamore, oak, bramble and broom and other species. There is slightly denser growth of sycamore and osier at the southern end of the section, on the lower slopes adjoining the stone wall which separates the verge from the adjoining wood (Area A).

4.2 A surfaced track runs near the outer edge of the verge, and in this area the sward is short. There is some influence of road salt at the edge of the road, indicated by the presence of the saltmarsh species ***Puccinellia distans*** and ***Spergularia marina***.

4.3 On the flat ground below the M20 slip-road is an area of shorter grassland dominated by ***Agrostis capillaris***, and with herbs such as ***Trifolium arvense, Plantago lanceolata*** and ***Vicia hirsuta*** prominent. This area is more species rich than the taller sward.

4.4 The grass field beyond the road verge fence just falls within the survey area. The affected area is semi-improved grassland which had been mown in 1991 but was somewhat rough. ***Agrostis capillaris*** and ***Festuca rubra*** are dominant, and other frequent species include ***Dactylis glomerata, Achillea millefolium, Lotus corniculatus, Senecio jacobaea, Cirsium vulgare, Potentilla reptans*** and ***Carex hirta***.

Section 2

4.5 Most of this section consists of a broad grass verge, on level ground, between Park Road and Leybourne church. The vegetation is much trampled or crushed near the road. The main grass species are ***Arrhenatherum elatius, Festuca rubra, Dactylis glomerata*** and ***Holcus lanatus***. The most frequent herbs include ***Achillea millefolium, Heracleum sphondylium*** and ***Plantago lanceolata***. There is little scrub except some bramble and immature sycamore along the wall which forms the rear boundary to the verge.

4.6 At the southern end of the section, the 10m strip includes the stone wall, and land beyond. The latter includes part of a horse-grazed pasture and part of the churchyard. The pasture is a close-grazed semi-improved sward, with various grasses present: ***Poa sp, Lolium perenne, Dactylis glomerata, Festuca rubra*** and ***Agrostis capillaris***. There is a fairly high cover of mainly common herbs such as ***Senecio jacobaea, Medicago arabica*** and ***Ranunculus bulbosus***. A line of cypresses stands along the wall near the churchyard, and there is a large hawthorn bush opposite Oxley Shaw Lane.

4.7 The churchyard is dominated by ***Lolium perenne***, but also contains such herbs as ***Malva sylvestris, Crepis capillaris, Potentilla reptans*** and ***Plantago lanceolata***. There are a few planted trees including a fairly large yew. A large but damaged wellingtonia stands just outside the churchyard gate.

SECTION 3

4.8 This section relates to the western half of the proposed link between Park Road and Oxley Shaw Lane. It passes through an area of mixed plantation woodland (Area B). The woodland is neglected with many fallen trees from 1987 and earlier. The remaining mature trees stand as individuals or small groups, with a larger group of pines to the north-west. The tree species falling within the survey route are, in approximate order of abundance: pedunculate oak, Corsican pine, sycamore, holm oak, turkey oak and hornbeam. About 20 trees are involved, ranging up to about 100cm diameter at breast height (dbh). There are also some dead stumps standing up to 5m high.

4.9 Over much of the area there is a dense understorey of elder about 3-4m tall, interspersed by areas dominated by ***Urtica dioica*** plus other tall or clambering plants such as ***Cirsium vulgare, C arvense, Galium aparine*** and bramble. The ground flora is species-poor, although there is some ***Mercurialis perennis, Viola odorata*** and much moss. The whole area is densely populated by rabbits.

4.10 The plantation is not fenced off from the horses in adjoining fields, but they penetrate to this section only along a fairly narrow path.

SECTION 4

4.11 A complex section, forming the edge of the former gravel workings around Castle Lake, between the M20 and Oxley Shaw Lane. Habitats included the steep embankment below the M20 roundabout, wet alder and Salix woodland below the embankment, a more open area of ruderal vegetation on gravelly soil, and a short section of stream by Oxley Shaw Lane.

4.12 The road verge and embankment consisted of mixed grassland and scrub, the latter comprising mainly planted specimens and locally dense. The main tree and shrub species were silver birch, hawthorn, sallows, sycamore, field maple and alder; most are 3-4m tall but some stand up to 8m. Grassy areas are mostly dominated by ***Arrhenatherum elatius***, but recently cleared areas on the steep embankment have a more mixed flora including such plants as ***Dipsacus fullonum, Epilobium ciliatum*** and ***Inula conyza***.

4.13 At the foot of the embankment, there is a mixture of immature alder and sallow/willow woodland and more open areas. The latter have a varied flora which includes many species of damp areas such as ***Pulicaria dysenterica*** and ***Juncus inflexus***. More mature stands of alder lie outside the area surveyed, beyond a broad silted ditch (Area C). The ditch, although shaded, has marshland plants including ***Equisetum telmateia, Mentha aquatica, Lycopus europaeus*** and ***Carex pendula***.

4.14 The open area of ruderal vegetation further south is on gravelly soils. It has a variable height turf, some kept short by rabbit-grazing and some tall and rank. Various herbs typical of such nutrient-poor conditions are abundant – ***Medicago lupulina, Senecio jacobaea, Tussilago farfara*** and ***Picris hieracioides***, for example. There is a concrete hard-standing at the entrance gate. There are scattered self-sown and planted shrubs (especially ***Salix*** sp. and Alder) but few are doing very well. In the corner of Castle Way and Oxley Shaw Lane is a clump of larger poplars and white willows, partly shading a short section of stream (Area D) which flows north before passing into a culvert. The stream has several aquatic and marginal plant species not found elsewhere in this section, such as ***Callitriche*** sp., ***Nasturtium officinale*** agg, ***Apium nodiflorum*** and ***Impatiens glandulifera***.

Section 5

4.15 This section forms the proposed route of the eastern half of the Park Road-Oxley Shaw Lane link. Mostly, it passes through open ruderal vegetation similar to that in section 4 (paragraph 4.16).

4.16 The route would also affect a group of mature but sick white willows, and a line of mature white willows (up to 50cm dbh) along the Oxley Shaw Lane fence. The road verge of Oxley Shaw Lane consists of mown grass with a few small planted oak trees.

4.17 The route comes close to, but does not directly affect the western arm of Castle Lake.

Section 6

4.18 This short section comprises mainly tall ruderal vegetation on either side of a stream, but includes also the mown grass verge (with surfaced pathway) and comes close to Leybourne Primary School.

4.19 The ruderal vegetation consists mainly of tall species, notably ***Arrhenatherum elatius, Lactuca serriola, Urtica dioica, Cirsium arvense*** and ***Calystegia sepium***. There are scattered trees and shrubs, mostly planted but including some natural hawthorn and elder.

4.20 The stream (Area E) lies in a steep-sided channel, 2m or more deep. It is about 2m wide and is well vegetated; the principal species were ***Myosotis scorpioides, Nasturtium officinale, Sparganium erectum*** and ***Impatiens glandulifera***.

Section 7

4.21 The route in this section runs mainly over mown amenity grassland. The north end impinges slightly on the stream, and there is a donkey paddock at the north end.

4.22 The mown grassland is dominated by ***Lolium perenne*** and is rather poor in other species although ***Trifolium repens, Achillea millefolium*** and ***Taraxacum*** sp. are reasonably frequent. There are a few planted trees, up to 5m tall, in the grassland but few fall into the line of the route. The donkey paddock is similar, but with a less uniform sward and slightly more species-rich.

4.23 The stream (Area F) is similar to that in section 6, but is more shaded and overgrown by adjoining tall vegetation and trees and shrubs in adjoining gardens.

Section 8

4.24 Much of the affected land in this section lies in private gardens which were not surveyed. The remaining land forms road verges, mostly narrow but broader near the A20 roundabout. The latter area is dominated by ***Lolium perenne*** and ***Arrhenatherum elatius***, with typical road verge herbs

4.33 Several hedgerows and shaws have parts of their lengths within the survey area. Close to the A20, several wooded strips would be affected (Area I). The former (now cut by the A228) Hermitage driveway has tall horse chestnuts and sycamores to the north and a 2.5m hedge of hawthorn, elm and elder to the south. The driveway itself now is mostly grassy though with a surfaced centre. The line of tall trees is somewhat gappy because of storm damage. Beneath them is ***Urtica dioica***, bramble, ***Cirsium vulgare*** and some elder. North of the horse chestnut/sycamore strip is a belt of smaller sweet chestnut (10-40cm dbh) over a sparse ground flora of bramble, ***Alliaria petiolata*** etc.

4.34 The parts of Area I running along the A20 consist of mixed stands of ash (some of which appear sickly) and sweet chestnut, with some sycamore, norway maple, elm and larch. Most trees are up to 50cm dbh but some are as large as 80 cm. There is a moderately dense understorey of hawthorn with holly, rose and elder, and sparse ground flora dominated by ivy but including ***Viola odorata, Glechoma hederacea*** and ***Alliaria petiolata***. A private garden falls within this sector.

4.35 The field at the junction of the A228 and A20 is unused. It has an uneven surface and contains large numbers of old car tyres. The field is dominated mainly by tall herbs such as ***Urtica dioica, Senecio jacobaea, Cirsium arvense*** and ***C vulgare***, with low cover consisting of other very common species including ***Holcus lanatus*** and ***Ranunculus repens***.

4.36 At the south end (Area J), closest to the road there is a small group of larch and sweet chestnut with an understorey of elder and hawthorn and ground flora of ***Galium aparine, Urtica dioica***, etc.; further back this line becomes a 2m high clipped hawthorn hedge.

5. Vegetation Descriptions: Blue Route (Figures 12-16)

Section 1

5.1 This section, from the M20 to Park Road, overlaps with section 1 and part of section 4 of the on-line route, but includes a larger part of the field west of Castle Way.

5.2 On the west side of Castle Way, the vegetation over much of the verge is dominated by tall grasses especially ***Arrhenatherum elatius*** and includes typical tall herbaceous species of such grasslands, e.g. ***Rumex crispus, Heracleum sphondylium, Cirsium arvense*** and ***Equisetum arvense***. There is scattered young scrub of sycamore, oak, bramble and broom and other species. There is slightly denser growth of sycamore and osier at the southern end of the section, on the lower slopes adjoining the stone wall which separates the verge from the adjoining wood.

5.3 A surfaced track runs near the outer edge of the verge, and in this area the sward is short. There is some influence of road salt at the edge of the road, indicated by the presence of the saltmarsh species ***Puccinellia distans*** and ***Spergularia marina***.

5.4 On the flat ground below the M20 slip-road is an area of shorter grassland dominated by ***Agrostis capillaris***, and with herbs such as ***Trifolium arvense, Plantago lanceolata*** and ***Vicia hirsuta*** prominent. This area is more species rich than the taller sward.

5.5 The grass field beyond the road verge fence just falls within the survey area. The affected area is semi-improved grassland which had been mown in 1991 but was somewhat rough. ***Agrostis capillaris*** and ***Festuca rubra*** are dominant, and other frequent species include ***Dactylis glomerata, Achillea millefolium, Lotus corniculatus, Senecio jacobaea, Cirsium vulgare,***

Potentilla reptans and ***Carex hirta***. Some mature trees stand in the fields close to the wood (part of section 2). The few which fall within the survey area are ash and oak.

5.6 On the east side of Castle Way, the road verge and embankment consist of mixed grassland and scrub, the latter comprising mainly planted specimens and locally dense. The main tree and shrub species are silver birch, hawthorn, sallows, sycamore, field maple and alder; most are 3-4m tall but some stand up to 8m. Grassy areas are mostly dominated by ***Arrhenatherum elatius***, but recently cleared areas on the steep embankment have a more mixed flora including such plants as ***Dipsacus fullonum, Epilobium ciliatum*** and ***Inula conyza***.

5.7 At the foot of the embankment, there is a mixture of immature alder and sallow/willow woodland and more open areas. The latter have a varied flora which includes many species of damp areas such as ***Pulicaria dysenterica*** and ***Juncus inflexus***. More mature stands of alder lie outside the area surveyed, beyond a broad silted ditch (Area A). The ditch, although shaded, has marshland plants including ***Equisetum telmateia, Mentha aquatica, Lycopus europaeus*** and ***Carex pendula***.

Section 2

5.8 Included here are the plantation woodlands either side of Park Road. The wood to the south has already been described as section 2 of the on-line route, but the inner off-line option would affect a larger area.

5.9 The wood to the north of Park Road is mixed sycamore and oak, with some turkey oak and holm oak, up to about 75cm dbh. There is some understorey of elder, hawthorn and holly. The ground flora is strongly dominated by ivy but there is a little ***Mercurialis perennis***.

5.10 To the south of Park Road, the majority of the woodland would be affected. This area has suffered severe storm damage, but remaining mature trees include oak, sycamore, scots and Corsican pine, cedar, holm oak, turkey oak and hornbeam. The understorey, often dense, is dominated by elder but with some hawthorn. The ground flora is mostly of Urtica dioica, but in more open areas where horses penetrate, there is grassland.

Section 3

5.11 This section runs through horse-grazed pastures, but also involves small areas of plantation woodland.

5.12 The grassland is semi-improved; in this case, this implies that the fields are long-established leys which have gradually acquired a range of species other than those which were sown. The dominant grass is ***Agrostis capillaris***, but other frequent species are ***Lolium perenne, Festuca rubra, Dactylis glomerata, Holcus lanatus*** and possibly others. The close-grazing makes it difficult to identify all species, especially in autumn. Herb species which are frequent or abundant include ***Trifolium repens, Cerastium fontanum, Ranunculus bulbosus, Rumex acetosa, Veronica chamaedrys, Cirsium arvense, C vulgare, Leontodon autumnalis*** and ***Plantago lanceolata***.

5.13 Along Park Road, the re-aligned Park Road would affect some trees and shrubs. Area B is an under-grazed stand of mature oaks (about 80cm dbh). Area C includes a few small (6-8m tall) scots pines, again not fenced off from the horses. The proposed spur serving the line of houses would affect or come close to a group of four semi-mature norway maples planted in the field. Running along Park Road in this area is a single line of mature scots pine with a hawthorn hedge underneath.

5.14 The two large grass fields within this section are separated by an area which includes clumps of trees (Areas D and E), stables and ***Lolium perenne*** dominated paddocks (Area F). Area D is partly under-grazed with other areas used for car-parking or stables and sheds. The trees are mainly oaks, up to 90cm dbh, with some sycamores. Underneath there is ***Urtica dioica*** or ***Lolium perenne***. Area E is mainly fenced from grazing, but the south-west lobe consists of under-grazed hawthorns with ***Urtica dioica***. Most of Area E is mature oak and Corsican pine, with an understorey of hawthorn, elder and elm, and ground flora dominated by ***Urtica dioica*** and ***Alliaria petiolata***. Both of Areas D and E have suffered moderate storm damage.

5.15 On the southern side of the pastures, a public footpath (Area G) is separated from the field by a fence. There is an intermittent hawthorn hedge on the south side of the footpath.

Section 4

5.16 This section consists almost entirely of arable land, holding an unharvested maize crop at the time of the survey. The density of the crop meant that virtually no weeds were present except on field margins. Where present, species were widespread species such as ***Veronica persica, Urtica urens, Tripleurospermum inodorum, Coronopus squamatus*** and ***Solanum nigrum***.

5.17 Near the northern end of the section is a strip of uncultivated land about 15m wide (Area H). This strip includes a steeply sloping bank. It is dominated by tall grassland with ***Elymus repens, Holcus lanatus*** and ***Agrostis stolonifera*** prominent and herb species typical of rank grassland, e.g. ***Urtica dioica, Cirsium arvense, Heracleum sphondylium, Vicia sativa***, etc.

Section 5

5.18 In this section, small streams (Area J) flow through a small horse-grazed field (Area K) close to Pump Close. The field was heavily trampled, making species identification difficult, but appeared to be dominated by ***Holcus lanatus*** especially in damper and more shady areas. The grassland was not particularly rich in herbaceous species, although in some areas ***Urtica dioica*** and ***Glechoma hederacea*** were frequent. The north-western section of Area K has many moderately large trees: white and crack willow, alder and poplar.

5.19 The main stream, running SW-NE, is 1-1.5m wide and 20-50cm deep. Locally it is shaded by bankside trees but elsewhere has vegetation dominated by ***Impatiens glandulifera*** and ***Urtica dioica***. The smaller stream joining it from the south is heavily silted so that horses can graze across a broad damp zone up to 5m wide. This has varied aquatic/marshland flora dominated by ***Apium nodiflorum*** and with ***Lycopus europaeus, Veronica beccabunga, Iris pseudacorus, Mentha aquatica*** and ***Myosotis scorpioides***.

5.20 The steep embankment at the junction of the A20 and Pump Close is dominated by ***Urtica dioica*** and shrubs (hawthorn and others).

Section 6

5.21 This section is the part of Leybourne Wood which is believed to be 'ancient'. It is separated from section 7 by a large earth bank at the foot of a steep slope.

5.22 The woodland within the survey area consists almost entirely of sweet chestnut coppice. A narrow peripheral strip (mostly around 5m wide) remained uncut at the last coppicing, but most of the area affected consisted of coppice cut in winter 1990/91 (the southern part) or in about 1987/88

(the northern part). The area contains no standards with the exception of one large oak tree on the northern margin of the wood, just within the 30m survey strip.

5.23 Although sweet chestnut dominates the coppice, there is a little ash, elder, hornbeam and hazel especially near the wood edge. The ground flora in the most recently cut area, where about 40-50% of the ground remained open, was very mixed, including for example ***Glechoma hederacea, Epilobium ciliatum, Silene dioica, Digitalis purpurea, Euphorbia amygdaloides*** and ***Hyacinthoides non-scripta***. The last species – bluebell – may appear more dominant in spring. The sandy and acidic nature of the soil is indicated by the presence of species such as ***Rumex acetosella*** and ***Ornithopus perpusillus***.

5.24 In the older coppice, the canopy was more or less closed and reached about 4m high. The ground flora was dominated by ***Hyacinthoides non-scripta*** and ***Glechoma hederacea***, with grasses remaining where more light penetrated. At the woodland edge, ***G hederacea*** was especially abundant, and ***Mercurialis perennis*** also was more frequent in these areas.

SECTION 7

5.25 This section contains two areas of recently developed woodland (Area I), known as Woods Meadow, separated by a stream (Area J, as described under section 5 but with some ***Carex pendula*** on the banks).

5.26 The southern part of Area I includes two parallel rows of beech of about 50cm dbh set about 10m apart. There is little vegetation under their shade, although species present include ***Ligustrum vulgare, Mercurialis perennis*** and ***Viola odorata***, and a path runs between the two rows. There are also some large sycamores and horse chestnuts. To the west is immature woodland dominated by sycamore, elder, ivy and ***Urtica dioica***.

5.27 The northern part of Area I is open woodland of ash, poplar and crack willow with an understorey of elder, lilac and poplar suckers and regrowth. The ground flora is dominated by ***Urtica dioica*** but includes moderate amounts of other species including ***Impatiens glandulifera*** and ***Ranunculus repens***.

SECTION 8

5.28 This is a very complex section, comprising a series of fields in various uses separated by shaws and hedges of varying composition. It includes all land affected by this option south of the A20.

5.29 Close to the A20, the route affects private gardens and an arable field. The latter held wheat in 1991 and had not been ploughed by the survey date; apart from wheat regrowth there was little vegetation in it. On a steep bank (Area M), the lower part forms part of a garden (including a small waterfall over ragstone) but the upper slope consists of hawthorn and elder scrub, plus one large ash tree, over ***Urtica dioica*** and ivy in the south, and more open mixture of bramble, hawthorn, elm, traveller's joy and ***Urtica dioica*** to the north.

5.30 Moving to the south, the route affects an area of horse-grazed pasture with scattered shaws or clumps of trees. The grassland is permanent pasture. The dominant grass is ***Lolium perenne*** but other species such as ***Agrostis stolonifera*** also are present. It has a fairly high component of herbaceous species, mostly common species such as ***Trifolium repens, Ranunculus repens, R acris, Plantago lanceolata, Cirsium arvense, Rumex acetosa*** and patches of ***Urtica dioica***. The trees within the pasture include areas described below and also smaller areas of lime, poplar and horse chestnut and individual walnuts.

5.31 The most extensive area of woodland Area L) surrounds a deep hollow excavated from the field. This area is open to grazing with a grassy glade up the middle but elsewhere has a woodland structure. There are large beech and oak trees (up to 80cm dbh) and smaller sycamores and ashes. The woodland has suffered some storm damage. The understorey is composed of hawthorn, elder and sycamore, and the ground flora dominated by ***Urtica dioica*** and ***Glechoma hederacea***.

5.32 The shaw between the pasture and the arable field (Area P) is predominantly sweet chestnut with hawthorn understorey. There is one large sessile oak in the affected section. The ground flora appeared dominated by bramble and ***Alliaria petiolata***.

5.33 The rectangular Area N consists of a pond with a clump of large trees to the west. Most of the area is undergrazed. The trees include lime, beech, sweet chestnut and Wellingtonia, the latter well over 100cm dbh. The area suffered moderate storm damage. The pond is part filled with fallen timber, and the vegetation present – ***Agrostis stolonifera, Cirsium arvense*** and ***Urtica dioica*** – suggests that it dries out at times.

5.34 Area O, falling close to the route alignment, consists of a clump of now sparse conifers (cedar and cypress).

5.35 Along the Hermitage driveway is a strip of large trees (up to 80cm dbh) along the north side of the Hermitage driveway; these are mainly horse chestnut but there are also sycamores. The ground flora is of ***Urtica dioica, Glechoma hederacea***, etc. On the south side of the driveway, there is lower cover of elder and bramble along the fence line, then a dense mixed block of sycamore, horse chestnut, yew, ash, elder and holly running to the south. This whole area is shown on the map as Area Q.

5.36 South of the shaw, Area Q, the driveway runs through an area of mown grass with recently planted trees (broad-leaved and conifers). The grass is dominated by ***Lolium perenne*** and ***Agrostis stolonifera***, and is not species-rich although ***Trifolium repens*** is frequent.

5.37 Ruderal vegetation in a series of abandoned fields south of the Hermitage driveway consisted of a rank growth of species including ***Lactuca serriola, Agrostis stolonifera, Galium aparine, Cirsium vulgare, Senecio jacobaea*** and ***Rumex crispus***. One strip of this land, closest to the A228, has been fenced off and although otherwise similar has been planted with trees and shrubs as on the road verge. The southernmost area of ruderal vegetation is more grassy, being dominated by ***Arrhenatherum elatius, Elymus repens*** and ***Holcus lanatus***, and the presence of ***Urtica dioica***, ***Rumex*** sp. and ***Epilobium hirsutum*** and old car tyres suggests that until recently it may have been horse-grazed.

5.38 Two small pony paddocks close to the Hermitage are closely grazed, but appear to be dominated by ***Lolium perenne*** and ***Agrostis stolonifera*** on rather uneven ground. The fields do include patches of ***Urtica dioica*** and elder bushes.

5.39 South-east of the Hermitage lies an arable field from which a crop of potatoes had recently been gathered. The field held many common weeds, including ***Rumex obtusifolius, R crispus, Cirsium arvense, Solanum nigrum*** and ***Chenopodium album***.

5.40 Beside the potato field is a tall shaw (Area R) of sweet chestnut and sycamore, multi-stemmed and originally coppiced, over an understorey of hawthorn and ground flora dominated by ivy.

5.41 The road verges of the A228 were dominated by rank, seeded ***Festuca rubra***, plus smaller amounts of many herbaceous species such as ***Cirsium arvense, Daucus carota*** and ***Achillea millefolium***.

Locally, especially near the A20, the flora was more diverse including such species as ***Trifolium arvense*** and ***Malva moschata***. Many young planted trees and shrubs are present, including ash, lime, silver birch, dog rose, wild cherry, oak, field maple and scots pine.

6. VEGETATION DESCRIPTIONS: ORANGE ROUTES (FIGURES 1-6)

SECTION 1

6.1 This includes all land affected by this roure oprion north of the M20. It includes various rough grassland and ruderal land and also part of a gravel pit. The latter was not shown on the base map used for the survey, and its dimensions shown on the attached plan are approximate.

6.2 The majority of the affected land is tall (often over lm) ruderal vegeration, apparently unused, although horses gain entry at one or two points and some areas are grazed by numerous rabbits. The most abundant species include ***Senecio jacobaea*** and ***Cirsium arvense***, but the following also are very common: ***Carex hirta, Cirsium vulgare, Pulicaria dysenterica, Ranunculus repens*** and ***Potentilla reptans***. Despite the sandy nature of the soil, there is clearly a high water table, indicated by the presence of so much ***Carex hirta*** for example, and in fact a strong seepage was apparent on the bank sloping down to the gravel pit. Rabbit-grazed turf is dominated by ***Festuca*** and ***Agrostis*** species. There is occasional small scrub – elder, ash and ***Salix*** sp.

6.3 The M20 verge has a rough short sward of ***Holcus lanatus*** and ***Agrostis stolonifera***, with much ***Cirsium arvense, Senecio jacobaea***, etc, and scattered small hawthorn and dog rose bushes.

6.4 The gravel pit has steep banks rising 5m or more above the water level. The banks were vegetated either as the surrounding ruderal areas or, more extensively, by a belt of trees and shrubs: willows, sallows, osier, alder and elder. Most of the margins were shaded, and the steep slope does not promote marginal vegetation, but there is some ***Juncus inflexus, J effusus*** and ***Typha latifolia***. It was not possible to gain access to sample fully the aquatic vegeration, but species noted were ***Elodea nuttallii, Callitriche*** sp, and possibly a large ***Potamogeton*** species such as ***P lucens***.

6.5 To the west, part of a horse-grazed field would be affected. This has large amounts of tall species such as ***Senecio jacobaea, Urtica dioica, Cirsium vulgare*** and ***C arvense***. There are under-grazed clumps of trees in the pasture including one small clump of hawthorn, elder and field maple, and a larger srand of coppiced ash (Area A) to the west.

6.6 The pasture and the ruderal area are separated by hedges of hawthorn and some elder and common sallow, and, to the west, by a ditch carrying shallow water about 2m wide. Where not shaded this has such aquatic plants as ***Berula erecta, Veronica beccabunga*** and ***Mentha aquatica***, and raller species such as ***Epilobium hirsutum*** and ***Urtica dioica*** on the banks.

6.7 Between Area B and the M20 fence is a stand of large crack willows, with understorey of elder and ground flora of ***Urtica dioica***.

SECTION 2

6.8 This includes the land between the M20 and Park Road. Most of it is grassland ungrazed at the time of survey and probably cut for forage. It is improved grassland dominated by ***Lolium***

perenne, but with some ***Agrostis stolonifera, Holcus lanatus*** and ***Cynosurus cristatus***. It appears poor in herbaceous species.

6.9 In the centre of the field is a group of trees (Area C), comprising six oaks and three beeches, one of the latter looking in very poor condition. Under the trees had not been mown and consisted of rank grass, especially ***Dactylis glomerata***, and ***Urtica dioica***.

6.10 The vegetation on the embankment of the M20 and Birling (Bull) Road is dominated by planted trees and shrubs, well-established and about 4m tall, including hawthorn, ***Salix*** species, field maple and, at the eastern end, a line of poplars inside the grass field.

SECTION 3

6.11 This area principally involves horse-grazed pasture with two clumps of trees, but the species list also includes a number of weed species from the north-east corner of the maize field adjoining Park Road.

6.12 The pasture is similar in species composition to that on the inner off-line route (see paragraph 5.12) but appears slightly less species rich, although this could be a result of the less tight grazing.

6.13 The two clumps of trees have suffered only slight storm damage. Area D comprises large oak and turkey oak plus one hawthorn and a group of plum trees. Area E includes some very large oaks and beech (over 100cm dbh). Both of these groups are under-grazed, with similar swards to the surrounding fields although with some patches of ***Urtica dioica***.

6.14 The footpath (Area F) which marks the southern limit of this section has a 3m tall hawthorn hedge along its north side.

SECTION 4

6.15 This section consists almost entirely of arable land, holding an unharvested maize crop at the time of the survey. The density of the crop meant that virtually no weeds were present except on field margins. Where present, species were widespread species such as ***Veronica persica, Urtica urens, Tripleurospermum inodorum, Coronopus squamatus*** and ***Solanum nigrum***.

6.16 Near the northern end of the section is a strip of uncultivated land about 15m wide (Area G). This strip includes a steeply sloping bank. It is dominated by tall grassland with ***Elymus repens, Holcus lanatus*** and ***Agrostis stolonifera*** prominent and herb species typical of rank grassland, e.g. ***Urtica dioica, Cirsium arvense, Heracleum sphondylium, Vicia sativa***, etc.

SECTIONS 5-8

6.17 These sections follow very closely the alignment of sections 5-8 of the inner off-line route, and reference should be made to paragraphs 5.18-5.41 for details. Only in section 6 is there significant deviation from the inner off-line route.

6.18 The outer off-line option would take a larger area of Leybourne Wood in section 6 than would the inner route. The habitats affected would be the same, but more of each age class of coppice would be affected. The one large oak tree mentioned in paragraph 5.22 would be lost. Although a greater area would be affected, only three extra species were found (see tables) compared with the inner off-line route, indicating the general uniformity of this woodland.

7. West Malling By-Pass

7.1 The area covered in this section is the east side of the existing West Malling bypass, from Luck's Hill to Lavenders Road. Most of the land affected is farmland (arable land and orchards) or the existing road verges.

7.2 The verges are dominated by tall grasses and various common herb species. The principal grasses include ***Elymus repens, Agrostis*** sp. and ***Arrhenatherum elatius***, and other species include – for example – ***Hypericum perforatum, Daucus carota, Cirsium arvense*** and ***Senecio jacobaea***. Many trees and shrubs have been planted, most of these being around 1m tall; they include wild cherry, dogwood, ash, guelder rose, oak, dog rose, silver birch, goat sallow, field maple and hazel.

7.3 The arable fields had held cereal crops during 1991 but had not yet been ploughed. There was considerable wheat regrowth but relatively little weed growth. Species that were present included ***Agrostis stolonifera, Elymus repens, Senecio vulgaris, Rumex obtusifolius, Ranunculus repens*** and ***Tripleurospermum inodorum***. An asparagus field south of Lavenders Road had a greater abundance of weeds, especially ***Hypericum perforatum, Solanum nigrum*** and ***Conyza canadensis***.

7.4 Also south of Lavenders Road is a horse-grazed pasture which would just be affected by the development. This consists of improved grassland dominated by ***Lolium perenne*** and ***Agrostis*** sp. and herbs such as ***Senecio jacobaea*** and ***Leontodon autumnalis***. The ragstone wall fronting Lavenders Road has several species growing on it found elsewhere during this survey only very locally if at all; these were the ***Arenaria*** sp, and the ferns ***Asplenium ruta-muraria*** and ***Polypodium*** sp.

7.5 The orchards consisted of a series of blocks of various apple varieties, most trees on dwarfing rootstocks and only about 2m high. Between the rows and around the orchards is mown grass dominated by ***Lolium perenne*** with much ***Agrostis stolonifera*** and locally ***Bromus hordeaceus***, and a moderate variety of herbs. The latter include ***Trifolium repens, Plantago lanceolata, Rumex obtusifolius, Leontodon autumnalis*** and ***Trifolium dubium***. One recently cleared orchard had been colonised by a dense stand of ***Conyza canadensis***.

7.6 Several shaws or hedgerows cross the survey area. Area A is a shelterbelt of ash, horse chestnut, sweet chestnut and elm, standing about 10-15m tall. Area B is of similar size but dominated by sweet chestnut with a little elm. It has a ground flora of ivy and some ***Brachypodium sylvaticum***. Between this and Area C lie the railway embankments, which have coarse grassland of ***Dactylis glomerata, Brachypodium sylvaticum***, etc, and one years re-growth of sweet chestnut, ash and sycamore.

7.7 Area C includes a shelterbelt on the south side of sycamore, oak, elder, etc, and nearer the railway a more open grassy area with scattered mainly small trees. The grassy areas are dominated by ***Festuca rubra, Brachypodium sylvaticum*** and ***Dactylis glomerata***, and have a very mixed flora including ***Potentilla reptans, Glechoma hederacea, Veronica chamaedrys, Lupinus polyphyllus, Mentha spicata, Cirsium arvense*** and ***Urtica dioica***.

7.8 Area D is a low hedgerow (up to 4m) of elder, plum, traveller's joy and much ***Urtica dioica***, growing on a steep bank about 2m high.

8. EVALUATION

8.1 This section of the report attempts to put into context the nature conservation interest of the vegetation types and plant species recorded in this survey.

8.2 The majority of the land under consideration is arable farmland, improved or semi-improved grassland, private gardens, plantation woodland and road verges. These are habitats which are not normally of very high nature conservation interest, and observations do not suggest anything to the contrary in the present case. It has not been thought necessary to carry out a full evaluation using all of the standard criteria (as set out, for example, in A Nature Conservation Review, ed. D A Ratcliffe, 1977, Cambridge University Press). This section makes comments on the interest affected by the various options, based on observations of the vegetation types and on the plant species present.

PLANT SPECIES

8.3 Table 1 sets out the numbers of taxa (species or species groups) identified in each section of each route. In interpreting these totals, it is important to remember that the sections differed in their size and habitat diversity, and also that species richness is not necessarily allied to nature conservation interest.

TABLE 1

Numbers of plant taxa found on each route

Section	Red	Blue	Orange	West Malling Bypass
1	66	97	76	
2	66	50	43	
3	43	45	47	
4	108	56	35	
5	55	58	56	
6	74	89	92	
7	55	55	55	
8	54	108	108	
9	89			
10	74			
TOTAL	211	231	229	122

8.4 The sections which hold substantially higher numbers of species than elsewhere include the Castle Lake surrounds (Red 4 & Blue 1), Leybourne Wood (off-line routes 6) and the Hermitage area (Red 9 and Blue and Orange routes 8). The last is a relatively large area with a variety of habitats and thus would be expected to hold relatively more species. The higher numbers in Leybourne Wood and near Castle Lake are more significant since these are smaller areas, and in the case of Leybourne Wood the habitat is relatively uniform.

SCARCE SPECIES

8.5 Most of the species identified were common and widespread in Kent and nationally. No species which can be described as scarce nationally (found in 100 or fewer 10x10 km grid squares in Britain) were found. Neither was any species rare in Kent found, but two species which are scarce in the county (found in fewer than 10% of the 1044 2x2 km grid squares or tetrads in the county) were recorded. These are ***Myosoton aquaticum*** (102 tetrads) and ***Ornithopus perpusillus*** (52 tetrads).

8.6 ***Myosoton aquaticum*** was found in the short section of stream affected by the on-line route in section 4, at the junction of Castle Way and Oxley Shaw Lane, and in the streams crossing the pasture in section 5 of the off-line routes. In each case only small amounts were present. The species is found throughout Kent by rivers and streams and in marshes, but is most frequent in the west of the county.

8.7 ***Ornithopus perpusillus*** was found in small amounts in the recently coppiced areas of Leybourne Wood (section 6 of the off-line routes). It is a small species of sandy or gravelly areas with sparse vegetation and in Kent is especially characteristic of the Folkestone Beds, as at Leybourne Woods.

8.8 More species would be found if the surveys were repeated at other times of year. However, the relative species richness of the sections would be expected to be roughly similar.

8.9 The vegetation types which are regarded as most important are those which are relatively scarce and those which are especially sensitive to disturbance. The areas in the present survey which fall into these categories are Leybourne Wood and various wetland areas.

WOODLAND

8.10 Leybourne Wood is classified as 'ancient woodland', implying a long and continuous history of woodland on the site. This type of woodland typically includes species which tend to be restricted to such habitat and which are poor at colonising new woodlands. In the case of Leybourne Wood, ten ancient woodland species were found, using a list compiled by the Kent Trust for Nature Conservation (KTNC): field maple, rowan, hornbeam, ***Euphorbia amygdaloides, Scrophularia nodosa, Veronica montana, Lamiastrum galeobdolon, Campanula trachelium, Festuca gigantea*** and ***Holcus mollis***. A number of other such species have been recorded in the wood by the KTNC; these may have been missed because of the season or because they occurred in other parts of the wood.

8.11 The affected part of the wood is not exceptional, and the predominance of sweet chestnut and paucity of other coppice species and standards reduce its nature conservation importance to an extent. It is though of considerable interest within the local context. The wood is listed by the KTNC as a Site of Nature Conservation Interest (SNCI) and the site description and map is to be found in Section 1. The SNCI includes both the ancient part of the wood (section 6) and the recently wooded part (section 7).

WETLANDS

8.12 Wetland areas were found in or close to the following sections: on-line route: sections 4, 5, 6, 7 & 8; off- line routes: sections 5 and 8; and outer off-line route: section 1. In most cases, sections of the same stream are involved.

8.13 On the on-line route (sections 4,6,7 & 8), the stream is in a fairly steep sided channel and is partly shaded. The aquatic and marginal vegeration is reasonably well developed for a small stream, especially in sections 4 and 6. The stream and its tributary in section 5 of the off-line routes has shallower sloping banks and, especially the tributary, has a broader band of marginal vegetation.

8.14 Route options also come close to two wetland areas near Castle Lake, the damp but largely silted ditch below the M20 embankment (on-line section 4 and inner off-line section 1) and the western arm of the lake itself (on-line section 5). These areas are an integral part of wetlands of county importance, falling within the Kent Trust for Nature Conservation (KTNC) Site of Nature Conservation Interest (SNCI) known as Leybourne Lakes. The description and a map of this site is to be found in Section 1; the site extends well north of the M20.

8.15 In section 8 of the off-line routes is a small pond with little aquatic plant life and low nature conservation interest.

8.16 North of the M20 in section 1 of the outer off-line route are a small stream and part of a gravel pit. The stream is silted and mostly shaded but open sections do have a moderate selection of marsh plants. The gravel pit was not recorded fully because of access difficulties, but appeared to have a typical range of aquatic plants.

8.17 These wetlands are important less because of the intrinsic interest of the affected sections than for the contribution which they make to wider wetland complexes, and the fact that these habitats are generally scarcer than the farmland and plantation woodland which make up most of the survey areas.

Other habitats

8.18 The plantation woodland and shaws which are included in each of the route options are considered of less interest than Leybourne Wood. They have fewer species and frequently a large component is made up of non-native tree species. Many areas are under-grazed and consequently have little shrub layer and a ground flora which is composed of non-woodland species. Many of these areas do, however, include a large proportion of mature trees in contrast to Leybourne Wood. This raises their nature conservation value since such large trees with plenty of dead wood are attractive to many invertebrates and to birds.

8.19 Other vegetation types are regarded as having lower nature conservation interest. Some of the ruderal areas and road verges have high species diversity, but the majority of species involved are common and widespread, and these habitats are recently established and easily recreatable. The farmland areas also consisted of widely distributed vegeration types. Some of the horse-grazed pastures had plant species diversity considerably higher than many younger leys but they did not appear to have the degree of diversity or contain species which would afford them a high nature conservation value. Some slight reservations must be held over this conclusion, since the survey was not conducted at the ideal season. None of the arable land had any specially interesting features.

9. Effects of Proposed Development

9.1 This section summarises the effects on nature conservation interests of the various route options, and makes suggestions for the mitigation of some adverse effects.

Effects

9.2 Of the three Castle Way options, the on-line route involves the smallest area of vegetation types of above average interest. Much of the route would affect the existing road and its verges, and private houses and gardens, and although these are not without interest, there is far less of the 'natural' types which are of greater interest. Wetland areas affected include parts of the stream, and the development would come close to, but not actually directly affect the more important wetlands around Castle Lake.

9.3 Both of the off-line routes affect Leybourne Wood, which is regarded as the single most important site in the survey areas. The outer off-line route would take a greater area of the wood than the inner. Both of the off-line routes would affect the stream where it passes through the small grass field adjoining the wood. Both routes involve a larger total area of undeveloped land than the on-line route, and even though much of the land affected is arable or grassland of relatively low interest, each would affect substantial areas of habitats of secondary interest such as hedgerows and tree clumps.

9.4 The outer off-line route, by requiring a new roundabout on the M20, would result in the greatest total area of land-take. The land affected north of the M20 includes wetlands and small areas of trees and scrub.

9.5 Even though the on-line route affects an SNCI, it is considered the least damaging to nature conservation interests of the three routes. The impact on the SNCI need not affect the key features of interest (see mitigation). The area of semi-natural vegetation types affected is smaller than the other routes, and fewer of the more important features are involved.

9.6 Of the off-line options, the outer route is considered less desirable from a nature conservation point of view, since it would result in a greater loss to Leybourne Wood and involves additional loss of habitats of some interest north of the M20.

9.7 The widening of the West Malling by-pass would influence mainly land of low nature conservation interest. Only small areas of semi-natural habitat would be affected.

Mitigation

9.8 The following is a brief list of possible measures to reduce the impact on nature conservation of each of the route options.

9.9 On the on-line route, and in section 1 of the inner off- line route, care would need to be taken to restrict working areas so as to avoid disturbance of the damp ditch at the foot of the existing embankment, or the mature alder woodland behind the ditch.

9.10 At both the location referred to in the above paragraph and at the western arm of Castle Lake (section 5 of the on-line route), special measures to reduce the chance of disturbance or run-off into the wetland areas would be desirable.

9.11 Consideration could be given to a revised design of the Park Road-Oxley Shaw Lane link for the on-line option, with the road skirting the south of the plantation on the west side of Castle Way and the bridge in line with Oxley Shaw Lane. Slip roads on/off the north-bound carriageway could be accommodated into such a scheme, though as they are omitted from the inner off-line option, they may not be essential. This design would take development further from Castle Lake and would avoid damage to the plantation.

9.12 For the outer off-line route, shifting the alignment of the northern section up to 75m west might allow the gravel pit north of the M20, and two clumps of trees in fields south of the motorway to be avoided.

9.13 There is little scope for reducing the impacts of the West Malling bypass widening, which in any case affects land of mostly low nature conservation interest.

9.14 In addition to the measures outlined above, it would of course be desirable to reduce the extent of land-take throughout the routes, for working areas etc. above that needed for the development itself, especially where habitats of above average interest are concerned. Good working practices over dumping and storing of materials, control of dust and disturbance, and care over the use of fuels and other chemicals also would benefit wildlife.

APPENDIX 1

PLANS SPECIES LISTS

The four tables which follow indicated which species were found in each of the sections of the three Castle Way improvement options and the West Malling bypass dualling route. The numbering of sections can be found on the relevant plants.

The frequency of occurrence of species is indicated on a five point scale:

D = dominant

A = Abundant

F = Frequent

O = Occasional

R = Rare

The suffix 'p' is used for trees and shrubs of which all or many of those present in a section had been recently planted.

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Plant species Red route

Section No.	1	2	3	4	5	6	7	8	9	10
Equisetum arvense	F	O	–	O	–	F	–	–	–	–
Equisetum relmateia	–	–	–	R	R	–	–	–	–	–
Asplenium ruta-muraria	–	R	–	–	–	–	–	–	–	–
Dryopteris filix-mas	–	–	R	R	–	–	–	–	–	–
Pinus sylvestris	–	–	–	R	–	–	–	R	Op	Op
Pinus nigra	–	–	–	O	–	–	–	–	–	–
Chamaecyparis lawsoniana	–	–	Op	–	–	–	–	–	–	–
Taxus baccata	–	R	–	–	–	–	–	–	–	–
Clematis viralba	–	–	–	–	–	–	–	–	R	–
Ranunculus acris	–	–	–	–	–	–	–	–	F	–
Ranunculus repens	–	–	R	R	–	–	F	–	F	O
Ranunculus bulbosus	–	O	–	–	–	–	–	–	–	–
Ranunculus sp (aquatic)	–	–	–	–	–	O	–	–	–	–
Papaver rhoeas	–	–	–	–	–	–	–	–	O	R
Brassica napus	–	–	–	R	–	–	R	–	–	–
Diploraxis tenuifolia	–	–	–	–	–	–	–	R	R	–
Armoracia rusticana	O	–	–	–	–	R	O	–	–	–
Cardamine flexuosa	–	–	R	–	–	–	–	–	–	–
Barbarea vulgaris	–	–	–	R	–	–	–	–	–	–
Nasturtium officinale	–	–	–	R	–	F	–	–	–	–
Alliaria petiolata	–	–	–	–	–	R	–	–	O	F
Sisymbrium officinale	–	O	–	–	–	R	–	–	O	O
Reseda lutcola	–	–	–	–	R	–	–	–	R	–
Reseda lutea	–	–	–	–	–	–	–	–	R	–
Viola odorata	–	–	O	–	–	–	–	–	O	O
Hypericum perforatum	–	R	–	O	O	–	–	–	O	R
Silene dioica	–	–	O	–	–	R	–	–	–	–
Silene latifolia	–	–	–	–	–	–	–	–	R	R
Silene dioica X larifolia	O	–	–	–	–	–	–	–	–	–
Silene vulgaris	–	–	–	R	–	–	–	–	–	–
Cerastium fontanum	–	O	–	O	O	–	O	O	–	–
Myosoton aquaticum	–	–	–	R	–	–	–	–	–	–
Stellaria media	–	–	O	–	–	–	O	–	–	O
Arenaria sp	–	–	–	–	R	–	–	–	–	–
Spergularia marina	O	–	–	R	–	–	–	–	–	–
Chenopodium album	–	–	–	R	–	–	–	–	–	–
Atriplex patula	–	–	R	–	–	–	–	–	–	O
Atriplex prostrata	–	R	–	–	–	O	–	O	–	–
Atriplex sp	R	–	–	–	–	–	–	–	–	–
Tilia X vulgaris	–	–	–	–	–	–	–	–	Fp	Op
Malva moschata	R	–	–	–	–	–	–	–	O	–
Malva sylvestris	O	O	–	–	–	O	O	F	–	–
Geranium dissectum	–	–	–	–	–	–	O	–	–	–

	1	2	3	4	5	6	7	8	9	10
Geranium molle	–	O	–	–	–	–	O	–	–	–
Impatiens glandulifera	–	–	–	O	–	O	R	–	–	–
Acer pseudoplatanus	A	O	O	O	R	–	–	Rp	Op	Fp
Acer platanoides	–	–	–	–	–	–	–	–	–	O
Acer campestre	–	–	–	Fp	–	–	–	Op	Fp	Op
Aesculus hippocastanum	–	–	–	–	–	–	–	–	O	F
Ilex aquifolium	–	–	R	–	–	–	–	–	R	O
Cytisus scoparius	F	–	–	O	–	–	–	–	–	–
Ulex europaeus	O	–	–	R	–	–	–	–	–	–
Vicia hirsuta	F	–	–	–	–	–	–	–	–	–
Vicia tetrasperma	–	R	–	–	–	–	–	–	–	–
Vicia cracca	R	–	–	–	–	–	–	–	–	–
Vicia sepium	–	–	–	R	–	–	–	–	–	–
Vicia sativa	O	R	–	O	–	R	–	–	O	–
Lathyrus pratensis	–	–	–	–	R	–	–	–	–	–
Melilotus alba	–	–	–	–	O	–	–	–	–	–
Melilotus sp	–	–	–	–	–	R	–	–	–	–
Medicago lupulina	–	–	–	F	F	R	–	O	–	R
Medicago arabica	–	O	–	–	–	–	–	R	–	–
Trifolium repens	–	O	–	O	–	–	A	F	F	–
Trifolium arvense	F	–	–	–	R	–	–	–	R	–
Trifolium pratense	F	O	–	O	O	R	–	F	F	O
Lotus corniculatus	O	–	–	O	R	R	–	–	O	–
Filipendula ulmaria	–	–	–	–	–	–	R	–	–	–
Rubus fruticosus	A	O	F	F	O	F	R	–	O	F
Potentilla reptans	F	F	–	O	O	F	F	F	O	O
Geum urbanum	–	–	O	–	–	–	–	–	–	–
Rosa canina	–	–	–	R	–	–	–	O	Op	F
Rosa sp	R	–	–	O	–	–	–	–	–	–
Prunus domestica	–	–	–	–	–	–	R	O	–	–
Prunus avium	–	Rp	–	–	–	–	–	–	Op	Op
Crataegus monogyna	O	R	F	Fp	O	O	R	R	O	A
Malus domestica	R	R	–	O	–	–	–	–	–	–
Epilobium hirsutum	–	–	–	–	R	–	O	O	–	–
Epilobium ciliatum	–	–	O	O	R	–	–	–	O	O
Chamaenerion angustifolium	R	–	R	–	–	–	–	–	–	R
Oenorhera sp	–	–	–	–	–	–	–	–	R	–
Callitriche sp	–	–	–	O	–	F	–	–	–	–
Cornus sanguinea	–	–	–	Op	Rp	Op	–	Op	–	–
Hedera helix	O	–	–	O	–	R	–	O	O	F
Anthriscus sylvestris	R	O	–	R	–	–	O	O	F	O
Conium maculatum	–	R	–	–	–	–	–	–	–	–
Apium nodiflorum	–	–	–	R	–	O	–	–	–	–
Heracleum sphondylium	F	F	–	O	O	F	–	–	–	–
Torilis japonica	F	O	–	O	O	O	–	–	–	–
Daucus carota	R	R	–	R	–	R	–	–	O	–

	1	2	3	4	5	6	7	8	9	10
Mercurialis perennis	–	–	F	R	–	–	–	–	–	–
Polygonum aviculare agg	R	–	–	–	–	–	–	R	R	O
Polygonum persicaria	–	–	–	–	–	–	–	–	–	R
Fallopia convulvulus	–	–	–	–	–	–	–	–	R	–
Rumex acetosa	R	R	–	–	–	–	–	–	O	–
Rumex crispus	O	O	–	O	O	O	O	–	F	F
Rumex obtusifolius	–	–	–	–	R	–	R	O	R	O
Rumex sanguineus	–	–	O	–	–	–	–	–	–	–
Rumex conglomeratus	–	R	R	R	O	–	–	–	O	R
Urtica dioica	F	F	D	O	–	F	O	F	F	A
Ulmus glabra	–	–	–	–	–	–	–	R	–	–
Ulmus minor	–	–	–	–	–	–	–	–	R	O
Juglans regia	–	–	–	–	–	–	Rp	–	R	–
Betula pendula	–	–	–	Fp	–	–	–	–	Op	–
Alnus glutinosa	–	–	–	F	O	R	R	R	–	Op
Alnus incana	–	–	–	–	–	Op	–	–	–	–
Carpinus betulus	–	–	R	–	–	Rp	–	Op	–	–
Corylus avellana	–	–	–	Op	Rp	Op	–	Op	Op	Op
Castanea sativa	–	–	–	–	–	–	–	–	O	A
Quercus cerris	–	–	R	R	–	–	–	Rp	–	–
Quercus ilex	–	–	O	–	–	–	–	–	–	–
Quercus robur	O	R	F	O	R	–	–	–	–	–
Quercus petraea	–	–	–	–	–	–	–	–	R	–
Quercus sp	–	–	–	–	–	Op	–	–	Fp	Op
Populus alba	–	–	–	–	–	–	Rp	–	–	–
Populus nigra italica	–	–	–	–	–	–	–	–	R	–
Populus sp	–	–	–	R	–	–	–	–	–	Rp
Salix fragilis	–	–	–	O	R	R	Rp	–	–	–
Salix alba	R	–	–	F	F	–	–	–	–	–
Salix viminalis	O	–	–	F	–	–	–	–	–	–
Salix caprea	O	R	–	F	–	–	–	–	–	R
Salix cinerea	–	–	–	Op	–	R	–	–	–	–
Salix sp	–	–	–	–	–	–	–	R	–	–
Fraxinus excelsior	–	–	O	–	–	–	–	Op	Fp	Fp
Syringa vulgaris	R	–	–	–	–	–	–	–	–	–
Ligustrum vulgare	–	–	–	O	–	–	–	–	–	–
Centaurium erythraea	–	–	–	R	–	–	–	–	–	–
Myosotis scorpioides	–	–	–	O	–	F	R	–	–	–
Myosotis arvensis	–	–	–	R	–	–	–	–	–	–
Echium vulgare	–	–	–	–	–	–	–	–	R	–
Convulvulus arvensis	O	R	–	–	–	O	O	F	–	–
Calystegia sepium	–	O	–	R	–	F	–	–	–	–
Solanum dulcamara	R	–	–	–	–	O	–	R	–	–
Solanum nigrum	–	–	–	–	–	–	–	–	–	R
Verbascum thapsus	–	–	–	R	–	–	–	–	R	–
Linaria vulgaris	–	–	–	R	–	–	–	–	O	–

	1	2	3	4	5	6	7	8	9	10
Scrophularia nodosa	R	–	–	–	–	–	–	–	R	R
Scrophularia auriculata	–	–	–	R	R	–	–	R	–	–
Veronica chamaedrys	R	–	O	R	–	R	O	–	O	–
Veronica serpyllifolia	–	–	–	–	–	–	–	–	–	R
Odontites verna	–	–	–	R	–	–	–	–	–	–
Mentha aquatica	–	–	–	O	–	R	–	–	–	–
Prunella vulgaris	–	–	–	O	–	–	–	–	–	–
Stachys sylvatica	–	R	–	–	–	–	–	–	–	–
Ballota nigra	–	R	–	–	–	O	O	O	O	–
Lamium album	–	–	–	–	–	–	–	–	–	R
Glechoma hederacea	–	O	O	O	–	–	–	–	–	–
Plantago major	–	–	–	R	–	O	O	–	O	–
Plantago lanceolata	F	F	–	F	O	F	F	F	F	O
Plantago coronopus	–	–	–	–	–	R	–	–	–	–
Galium aparine	O	O	F	–	–	O	–	R	O	F
Sambucus nigra	–	–	–	–	–	O	R	–	O	F
Viburnum lantana	–	–	–	–	–	Op	–	–	–	–
Viburnum opulus	–	–	–	R	R	–	–	Rp	Rp	–
Symphoricarpos albus	–	–	O	–	–	–	–	–	–	–
Dipsacus fullonum	–	–	–	O	–	O	–	–	–	–
Senecio jacobaea	F	F	O	F	F	O	O	F	F	F
Senecio vulgaris	–	R	–	–	–	–	R	–	O	–
Tussilago farfara	–	R	–	O	O	R	–	–	–	R
Inula conyza	–	–	–	O	–	–	–	–	–	–
Pulicaria dysenterica	–	–	–	O	O	–	–	–	–	–
Gnaphalium uliginosum	–	–	R	R	–	–	–	–	–	–
Solidago canadensis	R	–	–	–	–	–	–	–	–	–
Conyza canadensis	O	R	R	O	–	–	–	–	R	R
Bellis perennis	–	–	–	–	–	–	F	–	O	–
Achillea millefolium	F	F	–	O	O	O	A	F	F	O
Tripleurospermum inodorum	–	–	–	R	–	–	R	R	R	O
Leucanthemum vulgare	O	O	–	O	–	–	–	–	R	O
Arremisia vulgaris	O	F	–	O	O	O	O	O	F	O
Arctium minus	–	R	R	–	–	–	–	–	O	O
Cirsium vulgare	O	O	O	O	O	R	O	O	F	F
Cirsium palustre	–	–	–	–	–	O	O	–	–	–
Cirsium arvense	F	O	O	O	F	F	–	F	F	F
Centaurea nigra	–	–	–	–	–	–	–	–	R	–
Lapsana communis	–	O	–	–	–	R	–	O	–	–
Hypochoeris radicata	R	–	R	–	O	–	O	O	–	–
Leontodon autumnalis	O	O	–	O	–	O	O	O	–	–
Picris echioides	–	–	–	–	–	–	R	–	O	–
Picris hieracioides	F	O	R	F	O	O	–	–	O	O
Lactuca serriola	O	R	–	O	–	A	O	O	F	O
Sonchus arvensis	–	–	–	–	R	–	–	–	–	–
Sonchus oleraceus	–	–	–	R	–	R	O	O	O	O

	1	2	3	4	5	6	7	8	9	10
Sonchus asper	–	–	–	–	–	–	R	–	–	R
Crepis capillaris	–	O	R	O	O	–	–	–	–	–
Taraxacum sp	O	F	–	O	–	O	A	F	F	O
Juncus inf lexus	–	–	–	F	F	–	–	–	–	–
Juncus buf onius	–	–	–	R	O	–	–	–	–	–
Iris pseudacorus	–	–	–	R	–	R	R	–	–	–
Arum maculatum	–	–	R	–	–	–	–	–	–	R
Sparganium erectum	–	–	–	R	–	F	–	–	–	–
Carex hirta	O	–	–	F	O	R	–	–	–	–
Festuca arundinacea	–	–	–	–	–	R	–	–	–	–
Festuca rubra	A	F	R	F	F	O	–	–	A	F
Lolium perenne	O	F	O	O	O	O	O	A	A	O
Poa annua	–	–	–	O	F	–	O	–	–	–
Poa sp	–	O	–	–	–	–	–	–	–	–
Puccinellia distans	O	–	–	–	–	–	–	–	–	–
Dactylis glomerata	F	F	R	F	O	F	O	O	O	O
Bromus sterilis	–	R	–	O	–	R	R	O	–	O
Bromus hordeaceus	O	O	–	R	O	–	–	–	R	–
Brachypodium sylvaticum	–	–	–	–	–	–	–	–	R	–
Elymus repens	R	O	–	–	R	O	O	A	F	O
Hordeum murinum	–	R	–	R	–	–	–	–	–	R
Avena f atua	–	–	–	–	–	–	–	–	R	–
Arrhenatherum elatius	A	A	–	F	O	F	O	A	O	O
Trisetum flavescens	–	–	–	–	–	–	–	–	O	–
Holcus lanatus	F	O	O	O	F	O	O	F	F	F
Agrostis capillaris	A	O	R	O	–	–	–	–	–	–
Agrostis stolonif era	R	–	–	O	F	F	O	–	F	F
Phleum pratense	–	–	–	–	–	–	–	–	–	R
Phalaris arundinacea	–	–	–	R	–	O	–	–	–	–
Phragmites australis	–	–	–	–	O	–	–	–	–	–

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Plant Species on Blue Route

Section No.	1	2	3	4	5	6	7	8
Equisetum arvense	F	–	–	–	–	–	R	–
Dryopteris filix-mas	–	–	–	–	–	O	O	–
Dryopteris dilatata	–	–	–	–	–	O	–	–
Cedrus libani	O	–	–	–	–	–	–	R
Pinus sylvestris	O	O	–	–	–	–	–	Rp
Pinus nigra	O	R	–	–	–	–	–	Rp
Sequoiadendron giganteum	–	–	–	–	–	–	–	Rp
Chamaecyparis lawsoniana	–	–	–	–	–	–	–	R
Taxus baccata	–	–	–	–	–	–	–	R
Clematis vitalba	–	–	–	–	O	–	R	O
Ranunculus acris	–	–	O	–	–	–	–	F
Ranunculus repens	–	O	O	R	F	O	O	F
Ranunculus bulbosus	–	–	F	–	–	–	–	–
Papaver rhoeas	–	–	–	R	–	–	–	R
Brassica napus	–	–	–	–	–	–	–	R
Diplotaxis tenuifolia	–	–	–	–	–	–	–	R
Coronopus squamatus	–	–	–	R	–	–	–	–
Capsella bursa-pastoris	–	–	–	R	–	–	–	–
Armoracia rusticana	O	–	–	–	–	–	–	–
Cardamine flexuosa	–	–	–	–	–	R	–	–
Alliaria periolata	–	–	R	R	O	–	–	O
Sisymbrium officinale	–	–	R	R	–	R	–	O
Reseda luteola	–	–	–	–	–	–	–	R
Reseda lutea	–	–	–	–	–	–	–	R
Viola odorata	–	R	–	–	–	–	O	O
Viola riviniana	–	–	–	–	–	O	–	–
Hypericum perforatum	O	–	–	R	–	–	–	O
Hypericum hirsutum	R	–	–	–	–	–	–	–
Silene dioica	–	O	–	–	–	O	O	–
Silene latifolia	–	–	–	–	–	–	–	R
Silene dioica X latifolia	O	–	–	–	–	–	–	–
Cerastium fontanum	O	–	F	–	–	–	–	–
Myosoton aquaticum	–	–	–	–	R	–	–	–
Stellaria media	–	O	–	R	O	O	–	–
Stellaria holostea	–	–	–	–	–	O	–	–
Sagina procumbens	–	–	–	–	–	R	–	–
Spergularia marina	O	–	–	–	–	–	–	–
Chenopodium polyspermum	–	–	–	–	–	O	–	–
Chenopodium album	–	–	–	R	–	R	–	O
Atriplex patula	–	–	–	–	–	–	–	O
Atriplex prostrata	R	R	–	–	–	–	–	–
Atriplex sp	R	–	–	–	–	–	–	–
Tilia X vulgaris	–	–	–	–	–	–	–	Op

	1	2	3	4	5	6	7	8
Malva moschata	R	–	–	–	–	–	–	O
Malva sylvestris	O	–	–	–	–	–	–	O
Geranium dissectum	R	–	–	–	–	–	–	R
Geranium robertianum	–	–	–	–	R	O	O	–
Impatiens glandulifera	–	–	–	–	F	R	O	–
Acer pseudoplatanus	A	F	–	–	–	R	F	F
Acer platanoides	–	O	R	–	–	–	–	–
Acer campestre	Fp	–	–	–	–	O	–	Op
Aesculus hippocastanum	–	–	–	–	–	–	O	O
Ilex aquifolium	–	O	–	–	–	O	–	O
Buxus sempervirens	–	–	–	–	–	–	R	–
Cytisus scoparius	F	–	–	–	–	R	–	–
Ulex europaeus	O	–	–	–	–	–	–	–
Vicia hirsuta	F	–	–	–	–	–	–	–
Vicia cracca	R	–	–	–	–	–	–	–
Vicia sepium	–	–	–	–	–	O	–	–
Vicia sativa	O	–	–	R	–	–	–	–
Medicago sativa	–	–	–	O	–	–	–	–
Medicago lupulina	–	–	–	O	–	–	–	–
Medicago arabica	–	R	–	–	–	–	–	–
Trifolium repens	O	–	A	R	O	O	R	A
Trifolium dubium	–	–	R	–	–	–	–	–
Trifolium arvense	F	–	–	–	–	–	–	R
Trifolium pratense	F	–	O	–	–	–	–	O
Lotus corniculatus	O	–	–	–	–	–	–	O
Ornithopus perpusillus	–	–	–	–	–	R	–	–
Filipendula ulmaria	–	–	–	–	R	–	–	–
Rubus fruticosus	A	O	O	–	O	O	F	F
Potentilla reptans	F	–	R	–	R	–	–	O
Geum urbanum	–	–	–	–	R	O	–	–
Rosa canina	–	–	–	–	R	–	–	Op
Rosa sp	R	–	–	–	–	–	–	–
Prunus domestica	–	–	–	R	R	–	–	–
Prunus avium	–	–	–	–	–	–	–	Op
Crataegus monogyna	O	F	O	O	O	O	F	F
Sorbus aucuparia	–	–	–	–	–	R	–	–
Malus domestica	R	–	–	–	–	–	–	–
Epilobium hirsutum	–	–	–	–	R	–	R	R
Epilobium parviflorum	–	–	–	–	R	–	–	–
Epilobium ciliatum	O	O	–	R	–	F	R	O
Chamaenerion angustifolium	R	R	–	–	R	O	–	–
Oenothera sp	–	–	–	–	–	–	–	R
Circaea lutetiana	–	–	–	–	–	O	O	–
Hedera helix	O	F	O	R	–	O	D	O
Chaerophyllum temulentum	–	–	R	–	–	–	–	–
Anthriscus sylvestris	R	O	–	R	–	–	–	O

	1	2	3	4	5	6	7	8
Aegopodium podagraria	–	–	R	–	–	–	R	–
Apium nodiflorum	–	–	–	–	F	–	R	–
Angelica sylvestris	–	–	–	–	–	–	R	–
Heracleum sphondylium	F	O	–	O	O	O	O	–
Torilis japonica	F	–	–	O	–	–	R	R
Daucus carota	R	–	–	–	–	–	–	R
Mercurialis perennis	R	O	–	–	–	F	O	–
Euphorbia amygdaloides	–	–	–	–	–	F	–	–
Polygonum aviculare	R	–	R	R	–	O	–	R
Polygonum persicaria	–	–	–	R	–	O	–	O
Polygonum hydropiper	–	–	–	–	R	–	–	–
Fallopia convulvulus	–	–	–	R	–	F	–	O
Rumex acerosella	–	–	–	–	–	O	–	–
Rumex acetosa	R	–	F	–	–	–	–	O
Rumex crispus	O	–	–	–	–	–	–	O
Rumex obtusifolius	–	–	R	R	F	O	–	F
Rumex sanguineus	–	–	–	–	–	R	–	–
Rumex conglomeratus	–	R	O	–	O	O	R	O
Urtica urens	–	–	–	O	–	–	–	–
Urtica dioica	F	A	F	F	A	F	F	F
Ulmus minor	–	–	R	R	R	–	R	O
Ulmus sp	–	–	–	–	–	R	–	–
Juglans regia	–	–	–	–	–	–	–	O
Betula pendula	F	–	–	–	–	F	R	Rp
Alnus glutinosa	O	–	–	–	F	–	–	–
Carpinus betulus	–	R	–	–	–	O	–	–
Corylus avellana	–	–	–	–	R	F	O	Op
Fagus sylvatica	–	R	–	–	–	–	A	R
Castanea sativa	–	–	–	–	–	D	–	O
Quercus cerris	R	O	–	–	–	–	–	–
Quercus ilex	–	O	–	–	–	–	–	–
Quercus robur	O	F	F	R	–	R	–	–
Quercus petraea	–	–	–	–	–	–	–	R
Quercus sp	–	–	–	–	–	–	–	Op
Populus nigra italica	–	–	–	–	–	–	R	R
Populus sp	–	–	–	–	R	–	O	–
Salix fragilis	–	–	–	–	O	–	O	–
Salix alba	R	–	–	–	R	–	R	–
Salix 'babylonica'	–	–	–	–	–	–	–	R
Salix viminalis	O	–	–	–	–	–	–	–
Salix caprea	O	–	–	–	–	O	R	Op
Buddleja davidii	–	–	–	–	–	–	R	–
Fraxinus excelsior	–	R	–	R	–	O	O	Op
Syringa vulgaris	R	–	–	–	–	–	R	–
Ligustrum vulgare	R	R	–	–	–	–	R	–
Centaurium erythraea	–	–	–	–	–	O	–	–

	1	2	3	4	5	6	7	8
Myosotis scorpioides	–	–	–	–	O	–	–	–
Myosotis arvensis	R	–	–	–	–	–	–	–
Echium vulgare	–	–	–	–	–	–	–	R
Convulvulus arvensis	O	–	–	R	–	–	–	–
Calystegia sepium	–	R	–	–	R	–	–	–
Solanum dulcamara	R	–	–	–	R	–	R	–
Solanum nigrum	–	–	–	O	–	O	–	O
Verbascum thapsus	R	–	–	–	–	–	–	R
Linaria vulgaris	–	–	–	–	–	–	–	R
Scrophularia nodosa	R	–	–	–	–	O	–	O
Scrophularia auriculata	–	–	–	–	O	–	–	–
Digitalis purpurea	–	–	–	–	–	F	–	–
Veronica beccabunga	–	–	–	–	R	–	–	–
Veronica montana	–	–	–	–	–	R	–	–
Veronica chamaedrys	O	–	F	R	–	O	–	O
Veronica serpyllifolia	–	–	R	–	–	–	–	–
Veronica persica	–	–	–	R	–	–	–	–
Veronica filiformis	–	–	–	–	R	–	–	–
Mentha aquatica	O	–	–	–	O	–	O	–
Lycopus europaeus	–	–	–	–	R	–	–	–
Prunella vulgaris	O	–	O	–	–	O	–	–
Stachys sylvatica	–	–	–	–	R	O	O	–
Ballota nigra	–	–	–	–	–	–	–	O
Lamiastrum galeobdolon	–	–	–	–	–	O	–	–
Lamium album	–	–	–	R	R	–	–	R
Galeopsis tetrahit	–	–	–	–	–	F	–	–
Glechoma hederacea	F	O	R	O	F	F	O	O
Ajuga reptans	–	–	–	–	–	R	–	–
Plantago major	O	–	–	R	R	O	O	O
Plantago lanceolata	F	O	F	R	O	R	–	F
Campanula trachelium	–	–	–	–	–	R	–	–
Galium aparine	O	F	–	O	–	–	R	F
Sambucus nigra	O	A	O	R	O	O	A	F
Viburnum opulus	–	–	–	–	–	–	–	Rp
Symphoricarpos albus	O	–	–	–	–	–	O	–
Lonicera periclymenum	–	–	–	–	–	F	–	–
Dipsacus fullonum	O	–	–	–	O	–	–	–
Senecio jacobaea	F	O	F	O	–	O	–	F
Senecio vulgaris	–	–	–	–	–	R	–	O
Senecio sylvatica	–	–	–	–	–	R	–	–
Tussilago farfara	–	R	–	–	–	–	–	–
Inula conyza	O	–	–	–	–	–	–	–
Pulicaria dysenterica	O	–	–	–	–	–	–	–
Gnaphalium uliginosum	–	R	–	R	–	O	–	–
Solidago canadensis	R	–	–	–	–	–	–	–
Aster novi-belgii	–	–	–	–	–	–	–	R

	1	2	3	4	5	6	7	8
Erigeron acer	O	–	–	–	–	–	–	–
Conyza canadensis	O	O	R	–	–	R	–	O
Bellis perennis	–	–	O	–	O	–	–	O
Achillea millefolium	F	–	F	R	O	–	–	O
Tripleurospermum inodorum	–	–	–	O	–	–	–	O
Leucanthemum vulgare	O	–	–	–	–	–	–	O
Tanacetum vulgare	–	–	–	–	–	–	–	R
Artemisia vulgaris	O	–	–	R	–	–	–	O
Arctium minus	–	–	–	–	–	–	–	O
Arctium sp	–	R	R	–	R	O	R	–
Cirsium vulgare	O	O	F	–	–	–	–	O
Cirsium palustre	–	–	–	O	O	R	R	–
Cirsium arvense	F	O	F	O	O	O	O	F
Centaurea nigra	–	–	–	–	–	–	–	R
Lapsana communis	–	R	–	R	R	O	–	–
Hypochoeris radicata	R	R	–	–	–	O	–	–
Leontodon autumnalis	O	–	O	–	–	–	–	–
Picris echioides	–	–	–	–	–	R	–	R
Picris hieracioides	F	–	–	–	–	–	–	O
Lactuca serriola	O	–	–	–	–	–	–	O
Sonchus oleraceus	R	–	–	–	–	R	–	O
Sonchus asper	–	R	–	–	–	–	–	–
Crepis capillaris	–	–	R	–	–	R	–	–
Taraxacum sp	O	–	O	R	–	R	–	O
Hyacinthoides non-scripta	–	–	–	–	–	A	–	–
Juncus inflexus	O	–	–	–	R	–	–	–
Juncus conglomeratus	–	–	–	–	–	R	–	–
Iris pseudacorus	–	–	–	–	R	–	–	–
Arum maculatum	–	R	–	–	R	–	R	–
Carex hirta	O	–	–	–	–	–	–	–
Carex pendula	R	–	–	–	–	–	R	–
Festuca gigantea	–	–	–	–	–	R	O	–
Festuca rubra	A	–	F	O	–	–	–	F
Lolium perenne	O	O	F	R	O	–	R	A
Poa annua	–	O	–	O	–	O	–	–
Poa sp	–	–	–	–	–	O	O	–
Puccinellia distans	O	–	–	–	–	–	–	–
Dactylis glomerata	F	O	F	R	–	–	–	F
Glyceria fluitans	–	–	–	–	R	–	–	–
Bromus sterilis	–	–	–	R	–	–	–	–
Bromus hordeaceus	O	–	–	–	–	–	–	R
Brachypodium sylvaticum	–	–	–	–	–	–	–	R
Elymus repens	R	–	–	O	–	–	–	F
Avena fatua	–	–	–	–	–	–	–	R
Arrhenatherum elatius	A	O	–	–	–	R	–	F
Trisetum flavescens	–	–	–	–	–	–	–	O

	1	2	3	4	5	6	7	8
Holcus lanatus	F	O	F	O	D	R	–	–
Holcus mollis	–	–	–	–	–	F	–	–
Agrostis capillaris	A	–	D	–	–	O	–	–
Agrostis stolonifera	R	O	O	O	A	R	–	F

A228 Castle Way, Leybourne, Improvements
Plant Species on Orange Route

Product No.	1	2	3	4	5	6	7	8
Equisetum arvense	O	R	–	–	–	–	R	–
Pteridium aquilinum	–	–	–	–	–	R	–	–
Dryopteris filix-mas	–	–	–	–	–	O	O	–
Dryopteris dilarata	–	–	–	–	–	O	–	–
Cedrus libani	–	–	–	–	–	–	–	R
Pinus sylvestris	–	–	–	–	–	–	–	Rp
Pinus nigra	–	–	–	–	–	–	–	Rp
Sequoiadendron giganteum	–	–	–	–	–	–	–	Rp
Chamaecyparis lawsoniana	–	–	–	–	–	–	–	R
Taxus baccata	–	–	–	–	–	–	–	R
Clematis vitalba	R	R	–	–	–	O	R	O
Ranunculus acris	–	–	O	–	–	–	–	F
Ranunculus repens	A	–	–	–	O	F	O	F
Ranunculus bulbosus	–	–	F	–	–	–	–	–
Papaver rhoeas	–	–	–	R	–	–	–	R
Brassica napus	–	–	–	–	–	–	–	R
Diplotaxis tenuifolia	–	–	–	–	–	–	–	R
Rapistrum rugosum	R	–	–	–	–	–	–	–
Coronopus squamatus	–	–	–	R	–	–	–	–
Cardamine flexuosa	–	–	–	–	R	–	–	–
Nasturtium officinale	O	–	–	–	–	–	–	–
Alliaria periolata	–	O	R	O	O	–	–	O
Sisymbrium officinale	–	–	R	–	–	R	–	O
Reseda luteola	–	–	–	–	–	–	–	R
Reseda lutea	–	–	–	–	–	–	–	R
Viola odorata	–	–	–	–	–	–	O	O
Viola riviniana	–	–	–	–	–	O	–	–
Hypericum perforatum	–	–	–	–	–	–	–	O
Silene dioica	O	–	–	–	–	O	O	–
Silene latifolia	–	–	–	–	–	–	–	R
Cerastium fontanum	R	–	–	–	–	–	–	–
Myosoton aquaticum	–	–	–	–	R	–	–	–
Stellaria media	O	–	R	R	O	O	–	–
Stellaria holostea	–	–	–	–	–	O	–	–
Sagina procumbens	–	–	–	–	–	R	–	–
Chenopodium polyspermum	–	–	–	–	–	O	–	–
Chenopodium album	–	–	R	R	–	R	–	O
Atriplex patula	–	–	–	–	–	–	–	O
Tilia X vulgaris	–	–	–	–	–	–	–	Op
Malva moschata	R	–	–	–	–	–	–	O
Malva sylvestris	–	–	–	–	–	–	–	O
Geranium dissectum	R	–	–	–	–	–	–	R
Geranium molle	O	–	R	–	–	–	–	–

	1	2	3	4	5	6	7	8
Geranium robertianum	–	–	–	–	R	O	O	–
Impatiens glandulifera	–	–	–	–	F	R	O	–
Acer pseudoplatanus	O	–	–	–	–	R	F	F
Acer campestre	R	O	–	–	–	O	–	Op
Aesculus hippocastanum	–	–	–	–	–	–	O	O
Ilex aquifolium	–	R	–	–	–	O	–	O
Buxus sempervirens	–	–	–	–	–	–	R	–
Cytisus scoparius	–	–	–	–	–	R	–	–
Vicia sepium	–	–	–	–	–	O	–	–
Vicia sativa	–	–	R	–	–	–	–	–
Medicago lupulina	–	–	–	R	–	–	–	–
Trifolium repens	F	–	A	–	O	O	R	A
Trifolium arvense	–	–	–	–	–	–	–	R
Trifolium pratense	–	–	O	–	–	–	–	O
Lotus corniculatus	–	–	–	–	–	–	–	O
Ornithopus perpusillus	–	–	–	–	–	R	–	–
Filipendula ulmaria	R	–	–	–	R	–	–	–
Rubus fruticosus	O	O	–	–	O	O	F	F
Potentilla anserina	O	–	–	–	–	–	–	–
Potentilla reprans	A	O	R	–	R	–	–	O
Geum urbanum	–	–	–	–	R	O	–	–
Rosa canina	O	–	–	–	R	–	–	Op
Prunus domestica	–	–	R	–	R	–	–	–
Prunus avium	–	–	–	–	–	–	–	Op
Crataegus monogyna	F	O	O	–	O	O	F	F
Sorbus aucuparia	–	–	–	–	–	R	–	–
Epilobium hirsutum	F	–	–	–	R	–	R	R
Epilobium parviflorum	–	–	–	–	R	–	–	–
Epilobium ciliatum	R	–	–	O	–	F	R	O
Chamaenerion angustifolium	–	–	–	–	R	O	–	–
Oenothera sp	–	–	–	–	–	–	–	R
Circaea lutetiana	–	–	–	–	–	O	O	–
Callitriche sp	O	–	–	–	–	–	–	–
Hedera helix	–	O	–	–	–	O	D	O
Anthriscus sylvestris	–	R	R	–	–	–	–	O
Aegopodium podagraria	–	–	–	–	–	–	R	–
Berula erecta	O	–	–	–	–	–	–	–
Conium maculatum	–	R	–	–	–	–	–	–
Apium nodiflorum	O	–	–	–	F	–	R	–
Angelica sylvestris	–	–	–	–	–	–	R	–
Heracleum sphondylium	–	–	–	–	O	O	O	–
Torilis japonica	–	–	–	O	–	–	R	R
Daucus carota	–	–	–	–	–	–	–	R
Bryonia cretica	R	R	–	–	–	–	–	–
Mercurialis perennis	R	–	–	–	–	F	O	–
Euphorbia amygdaloides	–	–	–	–	–	F	–	–

	1	2	3	4	5	6	7	8
Polygonum aviculare	–	–	R	R	–	O	–	R
Polygonum persicaria	–	–	R	R	–	O	–	O
Polygonum hydropiper	–	–	–	–	R	–	–	–
Fallopia convulvulus	–	–	–	–	–	F	–	O
Rumex acetosella	–	–	–	–	–	O	–	–
Rumex acetosa	–	O	F	–	–	–	–	O
Rumex crispus	–	R	–	–	–	–	–	O
Rumex obtusifolius	–	–	O	R	F	O	–	F
Rumex sanguineus	–	–	–	–	–	R	–	–
Rumex conglomeratus	O	R	–	–	O	O	R	O
Urtica urens	–	–	–	R	–	–	–	–
Urtica dioica	A	F	O	O	A	F	F	F
Ulmus minor	–	–	R	–	R	–	R	O
Ulmus sp	–	–	–	–	–	R	–	–
Juglans regia	–	–	–	–	–	–	–	O
Betula pendula	–	–	–	–	–	F	R	Rp
Alnus glutinosa	R	–	–	–	F	–	–	–
Carpinus betulus	–	–	–	–	–	O	–	–
Corylus avellana	O	–	–	–	R	F	O	Op
Fagus sylvatica	–	O	R	–	–	–	A	R
Castanea sativa	–	–	–	–	–	D	–	O
Quercus cerris	–	O	O	–	–	–	–	–
Quercus robur	–	O	O	–	–	R	–	–
Quercus petraea	–	–	–	–	–	–	–	R
Quercus sp	–	–	–	–	–	–	–	Op
Populus nigra italica	–	–	–	–	–	–	R	R
Populus sp	–	O	–	–	R	–	O	–
Salix fragilis	O	–	–	–	O	–	O	–
Salix alba	R	R	–	–	R	–	R	–
Salix 'babylonica'	–	–	–	–	–	–	–	R
Salix viminalis	F	–	–	–	–	–	–	–
Salix caprea	F	O	–	–	–	O	R	Op
Salix cinerea	F	–	–	–	–	–	–	–
Buddleia davidii	–	–	–	–	–	–	R	–
Fraxinus excelsior	O	O	–	–	–	O	O	Op
Syringa vulgaris	–	–	–	–	–	–	R	–
Ligustrum vulgare	–	–	–	–	–	–	R	–
Centaurium erythraea	R	–	–	–	–	O	–	–
Myosotis scorpioides	–	–	–	–	O	–	–	–
Echium vulgare	–	–	–	–	–	–	–	R
Convulvulus arvensis	–	O	R	R	–	–	–	–
Calysregia sepium	O	–	R	–	R	–	–	–
Solanum dulcamara	O	–	–	–	R	–	R	–
Solanum nigrum	–	–	–	R	–	O	–	O
Verbascum thapsus	–	–	–	–	–	–	–	R
Linaria vulgaris	–	–	–	–	–	–	–	R

	1	2	3	4	5	6	7	8
Scrophularia nodosa	–	–	–	–	–	O	–	O
Scrophularia auriculata	O	–	–	–	–	–	–	–
Digitalis purpurea	–	–	–	–	–	F	–	–
Veronica beccabunga	O	–	–	–	–	–	–	–
Veronica montana	–	–	–	–	–	R	–	–
Veronica chamaedrys	O	–	O	–	–	O	–	O
Veronica persica	–	–	R	R	–	–	–	–
Veronica filiformis	–	–	–	–	R	–	–	–
Mentha aquatica	F	–	–	–	O	–	O	–
Lycopus europaeus	–	–	–	–	R	–	–	–
Prunella vulgaris	F	–	–	–	–	O	–	–
Stachys sylvatica	–	–	–	–	R	O	O	–
Ballota nigra	–	–	–	–	–	–	–	O
Lamiastrum galeobdolon	–	–	–	–	–	O	–	–
Lamium album	–	–	–	–	R	–	–	R
Galeopsis tetrahit	–	–	–	–	–	F	–	–
Glechoma hederacea	O	O	–	–	F	F	O	O
Teucrium scorodonia	–	–	–	–	–	R	–	–
Ajuga reptans	–	–	–	–	–	R	–	–
Plantago major	–	–	R	R	R	O	O	O
Plantago lanceolata	O	O	F	O	O	R	–	F
Campanula trachelium	–	–	–	–	–	R	–	–
Galium aparine	–	O	R	O	–	–	R	F
Sambucus nigra	F	O	R	R	O	O	A	F
Viburnum opulus	–	–	–	–	–	–	–	Rp
Symphoricarpos albus	–	–	–	–	–	–	O	–
Lonicera periclymenum	–	–	–	–	–	F	–	–
Dipsacus fullonum	O	–	–	–	O	–	–	–
Senecio jacobaea	A	–	O	O	–	O	–	F
Senecio vulgaris	–	–	–	–	–	R	–	O
Senecio sylvatica	–	–	–	–	–	R	–	–
Pulicaria dysenterica	–	–	–	R	–	–	–	–
Gnaphalium uliginosum	–	–	–	R	–	O	–	–
Aster novi-belgii	–	–	–	–	–	–	–	R
Erigeron acer	R	–	–	–	–	–	–	–
Conyza canadensis	–	–	–	–	–	R	–	O
Bellis perennis	–	–	–	–	O	–	–	O
Eupatorium cannabinum	O	–	–	–	–	–	–	–
Achillea millefolium	O	O	–	O	O	–	–	O
Tripleurospermum inodorum	–	–	R	R	–	–	–	O
Leucanthemum vulgare	O	–	–	–	–	–	–	R
Tanacetum vulgare	–	–	–	–	–	–	–	R
Artemisia vulgaris	–	–	–	R	–	R	–	O
Arctium minus	–	–	–	–	–	–	–	O
Arctium sp	O	–	–	–	R	O	R	–
Cirsium vulgare	A	O	O	–	–	–	–	O

	1	2	3	4	5	6	7	8
Cirsium palustre	–	–	–	R	O	R	R	–
Cirsium arvense	A	F	O	O	O	O	O	F
Centaurea nigra	–	–	–	–	–	–	–	R
Lapsana communis	–	R	–	–	R	O	–	–
Hypochoeris radicata	–	–	O	–	–	O	–	–
Leontodon autumnalis	O	O	O	–	–	–	–	–
Picris echioides	R	–	–	–	–	R	–	R
Picris hieracioides	–	R	–	–	–	–	–	O
Lactuca serriola	–	–	–	–	–	–	–	O
Sonchus oleraceus	–	R	–	–	–	R	–	O
Crepis capillaris	–	–	–	–	–	R	–	–
Taraxacum sp	–	O	O	R	–	R	–	O
Elodea nuttallii	O	–	–	–	–	–	–	–
? Potamogeton sp	O	–	–	–	–	–	–	–
Hyacinthoides non-scripta	–	–	–	–	–	A	–	–
Juncus inflexus	O	–	–	–	R	–	–	–
Juncus effusus	O	–	–	–	–	–	–	–
Juncus conglomeratus	–	–	–	–	–	R	–	–
Iris pseudacorus	–	–	–	–	R	–	–	–
Arum maculatum	–	–	–	–	R	–	R	–
Typha latifolia	O	–	–	–	–	–	–	–
Carex hirta	A	–	–	–	–	–	–	–
Carex riparia	R	–	–	–	–	–	–	–
Carex riparia/acutiformis	O	–	–	–	–	–	–	–
Carex pendula	–	–	–	–	–	–	R	–
Festuca gigantea	–	–	–	–	–	R	O	–
Festuca rubra	O	–	O	–	–	–	–	F
Festuca ovina	O	–	–	–	–	–	–	–
Lolium perenne	O	D	F	O	O	–	R	A
Poa annua	O	–	–	O	–	O	–	–
Poa trivialis	O	–	–	–	–	–	–	–
Poa sp	–	–	–	–	–	O	O	–
Dactylis glomerata	F	F	F	–	–	–	–	F
Glyceria fluitans	–	–	–	–	R	–	–	–
Cynosurus cristatus	–	O	–	–	–	–	–	–
Bromus sterilis	–	–	–	R	–	–	–	–
Bromus hordeaceus	–	–	–	–	–	–	–	R
Brachypodium sylvaticum	–	–	–	–	–	–	–	R
Elymus repens	–	–	R	–	–	–	–	F
Hordeum murinum	–	R	–	–	–	–	–	–
Avena fatua	–	–	–	–	–	–	–	R
Arrhenatherum elatius	–	–	R	–	–	R	–	F
Trisetum flavescens	–	–	–	–	–	–	–	O
Holcus lanatus	A	A	O	R	D	R	–	–
Holcus mollis	–	–	–	–	–	F	–	–
Agrostis capillaris	O	F	D	O	–	O	–	–

	1	2	3	4	5	6	7	8
Agrostis stolonifera	A	F	O	O	A	R	–	F
Phleum pratense	–	–	O	–	–	–	–	–

A228 West Malling By-pass Dualling
Plant Species

Polypodium vulgare	R
Asplenium ruta-muraria	R
Clematis vitalba	O
Ranunculus repens	F
Papaver rhoeas	O
Diplotaxis tenuifolia	O
Raphanus raphanistrum	R
Capsella bursa-pastoris	O
Barbarea vulgaris	R
Sisymbrium officinale	O
Reseda luteola	O
Viola odorata	O
Viola arvensis	O
Hypericum perforatum	F
Silene dioica	R
Silene latifolia	O
Cerastium fontanum	O
Arenaria serpyllifolia	R
Chenopodium album	O
Malva sylvestris	O
Malva neglecta	R
Geranium dissectum	O
Geranium molle	O
Acer pseudoplatanus	O
Acer campestre	Op
Aesculus hippocastanum	O
Ilex aquifolium	R
Cytisus scoparius	O
Lupinus polyphyllus	R
Lupinus arboreus	O
Vicia sativa	O
Lathyrus pratensis	R
Melilotus officinalis	R
Medicago sativa	O
Medicago lupulina	O
Trifolium repens	F
Trifolium campestre	R
Trifolium dubium	O
Trifolium arvense	O
Trifolium pratense	O
Lotus corniculatus	O
Rubus fruticosus	O
Potentilla reptans	F
Geum urbanum	O
Agrimonia eupatoria	R

Rosa canina	O
Prunus domestica	O
Prunus avium	Op
Crataegus monogyna	F
Epilobium ciliatum	O
Oenothera sp	R
Cornus sanguinea	Op
Hedera helix	O
Anthriscus sylvestris	O
Heracleum sphondylium	F
Torilis japonica	O
Daucus carota	F
Mercurialis annua	O
Polygonum aviculare	F
Fallopia convulvulus	O
Rumex obtusifolius	F
Urtica urens	O
Urtica dioica	F
Ulmus minor	O
Betula pendula	Op
Corylus avellana	Op
Castanea sativa	O
Quercus robur	Op
Populus sp	R
Salix caprea	Op
Fraxinus excelsior	Op
Syringa vulgaris	R
Solanum nigrum	O
Linaria vulgaris	O
Veronica chamaedrys	O
Veronica persica	F
Mentha spicata	R
Ballota nigra	O
Glechoma hederacea	O
Plantago major	F
Plantago lanceolata	F
Galium aparine	F
Sambucus nigra	O
Viburnum opulus	Op
Senecio jacobaea	F
Senecio squalidus	O
Senecio vulgaris	F
Petasites fragrans	R
Pulicaria dysenterica	R
Conyza canadensis	F
Achillea millefolium	O
Tripleurospermum inodorum	F

Leucanthemum vulgare	O
Artemisia vulgaris	O
Arctium sp	R
Cirsium vulgare	O
Cirsium arvense	F
Leontodon aurumnalis	F
Picris hieracioides	F
Lactuca serriola	O
Sonchus arvensis	R
Sonchus oleraceus	O
Sonchus asper	O
Crepis capillaris	O
Taraxacum sp	O
Asparagus officinalis	R
Arum maculatum	R
Festuca rubra	F
Lolium perenne	A
Poa annua	F
Poa trivialis	O
Dactylis glomerata	O
Cynosurus cristatus	R
Bromus sterilis	O
Bromus hordeaceus	O
Brachypodium sylvaticum	O
Elymus repens	F
Arrhenatherum elatius	F
Holcus lanatus	F
Agrostis capillaris	O
Agrostis stolonifera	F
Phleum pratense	O

APPENDIX 2

VERNACULAR NAMES OF PLANTS MENTIONED IN THE REPORT

Equisetum arvense	Field Horsetail
Equisetum telmateia	Great Horsetail
Polypodium vulgare agg.	Polypody
Pteridium aquilinum	Bracken
Asplenium ruta-muraria	Wall-Rue
Dryopteris filix-mas	Male-fern
Dryopteris dilatata	Broad Buckler-fern
Cedrus libani	Cedar
Pinus sylvestris	Scots Pine
Pinus nigra	Corsican Pine
Sequoiadendron giganteum	Wellingtonia
Chamaecyparis lawsoniana	Lawson's Cypress
Taxus baccata	Yew
Clematis vitalba	Traveller's Joy
Ranunculus acris	Meadow Buttercup
Ranunculus repens	Creeping Buttercup
Ranunculus bulbosus	Bulbous Buttercup
Ranunculus sp (aquatic)	Water-crowfoot
Papaver rhoeas	Field Poppy
Brassica napus	Rape
Diplotaxis tenuifolia	Perennial Wall Rocket
Raphanus raphanistrum	Wild Radish
Rapistrum rugosum	Bastard Cabbage
Coronopus squamatus	Swine-cress
Capsella bursa-pastoris	Shepherd's Purse
Armoracia rusticana	Horse-radish
Cardamine flexuosa	Wood Bitter-cress
Barbarea vulgaris	Winter Cress
Nasturtium officinale	Common Water-cress
Alliaria petiolata	Hedge Garlic
Sisymbrium officinale	Hedge Mustard
Reseda lureola	Weld
Reseda lutea	Wild Mignonette
Viola odorata	Sweet Violet
Viola riviniana	Common Dog-violet
Hypericum perforatum	Perforate St John's-wort
Hypericum hirsutum	Hairy St John's-wort
Silene dioica	Red Campion
Silene latifolia	White Campion
Silene dioica X latifolia	Hybrid Campion
Silene vulgaris	Bladder Campion
Cerastium fontanum	Common Mouse-ear Chickweed
Myosoton aquaticum	Water Chickweed

Stellaria media	Chickweed
Stellaria holostea	Greater Stitchwort
Sagina procumbens	Procumbent Pearlwort
Arenaria sp	Sandwort
Spergularia marina	Lesser Sea-spurrey
Chenopodium polyspermum	Many-seeded Goosefoot
Chenopodium album	Fat Hen
Atriplex patula	Common Orache
Atriplex prostrata	Hastate Orache
Atriplex sp	Orache
Tilia X vulgaris	Lime
Malva moschata	Musk Mallow
Malva sylvestris	Common Mallow
Malva neglecta	Dwarf Mallow
Geranium dissectum	Cut-leaved Crane's-bill
Geranium molle	Dove's-foot Crane's-bill
Geranium robertianum	Herb Robert
Impariens glandulifera	Indian Balsam
Acer pseudoplatanus	Sycamore
Acer platanoides	Norway Maple
Acer campestre	Field Maple
Aesculus hippocastanum	Horse Chestnut
Ilex aquifolium	Holly
Buxus sempervirens	Box
Cytisus scoparius	Broom
Ulex europaeus	Gorse
Lupinus polyphyllus	Common Lupin
Lupinus arboreus	Tree Lupin
Vicia hirsuta	Hairy Tare
Vicia tetrasperma	Smooth Tare
Vicia cracca	Tufted Vetch
Vicia sepium	Bush Vetch
Vicia sativa	Common Vetch
Lathyrus pratensis	Meadow Verchling
Melilotus officinalis	Ribbed Melilot
Melilotus alba	White Melilot
Melilotus sp	Melilot
Medicago sativa	Lucerne
Medicago lupulina	Black Medick
Medicago arabica	Spotted Medick
Trifolium repens	White Clover
Trifolium campestre	Hop Trefoil
Trifolium dubium	Lesser Trefoil
Trifolium arvense	Hare's-foot Clover
Trifolium pratense	Red Clover
Lotus corniculatus	Common Bird's-foot Trefoil
Ornithopus perpusillus	Bird's-foot

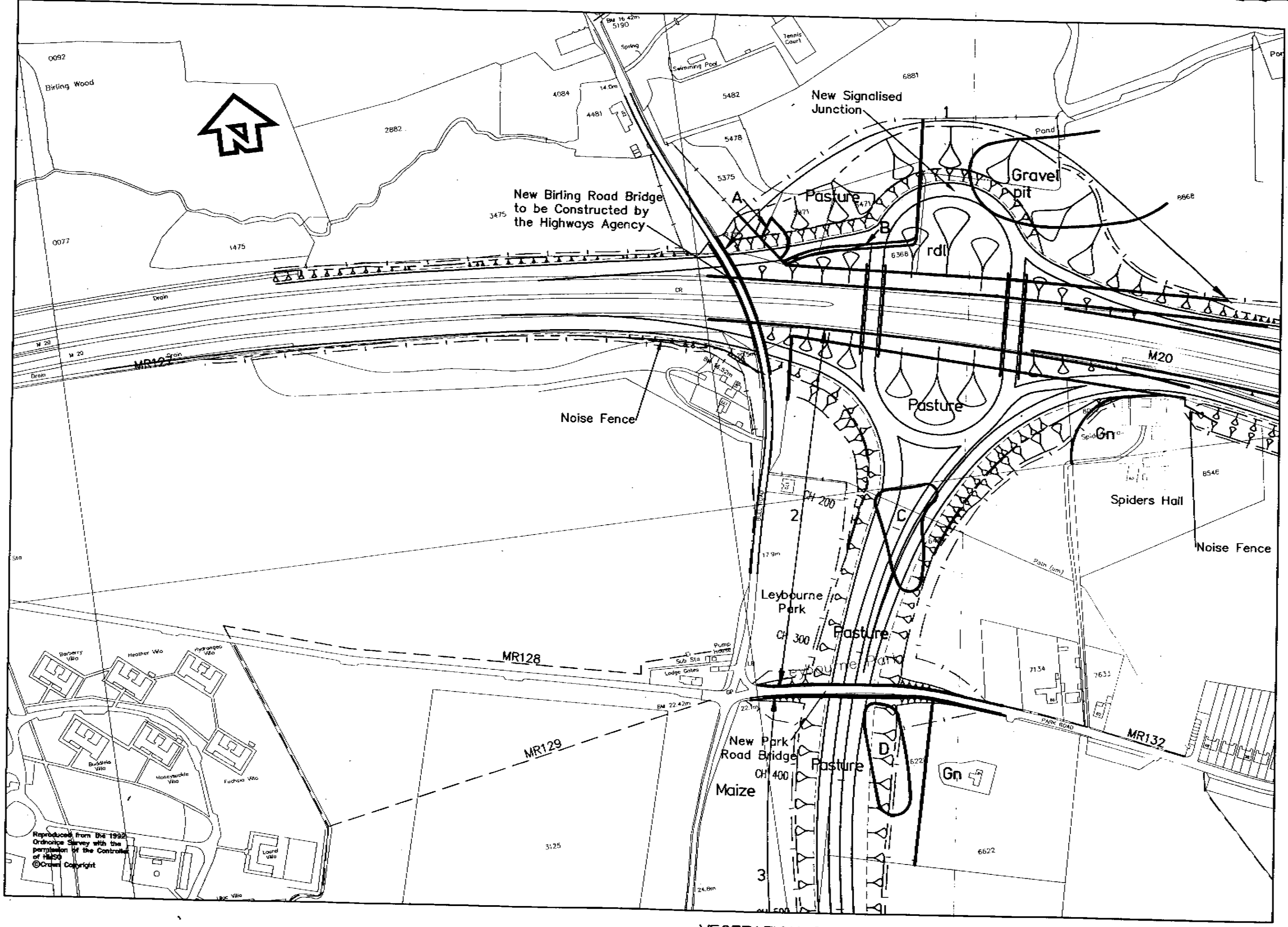
Filipendula ulmaria	Meadowsweet
Rubus fruticosus	Bramble
Potentilla anserina	Silverweed
Potentilla reptans	Creeping Cinquefoil
Geum urbanum	Herb Bennet
Agrimonia eupatoria	Agrimony
Rosa canina	Dog Rose
Rosa sp	Wild Rose
Prunus domestica	Wild Plum
Prunus avium	Wild Cherry
Prunus sp	Flowering Cherry
Crataegus monogyna	Hawthorn
Sorbus aucuparia	Rowan
Sorbus intermedia	Swedish Whitebeam
Malus domestica	Apple
Epilobium hirsutum	Great Willowherb
Epilobium parviflorum	Small-flowered Willowherb
Epilobium ciliatum	American Willowherb
Chamaenerion angustifolium	Rosebay Willowherb
Oenothera sp	Evening-primrose
Circaea luteriana	Enchanter's Nightshade
Callitriche sp	Water-starwort
Cornus sanguinea	Dogwood
Hedera helix	Ivy
Chaerophyllum temulentum	Rough Chervil
Anthriscus sylvestris	Cow Parsley
Aegopodium podagraria	Ground-elder
Berula erecta	Lesser Water-parsnip
Conium maculatum	Hemlock
Apium nodiflorum	Fool's Watercress
Angelica sylvestris	Wild Angelica
Heracleum sphondylium	Hogweed
Torilis japonica	Upright Hedge-parsley
Daucus carota	Wild Carrot
Bryonia cretica	White Bryony
Mercurialis perennis	Dog's Mercury
Euphorbia amygdaloides	Wood Spurge
Polygonum aviculare agg.	Knotgrass
Polygonum persicaria	Redshank
Polygonum hydropiper	Water-pepper
Fallopia convulvulus	Black Bindweed
Rumex acetosella	Sheep's Sorrel
Rumex acetosa	Common Sorrel
Rumex crispus	Curled Dock
Rumex obtusifolius	Broad-leaved Dock
Rumex sanguineus	Red-veined Dock
Rumex conglomeratus	Sharp Dock

Urtica urens	Small Nettle
Urtica dioica	Stinging Nettle
Ulmus glabra	Wych Elm
Ulmus minor	Elm
Ulmus sp	Elm
Juglans regia	Walnut
Betula pendula	Silver Birch
Alnus glutinosa	Alder
Alnus incana	Grey Alder
Carpinus betulus	Hornbeam
Corylus avellana	Hazel
Fagus sylvatica	Beech
Castanea sativa	Sweet Chestnut
Quercus cerris	Turkey Oak
Quercus ilex	Holm Oak
Quercus robur	Pedunculate Oak
Quercus petraea	Sessile Oak
Quercus sp	Oak
Populus alba	White Poplar
Populus nigra italica	Lombardy Poplar
Populus sp	Poplar
Salix fragilis	Crack Willow
Salix alba	White Willow
Salix 'babylonica'	Weeping Willow
Salix viminalis	Osier
Salix caprea	Goat Willow
Salix cinerea	Common Sallow
Salix sp	Willow/Sallow
Buddleja davidii	Buddleia
Fraxinus excelsior	Ash
Syringa vulgaris	Lilac
Ligustrum vulgare	Wild Privet
Centaurium erythraea	Common Centaury
Myosotis scorpioides	Water Forget-me-not
Myosotis arvensis	Field Forget-me-not
Echium vulgare	Viper's Bugloss
Convulvulus arvensis	Field Bindweed
Calysregia sepium	Hedge Bindweed
Solanum dulcamara	Bittersweet
Solanum nigrum	Black Nightshade
Verbascum thapsus	Great Mullein
Linaria vulgaris	Common Toadflax
Scrophularia nodosa	Common Figwort
Scrophularia auriculata	Water Figwort
Digitalis purpurea	Foxglove
Veronica beccabunga	Brooklime
Veronica montana	Wood Speedwell

Veronica chamaedrys	Germander Speedwell
Veronica serpyllifolia	Thyme-leaved Speedwell
Veronica persica	Common Speedwell
Veronica filiformis	Slender Speedwell
Odontites verna	Red Bartsia
Mentha aquatica	Water Mint
Mentha spicata	Spear Mint
Lycopus europaeus	Gipsywort
Prunella vulgaris	Selfheal
Stachys sylvatica	Wood Woundwort
Ballota nigra	Black Horehound
Lamiastrum galeobdolon	Yellow Archangel
Lamium album	White Dead-nettle
Galeopsis tetrahit	Common Hemp-nettle
Glechoma hederacea	Ground-ivy
Teucrium scorodonia	Wood Sage
Ajuga reptans	Bugle
Plantago major	Greater Plantain
Plantago lanceolata	Ribwort Plantain
Plantago coronopus	Buck's-horn Plantain
Campanula trachelium	Nettle-leaved Bellflower
Galium aparine	Cleavers
Sambucus nigra	Elder
Viburnum lantana	Wayfaring-tree
Viburnum opulus	Guelder-rose
Symphoricarpos albus	Snowberry
Lonicera periclymenum	Honeysuckle
Dipsacus fullonum	Wild Teasel
Senecio jacobaea	Ragwort
Senecio squalidus	Oxford Ragwort
Senecio vulgaris	Groundsel
Senecio sylvaticus	Wood Groundsel
Tussilago farfara	Colt's-foot
Petasites fragrans	Winter Heliotrope
Inula conyza	Ploughman's Spikenard
Pulicaria dysenterica	Fleabane
Gnaphalium uliginosum	Marsh Cudweed
Solidago canadensis	Canadian Golden-rod
Aster novi-belgii	Michaelmas Daisy
Erigeron acer	Blue Fleabane
Conyza canadensis	Canadian Fleabane
Bellis perennis	Daisy
Eupatorium cannabinum	Hemp Agrimony
Achillea millefolium	Yarrow
Tripleurospermum inodorum	Scentless Mayweed
Leucanthemum vulgare	Ox-eye Daisy
Tanacetum vulgare	Tansy

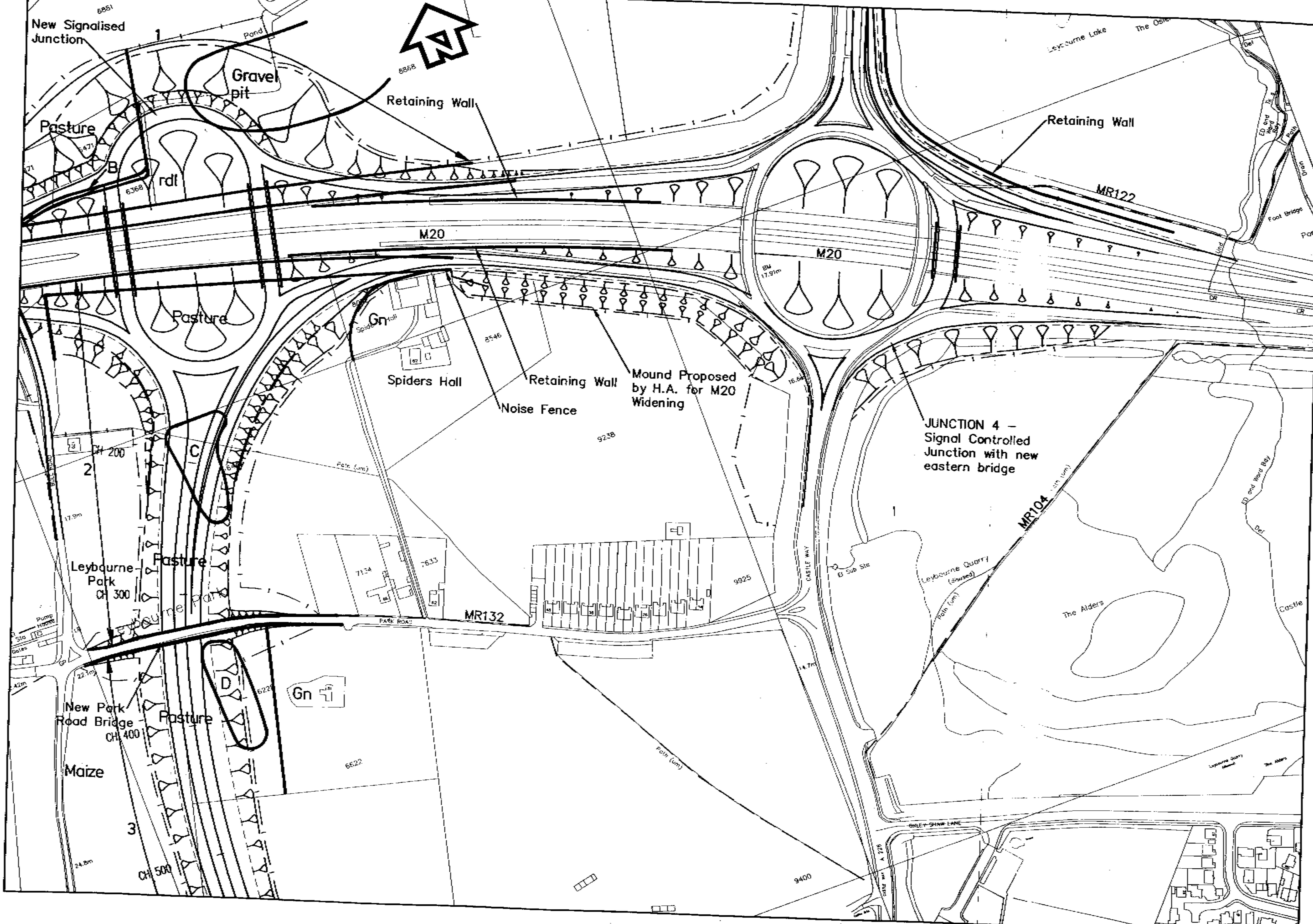
Artemisia vulgaris	Mugwort
Arctium minus	Lesser Burdock
Arctium sp	Burdock
Cirsium vulgare	Spear Thistle
Cirsium palustre	Marsh Thistle
Cirsium arvense	Creeping Thistle
Centaurea nigra	Lesser Knapweed
Lapsana communis	Nipplewort
Hypochoeris radicata	Cat's Ear
Leontodon autumnalis	Autumnal Hawkbit
Picris echioides	Bristly Ox-tongue
Picris hieracioides	Hawkweed Ox-tongue
Lactuca serriola	Prickly Lettuce
Sonchus arvensis	Field Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Sonchus asper	Spiny Sow-thistle
Crepis capillaris	Smooth Hawk's-beard
Taraxacum sp	Dandelion
Elodea nuttallii	Nuttall's Pondweed
? Potamogeton sp	Pondweed
Asparagus officinalis	Asparagus
Hyacinthoides non-scripta	Bluebell
Juncus inflexus	Hard Rush
Juncus effusus	Soft Rush
Juncus conglomeratus	Compact Rush
Juncus bufonius	Toad Rush
Iris pseudacorus	Yellow Flag
Arum maculatum	Cuckoo-pint
Sparganium erectum	Branched Bur-reed
Typha latifolia	Bulrush
Carex hirta	Hairy Sedge
Carex riparia	Great Pond-sedge
Carex riparia/acutiformis	Pond-sedge
Carex pendula	Pendulous Sedge
Carex sp	Sedge
Festuca arundinacea	Tall Fescue
Festuca gigantea	Giant Fescue
Festuca rubra	Red Fescue
Festuca ovina	Sheep's-fescue
Lolium perenne	Rye-grass
Poa annua	Annual Meadow-grass
Poa trivialis	Rough Meadow-grass
Poa sp	Meadow-grass
Puccinellia distans	Reflexed Saltmarsh-grass
Dactylis glomerata	Cock's-foot
Cynosurus cristatus	Crested Dog's-tail
Glyceria fluitans	Floating Sweet-grass

Bromus sterilis	Barren Brome
Bromus hordeaceus	Soft Brome
Brachypodium sylvaticum	False-brome
Elymus repens	Couch-grass
Hordeum murinum	Wall Barley
Avena fatua	Wild Oat
Arrhenatherum elatius	False Oat-grass
Trisetum flavescens	Yellow Oat-grass
Holcus lanatus	Yorkshire Fog
Holcus mollis	Creeping Soft-grass
Agrostis capillaris	Common Bent-grass
Agrostis stolonifera	Creeping Bent-grass
Phleum pratense	Cat's-tail
Phalaris arundinacea	Reed Canary-grass
Phragmites australis	Common Reed

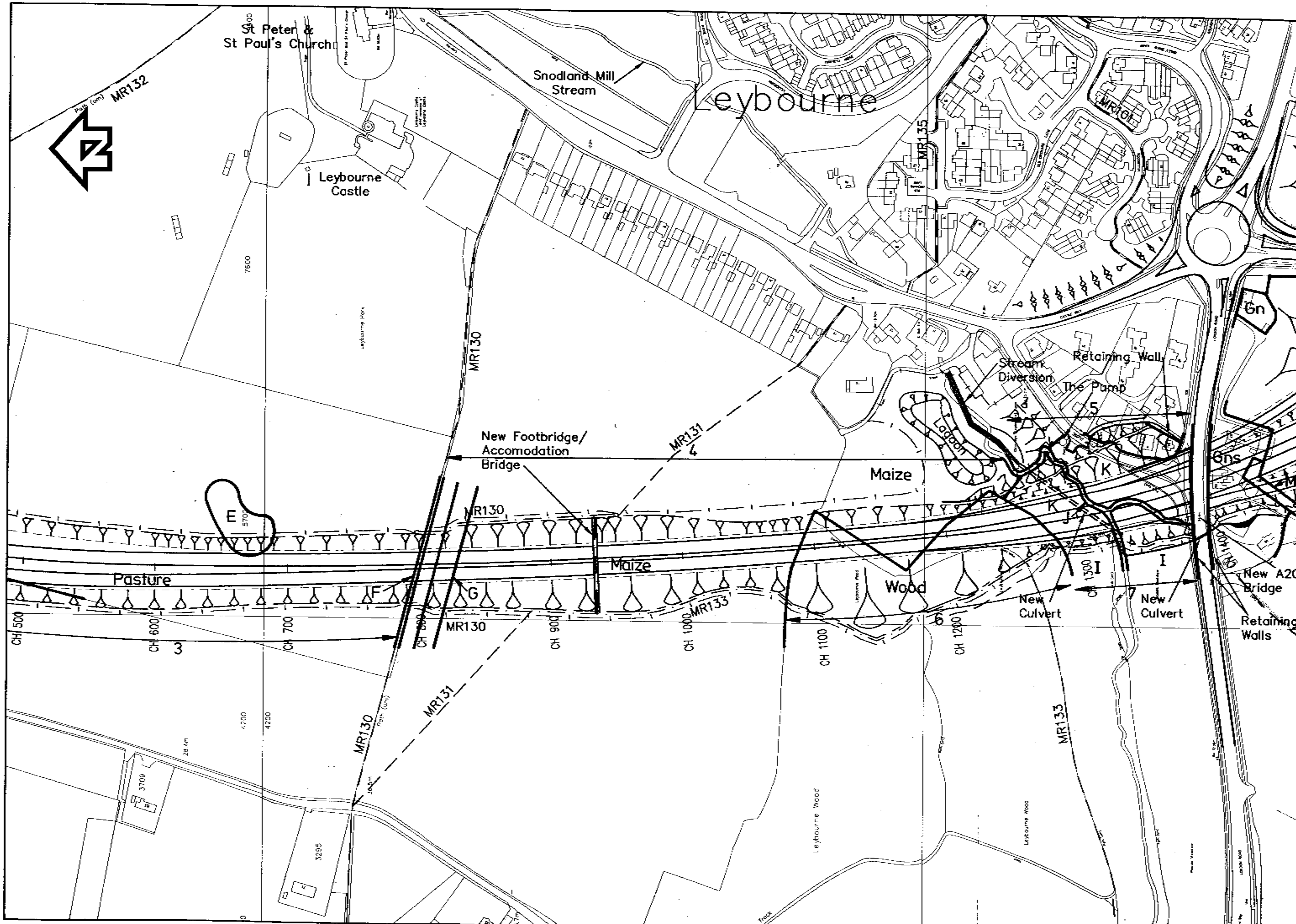


VEGETATION SURVEY ORANGE ROUTE SHEET 1 OF 6

Figure 1



VEGETATION SURVEY ORANGE ROUTE SHEET 2 OF 6 Figure 2



VEGETATION SURVEY ORANGE ROUTE SHEET 3 OF 6

Figure 3

A20 Roundabout
Retaining Wall
New A20 Bridge
Arable
Gn
Gns
Pasture
rdl
Grass
Stream Diversion
Retaining Walls
The Hermitage
The Hermitage Junction
More Park RC Primary School
Catholic Church of St Thomas More
New Steps & Access Ramp
Widened Railway Bridge
New Lucks Hill Bridge
West Malling Station
MR119
MR117
MR138
CH 1400
CH 1600
CH 1700
CH 1800
CH 1900
CH 2000
CH 2100
CH 2200
CH 2300
CH 2400
K
L
M
N
O
Q
R
S
T
U
8

VEGETATION SURVEY ORANGE ROUTE SHEET 4 OF 6 **Figure 4**

Footpath/Bridleway

MR116

MR116 New Subway

New Bridleway

New Footway & Cycleway

Arable

Arable

Orchard

Cleared

Orchard

New Lavenders Road Bridge

Pasture

Asparagus

CH 2300

CH 2400

CH 2500

CH 2600

CH 2700

CH 2800

CH 2900

CH 3000

CH 3100

CH 3200

CH 3300

West Malling Station

MR116

New MR143 Footbridge

MR578

MR143

Rathshan

Retaining Wall

Manor Park Country Park

VEGETATION SURVEY ORANGE ROUTE SHEET 5 OF 6

Figure 5

New Footway
& Cycleway

MR144

Tower View

MR578

CH 3200

CH 3300

CH 3400

CH 3500

CH 3600

CH 3700

CH 3800

CH 3900

Rathshan

Retaining Wall

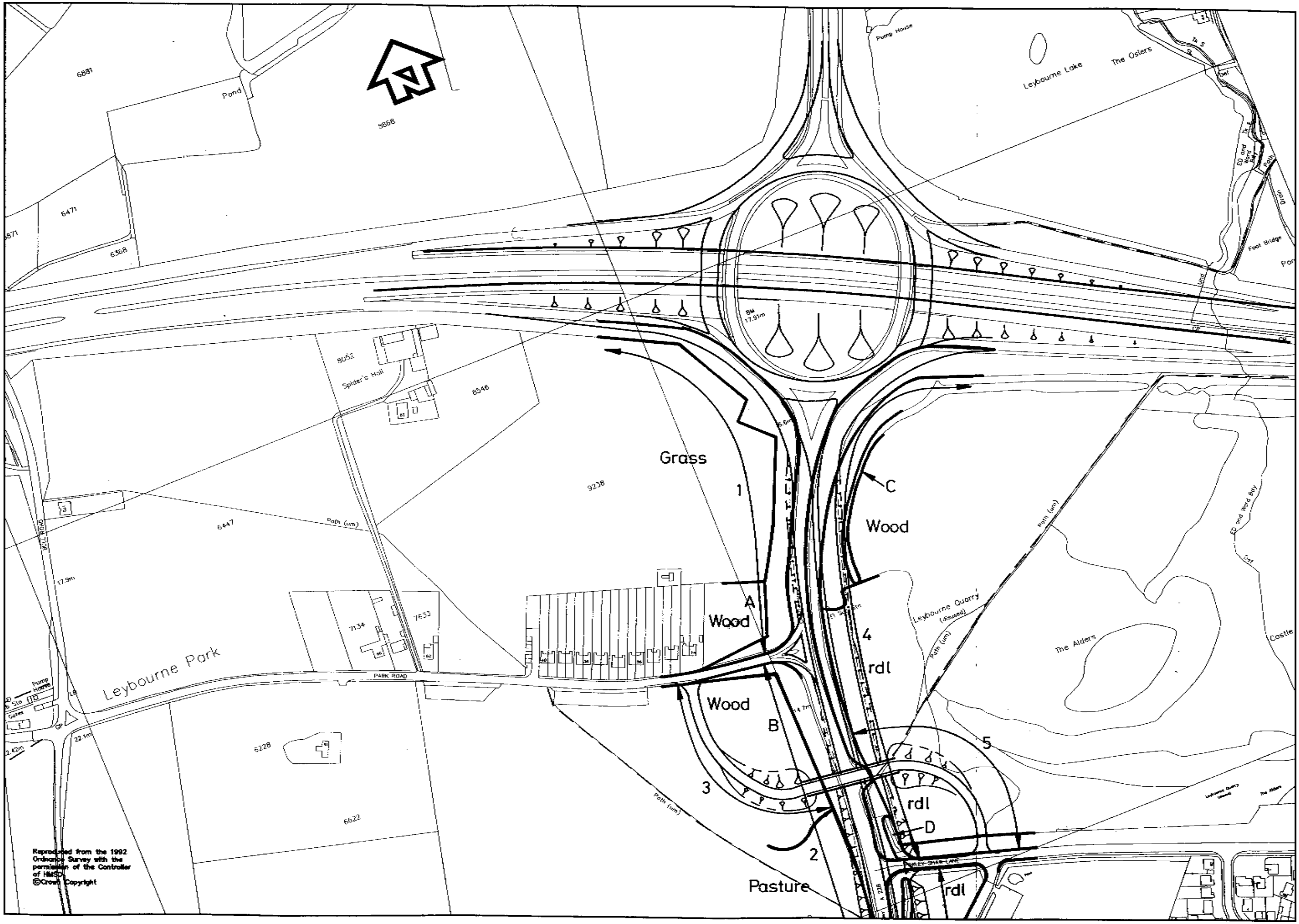
New Bridleway
Alignment

Access Track
already severed
by Agreement

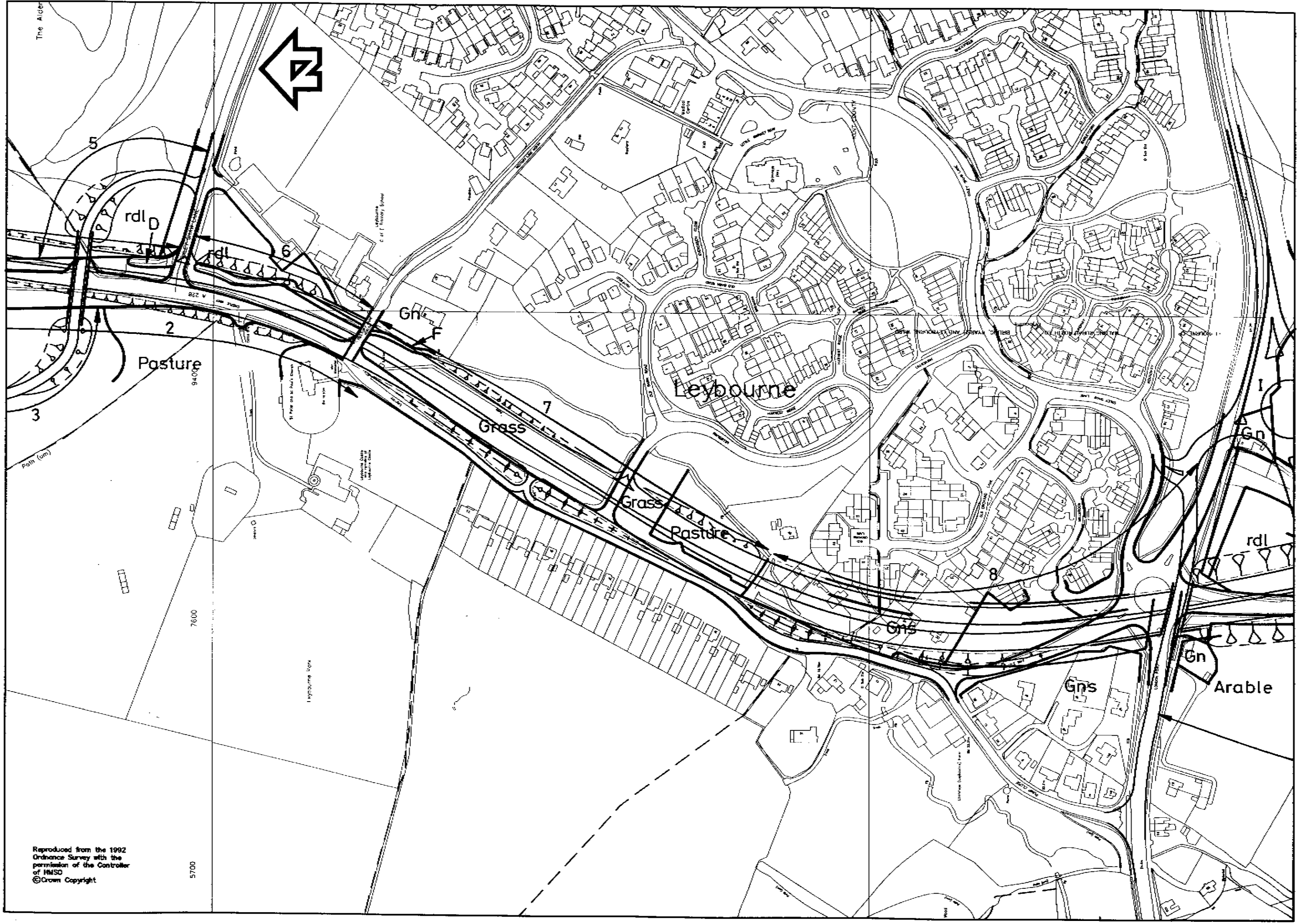
MR579

VEGETATION SURVEY ORANGE ROUTE SHEET 6 OF 6

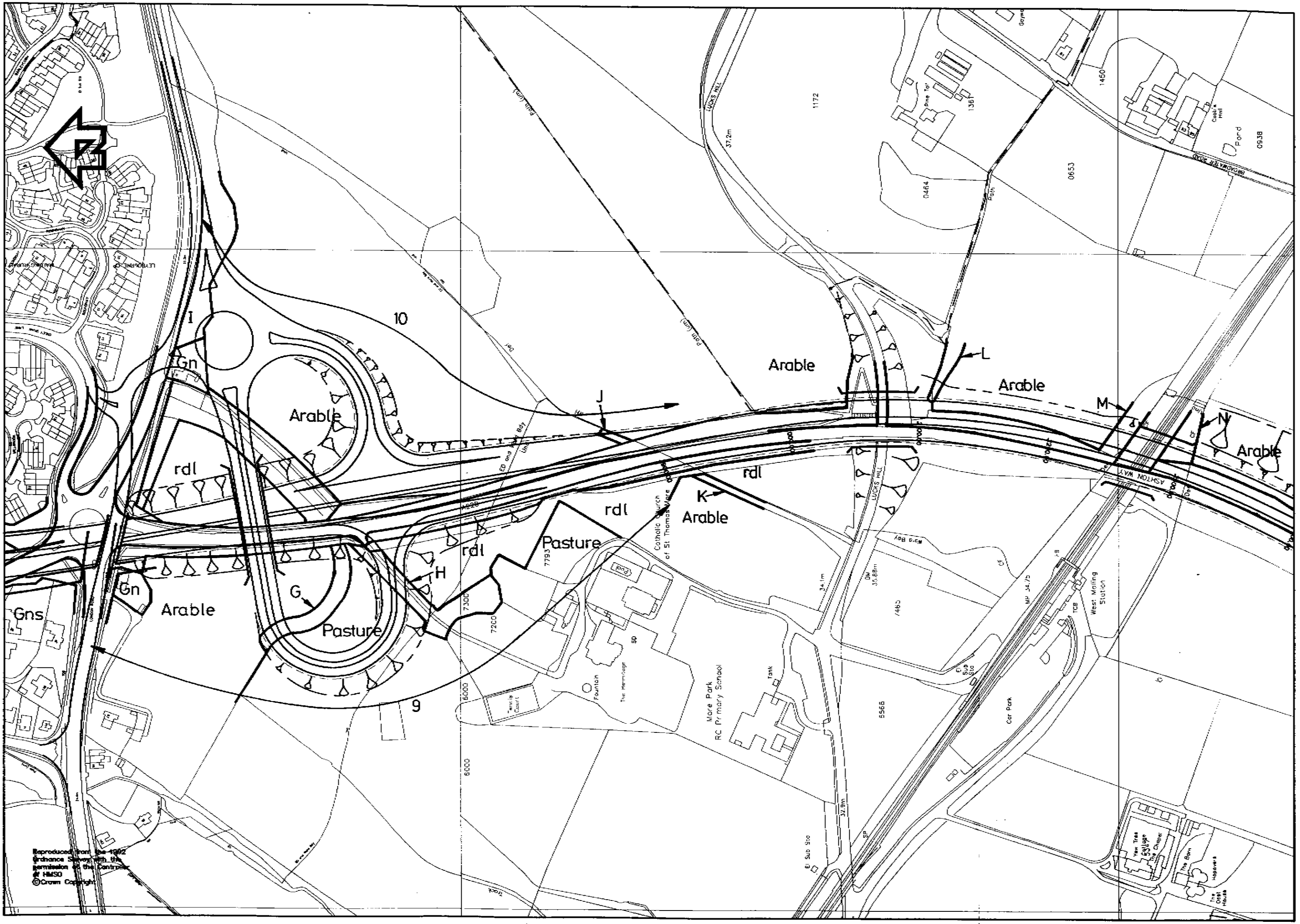
Figure 6



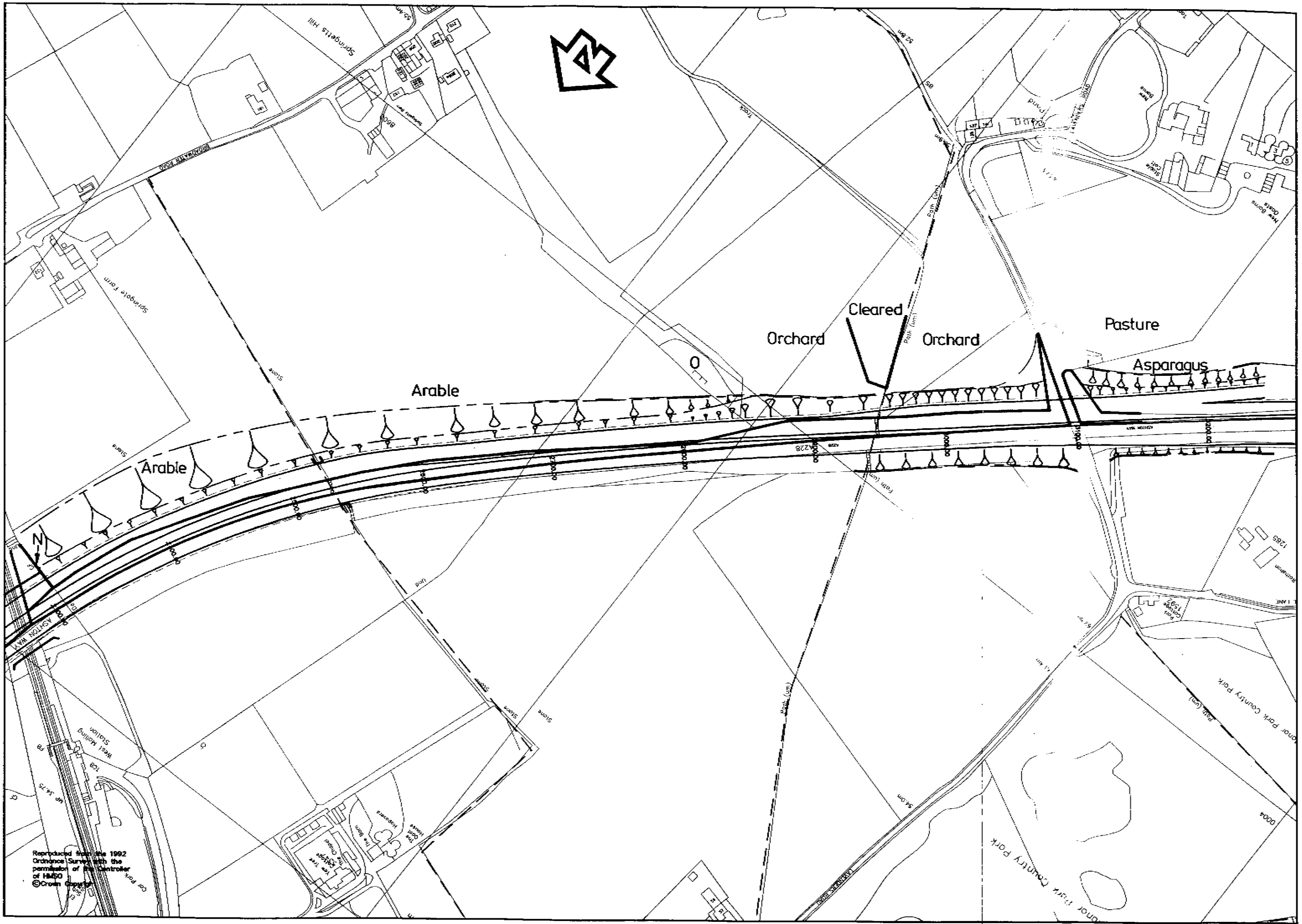
VEGETATION SURVEY RED ROUTE SHEET 1 OF 5 Figure 7



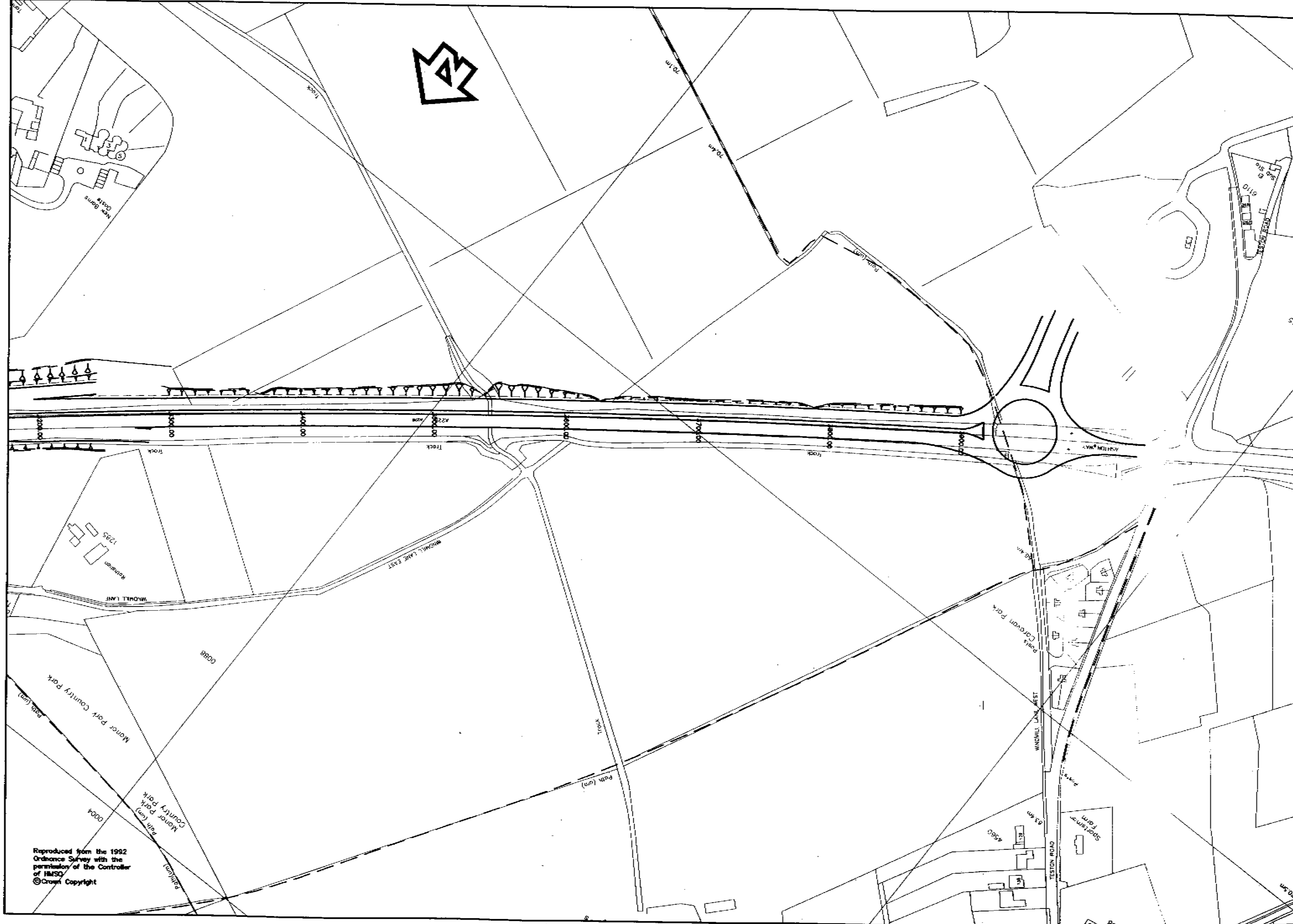
VEGETATION SURVEY RED ROUTE SHEET 2 OF 5 **Figure 8**



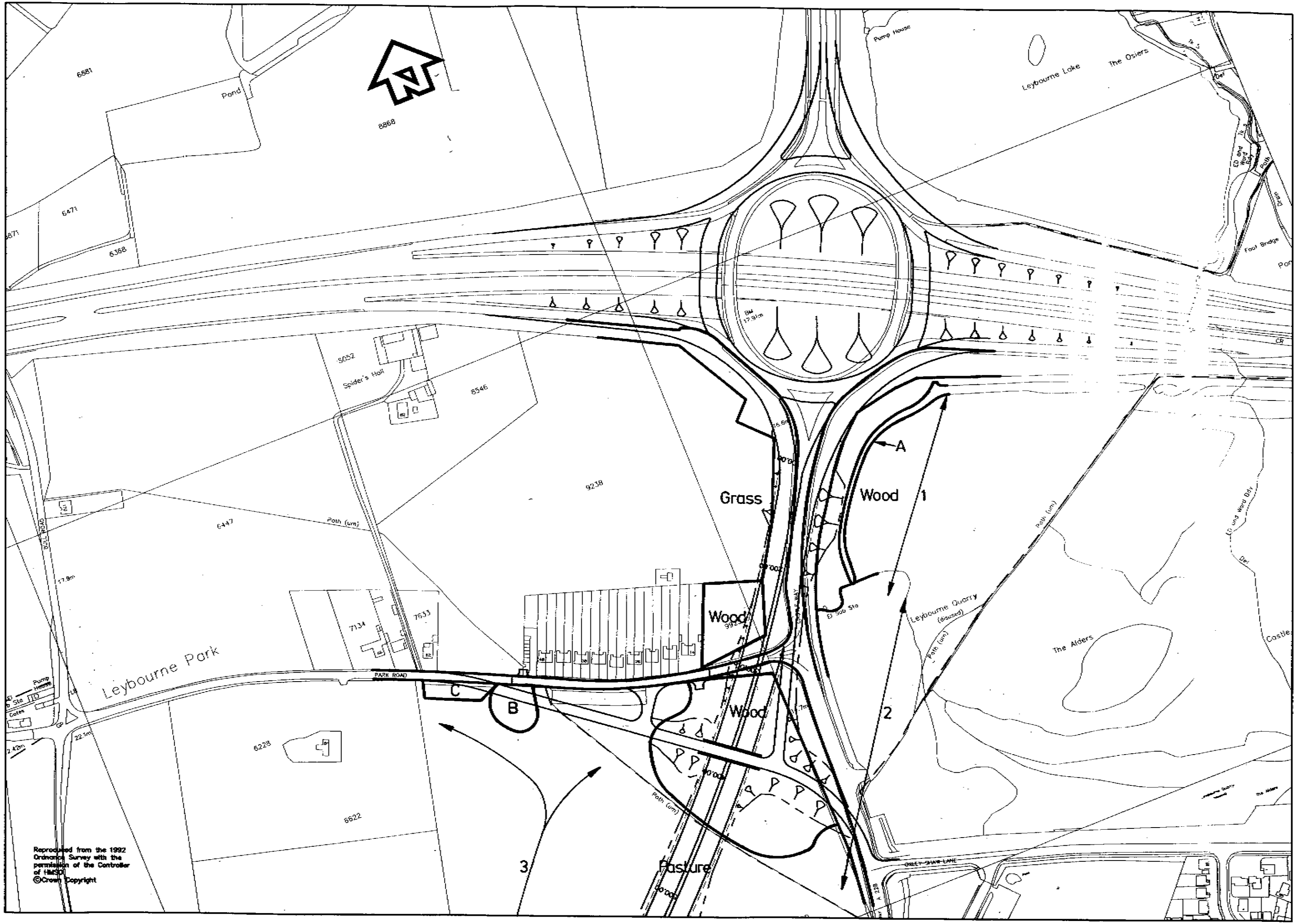
VEGETATION SURVEY RED ROUTE SHEET 3 OF 5 Figure 9



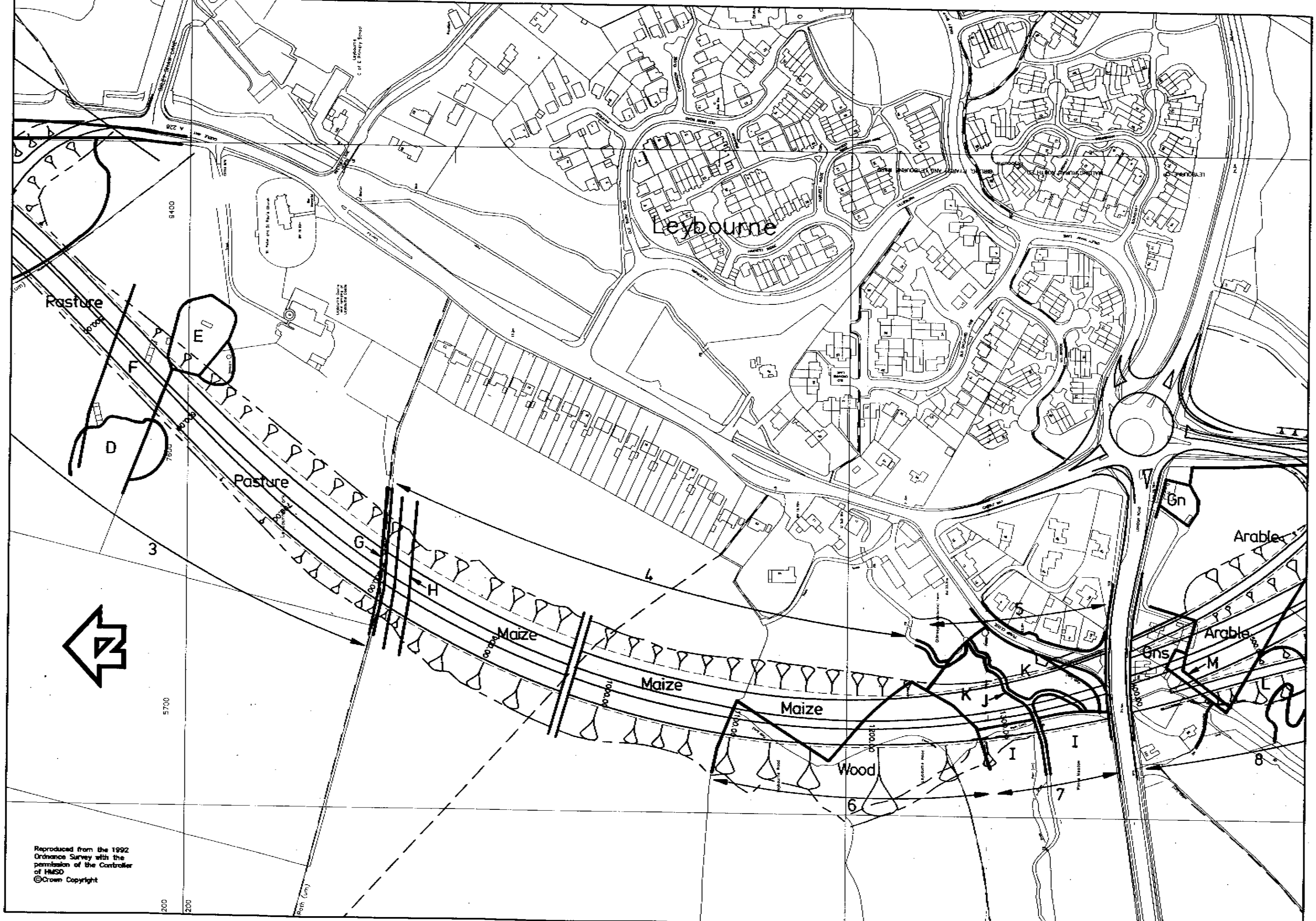
VEGETATION SURVEY RED ROUTE SHEET 4 OF 5 Figure 10



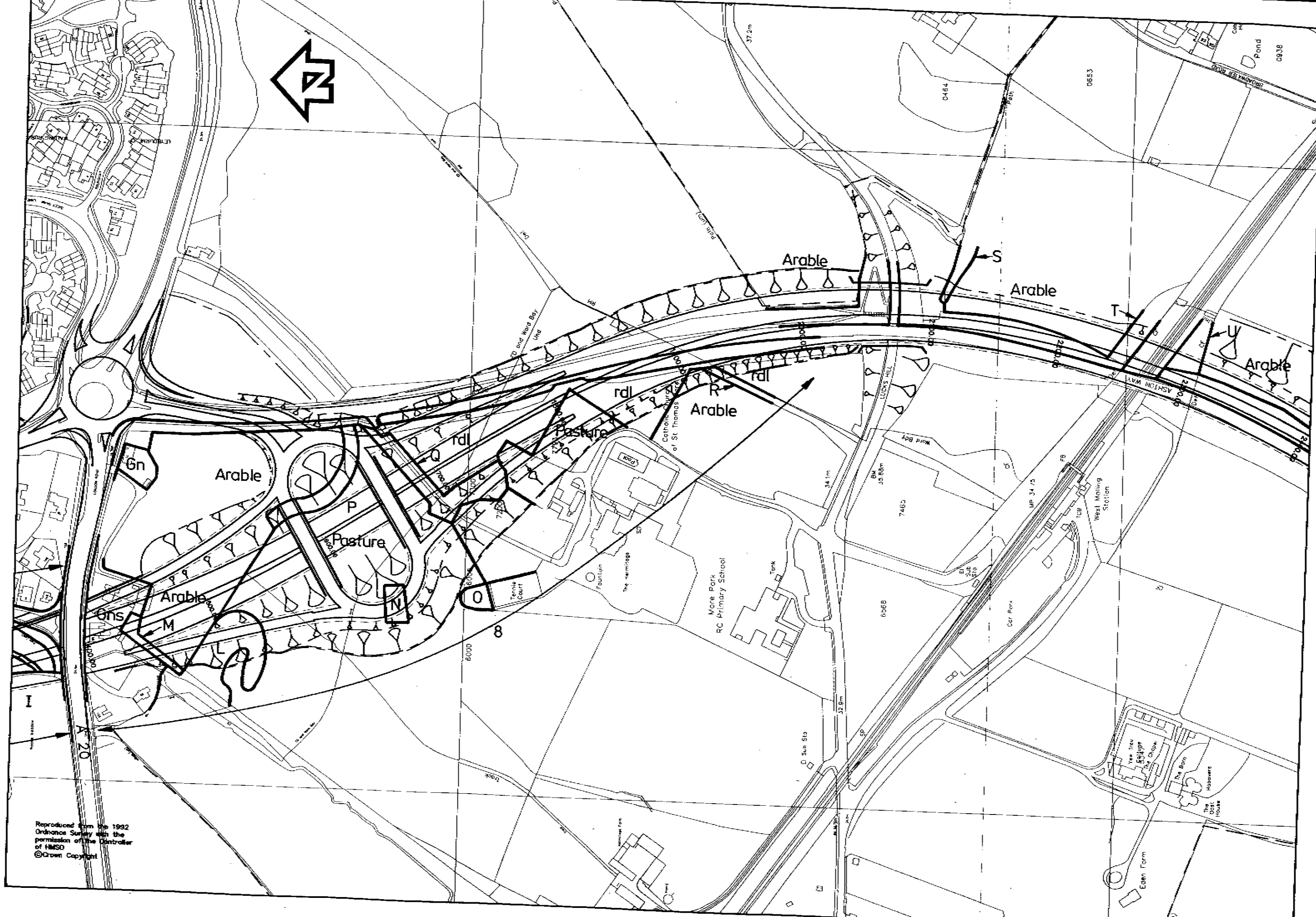
VEGETATION SURVEY RED ROUTE SHEET 5 OF 5 Figure 11



VEGETATION SURVEY BLUE ROUTE SHEET 1 OF 5 Figure 12

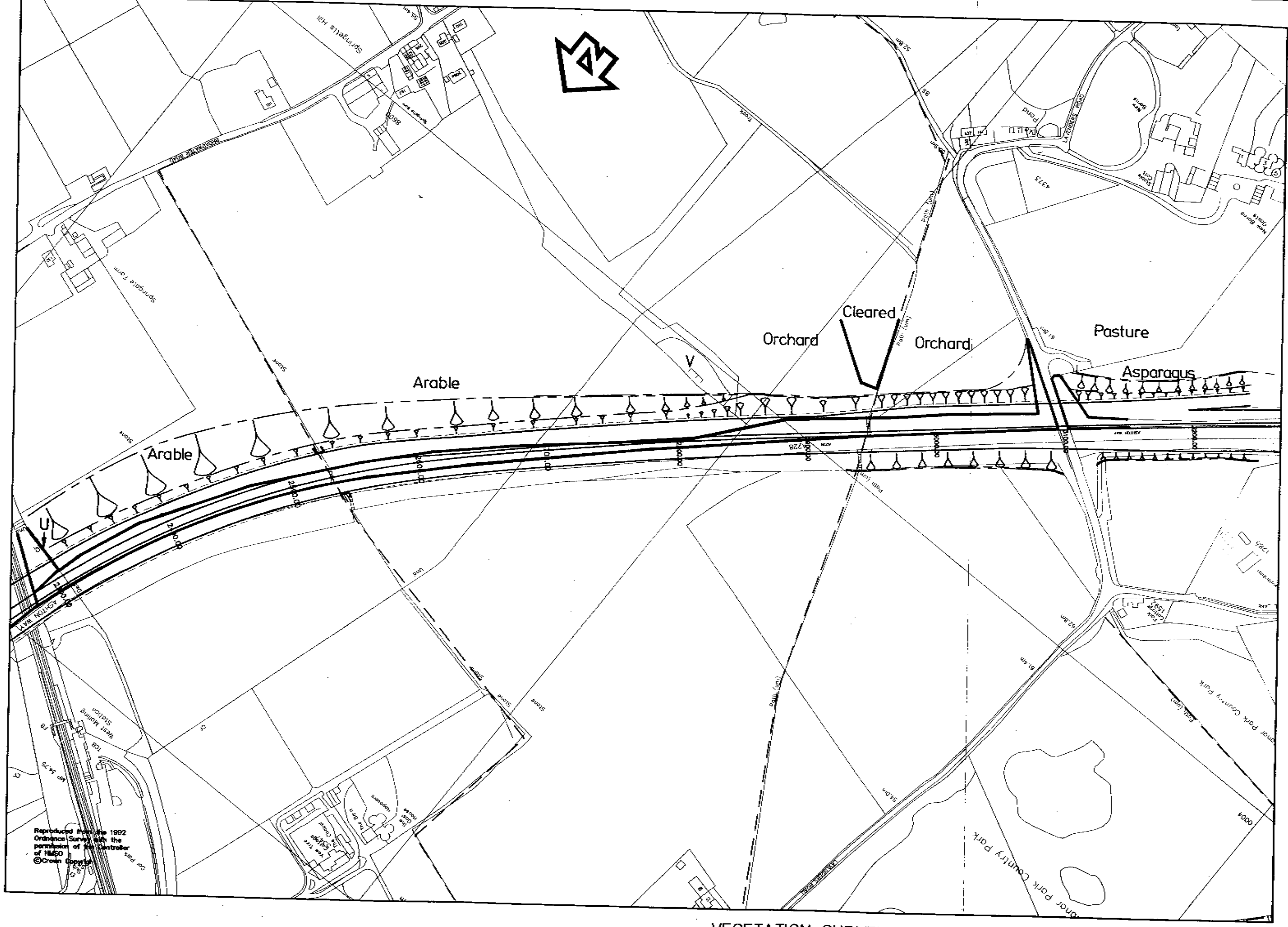


VEGETATION SURVEY BLUE ROUTE SHEET 2 OF 5 Figure 13

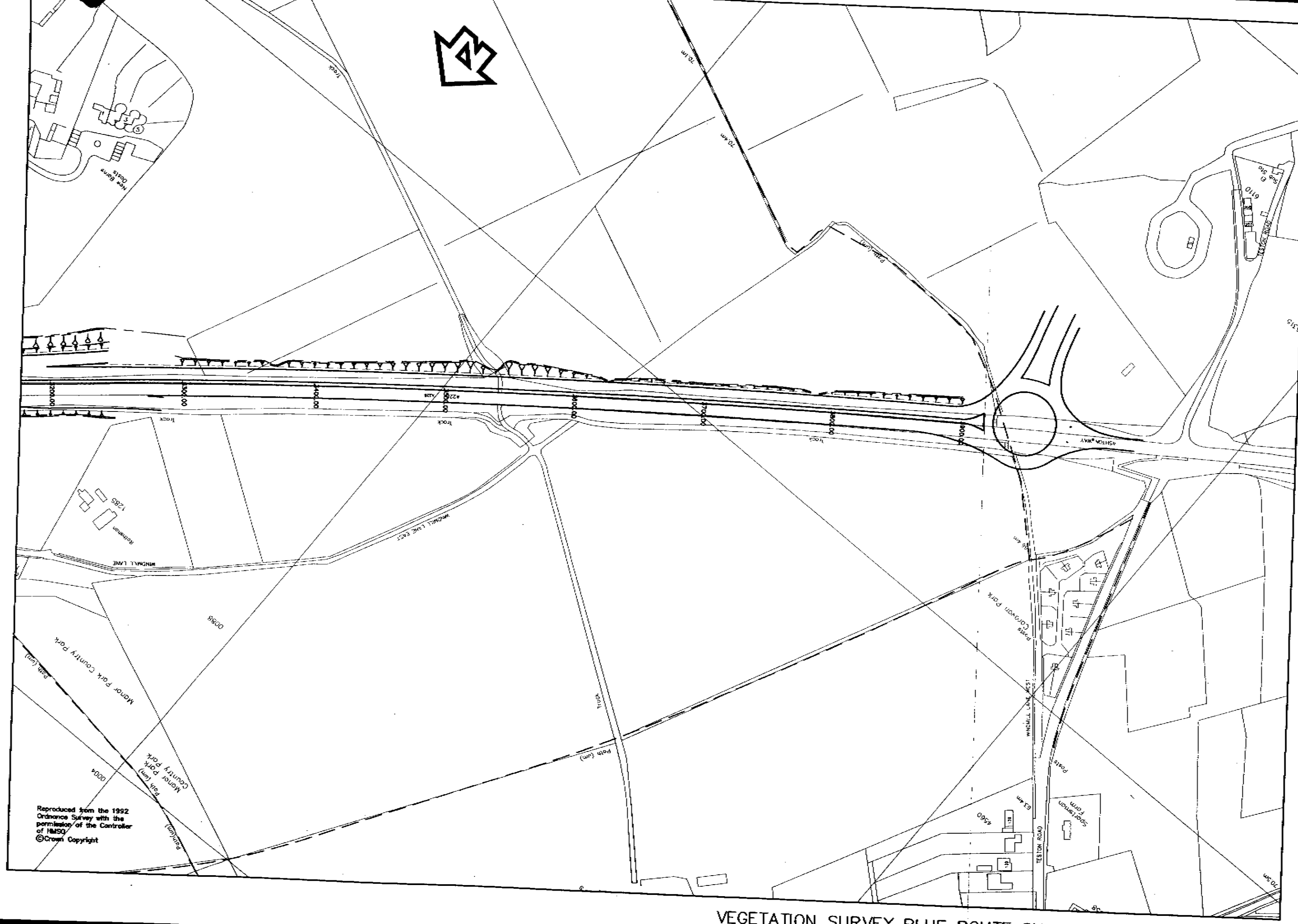


VEGETATION SURVEY BLUE ROUTE SHEET 3 OF 5

Figure 14



VEGETATION SURVEY BLUE ROUTE SHEET 4 OF 5 Figure 15



VEGETATION SURVEY BLUE ROUTE SHEET 5 OF 5

Figure 16

SECTION 2A

SUPPLEMENTARY VEGETATION SURVEY

KENT PROPERTY SERVICES LANDSCAPE BRANCH

2 JUNE 1992

1. INTRODUCTION

The survey of higher plants by Andrew Henderson was commissioned and undertaken unseasonably late in 1991 (late September to mid October). It applied an even intensity of search over the area concerned. The purpose of this study was to focus on the potentially richer sites identified by the initial survey and assess them in greater detail at a more favourable time (late June).

The results are expressed in tables which accompany location plans at the end of this report. They relate to the following subject areas:

a) the Leybourne stream (sites 1 to 19)

b) a broad channel north of the stream and which runs parallel to Castle Way (sites I to IV)

c) a field ditch on the north side of the M20 east of Bull Road (sites A to C)

d) a parkland shaw north east of The Hermitage (site Z)

e) Leybourne Wood (sites 1 to 13).

No nationally rare or scarce species were recorded. However seven species were found which may be recognised as scarce in Kent due to their occurrence in less than 10% of the County's 1044 tetrads (4 sq km grid squares):

	NUMBER OF TETRADS	SUBJECT AREA
Ceratocapnos claviculata (Climbing Corydalis)	21	(e)
Ornithopus perpusillus (Bird's foot)	52	(e)
Gnaphalium sylvaticum (Heath Cudweed)	52	(e)
Carex acutiformis (Lesser Pond-sedge)	81	(b)
Scirpus sylvaticus (Wood Club-rush)	86	(b)
Berula erecta (Lesser Water-parsnip)	98	(c)
Myosoton aquaticum (Water Chickweed)	102	(a)

The three most scarce species are all in Leybourne Wood. It should be understood that plants which are scarce purely on a county basis may not in themselves offer a marked constraint on choice of routes, but where they occur in combination or with a diverse assemblage of less uncommon species such habitats merit special consideration.

2. WETLAND SITES

The three linear features were sampled at regular intervals by recording the species in 25m lengths. The herbaceous species in Table 1 include both plants rooted in a wet substratum and others on the drier margins which characterise the adjoining habitat. Approximate levels of shade by trees and shrubs are given at the foot of the table. Table 2 gives the shading species.

In both tables the plants which are distinguished as wetland species by the National Pond Survey are underlined. Their totals for each sampling point provide a good indication of diversity and consequent

wetland wildlife value for each length. By according the Kent scarcities a double score the relative conservation values of each stretch are highlighted at the foot of Table 2. The mean score of 8.3 would suggest that values of 11 or more are significant in this locality.

2.1 The Leybourne Stream

A tributary converges with the main stream on the north side of the A20 in a small paddock. The tributary originates from springs near St Leonard's Tower, West Malling, which are sufficiently charged with nutrients to generate large algal blooms in Manor Park Lake.

The study commenced at an ungrazed fully vegetated and silted pond (1) south of the A20 from which the stream flows through domestic gardens (2) and under the road. It emerges in the deep shade of the Beech fringing Woods Meadow (3) and before its confluence flows through an open stretch in the paddock (4) where a shelving area of partly vegetated ground has the additional interest of Reflexed Saltmarsh-grass, a species increasingly found on road verges where de-icing salt is used.

The main stream approaches the confluence through woodland (5 & 6) where it is overhung by tall Nettles and Indian Balsam. The Balsam remains an almost constant feature in its continuing northward flow.

Below the confluence is the most species rich section of stream bank (7) currently unshaded by woody species and the habitat partly kept open by horse grazing. The scarce Water Chickweed occurs here slightly remote from the water edge. Beyond the paddock and almost to Castle Way the stream banks (8 to 10) are heavily tree shaded, ungrazed and Nettle dominated. Higher plant diversity is below average.

East of Castle Way the stream flows for some distance through a public open space (11 to 15). The degree of shading in the sample lengths varies from 10 to 50% and the species diversity is above average practically throughout. Herbaceous plants typical of woods and scrubland (False Brome, Enchanter's Nightshade, Great Fescue, Herb Robert) are more prevalent than elsewhere and suggest a more wooded history. However, the most diverse section (13) which has the most gently graded banks is relatively unshaded.

Between Rectory Lane North and Oxley Shaw Lane (16 to 18) there are virtually no stream-side trees and shrubs. The submerged and emergent species (ie those rooted under the water) are more abundant here than in any other part. The submerged species include Water Starwort, Water Cress and Thread-leaved Water-crowfoot. This stretch is consequently the most vulnerable to any pollution which the new road drainage might introduce upstream. Species diversity is only average, but the habitat quality looks higher. North of Oxley Shaw Lane (19) the stream runs in a cutting well shaded by planted trees and disappears into a culvert from which it presumably flows into Castle Lake.

To summarise, the Leybourne Stream is subject to a wide range of circumstances in terms of degree of shading, steepness of banks and presence or absence of grazing pressure. The vegetation varies accordingly as is exemplified by the fact that of the 36 wetland plants recorded, less than half occur in any 25m stretch. All would be potentially vulnerable to pollution damage by new road construction. The realignment or loss of any part of the watercourse could diminish the range of variation. Compensatory design work on any new section of the stream should take account of such losses and aim to sustain or even extend the habitat diversity.

2.2 The Channel West of Castle Lake Wood

Lies within the Leybourne Lakes Grade I Site of Nature Conservation Interest and drains northward. However the stretch parallel to Castle Way appears to hold water for less than six months per year and plants which normally occupy water margins, grow in its floor. The channel is heavily shaded by mature Alder and Willows several of which are collapsed across it. The herbaceous species include Great Horsetail, typical of damp base rich sites and two of the plants which are scarce in Kent, Wood Club-rush and Lesser Pond-sedge. The latter achieves greater abundance in the eastward continuation of the channel parallel to the M20 and the woodland fringing Castle Lake. This is not one of the more important parts of the SNCI.

2.3 Field Ditch East of Bull Road

Bordering a rough species-poor horse grazed pasture this broad ditch has above average species diversity. The shrub willow Grey Sallow is the major shading species. There are large drifts of Fleabane, Water Mint, Fool's Water-cress and Brooklime Speedwell in a habitat more comparable with an extensive shallow pond margin than an efficient provision for drainage. The scarce Lesser Water-parsnip occurs in part B. The extent and quality of this habitat linked as it is to adjoining hedge and tree growth is sufficient to warrant creation of a similar feature should the original be lost.

3. Woodland Sites

Herbaceous plants are given in Table 3 and woody species in Table 4. In each table the plants held to be most typical of ancient woodlands are underlined.

3.1 Parkland Shaw near The Hermitage

Amongst the various parkland groups, Henderson identified a handsome Sessile Oak in one. This tree occurs in ancient woodlands on the acidic drift over the Hythe Beds in the area and the site warranted a re-visit to establish if there were other associated species which might indicate an ancient origin for the group as a whole. No such evidence was found. The ground flora is dominated in different parts by Ivy, Nettle or Bramble. Oregon Grape and Sweet Violet are introduced species.

3.2 Leybourne Wood

Is a Grade 2 Site of Nature Conservation Interest. The ancient part of the wood which occupies the slope above Woods Meadow was surveyed only over the area likely to be influenced by highway construction. This area was sub-divided into 13 sectors (see plan) based on coppice height, footpaths and supposed road alignments.

The north western and most elevated part of the survey area occupies base deficient sandy Folkestone Beds. The major area is on Head Deposits which appear to become more nutrient rich lower down the slope, whether by downwash or influence of the alkaline Hythe Beds at the lower edge of the wood where it adjoins Woods Meadow.

Over the general survey area Sweet Chestnut has replaced the indigenous coppice so markedly that in many sectors only single representatives of some species remain. Hazel, Ash, Hornbeam and Field Maple are the persistent survivors in diminishing order of frequency. Towards the northern

boundary in area 2 are two Elm stools tentatively ascribed to Wych Elm. This sector is also distinguished by the only Oak standard observed. Ash occurs most abundantly on the east side of the area and is dominant in sector 3. Red Currant which is one of the more doubtful indicators of ancient woodland occurs in small quantity throughout.

The coppice boundaries to the wood (sectors 1 to 6) have been left longest uncut. Their crown height (approx 12m) is such that access is not difficult and there is some lateral illumination from the edges. The narrowest belt (area 5) is no more than 5m broad.

A more extensive area of coppice (sectors 7 to 9) is 6 to 7m tall, has closed canopy and the ground is densely shaded. The youngest coppice re-growth (sectors 10 to 13) has not yet closed canopy and supports a notably higher level of herbaceous ground cover and of species. These are largely ruderals eg Persicarias, Goosefoot, Orache and Black Nightshade.

The influence of the ragstone on the lower slope is demonstrated by the presence of Spindle and Dogwood in area 12, Nettle leaved Bellflower in 12 and 13, and Travellers Joy in 13. Nonetheless the calcifuge Foxglove occurs throughout. The more noteworthy herbaceous species of the woodland are Climbing Corydalis, Bird's foot, Heath Cudweed and Heath Groundsel, all calcifuges typical of base deficient sandy soils. Three of them are annuals : only Heath Cudweed is perennial. Although this Cudweed is regarded as a good indicator of ancient woodland, all four species are relatively shade intolerant and require an open habitat in order to flourish. Their locations within the wood demonstrate this more clearly than do the tabulated records owing to the presence of gaps in the more mature coppice stands. It is probable that their continuing survival in Leybourne Wood is dependent on the cycle of coppice cutting being maintained allied with persistence of viable seed in the soil (a seed bank) which would enable resurgence after coppice cutting.

To summarise, the particular interest of Leybourne Wood depends on the gradation of soil types and continuing active management. It is unfortunate from the wildlife viewpoint that so high a proportion of the ancient woodland trees has been replaced by Sweet Chestnut and that the remaining traditional coppice species are in greatest concentration towards the margins. If part of the wood is taken by road construction the choice between making a normally graded cutting or minimising the loss by use of retaining walls is not simple at the nature conservation level. A normally graded cutting would afford a good opportunity to establish a more traditional mixture of woody species on it. The topsoil lost from the existing wood could be spread on the new upper slopes to transfer its seed bank. The lower part of the cutting may expose more base rich substrata of which there is little in the ancient wood, but this would have limited significance. If a retaining wall were used compensatory provision of native mixed coppice species could be achieved only by poisoning adjoining chestnut coppice and re-planting in gaps. More of the woodland soil seed bank would be kept undisturbed and without the risks attached to storage and distribution. Whilst such risks militate against considering more gently graded and extensive cuttings to give a more attractive land form, the eventual choice may be best resolved by attention to factors outside the sphere of ecology.

4. Conclusion

The comparisons made by Henderson of the relative impacts of the proposed routes need no modification as a result of the above study. The on-line route is the least damaging to the interests of nature conservation, and the inner off-line route is less damaging than the outer off-line option.

5. KEY TO TABLES

With the exception of certain trees for which numbers are given, relative abundances are expressed by the following initials:

D	=	dominant
A	=	abundant
F	=	frequent
O	=	occasional
R	=	rare
L	=	may be prefixed, meaning locally
std	=	Trees may be described as std meaning standards or full grown specimens
copp	=	coppice

WETLAND SITES: Herbaceous Plants *(Species typical of wetlands are underlined)*

Table 1

SECTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	I	II	III	IV		A	B	C
Agrostis stolonifera (Creeping Bent)		A		O			O		R		R	A	O	O		O	R		O							
Alisma plantago – aquatica (Water Plantain)																							R				
Alliaria petiolata (Garlic Mustard)			R									R		R	R												
Apium nodiflorum (Fool's Water-cress)		+		D			O					F	R		R		R		R				O		F	A	R
Arctium minus (Lesser Burdock)					R			R	R																		
Barbarea vulgaris (Winter-cress)														R													
Berula erecta (Lesser Water-parsnip)																										O	
Brachypodium sylvaticum (False Brome)		R				F						R	R														
Callitriche spp (Water-starworts)											O	R	R	R		O	R	O	R								
Cardamine flexuosa (Wavy Bitter-cress)					R		R										R			R	R	O	O				
Carex acutiformis (Lesser Pond-sedge)																				O	O		LD				
Carex hirta (Hairy Sedge)				R																							
Carex pendula (Pendulous Sedge)		R		O		R															R	O					
Chaerophyllum temulum (Rough Chervil)					R																						
Circaea lutetiana (Enchanter's-nightshade)												R	R							O	R						
Cirsium arvense (Creeping Thistle)								O	R																O		O
Cirsium palustre (Marsh Thistle)							R	R		R				F	O								R				
Cirsium vulgare (Spear Thistle)				R																							
Clematis vitalba (Traveller's ivy)										R																	
Conium maculatum (Hemlock)									R	R																	
Dipsacus fullonum (Wild Teasel)							R			R							R										
Epilobium hirsutum (Great Willowherb)	D		R				O(LD)			O	O(LD)	O	O	F(LD)	A(LD)							R			F		F
Epilobium parviflorum (Hoary Willowherb)		+																				R					
Equisetum arvense (Field Horsetail)							R							R			R	R				R				O	R

WETLAND SITES: Herbaceous Plants *(Species typical of wetlands are underlined)*

Table 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	I	II	III	IV		A	B	C
Equisetum telmateia (Great Horsetail)																				A	A						
Festuca gigantea (Giant Fescue)			R						R		R		R	R		R	R		R							
Filipendula ulmaria (Meadowsweet)							R				R	R		R	O	O									R	
Gallium aparine (Cleavers)							R	O	R	R	R	R												R			
Geranium robertianum (herb-Robert)		O	R	R		F			R		R	O	R	R	R	R			O								
Geum urbanum (Wood Avens)						O														R							
Glechoma hederacea (Ground-Ivy)																				D	O	A					
Glyceria notata (Plicate Sweet-grass)													R												R		
Hedera helix (Ivy)		LA	A			LA																					
Hypericum tetrapterum (Square-stalked St John's Wort)														R													R
Impatiens glandulifera (Indian Balsam)					A	A	F(LD)	A(LD)	F	F	F	O	R	F	O	O		R	O								
Iris pseudacorus (Yellow Iris)	O	R		R			R												R								
Juncus bufonius (Toad Rush)				R																							
Juncus inflexus (Hard Rush)											R		O														
Lapsana communis (Nipplewort)		R				R																					
Lycopus europaeus (Gypsywort)	O	R		R			R						R			R		R		A	O	R				R
Lysimachia nummularia (Creeping Jenny)																											R
Lythrum salicaria (Purple-loose strife)																							R				R
Mentha Aquatica (Water-Mint)	O			F			O						R			O				A	O	F	F		F	F(LA)	F(LA)
Myosotis scorpioides (Water Forget-me-not)				O			O			R	F			F	O	F	O	F	O								
Myosoton aquaticum (Water Chickweed)							R						R														
Persicaria hydropiper (Water-pepper)							O																				
Persicaria maculosa (Redshank)				R			R																				
Phalaris arundinacea (Reed Canary-grass)	O												R			R	O	O									

WETLAND SITES: Herbaceous Plants *(Species typical of wetlands are underlined)*

Table 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	I	II	III	IV		A	B	C
Polygonum aviculare (Knotgrass)				R																							
Puccinellia distans (Reflexed Saltmarsh-grass)				R																							
Pulicaria dysenterica (Common Fleabane)																									A	F	O
Ranunculus acris (Meadow Buttercup)				R																							
Ranunculus repens (Creeping Buttercup)		+		F	F	F	O						R			O	F		O		F				A	F	O
Ranunculus trichophyllus (Water Crowfoot)																		O									
Rorippa nasturtium aquaticum agg (Water-cress)																									O		O
Rubus fruticosus (Bramble)			O(LD)				R				O				A		R		R								
Rubus idaeus (Raspberry)											R																
Rumex conglomeratus (Clustered Dock)				O			R						O				O	R								F	R
Rumex conglomeratus x obtusifolius																R											
Rumex obtusifolius (Broad-leaved Dock)																O			R								
Scirpus sylvaticus (Wood Club-rush)																				R							
Scrophularia auriculata (Water Figwort)	R	R		R	O					R	R		R	O	O	R	R	R		R	R				R	F	O
Solanum dulcamara (Bittersweet)	O						R	R		R	R	O	R		R	R	O						R		R	R	R
Sparganium erectum (Branched Bur-reed)										R	R	O(LD)		O(LD)		A	O	F	R							R	O
Tussilago farfara (Coltsfoot)																			R								
Urtica dioica (Common Nettle)		F	O	O	A	A	O	D	D	D	F	R	O	A	F		O	O	O	O	R	D	D		F	R	R
Veronica beccabunga (Brooklime)				R			R						R			R	R								A	O(LD)	F(LD)
Veronica filiformis (Slender Speedwell)							R																				
Veronica montana (Wood Speedwell)									R																		
Approximate percentage shade by woody species	70	10	90	NIL	70	80	NIL	80	90	70	30	30	10	10	50	NIL	NIL	NIL	60	90	80	90	80		30	10	70

WETLAND SITES: Trees and Shrubs *(Species typical of wetlands are underlined)*

Table 2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	I	II	III	IV		A	B	C
Acer campestre (Field Maple)					+																				+		
Acer platanoides (Norway Maple)																			+								
Acer pseudoplatanus (Sycamore)			+																	F							
Aesculus hippocastanum (Horse Chestnut)						D																					
Alnus glutinosa (Common Alder)					+		+	+	A	+	+	+	+	+						A		A	D				
Betula sp (Birch)																						+					
Cornus sanguinea (Dogwood)					+																						
Corylus avellana (Hazel)	+					+			+																+		
Crataegus monogyna (Hawthorn)		+				+		+	+		+		+		+										+		
Cydonia oblonga (Quince)									+																		
Fagus sylvatica (Beech)			D																								
Fraxinus excelsior (Ash)					+																						
Populus spp (Poplars)	+																		+								
Prunus domestica (Damson)												+			A												
Quercus robur (Pedunculate Oak)	+																										
Ribes rubrum (Red Currant)												+															
Rosa Canina (Dog Rose)								+						-													
Salix alba (White Willow)																			+				+				
Salix cinerea (Grey Sallow)																				+	+		+		+	+	D
Salix fragilis (Crack Willow)	+								+		+	+	+						+	A	D	A			+		
Sambucus nigra (Elder)	+		A		+	+		+	A	+	+	+	+	+						F		+			+		
Garden Exotics		+													+												
Totals of wetland plants as defined by the National Pond Survey	7	6	1	10	2	2	16	4	5	8	11	10	14	11	7	11	9	7	9	6	6	6	10		9	10	12
Wetland Plant Conservation Score	7	6	1	10	2	2	17	4	5	8	11	10	14	11	7	11	7	11	9	8	7	6	11		9	11	12

WETLAND SITES: Herbaceous plants *(Species typical of ancient woodland are underlined)*

Table 3

	Z	1	2	3	4	5	6	7	8	9	10	11	12	13
Agrostis capillaris (Common Bent)		F	R	R	R					R	R	F	O	O
Ajuga reptans (Bugle)					R	R			R	R				R
Alliaria petiolata (Garlic Mustard)	O		R	R										
Anthriscus sylvestris (Cow Parsley)				R	R									
Arctium minus (Lesser Burdock)			R	R	R	R								R
Arum maculatum (Lords and Ladies)	O				R	R	R							
Atriplex prostrata (Spear-leaved Orache)											R			
Brachypodium sylvaticum (False Brome)				R	O									
Campanula trachelium (Nettle-leaved Bellflower)													R	O
Centaurium erythraea (Common Centaury)													R	
Ceratocapnos claviculata (Climbing Corydalis)		R				R								
Chamerion angustifolium (Rosebay Willowherb)										R	R	R	R	R
Chenopodium polyspermum (Many-seeded Goosefoot)											O	R	R	
Circaea lutetiana (Enchanter's nightshade)							R	R	R		R		R	O
Cirsium arvense (Creeping Thistle)									R		O	O	R	O
Cirsium palustre (Marsh Thistle)									R		R		R	R
Cirsium vulgare (Spear Thistle)											R			R
Clematis vitalba (Traveller's Joy)														R
Conyza canadensis (Canadian Fleabane)											R			
Digitalis purpurea (Foxglove)		O	O			O		R	R	R	F(LA)	O(LA)	F(LA)	
Dryopteris dilatata (Broad Buckler-fern)					R		R	R		R		R	R	
Dryopteris filix mas agg (Male-fern)			R			R	R		R		R		R	R
Epilobium hirsutum (Great Willowherb)											R			
Epilobium tetragonum (Square-stalked Willowherb)											R		R	

WETLAND SITES: Herbaceous plants *(Species typical of ancient woodland are underlined)*

Table 3

	Z	1	2	3	4	5	6	7	8	9	10	11	12	13
Euphorbia amygdaloides (Wood-spurge)						R	R		R		R	F	F	O
Fallopia convolvulus (Black-bindweed)											O	R	R	R
Festuca gigantea (Giant Fescue)							R							
Galeopsis Tetrahit (Common Hemp-nettle)											O	O	R	R
Geum urbanum (Wood Avens)	R		R					R	R	R				R
Glechoma hederacea (Ground Ivy)	R		R	A	A	A	R	A	A	A	A	A	A	F
Gnaphalium sylvaticum (Heath Cudweed)											R		R	
Gnaphalium uliginosum (Marsh Cudweed)										R	R	R		R
Hedera helix (Ivy)	O		R(LD)	O			O(LA)	O						R
Heracleum sphondylium (Hogweed)			R	R	O	R								R
Holcus sp (mainly mollis)		F	R	R	R	O		R	R	R	O	O	R	O
Hyacinthoides non-scripta (Bluebell)	R	D	A		O	D	A	D	A	A	A	F	F	O
Hypericum humifusum (Trailing St John's wort)													R	
Hypericum perforatum (Perforate St John's wort)													R	R
Impatiens glandulifera (Indian Balsam)											R			
Juncus effusus (Soft-rush)									R		R	R	R	
Juncus tenuis (Slender Rush)					R								R	
Lapsana communis (Nipplewort)			R									R		R
Lonicera periclymenum (Honeysuckle)					R			O					R	
Lysimachia nemorum (Yellow Pimpernel)									R					
Mercurialis perennis (Dog's Mercury)		F	O(LD)	D	A(LD)	R	A	O	O	O	O	O	R	F
Moehringia trinervia (Three-nerved Sandwort)			R									R	R	
Ornithopus perpusillus (Bird's-foot)												R	R	
Persicaria lapathifolia (Pale Persicaria)											O			
Persicaria maculosa (Redshank)						R			R		F	O	O	R

WETLAND SITES: Herbaceous plants *(Species typical of ancient woodland are underlined)*

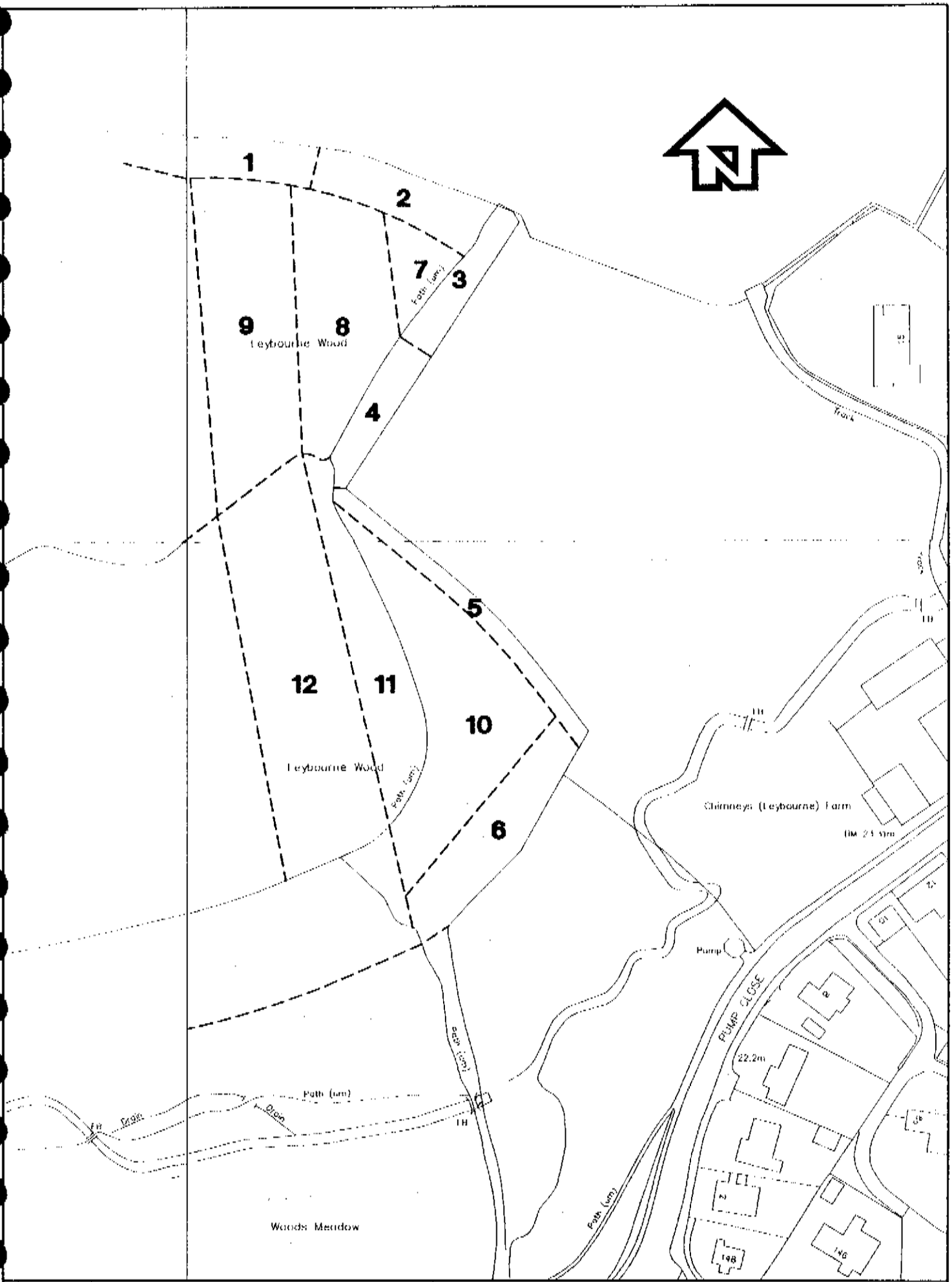
Table 3

	Z	1	2	3	4	5	6	7	8	9	10	11	12	13
Picris hieracioides (Hawkweed Oxtongue)													R	
Poa nemoralis (Wood Meadow-grass)					R									
Polygonum aviculare (Knotgrass)											R			
Primula vulgaris (Primrose)													R	
Pteridium aquilinum (Bracken)		R	R						R					
Rubus fruticosus agg (Bramble)	O		R			O		O	O	R(LA)		R	R	R
Rumex sanguineus (Wood Dock)	R		R	R	O	R		R	R	R				R
Scrophularia nodosa (Common figwort)		R	R		R	R			R	R	R	R	R	R
Senecio jacobea (Ragwort)											R		R	
Senecio sylvaticus (Heath Groundsel)						R				R	O	R	R	R
Silene dioica (Red Campion		O	F(LD)	O	O	F	R	F	O	R	O	O	O	O
Solanum dulcamara (Bittersweet)												R		R
Solanum nigrum (Black Nightshade)			R								O	R	R	
Stachys sylvatica (Hedge Woundwort)			R	R										
Stellaria holostea (Greater Stitchwort)				R	R			R			R	R		
Teucrium scorodonia (Wood Sage)									R	R		R	O	
Urtica dioica (Nettle)	D	R		O	R	O	O			R	F	R	R	O
Veronica montana (Wood Speedwell)							R	R						O
Vicia sepium (Bush Vetch)			R	O	R			R			R	R	R	R
Viola odorata (Sweet Violet)	O													
Viola riviniana (Common Dog-violet)					R					R			R	O
Totals of herbaceous species recorded	10	10	22	16	22	19	13	16	21	19	35	29	41	34

WETLAND SITES: Trees and Shrubs *(Species typical of ancient woodland are underlined)*

Table 4

	Z	1	2	3	4	5	6	7	8	9	10	11	12	13
Acer campestre (Field Maple) Acer pseudoplatanus (Sycamore) Alnus glutinosa (Alder)	F		1						R R 1	R Copp			R Copp	1
Betula pendula (Birch) Carpinus betulus (Hornbeam) Castanea sativa (Sweet Chestnut)	Std & D Copp	O Copp 1 D Copp	1 D Copp	R Copp	Co D Copp	2 D Copp	F Copp	R D Copp	F(LD) 1 D Copp	O D Copp	D Copp	R 1 D Copp	R 1 D Copp	D Copp
Cornus sanguinea (Dogwood) Corylus avellana (Hazel) Crataegus monogyna (Hawthorn) Cytisus scoparius (Broom)	F	2	R R	O R	O R	F	A F	R	R	R R	R R R	R R	R R R R	O R
Euonymus europaeus (Spindle) Fraxinus excelsior (Ash) Ilex aquifolium (Holly)	R R	R	R	D Copp	Co D Copp 1	D Copp	O Copp	R Copp	1				R	R
Mahonia aquifolium (Oregon-grape) Pinus sylvestris (Scots Pine) Prunus avium (Wild Cherry) Prunus domestica (Bullace)	O 1				1 R(LD)				1					
Quercus petraea (Sessile Oak) Quercus robur (Pedunculate Oak) Ribes rubrum (Red Currant)	1 Std 1		1	R	R	R		R	R	R		R	R	R
Ribes uva crispa (Gooseberry) Rosa canina (Dog Rose) Salix caprea (Goat Willow)	1			R					8		8			8
Sambucus nigra (Elder) Sorbus aucuparia (Rowan)	R	O	F	R	R	F	A	A	R	F	F	O	O 1	O
Ulmus glabra (Wych Elm) Ulmus procera (English Elm)	R		2 Copp											
Approximate coppice height (m)		12	12	12	12	12	12	6-7	6-7	6-7	2-3	2-3	2-3	2-3



A228 LEYBOURNE BYPASS
SUPPLEMENTARY VEGETATION SURVEY
LEYBOURNE WOOD

SECTION 3

BIRD SURVEY

AUTUMN/WINTER 1991

N C TARDIVEL

1. INTRODUCTION

The object of the survey was to:

1. Assess the importance of the area for birds,
2. To record the species present, indicating their abundance and the habitat, within the survey area which were of greatest importance for those species; and
3. To indicate what mitigating features should be included in the proposed by-pass design in order to reduce the impact of the development on the birds of the surrounding area.

2. METHOD

2.1 THE SURVEY AREA

The survey area lies to the south of the M20 motorway, from its junction (No.4) with the A228 to the northern end of the West Malling By-pass. At its eastern limit lies the A228 Castle Way and it extends through a corridor, approximately 0.5 kilometres wide, and to the west of the Castle Way. The A20 crosses the area near its southern limit and a B road (Park Way) traverses the northern section of the area.

The area consists mainly of farmland. The northern section, consisting of approximately 0.3 of the whole survey area, is mainly pasture grazed by horses. The middle section, also approximately 0.3 of the area, is planted with maize. The southern section includes a large tract of Leybourne Woods together with smaller copses, mature hedgrows and small fields also mainly grazed by horses, which lie to the south of the A20.

There are houses along Castle Way, Pump Close and Park Road and there are also a number of larger establishments such as Leybourne Castle, St Peter and St Pauls Church and The Hermitage. Many of the houses and the larger establishments have large gardens and grounds associated with them adding significantly to the variety of habitat within the survey area.

To the northeast of the survey area lie the Leybourne Lakes. This complex of old gravel pits has become one of the most interesting areas for birds within the county attracting both large numbers and a wide variety of birds throughout the year. It is considered that the survey area will derive an additional importance as a result of its proximity to the adjacent complex of lakes.

Recent bird surveys in the county have been based to a large extent on the tetrads (ie. 2km squares shown on the 1:50000 British Ordnance Survey maps). The survey area lies within the tetrad TQ65 V.

2.2 RECORDING METHOD

The survey area was visited on three occasions during November and early December 1991. Two visits were made during mornings and one in late afternoon; this latter in order to record any evidence of roosting within the area.

The timing of the survey is such that it does not fall within the generally accepted periods for the seasonal surveys carried out both within Kent and nationally. These have been based on methods designed to provide information which allows comparisons to be made between areas and for breeding and wintering birds.

It is considered that the survey information provided within this report, whilst of specific interest, should not be compared too strictly with previous bird surveys. The bird populations within the area at this time of year are in a state of flux (ie. between 'seasons') although it should resemble the expected winter populations.

The census method was based generally on that used for the British Trust For Ornithology (BTO) Winter Bird Survey 181–84. The BTO survey recommended a 6 hour visit each year to each 10km square shown on the 1:50000 British Ordnance Survey maps. Shorter visits (minimum 1 hr duration) could be used in the survey. There was also provision for including supplementary observations in order to record scarce and elusive species which may be overlooked on a single visit.

The survey area is contained generally within one km square (ie approx 0.25 of a tetrad). It was decided to make three 2hr visits in order to record in the brief period available, a reasonably comprehensive indication of the bird population at this time of year. Only the birds considered to be using the survey area in some way for feeding, resting or roosting, were recorded. Those which were deemed to be flying over the survey area were not included.

3. Diary of Survey Visits

3.1 Winter Survey

The site was visited on three occasions during the winter of 1991, as detailed below:

3.1.1 Date: 2nd November, 1991

Time – 09.30 – 12.05

Weather – Sunny, windy.

3.1.2 Date: 18th November, 1991

Time – 14.40 – 16.40

Weather – Sunny, cool, still.

3.1.3 Date: 1st December, 1991

Time – 09.25 – 12.00

Weather – Dull, misty, mild.

4. Winter Birds

Total Number of Species Recorded	Visit 1	Visit 2	Visit 3	Recorded on No. Visits
Grey Heron	1	–	2	
Kestrel	1	1	3	
Lapwing	12	–	210+	
Black-headed Gull	–	–	11	
Common Gull	–	–	1	
Stock Dove	4	–	–	
Woodpigeon	54+	22+	101+	
Collard Dove	1	2	–	
Green Woodpecker	–	1	1	
Pied Wagtail	2	–	12	
Starling	51+	29+	81+	
Jay	1	1	2	
Magpie	12	7	9	
Jackdaw	22+	–	4	
Rook	125+	–	5	
Carrion Crow	12	7	16	
Wren	2	4	8	
Dunnock	–	2	2	
Robin	14	7	22	
Fieldfare	–	9	5	
Blackbird	22	41	49	
Redwing	1	4	2	
Song Thrush	2	6	4	
Mistle Thrush	3	3	2	
Long-tailed Tit	3	–	23+	
Coal Tit	2	1	2	
Blue Tit	14	10	32	
Great Tit	4	3	12	
Treecreeper	1	–	–	
House Sparrow	57+	25+	85+	
Chaffinch	11	23	73	
Greenfinch	5	11	19	
Goldfinch	3	2	2	
Bullfinch	2	1	–	
Total Species per Visit	**29**	**24**	**30**	

Total species recorded during the survey

34 within the survey area

5. THE BIRDS RECORDED

In total 34 species were recorded. This is a smaller number than expected in view of the range and variety of habitat within the survey area. However, it is considered that throughout the year many more species would occur here and that the number of species recorded reflects the time of year and the short period during which the survey was carried out.

For comparison, other surveys within the region recorded species numbers as indicated below:

SURVEY	NO. OF SPECIES	SOURCE
Winter survey (1981-84)		BTO Atlas
data for full 10km sq.	76 – 100	
Winter survey (1977-80)		KOS Winter Bird Survey
survey area tetrad (ie 2km sq)		
	TQ65 V	25–49
	TQ76 E	100+
North Farm (1990-91)	33	Author for KCC
Lamberhurst By Pass (1990-91)	35	Author for KCC
A21 Kippings Cross to Lamberhurst (1990-91)	35	Author for KCC
Breeding survey 1968-72		BTO Atlas
data for full 10km sq		
	TQ65 V	76+
	TQ76 E	76+

The survey area lies within Tetrad TQ65 . This square includes the southeastern corner of Leybourne Lakes. Tetrad TQ76 E is the adjacent northeasterly tetrad which includes the larger proportion of Leybourne Lakes.

Of greatest interest on the list of species recorded where the following:

SPECIES	COMMENTS
Lapwing	Over 200 Lapwings were counted during the third visit, feeding on the fields in the extreme southeastern corner of the survey area. They had been attracted to a recently ploughed field and were present together with a small number of gulls and Pied Wagtails.
Rook/Jackdaw	Very large numbers of these species were present on the grazing pasture in the northern section of the area on the first visit. Although these flocks were not present on the two subsequent visits, it is very likely that the area is regularly used by these species.
Blackbirds	49 Blackbirds were recorded within the southern section of the survey area on the third visit. The general distribution of the individual birds together with small numbers of Fieldfare, and Redwings, indicate that the area is of importance for these species particularly during the winter and that they may gather in large numbers to roost and feed in the woods and hedgerows.

Chaffinch — 73 Chaffinches were counted on the third visit. Many of these occurred in small flocks along the wooded margins of the maize fields. Greenfinches were also present in small number. It is anticipated that the maize fields will eventually provide an important feeding site for these species and that their numbers will increase significantly during the winter.

During the late afternoon visit, thrushes, finches and Starlings were observed moving to roost over the survey area. The thrushes and finches were gathering in the western sections of Leybourne Wood, beyond the survey area. This area consisted of mature coppice and was unlike the section of the wood closest to the proposed road improvement which had been more recently harvested. As the pattern of coppice age changes within the wood over time, it is expected that the location of roosts within the wood will also change. So the birds will tend to roost in the coppice at the eastern end as it grows through its management cycle and becomes more suitable for roosting birds.

The Starlings were flying northeast and it was not possible to identify their roost site.

There were also indications that tits were gathering and roosting in the woodland along the stream on the southern edge of Leybourne Wood.

It is considered that the numbers of thrushes and finches occurring in the area will at times be such (ie. >100 individuals of four species) that the area would be classified as of County importance for its ornithological interest under Fullers 1980 Site Assessment Criteria for winter population size.

6. Status of Species Recorded

Of the birds recorded during the survey the following species are the subject of specific legal status:

Species	Comments
Fieldfare	Protected under Schedule 1 of WCA 1981; EC Birds Directive; Appendix III of the Berne Convention.
Redwing	Protected under Schedule 1 of WCA 1981; EC Birds Directive; Appendix III of the Berne Convention.

In addition the following species are identified as Red Data Bird Candidate Species:

Lapwing

Nightingale — This summer migrant is listed as having been recorded within Leybourne Wood. (Kent Trust for Nature Conservation report on this Site of Nature Conservation Interest refers.)

6.1 EC Council Directive on the Conservation of Wild Birds (79/409/EEC)

All EC member states are required to take measures to protect wild birds and to preserve sufficient diversity, of habitat for all species naturally occurring within their territories, so as to maintain their populations at an ecologically and scientifically sound level. Species whose status is a cause of some concern are specifically identified (in Annex 1) for special conservation measures.

6.2 The Berne Convention on the Conservation of European Wildlife and Natural Habitat

The Convention carries an obligation to protect and conserve a wild range of flora and fauna (including their habitats), especially those listed as endangered or vulnerable.

6.3 The Wildlife and Countryside Acts 1981-5

Schedule 1 affords special protection to the birds listed therein.

6.4 The Red Data Bird Candidate Species

This is a recent publication of the Nature Conservancy Council and the Royal Society for the Protection of Birds, which lists species living in or visiting Britain which are considered to be vulnerable to the risks of extinction. Species have been selected for inclusion on the basis that their British populations fulfil at least one of the following five criteria:

1. **International significance of British Population**
   Form at least 20% of the N European population.

2. **Scarcity as British Breeders**
   Less than 300 pairs breeding in Britain.

3. **Declining breeding numbers**
   Persistent decline of more than 50% in the last 25 years.

4. **Restricted distribution in vulnerable sites or habitats**
   More than 50% of the total population occurring on 10 or fewer sites.

5. **Species of special concern**

This publication includes the Fieldfare and the Redwing. It also lists 30 species which do not yet qualify for full inclusion but which give rise to concern about their future status.

7. Effects of the Proposed Route

7.1 The Ornithological Interest

This will be considered in terms of the three sections of the survey area identified above.

7.1.1 The Grazing Pasture

The Grazing Pasture within the northern third of the survey area. Apart from the large flock of corvids (Rooks and Jackdaws) within the area on the first visit, there were relatively few birds in this section. Green Woodpecker and Kestrel occurred in the fields nearest the motorway and flocks of tits and sparrows used the isolated trees and remaining hedgerow bushes as they moved around the fields. Jay, Robin, Wren and Blackbird occurred within the woodland either side of the junction of Castle Way and Park Road. These woods are used by small numbers of these species for roosting. It was not possible to confirm whether the specimen Oak trees were used by hole nesting species, including owls or the Kestrels: this cannot be discounted.

7.1.2 The Maize Fields

Few birds were recorded within this section of the survey area. On the third visit small flocks of finches and sparrows were observed around the margins of the maize fields. indicating that as the crop ripened and was harvested, the birds would utilise the area to a greater extent.

7.1.3 Leybourne Woods

Leybourne Woods and the areas to the south of the A20.

This was the most diverse section and the most interesting for birds.

The east end of Leybourne Wood which lies within the survey area consisted of two very distinct parts.

1. The larger part covering the higher ground, consisted of an even aged stand of Sweet Chestnut coppice. Most of the growth was approximately four to five years old. Few birds were recorded here.

   Robins, holding winter territories, occurred among the taller trees around the margins of the coppice.

2. The southern edge of the Wood, consisted of a shallow valley with mixed woodland each side of a small stream. This area held higher numbers of birds. The tit species, including Coal Tits and Long-tailed Tits, together with Treecreeper, occurred here.

The area to the south of the A20 was very diverse and generally held higher numbers of birds. The copses and hedgerows in particular provided habitat within which many of the birds were observed. Herons roosted in the taller trees, Kestrels hunted over the area, and many of the Blackbirds together with Fieldfares and Redwings were feeding along the hedgerows.

7.2 Habitat Loss

The observed ornithological interest within the survey area was located mainly in the southern section as described above. It is concentrated within and around the mixed wooded areas and hedgerows. Nevertheless the importance of the more open areas should not be underestimated. It is usually the case that the habitats each contribute to the value of the whole area and it is difficult, on the basis of the brief period of the survey, to predict the full value of the specific features.

In general terms, the most significant habitat change, which it is considered will have the greatest effect on the existing wild bird populations, would be the removal and loss of woodland, trees and hedgerows.

7.3 Mitigating Proposals

To limit the impact of the proposed development on the local wild bird population within the survey area the following recommendations are made:

7.3.1 Retain as much of the existing woodland and hedgerow and as many of the existing trees as possible. In addition existing trees should be retained wherever possible, rather than be removed as a short term expedient, albeit with the intention of replacing them with new planting.

7.3.2 Protect the existing streams and restrict culverting of these to a minimum in order to preserve their integrity and prevent them becoming fragmented.

7.3.3 Ensure that there is a generous provision of tree and shrub planting along any new road development. The planting should consist of appropriate indigenous species. Adequate provision should be included for the management and early establishment of the planting.

It is not possible to predict what effect, if any, may arise from the disturbance along the route of the realigned road. Disturbance is an existing significant feature of the southern section of the area, and may well be influencing the bird populations in this location. The road improvements will however, greatly increase the disturbance within parts of the existing, relatively sheltered woodland. The impact of the development here may be reduced by one or both of the following measures:

7.3.4 Setting the road in a cutting. The banks of the cutting would act as a baffle reducing the penetration of the noise and other disturbance into the surrounding areas. Alternatively, the construction of a retaining wall along the road side would reduce g the loss of existing woodland by reducing the landtake necessary to form the bank.

7.3.5 Where the road, by necessity, is raised above the surrounding land, then screens at the side of the road should reduce the visual disturbance to the immediate surrounds. However, the full benefit of such a measure remains uncertain.

8. SUMMARY

On the basis of the survey undertaken, the ornithological interest is of local rather than regional importance. However, it is considered that the area will derive greater interest at other times of the year both because of its inherent diversity of habitat and as a result of its proximity close to the Leybourne Lakes.

It is anticipated that the proposed road improvements would have their greatest effect on the ornithological interest at the southern end of the survey area. The inclusion of appropriate, practical, mitigating measures will be most important in order to minimise the impact of the proposals on the ornithological interest of this location.

In order to more fully and accurately evaluate the ornithological interest g within the survey area, the survey should be extended to include both the winrering (December to February) and the breeding (late March to end June) periods.

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SECTION 3A

BIRD SURVEY

SUMMER 1992

N C TARDIVEL

1. INTRODUCTION

The object of the survey was to:

1. Continue the assessment of the importance of the area for birds; with observations during the Summer to complement those already made during the Winter of 1991/92.

2. To record the species present, indicating their abundance and the habitats within the survey area which were of greatest importance for those species; and

3. To indicate what mitigating features should be included in the proposed by-pass design in order to reduce the impact of the development on the birds of the surrounding area.

2. METHOD

2.1 THE SURVEY AREA

The survey area remains as described in the earlier Winter survey, with the exception that the farmland in the middle section of the survey area is planted with linseed following the earlier maize crop.

For reference the Area description is repeated below:

> The survey area lies to the south of the M20 motorway, from its unction (No.4) with the A228 to the northern end of the West Malling By-pass. At its eastern limit lies the A228 Castle Way and it extends through a corridor, approximately 0.5 kilometres wide, and to the west of the Castle Way. The A20 crosses the area near its southern limit and a B road (Park Road) traverses the northern section of the area.
>
> The area consists mainly of farmland. The northern section, comprising approximarely one third of the whole survey area, is mainly pasture grazed by horses. The middle section, also approximately one third of the area, is arable farmland. The southern section includes a large tract of Leybourne Woods together with smaller copses, mature hedgrows and small fields also mainly grazed by horses, which lie to the south of the A20.
>
> There are houses along Castle Way, Pump Close and Park Road and there are also a number of larger establishments such as Leybourne Castle, St Peter and St. Pauls Church and The Hermitage. Many of the houses and the larger establishments have large gardens and grounds associated with them adding significantly to the variety of habitat within the survey area.
>
> To the northeast of the survey area lie the Leybourne Lakes. This complex of old gravel pits has become one of the most interesting areas for birds within the county attracting both large numbers and a wide variety of birds throughout the year. It is considered that the survey area will derive an additional importance as a result of its proximity to the adjacent complex of lakes.
>
> Recent bird surveys in the county have been based to a large extent on the tetrads (ie. 2km squares shown on the 1:50000 British Ordnance Survey maps). The survey area lies within the tetrad TQ65 V.

2.2 Recording Method

The survey area was visited on four occasions, once each during the months of June, July, August and September 1992. All visits were made during mornings.

The timing of the survey is such that it does not fall within the generally accepted periods for the seasonal surveys carried out both within Kent and nationally. These have been based on methods designed to provide information which allows comparisons to be made between areas and for breeding and wintering birds.

It is considered that the survey information provided within this report, whilst of specific interest, should nor be compared too strictly with previous bird surveys. The bird populations within the area at this time of year are in a state of flux (ie. between 'seasons'). There is limited scope to make some rough estimates of the breeding populations in the general area.

The census method was based generally on that used for the British Trust For Ornithology (BTO) Winter Bird Survey 1981-84. The BTO survey recommended a 6 hour visit each year to each 10km square shown on the 1:50000 British Ordnance Survey maps. Shorter visits (minimum 1 hr duration) could be used in the survey. There was also provision for including supplementary observations in order to record scarce and elusive species which may be overlooked on a single visit.

The survey area is contained generally within one km square (ie approx. 0.25 of a tetrad). It was decided to make four 2 hr visits in order to obtain a reasonably comprehensive indication of the bird population at this time of year. Only the birds considered to be using the survey area in some way for nesting, feeding, resting or roosting, were recorded. Those which were deemed to be flying over the survey area were not included.

2.3 Diary of Survey Visits

Summer Survey

The site was visited on four occasions during the summer of 1992, as detailed below:

1. Date 14th June, 1992
   Time 08.10 – 10.10
   Weather Sunny, warm, still.

2. Date 19th July, 1992
   Time 08.15 – 10.30
   Weather Sunny becoming overcast, warm, still.

3. Date 8th August, 1992
   Time 08.00 – 10.20
   Weather Thundery, humid light breeze.

4. Date 13th September, 1992
   Time 08.40 – 10.50
   Weather Dull, cool, still.

3. Summer Birds

Total Number of Species Recorded	Visit 1	Visit 2	Visit 3	Visit 4
Greylag Goose	–	2	–	–
Kestrel	1	3	1	1
Black-headed Gull	1	2	7	5
Herring Gull	–	1	3	10
Stock Dove	–	5	2	–
Woodpigeon	50	52	54	73
Collard Dove	2	2	–	–
Turtle Dove	1	1	–	–
Cuckoo	1	–	–	–
Swift	3	10	10	–
Green Woodpecker	1	2	–	2
Great Spotted Woodpecker	–	1	3	–
Swallow	3	4	18	31
House Martin	5	11	73	173
Skylark	1	–	–	–
Pied Wagtail	1	–	13	1
Starling	65	67	129	387
Jay	–	–	2	2
Magpie	6	7	5	9
Jackdaw	5	–	2	5
Rook	–	–	5	87
Carrion Crow	1	6	10	11
Wren	23	17	5	6
Dunnock	7	–	6	10
Blackcap	1	3	2	–
Whitethroat	2	–	2	–
Chiffchaff	7	14	4	7
Spotted Flycatcher	1	3	10	–
Robin	9	4	12	33
Blackbird	29	17	17	6
Song Thrush	15	11	3	3
Mistle Thrush	4	1	–	2
Coal Tit	1	–	–	–
Blue Tit	57	33	37	35
Great Tit	18	2	11	22
House Sparrow	57	123	178	74
Chaffinch	17	7	3	8
Greenfinch	12	45	78	342
Goldfinch	7	5	12	–
Linnet	3	16	76	350
Redpoll	–	–	2	–
Bullfinch	2	–	1	–
Corn Bunting	–	–	1	–
Yellowhammer	3	1	2	–
Total Number of Species Recorded per visit	**36**	**32**	**36**	**27**

Total species recorded during the survey: 44
within the survey area

4. THE BIRDS RECORDED

In total 44 species were recorded. This number reflects the range and variety of habitat within the survey area. However, it is considered that throughout the year many more species would occur here and that the number of species recorded reflects the time of year and the time actually spent on site carrying out the survey.

For comparison, other surveys within the region recorded species numbers as indicated below:

SURVEY	NO. OF SPECIES	SOURCE
Breeding survey (1968-72) data for full 10km sq.		BTO Atlas
TQ65 V	76+	
TQ76 E	76+	
Lamberhurst By Pass Four visits Spring 1991	44	Author for KCC
A21 Kippings Cross to Lamberhurst Four visits Spring 1991	47	Author for KCC
Castle Way Winter 1990-91	34	Author for KCC

The survey area lies within Tetrad TQ65 V. This square includes the southeastern corner of Leybourne Lakes. Tetrad TQ76 E is the adjacent northeasterly tetrad which includes the larger proportion of Leybourne Lakes.

Of greatest interest on the list of species recorded where the following:

SPECIES	COMMENTS
Kestrel	One pair regularly within the northern end of the survey area. The nest site was not located.
Green & Great Spotted Woodpecker	Both of these species were present within the survey area during the survey period. The Green Woodpeckers were recorded in the farmland at the northern end, whilst the Great Spotted occurred in the woodland at the southern end of the area.
House Martin	There was a significant increase in the number of this species recorded in the later visits. They were observed feeding over the whole survey area but were probably attracted to the general area by the proximity of the nearby lakes which offer good feeding and roosting opportunities.
Rook	Although not recorded during the early visits, there was a significant number of this species in September as the winter flock gathered. The Winter survey recorded numbers over 125.

Wren	Territorial birds were still singing regularly during June, so the species was easier to detect, thus accounting for the higher numbers recorded at this time. As the breeding season progressed the birds become quieter and more skulking, and less likely to be recorded. It is considered that the June count gives some indication of the numbers of breeding pairs in the survey area. Wrens were recorded throughout the area but occurred in higher numbers along the streams and in the woods at southern end of the survey area.
Blackcap	Small numbers were recorded in the woodland along the stream at the southern edge of the chestnut coppice.
Whitethroat	Small numbers recorded both in the woodland along the stream at the southern edge of the chestnut coppice and in the woodland near the junction of Park Rd. and Castle Way.
Chiffchaff	Birds continued to sing throughout the survey period. Most occurred in the woodland in the southern end of the survey area. Two 'family' parties of Chiffchaff's were observed in the woodland along the stream at the southern edge of the chestnut coppice.
Spotted Flycatcher	Small numbers were recorded within the survey area during the survey period. 'Family' parties were very active during the third visit suggesting that not less than five or six pairs had bred within or close to the survey area.
Blackbird/Song Thrush	Higher early counts may give an indication of the numbers of breeding pairs in the area.
Blue Tit	Nine 'family' parties of Blue Tits were recorded on the first visit, seven at the southern end of the survey area.
Greenfinch/Linnet	A large mixed flock of these species was present in September. They were feeding along the northern edge of the linseed field.

It is considered that the numbers of birds occurring in the area are such that the area would be classified as of Local importance for its ornithological interest under Fullers (1980) Site Assessment Criteria for breeding populations.

5. Status of Species Recorded

Of the birds recorded during the survey the following species are the subject of specific legal status:

Species	Comments
Greylag Goose	Protected under Schedule 2 of WCA 1981; EC Birds Directive; Appendix III of the Berne Convention.

The birds seen are undoubtedly from the established introduced feral population of this species, and presumably resident on the Leybourne Lakes.

In addition the following species are identified as Red Data Bird Candidate Species:

Herring Gull
Turtle Dove
Swallow
Whitethroat
Spotted Flycatcher
Linnet
Corn Bunting

EC Council Directive on the Conservation of Wild Birds (79/409/EEC)

All EC member states are required to take measures to protect wild birds and to preserve sufficient diversity of habitat for all species naturally occurring within their territories, so as to maintain their populations at an ecologically and scientifically sound level. Species whose status is a cause of some concern are specifically identified (in Annex 1) for special conservation measures.

The Berne Convention on the Conservation of European Wildlife and Natural Habitats

The Convention carries an obligation to protect and conserve a wide range of flora and fauna (including their habitats), especially those listed as endangered or vulnerable.

The Wildlife and Countryside Acts 98-5

Schedule 1 affords special protection to the birds listed ' therein.

The Red Data Bird Candidate Species

This is a recent publication of the Nature Conservancy Council and the Royal Society for the Protection of Birds, which lists species living in or visiting Britain which are considered to be vulnerable to the risks of extinction. Species have been selected for inclusion on the basis that their British populations fulfil at least one of the following five criteria:

1. International significance of British Population Form at least 20% of the N W European population.
2. Scarcity as British Breeders Less than 300 pairs breeding in Britain.
3. Declining breeding numbers Persistent decline of more than 50%, in the last 25 years.
4. Restricted distribution in vulnerable sites or habitats More than 50% of the total population occurring on 10 or fewer sites.
5. Species of special concern.

This publication includes the Greylag Goose and also lists 30 species which do not yet qualify for full inclusion but which give rise to concern about their future status.

6. Effects of the Proposed Route

6.1 The Ornithological Interest

This will be considered in terms of the three sections of the survey area identified above.

1. The Grazing Pasture within the northern third of the survey area

As during the Winter survey, a smaller proportion of the total bird numbers occurred in this section. However, the variety of species was greater than during the winter. Green Woodpecker and Kestrel occurred in the fields nearest the motorway and flocks of tits and sparrows used the isolated trees and remaining hedgerow bushes as they moved around the fields. Spotted Flycatchers fed under the isolated Oak trees. Pied Wagtails frequented the fields grazed by horses. Mistle Thrush, Goldfinch, Bullfinch, Corn Bunting and Yellowhammer occurred here. The woodland either side of the junction of Castle Way and Park Road is considered to be of importance for many of the birds.

2. The Linseed Fields

Few birds were recorded within this section of the survey area during the first two visits. In August and September however, the area was used by many of the feeding House Martins, and there was a large mixed flock of over 500 Greenfinches and Linnets in approximately equal numbers, in September.

3. Leybourne Woods and the areas to the south of the A20

This was the most diverse section and the most interesting for birds.

The east end of Leybourne Wood which lies within the survey area consisted of two very distinct parts.

i. The larger part covering the higher ground, consisted of an even aged stand of Sweet Chestnut coppice. Most of the growth was approximately four to five years old. Few birds were recorded here, there being only small numbers of Great Tits, Chiffchaffs and Blackcap.

ii. The southern edge of the Wood, consisted of a shallow valley with mixed woodland each side of a small stream. This area held high numbers of Blue and Great Tits, several singing Chiffchaffs and Blackcap, Chaffinch and Greenfinch. It is considered to be the habitat of greatest ornithological interest within the survey area.

The area to the south of the A20 was very diverse and generally held higher numbers of birds than the northern areas. The small lightly grazed fields, with weedy margins enclosed by copses and hedgerows containing a variety of shrub and tree species including several non-indigenous conifers, is considered to provide an attractive habitat within which many of the recorded species were observed.

6.2 Habitat Loss

There were no significant observations during the summer survey that materially varied the assessment of the importance of the habitats within the survey area, made following the winter survey. Consequently, the following comments from the winter survey are repeated.

> 'The observed ornithological interest within the survey area was located mainly in the southern section as described above. It is concentrated within and around the mixed

wooded areas and hedgerows. Nevertheless the importance of the more open areas should not be underestimated. It is usually the case that the habitats each contribute to the value of the whole area and it is difficult, on the basis of the brief period of the survey, to predict the full value of the specific features.

In general terms, the most significant habitat change, which it is considered will have the greatest affect on the existing wild bird populations, would be the removal and loss of woodland, trees and hedgerows.'

6.3 Mitigating Proposals

To limit the impact of the proposed development on the local wild bird population within the survey area the following recommendations are made:

1. Retain as much of the existing woodland and hedgerow and as many of the existing trees as possible. In addition existing ;ti trees should be retained wherever possible, rather than be removed as a short term expedient, albeit with the intention of replacing them with new planting.

2. Protect the existing streams and restrict culverting of these to a minimum in order to preserve their integrity and prevent them becoming fragmented.

3. Ensure that there is a generous provision of tree and shrub planting along any new road development. The planting should consist of appropriate indigenous species. Adequate provision should be included for the management and early establishment of the planting.

It is not possible to predict what effect, if any, may arise from the disturbance along the route of the realigned road. Disturbance is an existing significant feature of the southern section of the area, and may well be influencing the bird populations in this location. The road improvements will however, greatly increase the disturbance within parts of the existing, relatively sheltered woodland. The impact of the development here may be reduced by one or both of the following measures:

4. Setting the road in a cutting. The banks of the cutting would act as a baffle reducing the penetration of the noise and other disturbance into the surrounding areas. Alternatively, the construction of a retaining wall along the road side would reduce the loss of existing woodland by reducing the landtake necessary to form the bank.

5. Where the road, by necessity, is raised above the surrounding land, then screens at the side of the road should reduce the visual disturbance to the immediate surrounds. However, the full benefit of such a measure remains uncertain.

7. Summary

On the basis of the survey undertaken, the ornithological interest is of local rather than regional or greater, importance. The area has a healthy and varied bird population because of its inherent diversity of habitat , and as a result of its proximity close to the Leybourne Lakes.

It is anticipated that the proposed road improvements would have their greatest effect on the ornithological interest at the southern end of the survey area. The inclusion of appropriate, practical,

mitigating measures will be most important in order to minimise the impact of the proposals on the ornithological interest of this location.

In order to more fully and accurately evaluate the ornithological interest within the survey area, the survey should be extended to include both the wintering December to February) and the breeding (late March to end June) periods.

SECTION 3B

BIRD SURVEY

SPRING 1993

N C TARDIVEL

1. Introduction

The object of the survey was to augment earlier work by continuing the survey into the breeding season. It is considered that it is the birds which actually utilise the area for breeding which give the best indication of the ornithological value of the locality.

The earlier work consists of surveys carried out during the autumn and winter 1991 and the Summer 1992.

2. Recording Method

The census method used was based on the territory mapping method used in the BTO Common Bird Census (Marchant 1983). It is recommended that a full survey would require 10 visits at intervals between late March and the end of June. However, since this was not intended to be an ongoing annual survey, it was decided that a reasonable census of the birds could be obtained with four visits made at intervals during the same period of the year. These visits were each of approximately 2 hours duration.

On each visit, all birds seen and heard were recorded and their location noted together with details of behaviour (eg, song, carrying nesting material or food) which would be expected if the birds were breeding in the area. The data was then analysed to determine an estimate of the number of territories present. Territories were deemed to occur where there were three significant records and two (or exceptionally one eg, active nest found) if experience of the species and habitat justified this.

3. Estimated Pairs of Breeding Birds

Based on observations and counts made during four visits during Spring 1993.

Species	Pairs	Species	Pairs
Kestrel	1	Song Thrush	14
Woodpigeon	+++	Mistle Thrush	1
Collard Dove	2	Long-tailed Tit	1
Turtle Dove	1	Coal Tit	1
Little Owl	1	Blue Tit	20
Starling	27	Great Tit	12
Jay	1	Treecreeper	1
Magpie	3	House Sparrow	5
Carrion Crow	2	Chaffinch	15
Wren	29	Greenfinch	14
Dunnock	12	Linnet	5
Blackcap	5		
Whitethroat	3	Total number of species	
Chiffchaff	3	recorded breeding within the	
Robin	14	survey area during Spring 1993:	27
Blackbird	27		

In addition, the following species were considered to be breeding within the close vicinity, but the locations of the breeding territories and the number of pairs in the area, could not be determined on the basis of the current survey data:

SPECIES	SPECIES
Cuckoo	Swift
Green Woodpecker	Swallow
House Martin	Skylark
Pied Wagtail	Jackdaw
Rook	Goldfinch
Redpoll	

4. SPECIES RECORDED

In total 41 species were recorded during this survey. The range of species is considered to be typical of the type and range of habitat within the survey area.

The birds recorded are considered in five categories as follows:

4.1 For some species, ie, Blackbird and Wren, it is considered that the estimated numbers of territories reflect satisfactorily the 1993 breeding populations within the survey area. Typically these are the common birds of the English countryside and it is not surprising therefore that they are the more numerous.

This group includes the following species:

SPECIES	PAIRS	SPECIES	PAIRS
Starling	27	Wren	29
Dunnock	12	Robin	14
Blackbird	27	Song Thrust	14
Blue Tit	20	Great Tit	12
Chaffinch	15	Greenfinch	14

Also included here are species recorded in smaller number. These hold larger breeding territories which may well extend beyond the limits of the area surveyed.

SPECIES	PAIRS
Kestrel	1
Jay	1
Magpie	3
Carrion Crow	2

4.2 Of most interest are those species recorded in small numbers. For most of these it is not immediately apparent why they should not be more numerous. Included here are the following species:

SPECIES	PAIRS	COMMENT
Collard Dove	2	Occurring near to the houses in Pump Close. Perhaps surprising that pairs were not associated with the other areas of human habitation within the survey area.
Turtle Dove	1	Summer Migrant. Probably restricted by lack of suitable breeding habitat.
Little Owl	1	Occupying the available breeding habitat within the survey area.
Blackcap	5	Summer Migrant. Apparently occupying the available breeding habitat within the survey area.
Whitethroat	3	Summer Migrant. This is considered to be a low number of pairs for the area.
Chiffchaff	3	Summer Migrant. This is considered to be a low number of pairs for the area.
Mistle Thrush	1	Suitable habitat is apparently available for additional pairs.
Long-tailed Tit	1	Suitable habitat is apparently available for additional pairs.
Coal Tit	1	Probably under-recorded by the survey method used.
Treecreeper	1	Under-recorded by the survey method used. It is considered that a more intensive survey within the wooded areas would have confirmed further pairs within the survey area.
Linnet	5	This is considered to reflect satisfactorily, the 1993 breeding population within the survey area.

4.3 Although estimates have been included for the number of territories for the following species, accurate counts are complicated in view of the specific reasons indicated below:

SPECIES	PAIRS	COMMENT
Woodpigeon	No count	Breeding season extends well beyond survey period; large number of non-breeding individuals present.
House Sparrow	5	Usually colonial, and associated with human habitation.

4.4 During the survey there were insufficient records to enable a realistic assessment of the importance of the area for a number of species. These are reviewed in two groups:

GROUP A

Those which were seen, but in insufficient numbers to establish whether or not they held territories and bred within the survey area. Included here are the following:

SPECIES	COMMENT
Cuckoo	Summer Migrant. Suitable host species ie, Dunnock, nested in the area.
Green Woodpecker	Resident. Suitable habitat available.
Swallow	Summer Migrant. Suitable buildings available for nesting within the survey area.
House Martin	Summer Migrant. Suitable buildings available for nesting within the survey area.
Skylark	Although marginally suitable nesting habitat apparently available, birds were not recorded until late in the season.
Pied Wagtail	Suitable nesting sites available in the area.
Goldfinch	Suitable nesting sites available in the area.

GROUP B

Those which were expected to be present but were not recorded during the survey.

The most notable absentee was the Willow Warbler. During the last two/three seasons this summer migrant has suffered a marked decline in numbers returning to the breeding areas during the summer. The species was not recorded.

4.5 Those species observed within the area but which do not currently nest within the survey area boundaries. These include the following:

SPECIES	COMMENT
Herring Gull	Vagrant visitor to the area.
Stock Dove	Vagrant visitor to the area.
Swift	Nesting within the locality; probably in West Malling.
Jackdaw	Nesting within the locality.
Rook	Nesting in a rookery to the west of the survey area.
Fieldfare	Late winter visitors still present on the first survey visit.
Redpoll	Nesting in the locality where suitable habitat available.

Maps are appended at the back of the report indicating the approximate location of the territories of the estimated pairs of breeding birds. A comparison of the numbers of species recorded is also included at the end of the report.

5. Status of Species Recorded

There are no species of specific legal status apparently currently nesting within the survey area.

The Fieldfare, which was recorded as a winter visitor is protected under Schedule 1 of WCA 1981; EC Birds Directive and Appendix III of the Berne Convention.

The following species which were recorded within the survey area are listed as Red Data Candidate Species:

Turtle Dove
Swallow
Whitethroat
Linnet

5.1 Barn Owl

There were no Barn Owls recorded during the survey. Inspections at potential nest site locations did not reveal any sign of occupation eg, owl pellets. Reference to local bird records reveals no recent reports of Barn Owls within the survey area.

5.2 Discussion

The total of 27 breeding species confers only local importance to the study area under the criteria developed by Fuller (1980) for assessing ornithological sites in terms of breeding populations.

It should be noted however that many of the breeding birds, both in terms of number of species and of pairs, are concentrated along the southern edge of Leybourne Woods and in the parkland to the south of the A20 and north of the Hermitage.

6. Effects of the Proposed Route

The observed breeding ornithological interest within the survey area was located mainly in the southern section of the survey area within and around the woodland and parkland. Here mature trees, the streams and associated wet areas provide important contributions to the diversity of the potential breeding habitat for birds.

6.1 Mitigating Proposals

As stated in the previous surveys carried out here, the most significant habitat changes which it is considered will have the greatest effect on the existing wild bird populations, would be the removal and loss of woodland, trees hedgrows and the stream and wet areas.

To limit the impact of the proposed development on the local bird population within the survey area, the recommendations as set out in the previous Autumn/Winter 1991 survey apply.

7. SUMMARY

Generally the area supports good numbers of a typical range of breeding birds. There are no particularly notable records. The numbers of breeding pairs was considered to reflect the populations that might be expected within the survey area. However, it is not possible to comment in detail on the changing patterns or current health of the bird populations since this is basically a 'snap-shot' survey ie. looking at one season only. There is no comprehensive historical information with which to compare it.

7.1 THE BIRDS RECORDED

For comparison, other surveys within the region recorded species numbers as indicated below:

SURVEY	NO OF SPECIES	SOURCE
1. Breeding Survey 1968-72		BTO Atlas
data for full 10km sq TQ65	76+	
TQ76 E	76+	
2. Lamberhurst By-Pass Four visits Spring 1991	44	Author for KCC
3. A21 Kippings Cross to Lamberhurst Four visits Spring 1991	47	Author for KCC
4. Castle Way – Winter 1990-91	34	Author for KCC

This survey area lies within Tetrad TQ65 V. This square includes the southeastern corner of Leybourne Lakes. Terrad TQ76 E is the adjacent northeasterly tetrad which includes the larger proportion of Leybourne Lakes.

7.2 EXPLANATION OF BIRD PROTECTION LEGISLATION

(Referred to in the text).

THE WILDLIFE AND COUNTRYSIDE ACTS 1981-5

Schedule 1 affords special protection to the birds listed therein.

EC COUNCIL DIRECTIVE ON THE CONSERVATION OF WILD BIRDS (79/409/EEC)

A11 EC member states are required to take measures to protect wild birds and to preserve sufficient diversity of habitat for all species naturally occurring within their territories, so as to maintain their populations at an ecologically and scientifically sound level. Species whose status is a cause of some concern are specifically identified (in Annex 1) for special conservation measures

THE BERNE CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS

The Convention carries an obligation to protect and conserve a wide range of flora and fauna (including their habitats), especially those listed as endangered or vulnerable.

The Red Data Bird Candidate Species

This is a recent publication of the Nature Conservancy Council and the Royal Society for the Protection of Birds, which lists species living in or visiting Britain which are considered to be vulnerable to the risk of extinction. Species have been selected for inclusion on the basis that their British populations fulfil at least one of the following five criteria:

1. International significance of British Population. Form at least 20% of the NW European population.
2. Scarcity as British Breeders. Less than 300 pairs breeding in Britain.
3. Declining breeding Numbers. Persistent decline of more than 50% in the last 25 years.
4. Restricted distribution in vulnerable sites or habitats. More than 50% of the total population occurring on 10 or fewer sites.
5. Species of special concern.

The publication lists 30 species which do not yet qualify for full inclusion but which give rise to concern about their future status.

8. References

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SECTION 4

PRELIMINARY MAMMAL SURVEY

KENT TRUST FOR NATURE CONSERVATION

1. INTRODUCTION

Kent County Council plans to improve the A228 between the southern end of the West Malling bypass and junction 4 of the M20. This will involve the widening of the existing West Malling bypass and the On-line or Off-line improvement of Castle Way. Following public consultation, an Off-line route known as the orange route was selected as the preferred option. Environmental Assessments of the route, being carried out by Kent County Council, are considering both of these options. The EA study area includes the routes of both of these alternatives.

Kent Trust for Nature Conservation was asked by Kent County Council to undertake the following brief:

> *The preparation of a factual report setting out the mammal interest for the study area as outlined in red on the attached drawing figure 1. The study should be undertaken in accordance with the standard survey methodologies as recommended by English Nature and should include a detailed desk top study with a walkover survey to assess the mammal interest and the probable impacts caused by the proposed improvements and the possible alternatives.*

We were also asked to recommend any requirements for more detailed survey work to cover particular areas or species likely to be affected.

1.2 MAMMALS IN THE A228 VICINITY

In view of the wide scope of the brief, our desk study search and field survey considered evidence of all species of mammals that are or might be found within the study area. However, in practice our survey efforts and consideration of impacts has concentrated on a number of species which are either protected by law or which are likely to be considered significant for some other reason. These are briefly considered below.

Three species or groups of species are singled out as likely to be of particular importance.

1.2.1 Bats Order Chiroptera

All species of bats in Britain are protected by law under Schedule 5 of the 1981 Wildlife and Countryside Act. Bats were assessed separately and a report by Peter and Pauline Hearthcote of the Kent Bat Group has been presented.

1.2.2 Common dormouse Muscardinus avellanarius

This species is fully protected under Schedule 5 of the 1981 Wildlife and Countryside Act (status updated in the 1986 quinquennial review) and has also received considerable attention in the past two years as one of the flagship species in English Nature's species recovery programme. It is a secretive species with fairly stringent habitat requirements. It is most often associated with deciduous woodland with plenty of secondary growth and scrub (eg bramble). It is especially associated with hazel coppice but may also be found in other woods, hedgerows and even marshy areas with alder and bramble. It needs a variety of foodplants to ensure availability at different seasons, and appears to depend upon the availability of arboreal pathways to facilitate movement. It is thus very prone to fragmentation of habitat by linear features such as roads and wide rides.

The dormouse is widespread but local from mid-Wales and Suffolk southwards and eastwards. Recent survey work in Mid and East Kent has suggested that the county is a stronghold for the species, with some of the highest population densities in the country.

1.2.3 Badger Meles meles

Badgers are also protected under the Wildlife and Countryside Act 1981, and the subsequent 1985 amendment. Their setts are further protected from unlicensed disturbance by the Badgers Act of 1991. They are prone to considerable persecution as a result of illegal badger digging, baiting and gassing, with estimates of up to 10,000 deaths per year. They have also been subject to control by the MAFF, primarily in South West England due to suspected links with bovine tuberculosis. They are also extremely vulnerable to deaths on roads and electrified railways. A road deaths figure of 47, 500 per annum has been suggested.

In spite of this, the badger remains widespread in the UK, although locally very scarce. It is frequent in suitable areas in Kent, most notably in the chalky soils of the North Downs and the sandstones of South West Kent. They are associated with all kinds of woodlands but will often have main or annexe setts in hedgerows and shaws and spend a considerable amount of time feeding in open countryside.

Other species which are considered to be worthy of consideration are:

Brown hare ***Lepus europaeus***, which is not protected by law but which appears to have declined markedly in the county in recent years.

Hedgehog ***Erinaceus europaeus***, which is partially protected under Schedule 6 of the 1981 Act although it remains numerous.

The common shrew ***Sorex araneus***, pygmy shrew ***Sorex minutus*** and water shrew ***Neomys fodiens***, which are all partially protected under Schedule 6 of the 1981 Act. Only the latter species can be considered to be under any threat in Kent, primarily as a result of habitat loss and pollution.

The water vole ***Arvicola terrestris***, which is not protected but which has been the subject of a number of recent studies to investigate widespread declines.

The predators such as stoat ***Mustela erminea***, weasel ***Mustela nivalis*** and fox ***Vulpes vulpes***, which are probably under no threat but whose presence is likely to be considered a material factor by many wildlife enthusiasts.

2. DESK STUDY

The desk study comprised a search of the following records:

County Biological Records at Maidstone Museum
Kent Trust files
English Nature files
Badger sett records
Kent Bat Group records (see separate report)

The records at Maidstone Museum were searched and discussed with Mr Eric Philp, the County Recorder. The Area of Study falls into four tetrads, as shown on figure 1. These are described as SW, SE, NW and NE.

Hedgehog	Recorded throughout area.
Mole	Recorded throughout area.
Common shrew	Recorded in NE but certainly occurs throughout.
Fox	Recorded throughout area.

Weasel	Recorded in 1960s but no records since.
Stoat	Recorded in 1960s but no records since.
Rabbit	Recorded throughout area.
Hare	Recorded from NE tetrad, just south of Motorway in Leybourne Park 11/3/1988.
Badger	Record from NE tetrad in 1960s.
Grey squirrel	Recorded throughout area.
Long tailed field mouse	Recorded from NE tetrad.
House mouse	Recorded from NW tetrad.
Harvest mouse	Recorded from NE tetrad, on the edge of Castle Lake.
Brown rat	Recorded from NE tetrad.
Bank vole	Recorded from NE tetrad.
Water vole	Recorded from NE tetrad.
Field vole	Recorded from NW and SW tetrad

Species not recorded but felt likely to be present included yellow necked field mouse and dormouse. Pygmy shrew and water shrew were both recorded from nearby tetrads. An old otter holt was formerly present in the NE tetrad but was lost to the M20 when first constructed. There is no recent evidence of these mammals in this area.

Kent Trust Records:

Two Sites of Nature Conservation Interest (SNCIs) occur within the study area. These are Leybourne Lakes and Leybourne Woods (see attached schedules section 1). There are no mammal records from Leybourne Woods or from the Castle Lake section of Leybourne Lakes. Nor are there any records of mammals elsewhere in the study area. A survey of the nearby Leybourne Grange produced records of fox, rabbit, grey squirrel and vole sp.

English Nature have no mammal records from within the study area.

West Kent Badger Group have no records from within the study area.

Existing Mammal records from all sources are clearly incomplete. Negative records therefore should not be interpreted to mean that any particular species is not likely to be present.

3. Field Survey

3.1 Method

Both embankments and road edges and the adjoining areas were walked throughout the study area. Survey comprised a combination of habitat assessment, questioning of local residents and, principally, signs and sightings of mammal species.

Aside from sightings, principal signs looked for were:

(a) paths, grass runnels (especially for badgers, rabbits, rats and small mammals)

(b) droppings

(c) signs of feeding (hazel and chestnuts, honeysuckle, heavily-grazed field edges, foxes meat-leavings, etc).

Particular attention was given to searching for dormice and badgers.

Dormice can be surveyed in a number of ways. Longer-term population studies are best done by a programme of nestbox erection and monitoring. Whilst this is arguably the best census method, it was not considered appropriate within the time and financial constraints of this scoping study.

Surveys have also been done by placing baited sticky tubes in appropriate areas. Dormouse presence has then been deduced from identification of their hairs. This method appears to have a low catch rate, with only about 30% containing mammal hairs, of which few or none may be dormice.

We therefore concentrated on looking for three principal signs:

Nests:	Dormice make domed, tightly-woven nests, often from honeysuckle bark and grass.
Honeysuckle flowers:	Dormice chew the bases from the petals of honeysuckle flowers which can then be found lying on the ground under the bushes.
Hazelnuts:	This is considered to be one of the most reliable indicators with around a 70% reliability rate. Gnawed hazelnuts were collected and analysed for the distinctive smooth-edged holes produced by dormice.

Badgers can be identified by a variety of signs which are normally clearly identifiable. These are primarily the presence of main or annexe setts, latrines, scratchmarks on trees, hairs, pathways and runs and footprints.

All banks were searched as thoroughly as possible, although the impenetrable bramble thickets of early June meant that inevitably some signs must have been missed.

Survey dates were 5th to 9th July 1993.

3.2 Description of Results

3.2.1 Leybourne Woods

The woods show clear evidence of the presence of rabbit, fox, grey squirrel, small mammals and hedgehog. There are also reports of weasel, stoat, brown rat and some badger activity.

There are at least two fox earths and numerous rabbit warrens throughout the wood.

Hazelnuts were collected and found to have been gnawed by squirrels, bank voles and woodmice but no evidence of dormice having eaten any was discovered. Nor were any nests or honeysuckle florets found.

Some molehills were present under the older chestnut coppice.

There were several reports by local people of sightings of badger and of an old sett within the wood. However, the sett could not be located and there was no sign of any latrines in the vicinity, although there were possible badger trails and scratchings. As there are known active setts on the Birling Manor Estate across the Birling Road, it is most likely that any badgers seen around Leybourne Woods are from the Birling Manor Estate setts and cross the road occasionally to forage.

3.2.2 Birling Road to Castle Way (A228) - North of A20 to M20

Rabbit, fox, hedgehog, squirrel and small mammals were all in evidence throughout this area.

There were also reports from local people of weasel, stoat and brown rat.

Along the footpath crossing from Birling Road to the A228 was a fox earth that had been used for breeding this year.

Molehills were scattered throughout.

3.2.3 M20 Motorway Edges

Rabbits were numerous on both sides of the motorway, with rabbit warrens scattered along the southbound carriageway under a line of hawthorn.

There were occasional signs of fox, and some small mammal tunnels were evident along both carriageways, where kestrel is frequently seen hunting along the verges and adjacent fields.

3.2.4 A228 West Malling Bypass: Pump Close to Windmill Lane

The very efficient fencing along the embankments ensures that nothing larger than small mammals have easy access to the verges in any great numbers. However, there was also evidence of rabbit, particularly close to the footpaths and bridges, where there is access through the fence.

Along the west side just north of the Lavender s Road bridge there was a rabbit warren, and signs of hedgehog and fox were found intermittently.

Local farmers have reported sightings of harvest mice in the adjacent fields.

In the small woods alongside the north-eastern side of the railway line either side of the A228, squirrel, rabbit, common shrew (and a tawny owl) were sighted. Signs of fox and small mammals were in evidence.

There are also reports of hedgehog, weasel, stoat and brown rat from local people.

3.2.5 North of the M20

This area seemed to be rich in species, including reports from local residents of badger (dead on Birling Road), stoat, weasel, brown rat, hedgehog and squirrel. Two records, apparently reliable, of particular interest were of water vole in the streams just north of the Motorway and a sighting of a hare near Birling Ashes House, although this was over a year ago.

There was also plenty of evidence throughout this rough area of fox, rabbit, mole and other small mammals.

3.2.6 East of A228 – M20 to Pump Close Roundabout

There were signs of rabbit, fox and mole along the stream, with sightings of rats, squirrel and hedgehog reported from local residents.

Traces and sightings of these species extended into the Castle Lake area.

3.2.7 South A20 - West A228

Signs and local reports of fox, rabbit, hedgehog, brown rat, squirrel, weasel, small mammals and badger were all seen and reported in the surrounding fields and gardens in this area. Molehills were found throughout.

There were no signs of any badger setts or other activity in this area.

3.2.8 South A20 – East A228

This area contained a good population of fox, rabbit, hedgehog, brown rat and small mammals, according to a mixture of reports and signs.

3.3 Summary

Fox, rabbit, squirrel and small mammals are plentiful throughout the survey area.

Hedgehog is reported from most parts, as are weasel and stoat, although none of these species appear to be common.

Leybourne Woods and, to a lesser extent, the smaller woods such as that north of West Malling station provide particularly good mammal habitat.

The M20 and A228 embankments provide excellent cover for small mammals.

No evidence was found of dormice. It seems clear that badgers do use the area, although possibly on an infrequent basis. No setts were found within the study area, although some are known to be nearby.

The reports of hare and water vole north of the M20 are certainly worthy of further interest and investigation by local naturalists to obtain additional information on any more recent sightings.

4. Provisional Comments on Impact of the Proposals

No species of particular conservation importance were found to be living regularly in the study area. Nonetheless the study area holds good populations of common mammals. Of the two possible routes, the major impact on the mammal population is likely to be from the Orange Route.

This new road will encroach into Leybourne Woods, which is a valuable habitat for many species. However, the wood should not suffer significant fragmentation, as the route will only cut across one end of the wood and it already has roads along two sides (Birling Road and the A20).

A greater risk of isolation for some species is due to the road cutting across the open land and effectively halving the open ground used by the animals. This is particularly apparent in the area between the Orange route and Castle Way where mammals such as foxes are common.

There is little concern for badger as there was no evidence found of any regularly occurring in the area. Nonetheless it is suggested that a further survey for this species should be undertaken shortly before construction commences, since suitable habitat does exist and it is possible that they may move into the

area during the intervening time.

The fox earth located close to the footpath crossing from Birling Road to the A228 (MR130) is used for breeding purposes, and it is therefore recommended that any construction work should be carried out outside the breeding season.

The road widening of the A228 will cause regrettable habitat losses, especially the two small woods either side of the A228 along the north-eastern side of the railway line, which are generally good for wildlife (tawny owl was seen and green woodpecker was heard).

North of the Motorway, where the roundabout would be constructed for the orange route, efforts should be made to minimise damage to, or pollution or siltation of, the streams. Any losses should be compensated for by the provision of new streams and transfer of vegetative material. Elsewhere, the impacts of the proposed route would seem to be relatively limited and populations should be able to re-establish once work is completed.

5. Effects on Species of Note

The impact on species of note mentioned in the introduction is considered below:

Badger	No evidence of a sett was found within the area. The road scheme will have little impact on the already depleted population around this area but, because of sightings and traces around Leybourne Woods and south of the A20, another survey could be carried out at a later date.
Hare	The hare sighted north of the M20 should not be affected.
Dormouse	There was no evidence of dormouse found in the survey area. However, this does not prove that they are not present, as the habitat is suitable in places. It is unlikely that any population would be significantly affected unless it was concentrated along the eastern edge of Leybourne Wood.
Harvest Mouse	It is unlikely that populations will be adversely affected.
Hedgehog	These appear to be frequent in the area. It is unlikely that populations will be adversely affected.
Shrew	Common and pygmy shrews are present in the area and should not be adversely affected in the long term, provided that good cover is maintained. The scarcer water shrew is also unlikely to be affected.
Fox, stoat and weasel	All have been reported in the study area. The current fieldwork recorded only fox, which were very common. The fox earth on the Birling Road to A228 footpath could be disturbed during the construction of the Orange Route road.

6. Further Study Recommendations

A further survey of badgers along the eventual route is advised shortly prior to construction.

A further study for hare and dormouse could be carried out for interest, but there is insufficient evidence of a destructive impact on the already depleted or non-existent numbers within the area for a further survey to be essential.

Good practice dicrates that consrruction acrivities should be alert to the presence of mammals, especially during periods of breeding. Ideally, and in common with recommendations relating to flowering plants and birds, heavy earth-moving activities should be undertaken in the period from August to January, so that most breeding acrivity is nor disturbed.

KEY TO MAP

B	Badger
BR	Brown Rat
F	Fox
H	Hare
He	Hedgehog
M	Mole Rabbit
SM	Small Mammal (Mice, Voles, Shrews)
S	Squirrel
W	Weasel
HM	Harvest Mouse
Sr	Stoat
d	droppings
f	feeding signs
h (1-10)	'hearsay': local reports with a reliability scale 1-10
l	lair (den, burrow, sett, earth, nest)
p	prints
s	seen
t	trails, paths, tunnels

MAMMAL SURVEY – SURVEY FOR THE PRESENCE OF BATS

1. STUDY AREA

The area outlined in red on Figure 1.

Surveyors: Peter Heathcote MSc and Pauline Heathcote BA.

The survey was conducted in two ways:

1. Examination of the records of the Kent Bat Group for OS map tetrads TQ65S, TQ65T, TQ65Y and TQ65Z inclusive together with other relevant information from literature.

2. Visits to the area at dusk between 17.06.93 & 27.06.93 (2 people) and included the following searches:

   a. view north-east (binoculars & bat detector) from M20/A228 intersection (TQ 693595)

   b. walk around lake to south-east of M20/A228 intersection (TQ 6694591).

   c. survey of church (TQ 690590).

   d. transect along boundary of "castle" grounds (0.5 km) along footpath (TQ 689588 to TQ 684589).

   e. view east from Leybourne to Birling bridge over M20 (TQ 685597).

   f. slow drive south/north along A228 from M20 (TQ 691595 to TQ 669557) – both extremes of site.

1.1 RESULTS OF INFORMATION AND LITERATURE SEARCH

1. a roost of pipistrelle bats ***Pipistrellus pipistrellus*** (maximum 50) were counted in a house in East Malling (TQ 697572) in 1984 (no follow up).

2. the presence of bats were determined at a house in East Malling (TQ 690573) in 1990 (no follow up).

3. a number of small bats were seen flying near a railway bridge in West Malling (TQ 6957) in 1990 (no follow up).

4. a roost of bats (probably pipistrelles) (max. 37) were counted in a house in Lunsford (TQ 698583) in 1986 (no follow up).

5. a dead pipistrelle was found on West Malling Air Station (TQ 677553) in 1986.

6. the following bats have been identified by sight and (bat detector) in Manor Park Country Park (TQ 685570) during 1986-1993: Daubenton's bat ***Myotis daubentonii*** (max. 10), noctule ***Nyctalus noctula*** (max. 12), pipistrelle (max. 10) and brown long-eared bat ***Plecotus auritus*** (max. 4).

1.2 RESULTS OF VISIT SEARCH

1. a number of noctule bats (20 + counted) and pipistrelles (5) were seen feeding over lake to the north-east of the M20/A228 intersection.

2. a number of noctule bats (60+ counted) and pipistrelles (20+) were seen feeding over lake and trees to the south-east of M20/A228 intersection.

3. noctule bats (7) were seen flying eastwards over the 'castle' grounds at TQ 687590 towards the area at 2 above.

1.3 Discussion

All species of bat and their roosts are protected by the Wildlife and Countryside Act 1981.

During the last 10 years at least 4 (four) species of bat have been recorded within the study area.

The species recorded have been placed in the following categories by the Species Survival Commission of the IUCN as detailed in the Red Data Book (see Stebbings 1988):

Species recorded in study area	IUCN Category
Noctule bat	vulnerable *
Daubenton's bat	not threatened
Pipistrelle bat	not threatened
Brown long-eared bat	not threatened

* species believed likely to move into the Endangered category if the causal factors continue operating.

There are a small number of bat roosts in East and West Malling. Manor Park Country Park provides valuable habitat for at least 4 species of bat. It has been found that the Leybourne area is important for the noctule bat although no roosts are known.

2. Possible Impact of the Proposed Improvements

NOTE: The following is based on the information available which may not be complete.

2.1 Lakes to the North-East and South-East of the M20/A228 Intersection

In our opinion both these lakes and surrounding vegetation provide a valuable feeding area for bats especially noctules and any roadworks improvements which damage the habitat or change it may have an impact on noctule populations using this area. The noctule bat has declined in Britain due, in part, to loss of suitable feeding habitats such as this (wetlands and especially that associated with deciduous woodland that is rich in invertebrate fauna (Roberts & Hutson, 1992)). It is probable that there is not a daytime noctule roost in these areas as noctules were seen flying towards the lake approximately 10 minutes after sunset whilst concentrations only occurred approximately 25 minutes after sunset. It is possible that alternative sites (lakes) to the north of the study area (not surveyed) are providing complementary feeding places and a reduction of resources in this area could reduce the total noctule population.

We would suggest that damage to the area should be kept to a minimum and be carried out sympathetically. When roadworks are being carried out (a) the area should not be cleared for a contractor's site for buildings/equipment/storage (b) contractors should not be permitted to access or dump on any adjacent land (c) as much of the lake(s) and surroundings should be retained in an unchanged state (d) as many as possible of the trees should be retained.

2.2 ALL OTHER AREAS

There would be little impact on bats in these areas.

3. REFERENCES

Roberts, G M & Hutson, A M (1992) *Noctule bat* ***Nyctalus noctula*** Leaflet produced by the Bat Conservation Trust, London.

Stebbings, R E (1988) *Conservation of European bats* Christopher Helm, London

MAMMAL SURVEY – SURVEY FOR THE PRESENCE OF BATS

Study Area

The area outlined in Figure 1.

Extra work on Leybourne Park, Leybourne Castle and Leybourne Woods area

Surveyors: Peter Heathcote M Sc. and Pauline Heathcote B A.

1. A visit was made to the area on 5th July 1993.

Results:

6 Noctule bats Nyctalus noctula were seen flying eastwards over Leybourne Park from Birling Road (TQ 684593). 4 Noctule bats were seen flying eastwards over Leybourne Woods (very high suggesting roost well away from this area) (TQ 686585).

Comment:

The whole area is a flyway for noctule bats moving from roost to feeding places. Some feeding takes place as the noctule flies over the area. In our opinion there would be little impact on bats in these areas unless there was major damage to habitat.

Peter Heathcote M Sc. & Pauline Heathcote BA,

9 Greenfinches, New Barn Longfield, Kent DA3 7ND.

6 July 1993

SECTION 5

INVERTEBRATE SURVEY

MR N HEAL

SEPTEMBER 1991

1. INTRODUCTION: AIMS AND LIMITATIONS

The general aims of this study are:

a) to provide a species list,

b) to indicate, where possible or relevant, the abundance and ecological requirements of each species, particularly those considered to be rare,

c) to indicate species and communities of insects of special interest, comment upon their status and ecology, where known,

d) to produce an assessment of overall interest of the study area and its component parts.

These aims are necessarily constrained by various limitations. Most importantly, to achieve a complete species list for even one group on a small site requires several years of all-year-round field work. To fully establish species distribution and abundance requires complex work beyond the scope of this study. To gain exact information on which species occur within such a large study in an extremely short period, is not possible.

For many species their emergence periods are very short and the limitation of the survey to one visit per site will have been a severe restriction which will have caused many species to have been overlooked. At least 6 visits per site is regarded as the minimum frequency of visit through April – August which are perhaps the most productive months for flying insects; this would also have enabled other longer term collecting methods – such as pitfall trapping – to have been employed.

Instructions to proceed with the survey were only received on 18 September 1991, thereby excluding the most productive period of the year, and it is recommended that some of the areas identified as having more potential should preferably be reinspected May/June 1992.

A total of 32 hours of actual field work have so far been undertaken in an attempt to produce meaningful data despite these general limitations, the results of which are summarised as follows:

2. SUMMARY OF FINDINGS

The occurrence of rare or notable species is currently the dominant criterion used in judging the quality of sites for invertebrate conservation. The Nature conservancy council, (now English Nature), has compiled lists of rare or notable invertebrates which has been published by Ball in a volume of the Invertebrate Site Register series – report number 66 (1986). Shirt detailed information on the rarer species in British Red Data Book 2 – Insects (1987).

These categories have to some extent to be regarded as provisional; they have been under review for some time but it is not known when the revised information will be published; the use of the existing information will at least indicate which are likely to be the rarer species, even if at some future date the categories of some species may be shown to have been reallocated.

The definitions can be summarised as follows:

RDB 1 'ENDANGERED'

Taxa in danger of extinction and whose survival is unlikely if the causal factors continue to operate. No RDB 1 species were found during the survey.

RDB 2 'VULNERABLE'

Taxa believed likely to move into the 'endangered' category in the near future if causal factors continue to operate.

Two RDB 2 species were found during the survey:

Uleiota planata Linn – locations 8/9/11
Recorded during the last century at Blackheath, there is only one other published Kent record – that of a specimen recorded in 1987 during a National Trust survey at Ightham Mote. I have seen the species in some numbers breeding in a woodyard in the Medway Towns in a somewhat 'artificial' habitat, but it is a very rare species in its natural environment and may only be enjoying the current increase of suitable habitat as a result of the 1987/88 wind-storm damage. This species (as well as other of the species with dead wood association) could again very easily be reduced to former rarity and a need to survive in standing timber with a small population, should the felled oak and beech be removed.

Nephus quadrimaculatus Herbst – location 3
This coccinellid beetle (ladybird) is only known from very few British localities and until recorded during the Darenth road improvement survey there was only one previous record for Kent – the mention in the Victoria County History of a single specimen in the Rye collection, over 150 years ago.

RDB 3 'RARE'

Taxa with small populations that are not at present 'endangered' or 'vulnerable', but are at risk. One RDB 3 species was found during the survey:

Cyphon pubescens Fabr – locations 8/10
The single specimens recorded on 3 and 8 October 1991 are the first published records of this species in the county. Only recognised as British as recently as 1962, previously confused with ***C variabilis*** – I have no information as to its national distribution.

Two levels of national notability are used to assess the occurrence of the more uncommon species:

2.1 Notable A (Nb) relates to species which are known to occur in 30 or less 10 km squares in Britain.

Four species in this category were found, viz:

Leiodes gallica Reitter – location 13
There are only 14 known British specimens, apparently none from Kent, and is a very rare species probably deserving of a higher status grading.

Longitarsus parvulus Park – locations 1/2/3/5/3/10/12/13/14
Present in almost every location inspected (and elsewhere in Kent this year). This is a species which for the time being at least is probably no longer deserving of its rarity status, at least in Kent. Host plant thought to be ***Linaceae*** sp. but may be polyphagous in times of abundance.

Kissophagus hederae Schmitt – locations 1/2/10
A very local scolytid beaten out of stems of dead ivy. There are no published Kent records since 1936, although I have taken the species at several locations in both East and west Kent – seems to be a Kent speciality.

Olibrus flavicornis Sturm – location 1

Associated with ***Leontodon autumnalis*** on the continent but found in some numbers during the Darenth survey feeding in flowerheads of ***Crepis***. Previously not recorded in Kent since 1913.

2.2 Notable B (Nb) relates to species which are known to occur in 100 or less 10 km squares

Nine species in this category were found, viz:

Leiodes obesa Schmidt	location	13
Oligota flavicornis Boisd.& Lacord	location	1
Phloiophilus edwardsi Steph	location	9
Diplocoelus fagi Guer – Mene	location	9
Adonia variegata Goeze	location	1
Enicmus brevicornis Manner	location	9
Sulcasis bicornis Mellie	location	8/9
Longitarsus ballotae Marsh	location	3
Apion pallipes Kirby	location	1

This group comprises the least rare of the notable species; however most are considered to be very local in Kent.

3. DEADWOOD ASSOCIATION

The Coleoptera has been selected as the prime invertebrate order to be studied; it forms one of the largest orders and is a very diverse group of insects with a number of well-defined taxonomic sub-divisions and habitat groupings. They often require considerable stability of habitat; whereas plants can survive upheavals as dormant seed and reappear after a short period of disturbance, Coleoptera often require the correct habitat to be present every year and have no way of surviving even short periods of unfavourable conditions. Thus the presence of such species can be indicative of long term stability and are particularly useful in identifying relict sites. Vegetation structure is highly important for many insects and may be far more significant than the actual plant species and the presence of deadwood is of considerable importance.

The presence of a number of species with such specialist habitat requirements can be indicative of well-established sites of prime conservation value. Invertebrates associated with ancient semi-natural woodland and deadwood have so far received the most attention and their strength of association has been graded (1) highest to (3) lowest.

Grade 1 – (D'wood 1) are species which are known to have occurred in recent times only in areas believed to be primary forest/parkland/woodland. Only one such indicator was found during the survey, viz:

Uleiota planata Linn	**locations**	**8/9/11**

Grade 2 – (D'wood 2) are species which occur mainly in areas believed to be primary forest/parkland/woodland, but which also appear to have been recorded from areas that may not be primary or for which the locality data are imprecise. Three such indicators were found during the survey, viz:

Diplocoelus fagi Guer-Mene	**location**	**9**
Enicmus brevicornis Manner	**location**	**9**
Bitoma crenata Fabr	**location**	**8/9**

Grade 3 – (D'wood 3) are species which occur widely in wooded land both primary and secondary, but which are collectively characteristic of primary areas. Eight such indicators were found during the survey, viz:

Paromalus flavicornis Herbst	**location**	**9**
Ptinella ? aptera Guer –Mene	**location**	**9**
Phloiophilus edwardsi Steph	**location**	**9**
Silvanus unidentatus Olivier	**location**	**8/9**
Cerylon ferrugineum Steph	**location**	**9**
Pseudotriphyllus suturalis Fabr	**location**	**9**
Litargus connexus Fourc	**location**	**9**
Mycetophagus quadripustulatus Linn	**location**	**9**

4. Description of Locations

For ease of description the principal areas of interest are referred to under their respective routes. The intervening areas of land are substantially under active agricultural management, areas which are generally very species poor and which are only as good as the amount of uncultivated unsprayed field edges available which in the study area have virtually been eliminated.

4.1 On-Line Scheme – ED ROUTE – plan ref. 102152/30

i) Grounds of The Hermitage

This area is affected to a considerable degree; generally it contained some interesting habitats and a good range of species was found on 15 October 1991. In particular, ***Leiodes gallica***, swept from low foliage along the rear access driveway, is a very rare species. It is recommended that this area be reinspected next May/June. The continuation of this access which is now severed by the bypass, has similar potential and should preferably be included in any reinspection.

ii) Perimeter hedge to No 30 Castle Way

A single Nephus quadrimaculatus was beaten from the hawthorn boundary hedge on 2 October 1991. British records are so few that little is known of its habitat requirements but seems mostly to be associated with old ivy, which is certainly present in the hedge.

iii) Stream in front of Primary School

Not inspected – is an area likely to be most productive in summer.

iv) Leybourne Quarry

Inspected on 2 October 1991. A good diversity of species found, although nothing of particular note. Much of the ground flora had already perished in the late summer heat, and is an area likely to be most productive in summer; reinspection May/June 1992 is suggested.

v) Leybourne Park

The Park Road/Oxley Shaw Lane Link road would affect the area of trees in the north-eastern corner to a degree. This group of trees proved to be of considerable interest, in particular the fallen butts, storm-damaged in 1987/88, were found to be supporting the Red Data species Ulciora planata, as well as other deadwood indicator species. Cyphon pubescens was also recorded here.

4.2 Inner Off-line Scheme – BLUE ROUTE – plan ref. 102152/31

i) Grounds of The Hermitage

A much greater area would be lost under this proposal – see remarks under Red Route (1).

(ii) Leybourne Wood/Woods Meadow

Much of the affected area of Leybourne Wood comprises managed chestnut coppice, which is generally of minimal value for insects other than perhaps during the relatively temporary period following cutting. The eastern end of the wood generally is currently in such a condition and a few species were recorded by sweeping on 21 September 1991, which included ***Olibrus flavicornis***.

A single ***Oligota flavicornis*** was the only notable beetle beaten out of the mature beech along the wood perimeter. If this margin is a critical area, I suggest a further inspection be made next May/June. Woods Meadow particularly contains a lot of dead faggot wood, which could perhaps best be investigated by longer-term pitfall trapping.

(iii) Chimneys Farm

The two small areas of horse-grazing bisected by the stream and which adjoins Leybourne Wood/Woods Meadow to the east, have not been inspected. The area will virtually disappear under both the Blue and Orange Route proposals, but as the principal interest is likely to be in summer-flying species, an inspection of the area has been deferred until May/June 1992.

iv) Leybourne Park Farm

The groups of trees in the vicinity of the detached stabling were not inspected; the north-eastern corner of the park will be severely affected – see my comments under Red Route (1).

v) Mid Kent Water Company

This small plantation is said by an adjoining occupier to contain the regular home of a family of foxes. It is also believed to be an area, part of which is ear-marked for a pumping station, for which planning permission has possibly already been granted? ***Kissophagus hederae*** and a second ***Cyphon pubescens*** were the most notable beetles recorded here.

vi) Spiders Hall Farm

The group of storm-damaged oak/beech located behind the row of semi-detached houses in Park Road proved to be the most productive area encountered during the entire survey. ***Uleiota planata, Phloiophilus edwardsi, Diplocoelus fagi***, and ***Enicmus brevicornis*** being the most notable as well as several of the deadwood indicator species. The plan appears to indicate that this area could remain largely unaffected by Blue Route unless there is any deviation of the proposal.

4.3 Outer Off-Line Scheme – ORANGE ROUTE – plan ref. 102152/32

i) The Hermitage, Leybourne Wood/Woods Meadow and Chimneys Farm

Generally these area are common to both Orange and Blue Routes and thus similar comments apply.

ii) Leybourne Park Farm

Two small groups of oaks were not inspected. In this context, Mr Metcalf, the property owner, mentioned in conversation that he is particularly concerned at the lost of amenity to his farmhouse if the adjacent oaks are removed.

(iii) Spiders Hall Farm

Uleiota planata was also present in the isolated group of trees in OS 6447.

SCHEDULE OF SPECIES RECORDED

Nomenclature and classification used:

1. **Coleoptera**

   A check list of British Insects by Kloet & Hincks Second Edition – Part 3 – 1977 (Revised)

2. **Hemiptera sub orders: Heteroptera and Homoptera**

   A check list of British Insects by Kloet & Hincks second edition – Part 1 – 1964 (Revised)

3. **Lepidoptera**

   A Recorders Log Book of British Butterflies and Moths by Bradley & Fletcher – 1979

A228 Castle Way, Leybourne

Principal Areas of Investigation

		Approx: TQ: map ref:
1.	Leybourne Wood	685585
2.	Woods Meadow	685585
3.	Hawthorn hedge adj. No. 30 Castle Way	687584
4.	Rectory Lane North	689588
5.	Leybourne Quarry	690590/to 691593
6.	Roadside verge to Primary School	690590
7.	Leybourne Park (park road perimeter)	688592
8.	Leybourne Park	689591
9.	Spiders Hall Farm – gale blown trees	690593
10.	Mid Kent Water Company – plantation	690592
11.	Spiders Hall Farm – isolated group of oaks	686594
12.	Spiders Hall Farm – roadside hawthorn hedge	686593
13.	The Hermitage – present grounds West of bypass	687581
14.	The Hermitage – former grounds East of bypass	688581

1. COLEOPTERA

CARABIDAE:	Leistus ferrugineus Linn	9
	Nebria brevicollis Fabr.	13
	Bembidion harpaloides Serville	1/8
	Prerostichus madidus Fabr.	13/14
	Demetrias atricapillus Linn.	6
	Dromius linearis olivier	1/2/5/8/9/13
	Dromius melanocephalus Dejean	2/14
	Dromius quadrimaculatus Linn.	13
	Dromius quadrinotatus zenk. in Panz.	2/13/14
HISTERIDAE:	Paromalus flavicornis herbst Dwood(3)	9
PTILIIDAE:	Ptinella ? aptera Guer-Mene Dwood(3)	9
LEIODIIDAE:	Leiodes gallica Reitter (= brunnea) Na	13
	Leiodes obesa Schmidt Nb	13
	Catops fuscus Panz.	9
SILPHIDAE:	Silpha atrata Linn.	2/9
STAPHYLINIDAE:	Micropeplus staphylinoides Marsh.	5
	Proteinus ovalis Steph.	13/14
	Dropephylla ioptera steph.	8/9
	Dropephylla vilis Erichs.	8/9/11
	Acrolocha sulcula Steph.	13
	Omalium italicum Bernh.	13
	Anotylus inustus Graven.	3/5/13/14
	Anotylus sculpturatus Graven.	13
	Anotylus tetracarinatus Block	14
	Stenus boops Ljungh	14
	Stenus similis Elerbst	13/14
	Stenus subaeneus Erichs.	5
	Rugilus rufipes Germ.	13
	Philonthus cognatus steph.	13/14
	Philonthus fimetarius Graven.	13
	Gabrius splendidulus Graven.	9/13
	Staphylinus olens Muller	13/14
	Tachyporus chrysomelinus Linn.	14
	Tachyporus hypnorum Fabr.	8/9/13/14
	Tachporus nitidulus Fabr.	7/13
	Tachinus signatus Graven.	13
	Cypha longicornis Park.	13
	Oligota flavicornis Boisd. & Lacord.	
	Nb Anomognathus cuspidatus Erichs.	11
	Leprusa fumida Rraatz	14
	Leprusa ruficollis Erichs.	2
	Amischa analis Graven.	13/14

	Amischa decipiens sharp	5
	Plataraea brunnea Fabr.	9
	Atheta (Bessobia) fungivora Thoms.	13
	Atheta (Mocyta) fungi Graven.	5/8/11/14
	Atheta pertyi Heer	13
	Atheta (Lohse I) crassicornis Fabr.	13
	Drusilla canaliculata Fabr.	14
	Phloeopora testacea Manner.	9
	Ischnoglossa prolixa Graven.	11
SCARABAEIDAE:	Aphodius contaminatus Herbgt	1/7
	Aphodius obliteratus Panz.	1/3
	Onthophagus coenobita Herbst	13
SCIRTIDAE:	Cyphon pubescens Fabr. RDB. (3)	8/10
ANOBIIDAE:	Anobium punctatum Degeer	14
PHLOIOPHILIDAE:	Phloiophilus edwardsi steph. Nb/ Dwood(3)	9
NITIDULIDAE:	Brachypterus glaber steph.	13
	Brachypterus urticae Fabr.	5/9
	Meligethes obscurus Erichs.	1
	Meligethes pedicularius Gyllen.	6
	Epuraea aestiva Linn.	2
RHIZOPHAGIDAE:	Rhizophagus bipustulutus Fabr.	9
CUCUJIDAE:	Uleiora planata Linn. RDB. (2) Dwood(1)	8/9/11
SILVANIDAE:	Silvanus unidentatus Olivier Dwoood(3)	8/9
CRYPTOPHAGIDAE:	Cryptophagus dentatus Herbst	8
	Cryptophagus scanicus Linn.	2
	Aromaria atricapilla steph.	13
	Ephistemus globulus Park.	13
BIPHYLLIDAE:	Diplocoelus fagi Guer-Mene. Nb Dwood(2)	9
PHALACRIDAE:	Olibrus aeneus Fabr.	8
	Olibrus flavicornis Sturm Na	1
	Olibrus liquidus Erichs.	3 / 5
	Stilbus testaceus	1/13/14
CERYLONIDAE:	Cerylon ferrugineum steph. Dwood(3)	9
COCCINELLIDAE:	Rhyzobius litura Fabr.	5/6
	Sterhorus punctillum Weise	2/5/7
	Scymnus (Pullus) suturalis Thunb.	7
	Nephus quadrimaculatus Herbst RDB. (2)	3

	Exochomus 4-pustulatus Linn.	3
	Adonia variegata Gocze Nb	1
	Tytthaspis 16-punctata Linn.	6
	Adalia bipunctata Linn.	1/3/8/9/11/12/13/14
	Adalia 10-punctata Linn.	1/3/8/9/10/11
	Coccinella 7-punctata Linn.	1/5/8/13/14
	Harmonia 4-punctata Pontopp.	13
	Propylea 14-punctata Linn.	1/8
	Myrrha 18-guttata Linn.	7/13
	Calvia 14-guttata Linn.	1/10
	Thea 22-punctata Linn.	5
LATHRIDIIDAE:	Stephostethus lardarius Degeer	13
	Aridius bifasciatus Reitter	1/5/8/9/10/11/13/14
	Enicmus brevicornis Manner. Nb Dwood(2)	9
	Corticarina fuscula Gyllen.	2/4
	Cortinicara gibbosa Herbst	1/2/3/5/7/8/9/13/14
CISIDAE:	Sulcasis bicornis Mellie Nb	8/9
	Cis bilamellatus Wood	13
	Cis boleti Scop.	13
MYCETOPHAGIDAE:	Pseudotriphyllus suturalis Fabr. Dwood(3)	9
	Litargus connexus Fourc. Dwood(3)	9
	Mycetophagus quadripustulatus Linn. Dwood(3)	9
COLYDIIDAE:	Bitoma crenata Fabr. Dwood(2)	8/9
SALPINGIDAE:	Salpingus castaneus Panz.	8/13
	Rhinosimus planirostris Fabr.	2/5/7/8/9/10/11/13/14
	Rhinosimus ruficollis Linn.	2/9
CERAMBYCIDAE:	Pogonocherus hispidus Linn.	2/7/8/9/10/13
CHRYSOMELIDAE:	Oulema melanopa Linn.	13
	Cryptocephalus pusillus Fabr.	5
	Chrysolina staphylaea Linn.	5
	Plagiodera versicolora Laich.	4
	Aphthona euphorbiae schrank	1/3/8/9/10/12/13/14
	Aphthona melancholica Weise	1
	Longitarsus ballotae Marsh. Nb	8
	Longitarsus flavicornis Steph.	1/5/8
	Longitarsus gracilis Rutsch	5/14
	Longitarsus parvulus Park. Na	1/2/3/5/8/10/12/13/14
	Longitarsus pratensi Panz.	5
	Longitarsus suturellus Dufts.	1
	Crepidodera transversa Marsh.	5
	Chalcoides aurata Marsh.	2/4/5
	Chalcoides fulvicornis Fabr.	5

	Chaetocnema concinna Marsh.	1
	Chaetocnema hortensis Fourc.	5
	Psylliodes chrysocephala Linn.	1/12
APIONIDAE:	Apion hydrolapathi Marsh.	5
	Apion pallipes Kirby Nb	1
	Apion frumentarium Linn. (= miniatum)	5
	Apion haematodes Kirby (= frumentarium)	1
	Apion confluens Kirby	5
	Apion carduorum Kirby	5/8/9/13
	Apion hookeri Kirby	13
	Apion craccae Linn.	1/4/5/10
	Apion pomonae Fabr.	2/8/10
	Apion dichroum Bedel	1/8
CURCULIONIDAE:	Sciaphilus asperatus Bonsd.	9
	Strophosoma melanogrammus Forst.	1/9
	Sitona hispidulus Fabr.	1/6
	Sirona humeralis steph.	5
	Sitona linearus Linn.	1/5/13
	Cleopus pulchellus Herbst	1
	Acalles turbatus Bohe.	2
	Dorytomus melanopthalmus Park.	5
	Dorytomus rufatus Bedel	5/8
	Cidnorhinus quadrimaculatus Linn.	5/8
	Ceuthorhynchidius troglodytes Fabr.	1/6
	Anthonomus pedicularius Linn.	3
	Anthonomus rubi Herbst	5
	Ramphus oxyacanthae Marsh.	2
SCOLYTIDAE:	Kissophagus hederae Schmitt Na	1/2/10
	Xylocleptes bispinus Dufts.	2
	Pityopthorus pubescens Marsh	7
BRUCHIDAE:	Bruchus aromarius Linn.	2/5/6/9

2. LEPIDOPTERA

NYMPHALIDAE:	Aglais urticae Linn. small Tortoiseshell	5
	Inachis io Linn. The Peacock	3
NOCTUIDAE:	Eupsilia transversa Hufn. The satellite	10

3. HEMIPTERA

(A) HETEROPTERA

ACANTHOSOMATIDAE:	Acanthosoma haemorrhoidale Linn.	3
PENTATOMIDAE:	Eysarcoris fabricii Rirk.	1/8
COREIDAE:	Coreus marginatus Linn.	1
RHOPALIDAE:	Rhopalus subrufus Gmelin	1/5
LYGAEIDAE:	Heterogaster urticae Fabr.	7
TINGIDAE:	Physatocheila dumetorum H.-S.	1/2/3/7
MIRIDAE:	Pilophorus perplexus Doug & Scott	11
	Liocoris tripustulatus Fabr.	5

(B) HOMOPTERA

ISSIDAE:	Issus coleoptratus Fabr.	1

SECTION 5A

SUPPLEMENTARY INVERTEBRATE SURVEY

MR N HEAL

Final Report
To be read in conjunction with
Section 5

1. REVIEW OF RARITY STATUS GRADINGS

Since submitting my 1991 report the first part of the long awaited JNCC review of the British Coleoptera has been published. The status of certain of the following species recorded during the 1991 survey period has changed viz:

Cyphon pubescens Fabr. (Scirtidae)
Downgraded from RDB 3 to Nb

Uleiota planata Linn. (Cucujidae)
Downgraded from RDB 2 to Na

Olibrus flavicornis Sturm (Phalacridae)
Upgraded from Na to RDB category 'K'; this relates to taxa that are suspected, but not definitely known to belong to an RDB category because of lack of information.

Apion pallipes Kirby (Apionidae)
Removed from Notable status

Kissophagus hederae Schmitt (Scolytidae)
Downgraded from Na to Nb

2. PRINCIPAL AREAS INVESTIGATED DURING 1992

		Approx TQ Map Ref
15.	Chimneys Farm	686583
16.	Stream and margins	689587
17.	Primary School	690589
18.	Ash coppice	685597
19.	Re-visit 'The Hermitage' – present grounds W. of bypass	687581
20.	Re-visit 'The Hermitage' – former grounds E. of bypass	688581
21.	Shaw adjoining A20	689582
22.	Hedge	688578
23.	Lucks Hill Bridge	689576
24.	Hedge adjoining railway	688575
25.	Hedge N. of Lavenders Road bridge	685570

Of these the stream running through locations 15, 16 and 17 proved to be the most interesting habitat with three species of ***Elmidae*** found clinging to partially submerged bricks and stones in some numbers throughout its entire length. Of these, ***Riolus subviolaceus*** is the most local and has previously only been recorded from Kent twice – in 1975 and 1976. Two Donacia species were present in the section of stream by the primary school as well as other damp habitat species. The presence of the aquatic donacines and elinids are thought to be potential indicators of good water quality and their presence influenced by the oxygen content of their freshwater habitat, but I have not been able to locate any published reference to substantiate this.

Both the present and previous grounds of 'The Hermitage' were re-visited twice, but I have not been able to find further specimens of the rare ***Leiodid-Leiodes gallica***. Several local subcortical species, including ***Uleiota planata***, were found in a log pile in the Bishop's garden which although located just outside the area affected by the road proposals, nevertheless originated from a fallen Oak within the search area and in

any case gives an idea of the range of species likely to be found if suitable habitat is available and accessible.

The small shaw adjacent to the A20 proved interesting with lots of decaying faggot-wood, small saplings and a dominant ground cover of Ivy – off which ***Acalles turbatus, Kissophagus hederae*** (both plentiful) and also a single ***Nephus quadrimaculatus*** were beaten. Ivy is of course an important food source to flying insects in the early autumn at a time when food source is short.

The newly-formed banks to the bypass were, as agreed, not investigated. In addition to the existing and the severed access to 'The Hermitage' referred to in the 1991 report, the principal areas of interest were the intersecting hedges and the main species of consequence found were ***Triplax aenea, Nephus quadrimaculatus, Kissophagus hederae, Taphrorychus bicolor, Stenocarus ruficornis*** and the very local large hopper bug ***Ledra aurita***.

3. Supplemental List of Rare/Notable Species

RDB 2:

Nephus quadrimaculatus Herbst (Coccinellidae) – Locations 21/24

Retained as an RDB 2 status in the JNCC review it is very pleasing to be able to report it from a further two locations during the extended survey; in all three instances it was beaten from dense ivy cover.

Na:

Uleiota planata Linn. (Cucujidae) – Location 19

Found in four separate locations under loose oak bark where the larvae are probably fungivorous. Status revised from RDB 2, but this may only be temporary and it is still a very rare species in Kent.

Longitarsus parvulus Payk. (Chrysomelidae) – Locations 19/20/21/22/25

Common in Kent and widely distributed; the species is probably enjoying a period of abundance due to the increased popularity of linseed as an agricultural crop.

Taphrorychus bicolor Herbst (Scolytidae) – Location 25

Found in the bark of dead beech usually; appears to be restricted to southern and south-eastern England.

Nb:	Location
Platyderus ruficollis Marsh. (Carabidae)	19
Liocyrtusa vittata Curtis (Leiodidae)	20
Scaphisoma boleti Panz. (Scaphidiidae)	21
Riolus subviolaceus Muller (Elmidae)	15/17
Malthinus balteatus Suff. (Cantharidae)	19
Anobium inexspectatum Lohse (Anobiidae)	16/19/21
Diplocoelus fagi Guer-Mene (Biphyllidae)	19
Lissodema quadripustulata Marsh. (Salpingidae)	16/21
Bruchus atomarius Linn. (Bruchidae)	20/24
Podagrica fuscicornis Linn. (Chrysomelidae)	15
Srenocatus ruficornis Steph. (Curculionidae)	23
Curculio betulae Steph. (Curculionidae)	16
Kissophagus hederae Schmitt (Scolytidae)	21/24

Ancient Woodland Indicators

AW(1) Uleiota planata	19
AW(2) Diplocoelus fagi	19
AW(3) Paromalus flavicornis	19
Biphyllus lunatus	24
Triplax aenea	24

SUPPLEMENTAL SCHEDULE OF SPECIES

COLEOPTERA: 269 SP. REPRESENTED FROM 39 FAMILIES

NOCTUIDAE:

1. Coleoptera

Note: Species marked '*' were not recorded in 1991 survey.

CARABIDAE:	Carabus violaceus Linn.	*	20
	Notiophilus substriatus Waterhouse	*	23
	Bembidion properans Steph.	*	18
	Platyderus ruficollis Marsh.	*	19 Nb
	Amara similata Gyllen.	*	20
	Amara tibialis Payk.	*	18
	Harpalus (Ophonus) puncticeps Steph.	*	25
	Harpalus (Ophonus) rufibarbis Fabr.	*	19
	Bradycellus harpalinus Serville	*	23
	Demetrias atricapillus Linn.		21/24/25
	Dromius linearis Olivier		21/23/24
	Dromius melanocephalus Dejean		21/23
	Dromius quadrinotatus Zenk. in Panz.		18/21
HALIPLIDAE:	Haliplus lineatocollis Marsh.	*	16
HYDROPHILIDAE:	Megasternum obscurum Marsh.	*	21
HISTERIDAE:	Abracus globosus Hoffman	*	19/21
	Kissister minimus Aube	*	20
	Paromalus flavicornis Herbst.		19 AW3
LEIODIDAE:	Liocyrtusa virrata Curtis	*	20 Nb
	Agathidium nigripenne Fabr.	*	19
	Agathidium varians Beck	*	23
	Promaphagus medius Rey	*	17
	Nargus velox Spence	*	21
	Catops fuliginosus Erichs.	*	21
	Catops nigricans Spence	*	21
SCAPHIDIIDAE:	Scaphisoma boleti Panz.	*	21 Nb
STAPHYLINIDAE:	Anthobium unicolor Marsh.		21
	Eusphalerum luteum Marsh.	*	16
	Phloeonomus punctipennis Thoms.	*	19
	Siagonium quadricorne Kirby	*	19
	Anotylus inustus Graven.		22
	Stenus picipes Steph.	*	20
	Stenus similis Herbst.		20/22
	Stenus subaeneus Erichs.		23
	Rugilus orbiculatus Payk.	*	23
	Xantholinus linearis Olivier	*	22
	Quedius aridulus Jansson	*	23

	Tachyporus chrysomelinus Linn.		20/21
	Tachyporus hypnorum Fabr.		15/21/25
	Tachyporus nitidulus Fabr.		20
	Tachinus marginellus Fabr.	*	24
	Tachinus signatus Graven.		21
	Bolitochara bella Markel	*	19
	Bolitochara obliqua Erichs.	*	19
	Amischa analis Graven.		23
	Dinaraea aequata Erichs.	*	19
	Atheta (Mocyta) fungi Graven.		20/24
	Aleochara bipustulara Linn.	*	24
PSELAPHIDAE:	Euplectus karsteni Reichen.	*	19
LUCANIDAE:	Dorcus parallelipipedus Linn.	*	19
ELMIDAE:	Elmis aenea Muller	*	15/17
	Limnius volckmari Panz.	*	17
	Riolus subviolaceus Muller	*	15/17 Nb
ELATERIDAE:	Athous hirtus Herbst	*	18
	Adrastus pallens Fabr.	*	15
THROSCIDAE:	Trixagus dermestoides Linn.	*	16
CANTHARIDAE:	Rhagonycha fulva Scop.	*	15/16/19
	Malthinus balteatus Suff.	*	19 Nb
DERMESTIDAE:	Anthrenus fuscus Olivier	*	15/16
ANOBIIDAE:	Ochina ptinoides Marsh.	*	16/19/21
	Hemicoelus fulvicornis Sturm	*	19/21
	Anobium inexspectatum Lohse	*	16/19/21 Nb
	Anobium punctatum Degeer		16/21
MELYRIDAE:	Axinotarsus marginalis Lap. de Castel	*	19
NITIDULIDAE:	Brachypterus glaber Steph.		15/20
	Brachypterus urticae Fabr.		19
	Meligethes aeneus Fabr.	*	15
	Meligethes difficilis Heer	*	17
	Meligethes ovatus Sturm	*	20
	Meligethes pedicularius Gyllen.		15/16
	Epuraea melanocephala Marsh.	*	20
RHIZOPHAGIDAE:	Rhizophagus bipustulatus Fabr.		19
CUCUJIDAE:	Uleiota planata Linn.		19 Na AW1
CRYPTOPHAGIDAE:	Telmatophilus caricis Olivier	*	17
	Antherophagus nigricornis Fabr.	*	20
BIPHYLLIDAE:	Biphyllus lunarus Fabr.	*	24 AW3
	Diplocoelus fagi Guer-Mene		19 Nb AW2

BYTURIDAE:	Byturus tomentosus Degeer	*	20
EROTYLIDAE:	Triplax aenea Schaller	*	24 AW3
PHALACRIDAE:	Olibrus aeneus Fabr.		20
	Olibrus liquidus Erichs.		19
CERYLONIDAE:	Cerylon ferrugineum Steph.		19
	Cerylon histeroides Fabr.	*	19
COCCINELLIDAE:	Subcoccinella 24 punctata Linn.	*	23
	Rhyzobius litura Fabr.		20/22/24
	Nephus quadrimaculatus Herbst		21/24 RDB2
	Exochomus 4-pustulatus Linn.		21/22
	Anisosticta 19-punctata Linn.	*	17
	Tytthaspis 16-punctata Linn.		21
	Adalia bipunctata Linn.		16/18/19
	Adalia 10-punctata Linn.		20/21/24
	Coccinella 7-punctata Linn.		15/19/22/23/25
	Propylea 14-punctata Linn.		15
	Calvia 14-guttata Linn.		21/24
	Thea 22-punctata Linn.		20/22/23/24
ENDOMYCHIDAE:	Mycetaea hirta Marsh.	*	21
LATHRIDIIDAE:	Stephostethus lardarius Degeer		23
	Aridius bifasciatus Reitter		19/21/22/24/25
	Aridius nodifer Westwood	*	21
	Lathridius anthracinus Manner.	*	20
	Enicmus transversus Olivier	*	19/20
	Corticarina fuscula Gyllen.		21
	Cortinicara gibbosa Herbst		19/21/22/23
CISIDAE:	Octotemnus glabriculus Gyllen.	*	19
	Cis boleti Scop.		19
	Cis nitidus Fabr.	*	19
SALPINGIDAE:	Lissodema quadripustulata Marsh.	*	16/21 Nb
	Rhinosimus planirostris Fabr.		21/22
SCRAPTIIDAE:	Anaspis lurida Steph.	*	18/20
	Anaspis pulicaria Costa	*	16
OEDEMERIDAE:	Oedemera lurida Marsh.	*	15/20
ANTHICIDAE:	Anthicus antherinus Linn.	*	16
	Anthicus formicarius Goeze	*	22
BRUCHIDAE:	Bruchus atomarius Linn.		20/24 Nb
CHRYSOMELIDAE:	Donacia simplex Fabr.	*	17
	Donacia vulgaris Zschach	*	17
	Oulema melanopa Linn.		19/22

	Lamprosoma concolor Sturm	*	16
	Chrysolina polita Linn.	*	20
	Phaedon tumidulus Germ.	*	19
	Plagiodera versicolora Laich.		16
	Phyllotreta nigripes Fabr.	*	15/23
	Phyllotreta undulata Kutsch.	*	20
	Aphthona euphorbiae Schrank	*	15/19/21
	Longitarsus flavicornis Steph.		20/21/25
	Longitarsus gracilis Kutsch.		19/21
	Longitarsus parvulus Payk.		19/20/21 Na /22/25
	Altica lythri Aube	*	16/22
	Hermaeophaga mercurialis Fabr.	*	18
	Crepidodera ferruginea Scop.	*	16
	Chalcoides aurata Marsh.	*	18
	Podagrica fuscicornis Linn.	*	15
	Chaetocnema hortensis Fourc.		20
	Sphaerodema testaceum Fabr.	*	19/23
	Psylliodes affinis Payk.	*	16
	Psylliodes cuprea Koch.	*	15
	Cassida rubiginosa Muller	*	20
	Cassida vibex Linn.	*	22
ATTELABIDAE:	Caenorhinus (= Rhynchites) aequatus Linn.	*	15
APIONIDAE:	Apion hydrolapathi Marsh.		20
	Apion malvae Fabr.	*	15
	Apion rufirostre Fabr.	*	15
	Apion aeneum Fabr.	*	15/19
	Apion frumentarium Linn. (= miniatum)		19/20/25
	Apion carduorum Kirby		19/20
	Apion onopordi Kirby	*	19
	Apion hookeri Kirby		20
	Apion ervi Kirby	*	21
	Apion tenue Kirby	*	15
	Apion virens Herbst	*	20
	Apion dichroum Bedel		24
	Apion nigritarse Kirby	*	20
	Apion trifolii Linn.	*	19
CURCULIONIDAE:	Barypeithes pellucidus Bohe.	*	20
	Strophosoma melanogrammus Forster	*	24
	Liophloeus tessulatus Muller	*	21
	Sitona hispidulus Fabr.		20/23
	Sitona lineatus Linn.		22/25
	Cionus alauda Herbst	*	15/16
	Cionus scrophulariae Linn.	*	17
	Euophryum confine Broun	*	19/21
	Acalles turbatus Bohe.		21/23

	Stenocarus ruficornis Steph.	*	23 Nb
	Nedyus (= Cidnorhinus) quadrimaculatus Linn.		16/19/20
	Trichosirocalus (= Ceuthorhynchidius) troglodytes Fabr.		20
	Ceutorhynchus erysimi Fabr.	*	15/20/24
	Ceutorhynchus floralis Payk.	*	15
	Parathelcus (= Ceutorhynchus) pollinarius Forster	*	15
	Microplontus (= Ceutorhynchus) rugulosus Herbst	*	15
	Rhinoncus pericarpius Linn.	*	20
	Anthonomus pedicularius Linn.		15/16/18/21
	Curculio betulae Steph.	*	16 Nb
	Miccotrogus picirostris Fabr.	*	20
	Mecinus pyraster Herbst	*	20/22
	Gymnetron pascuorum Gyllen.	*	20/22
SCOLYTIDAE:	Kissophagus hederae Schmitt		21/24 Nb
	Taphrorychus bicolor Herbst	*	25 Na

2. Hemiptera

a) Hereroptera

CYDNIDAE:	Legnotus limbosus Geoff.	*	15/20
PENTATOMIDAE:	Podops inuncta Fabr.		20
	Eysarcoris fabricii Kirk.		15/16
	Palomena prasina Linn.		23
COREIDAE:	Coriomeris denticulatus Scop.		22
LYGAEIDAE:	Heterogaster urticae Fabr.		24
	Gastrodes grossipes Degeer		23
TINGIDAE:	Derephysia foliacea Fallen	*	21
	Physatocheila dumetorum H – S		15/21/22

b) Homoptera:

CICADELLIDAE:	Ledra aurita Linn.	*	15/21/22

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SECTION 5B

GLOW-WORM INVESTIGATION

MR N HEAL

JULY 1993

'GLOW-WORM' INVESTIGATION

The glow-worm, (or fire-fly) is the colloquial name attributed to a small family of beetles – the Lampyridae – which are bioluminescent. The light-producing organs are situated on the ventral surface of the last abdominal segment. It involves a chemical reaction with a luminescent substance like luciferin or pyrophorin being activated by a catalyst such luciferase. The reaction also requires the presence of oxygen, and this is probably controlled through excitation of the nervous system. The luminescent process however has yet to be fully understood.

Only three species are found in Central Europe; of these in Britain only one ***Lampyris noctiluca Linn*** – is likely to be encountered. The species is widespread in Kent (there are over 50 records in the KBARC) and is found generally on well drained soils – ie, chalk and ragstone. ***Phosphaenus hemipterus Goeze*** is known from East Sussex and also single examples taken in 1894 and 1947 at Southampton. It was last recorded in Britain in July 1961 in East Sussex. A third species – ***Lamprohiza splendidula Linn*** is only known in Britain from two male specimens taken in Kent during 1884.

The life cycle of the larvae appears normally to take two years extending over 3 calendar years. They are carnivorous and their principal prey seems to be snails, especially ***Oxychilus*** sp and other similarly shaped and sized species. Adult glow-worms have a relatively short life span. The 'larviform' female, 15-20mm long, is strongly bioluminescent which is used to attract the winged males, 10-12mm long, and may be found nocturnally resting low down on leaves, twigs, general herbage, at the edges of paths during June and July.

The objective of the investigation was (1) to attempt to identify the distribution of the species within the general area of Leybourne Wood and its margins which may be affected by the Castle Way Improvements, and (2) to endeavour to ascertain the distribution of the species in the adjacent areas unaffected by the improvements.

Three visits were made between the hours of 2130 and 2330 on 24 June, 6 July, and 22 July 1993. None were seen on the first visit but on both subsequent visits, ***Lampyris noctiluca*** females were found to be present over a wide but scattered area of the wood. The attached map indicates the areas investigated by a red line, with the locations where specimens were found indicated in red.

CONCLUSION

Although the glow-worms are present in the portion of the wood which may be affected by the road improvements, they are also present in adjoining unaffected areas, albeit in small numbers and with a scattered distribution.

A228 LEYBOURNE & WEST MALLING BYPASS – ENV. STATEMENT VOLUME 2 – TERRESTRIAL ECOLOGY 07/95

SITES OF NATURE CONSERVATION INTEREST
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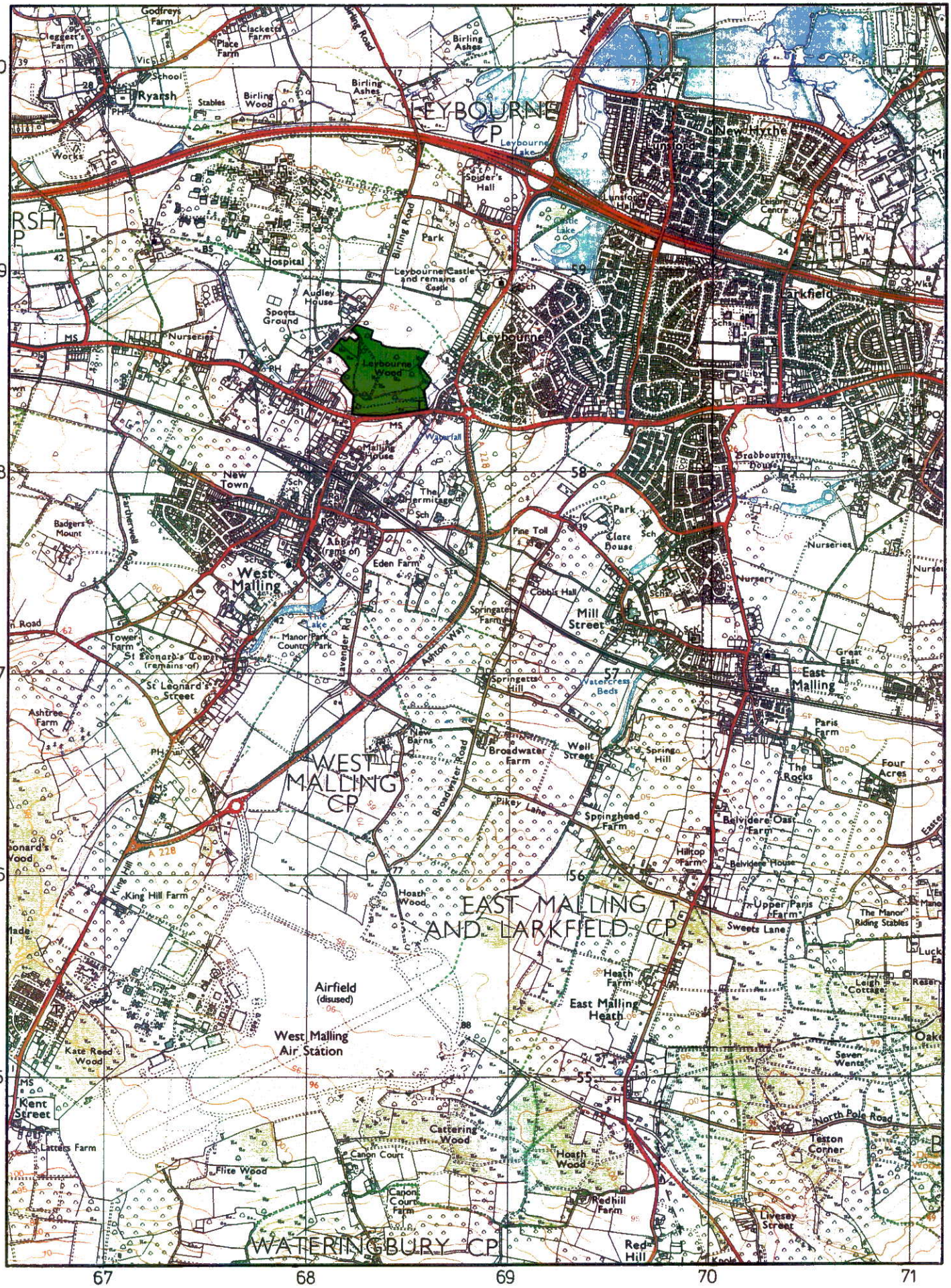

SITES OF NATURE CONSERVATION INTEREST

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SNODLAND

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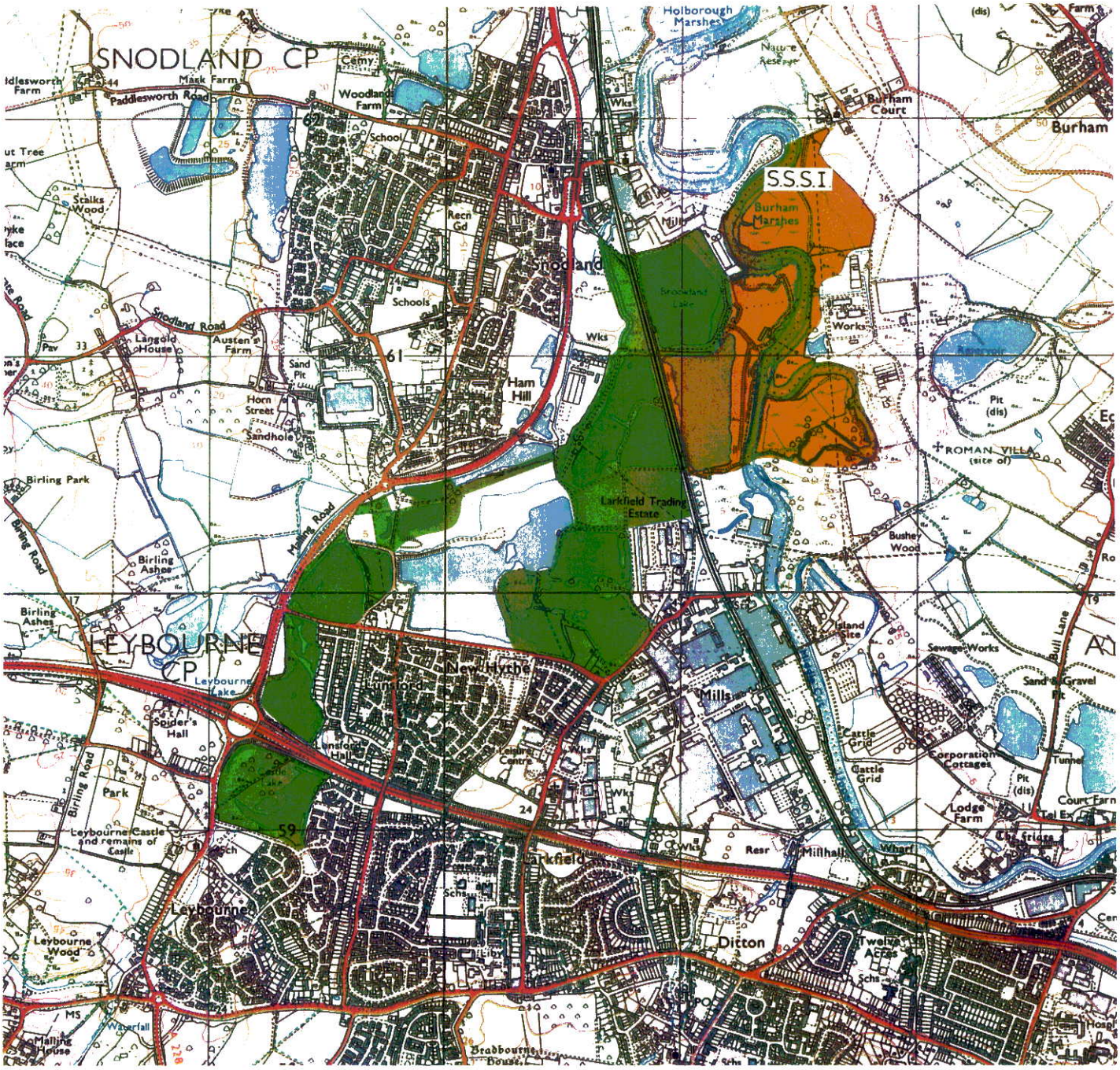
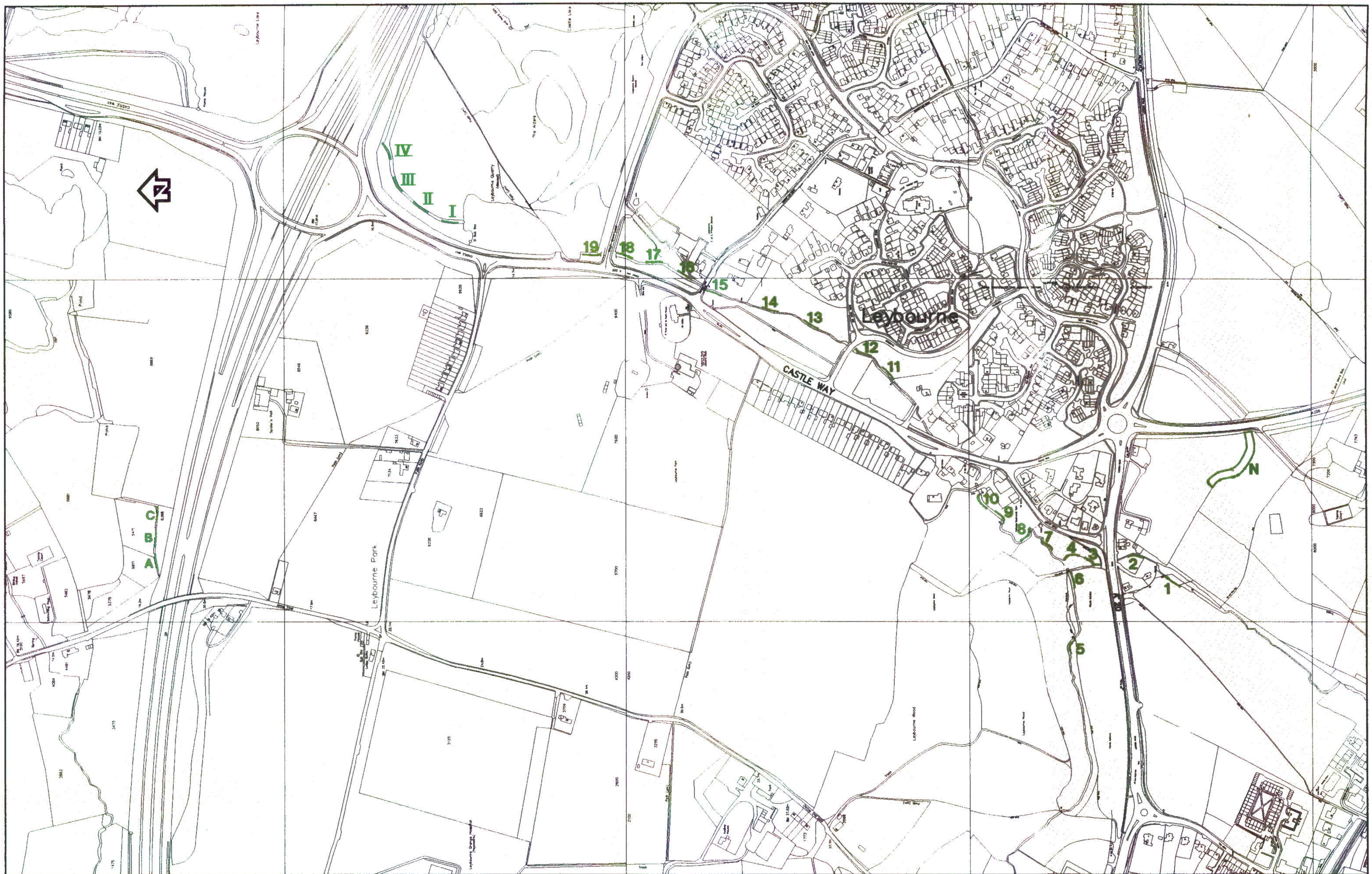




Kent County Council Highways & Transportation

ALLAN MOWATT, BSC(ENG), C.ENG, FICE, FIHT,
DIRECTOR OF HIGHWAYS & TRANSPORTATION

DRAFT ☐
PRELIMINARY ☐
CONSULTATION ☐
INFORMATION ☐
CONSTRUCTION ☐

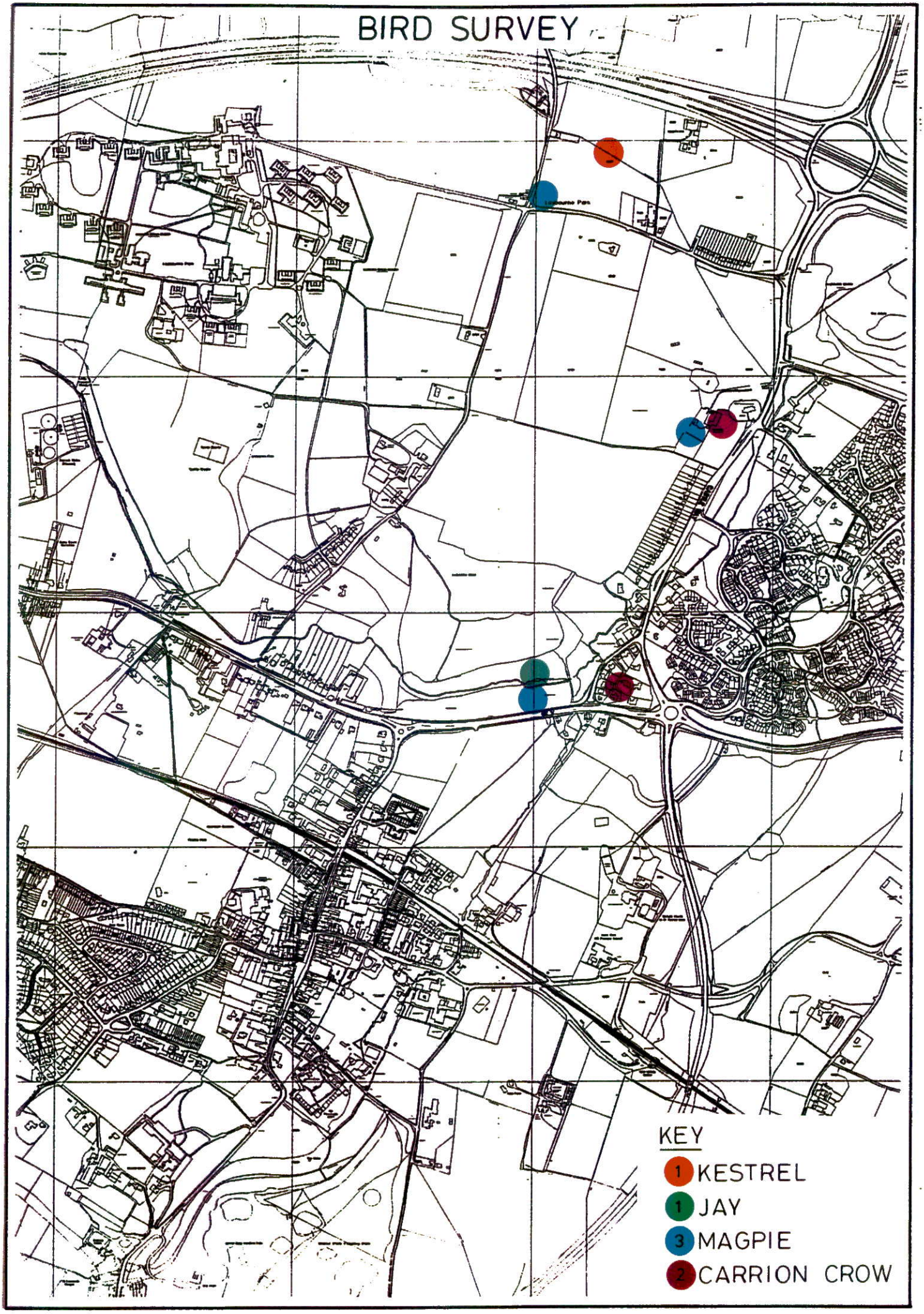
A228 LEYBOURNE AND WEST MALLING BYPASS
SUPPLEMENTARY VEGETATION SURVEY

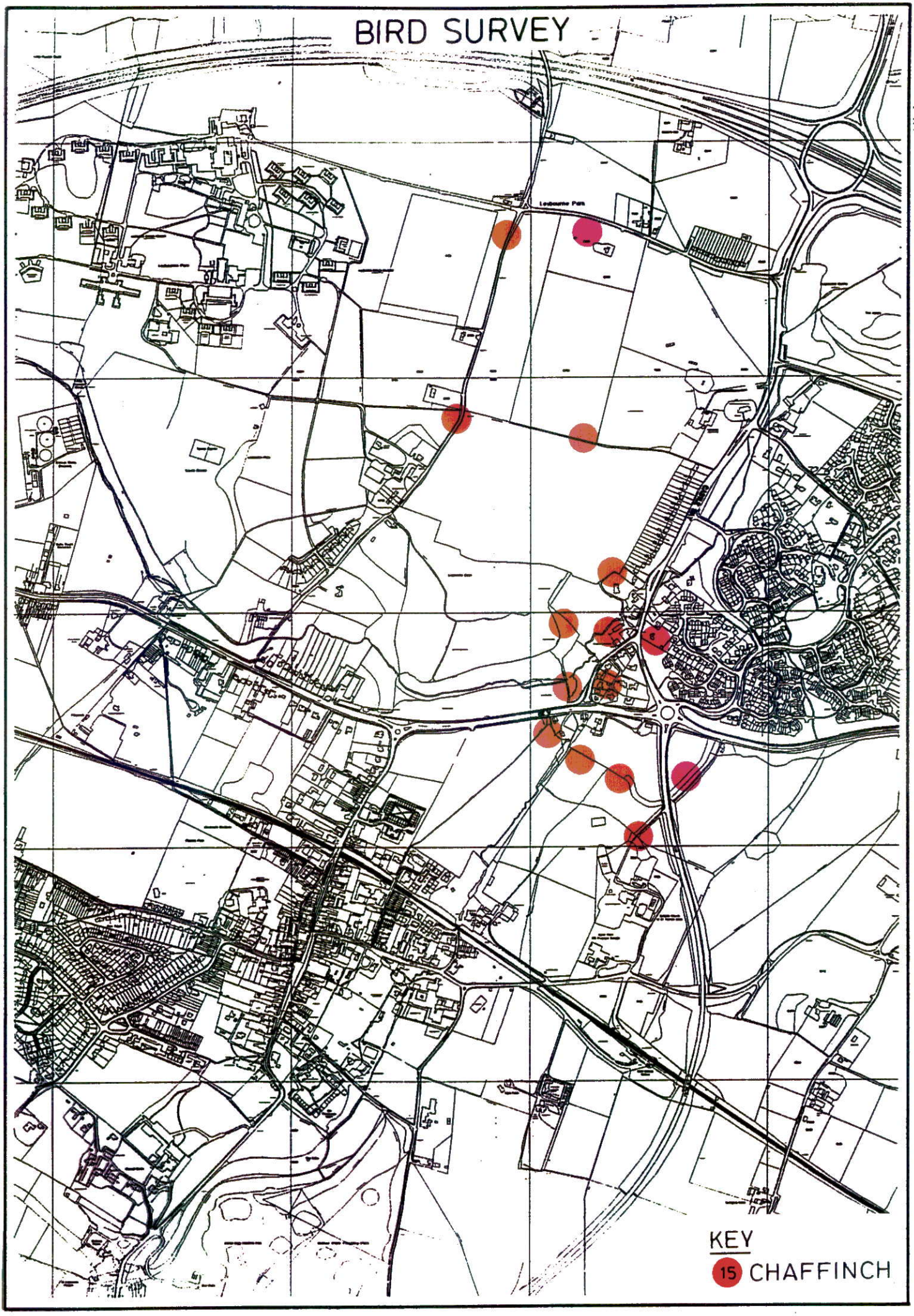
PETER BRETT ASSOCIATES
CONSULTING ENGINEERS

pba

Scales 1:5000		Drawing No
Date 29/6/95	Drawn S.S.	5839/
Checked	Passed	

BIRD SURVEY

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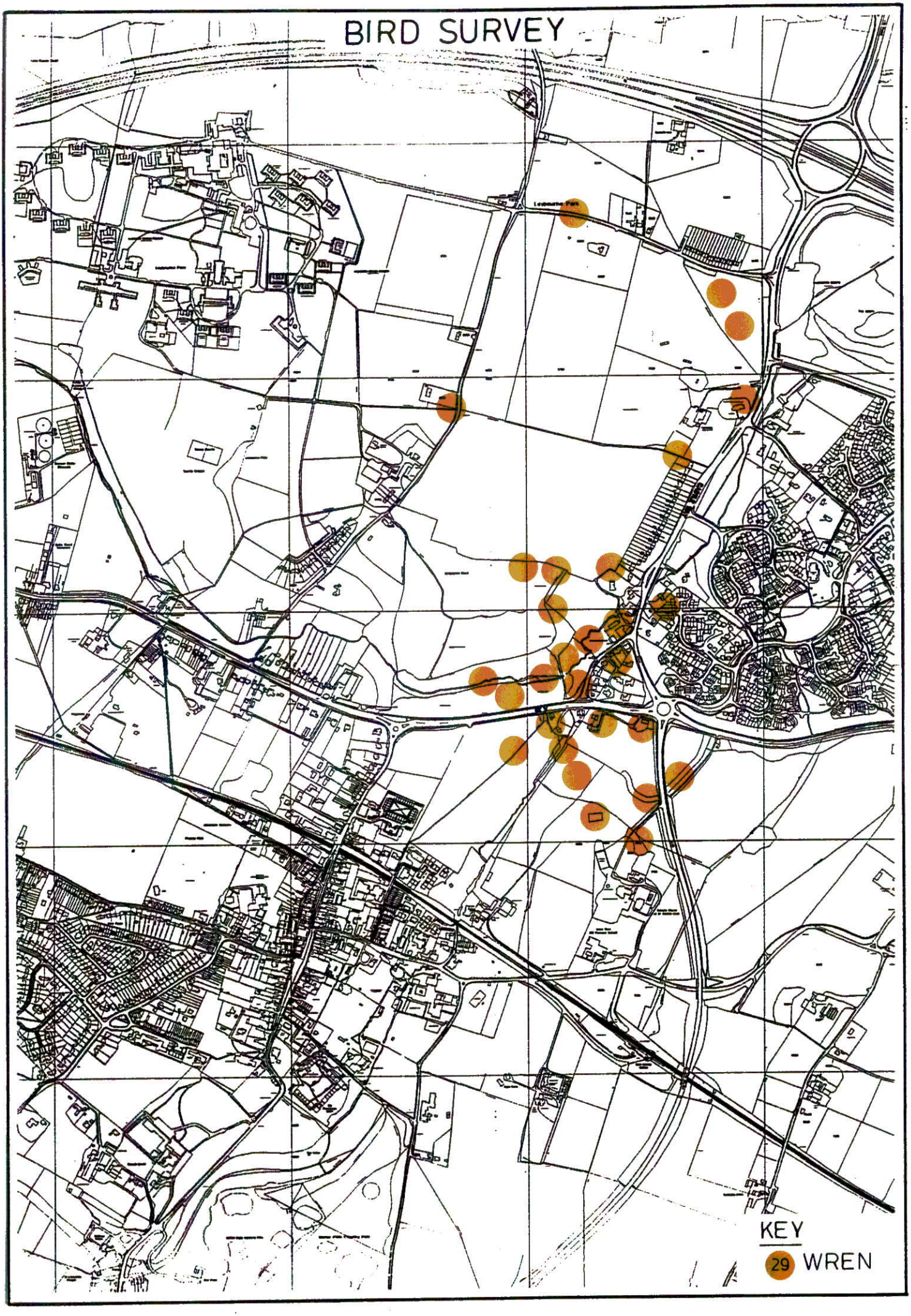
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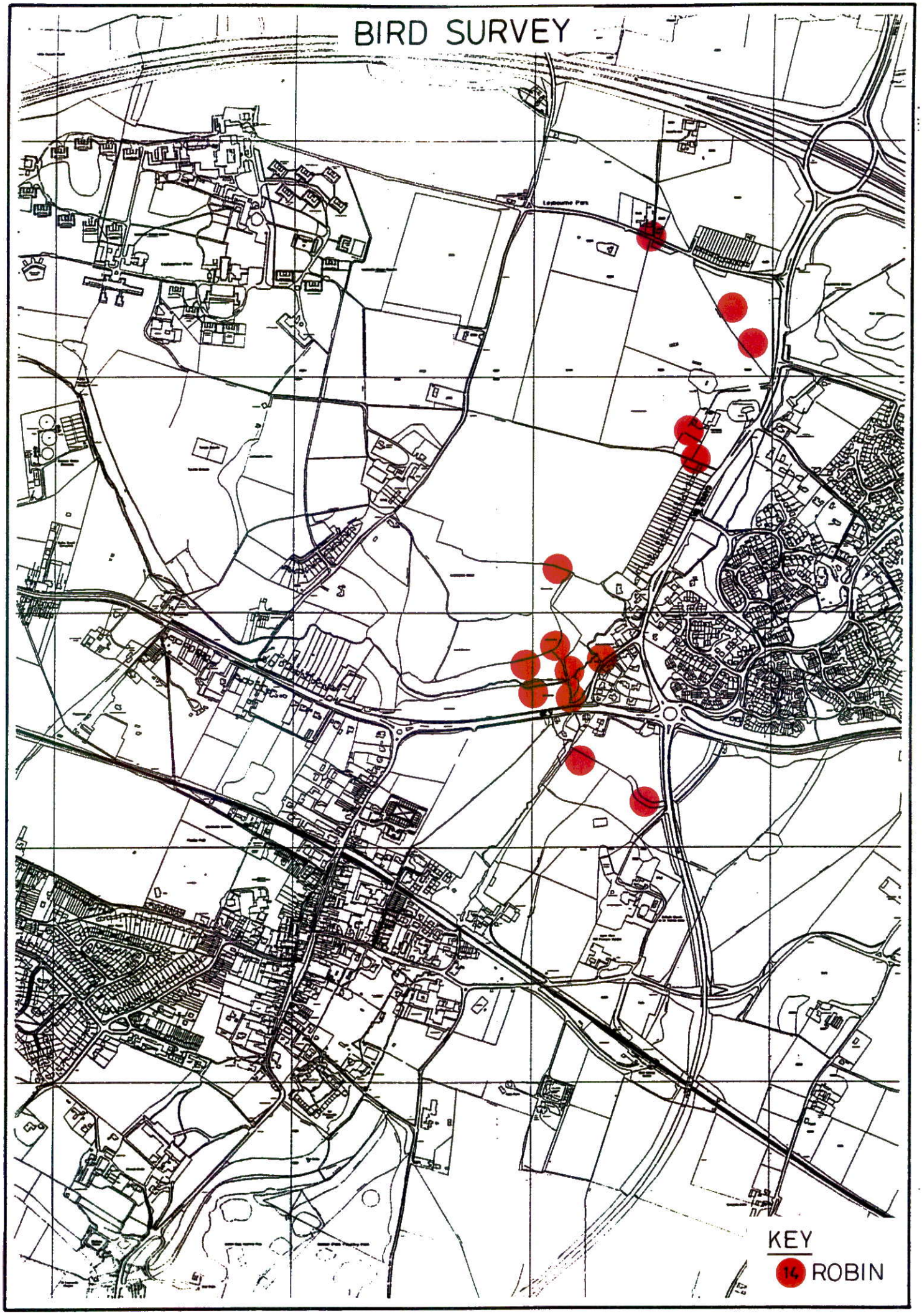
29 WREN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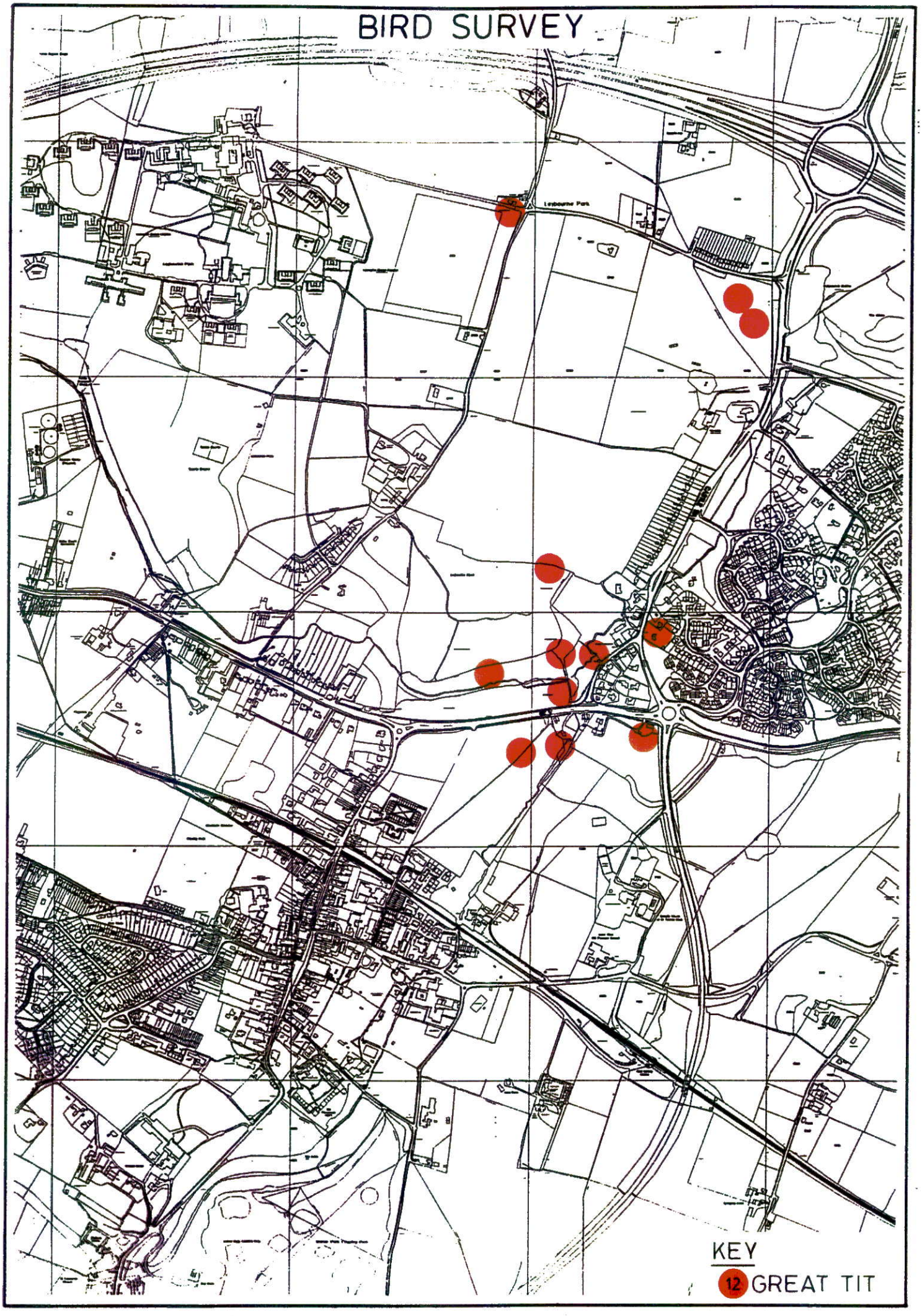
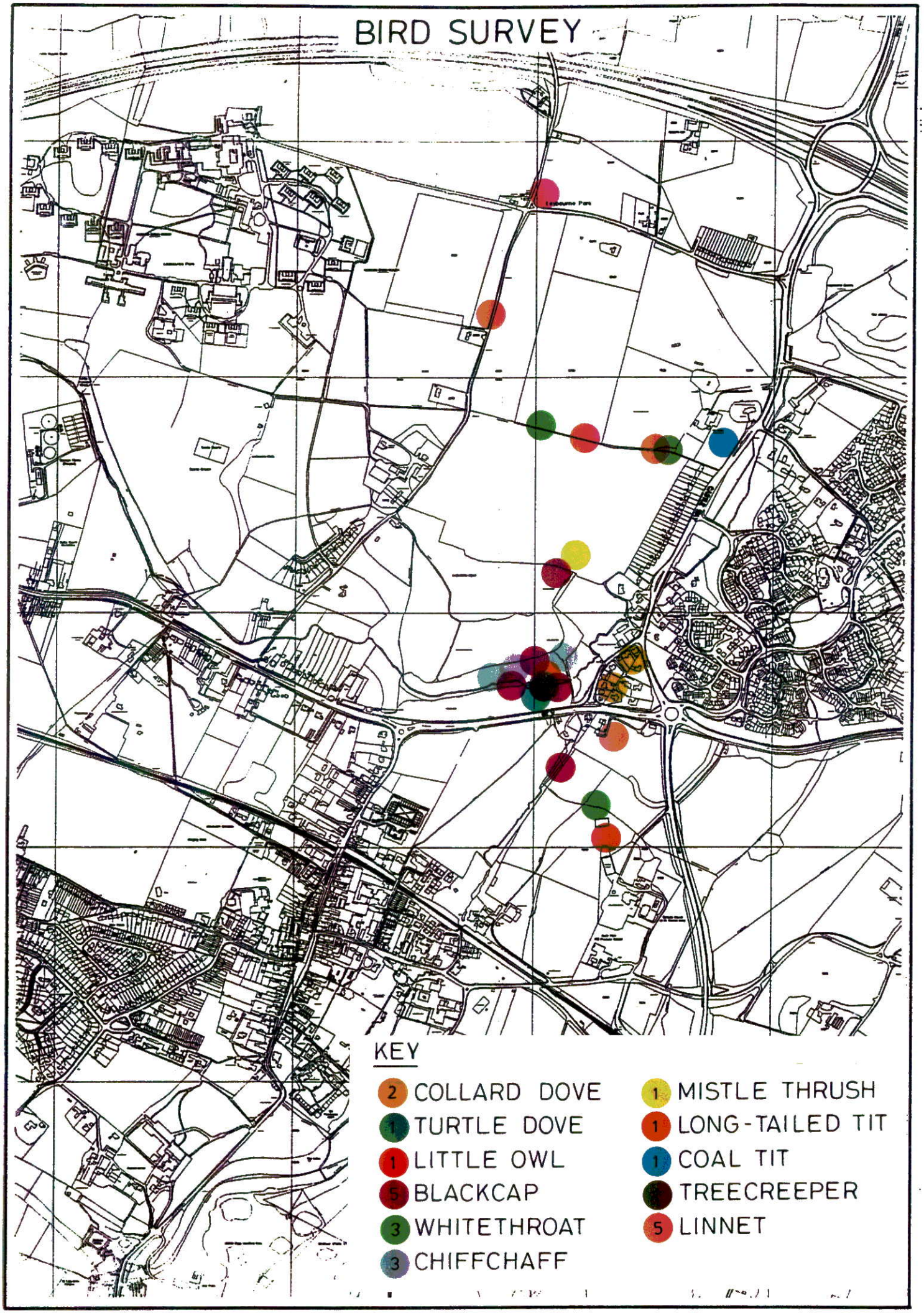
14 ROBIN


BIRD SURVEY
KEY
12 GREAT TIT


BIRD SURVEY
KEY
14 GREENFINCH

BIRD SURVEY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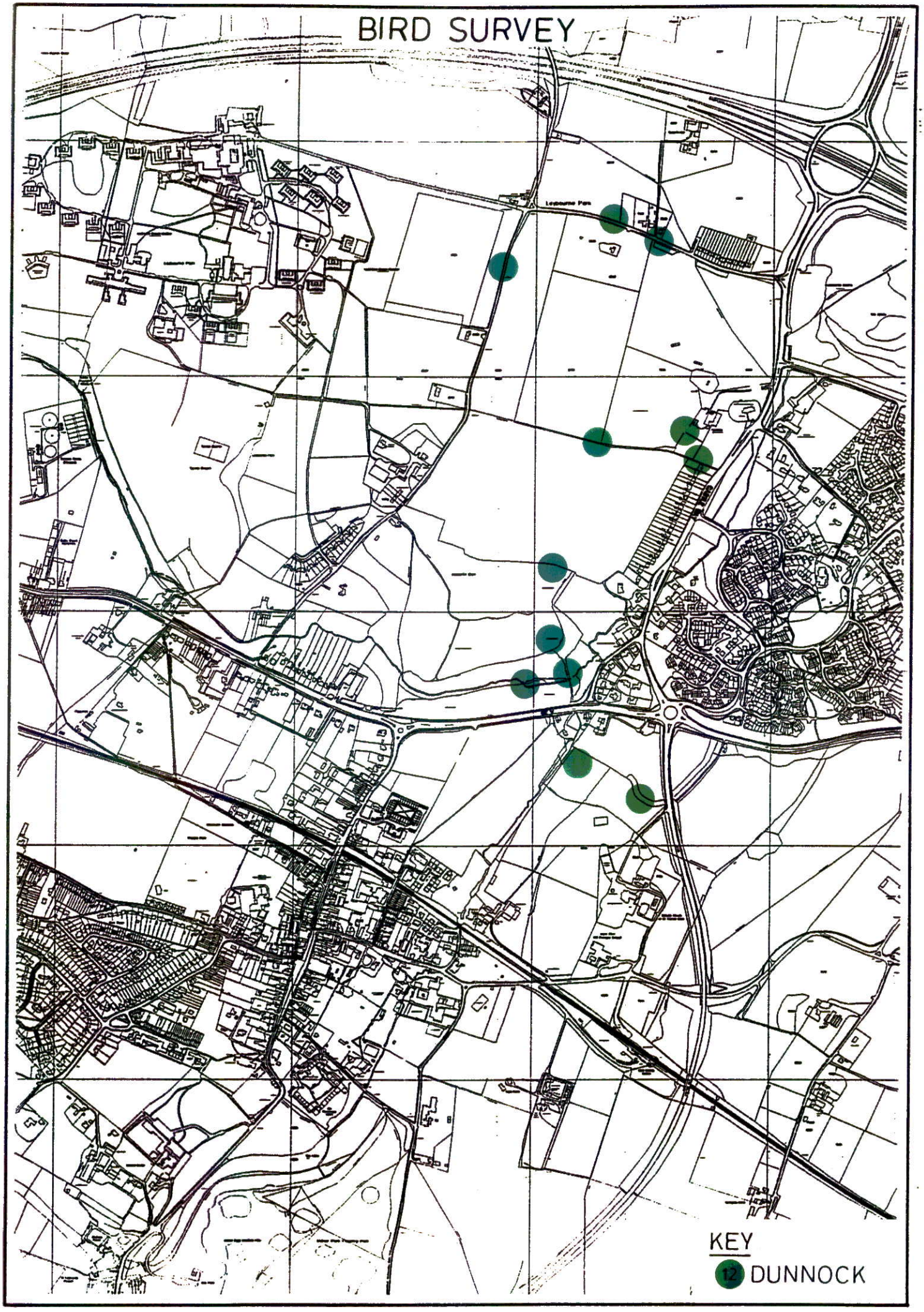
2 COLLARD DOVE
1 TURTLE DOVE
1 LITTLE OWL
5 BLACKCAP
3 WHITETHROAT
3 CHIFFCHAFF
1 MISTLE THRUSH
1 LONG-TAILED TIT
1 COAL TIT
1 TREECREEPER
5 LINNET


BIRD SURVEY
KEY
STARLING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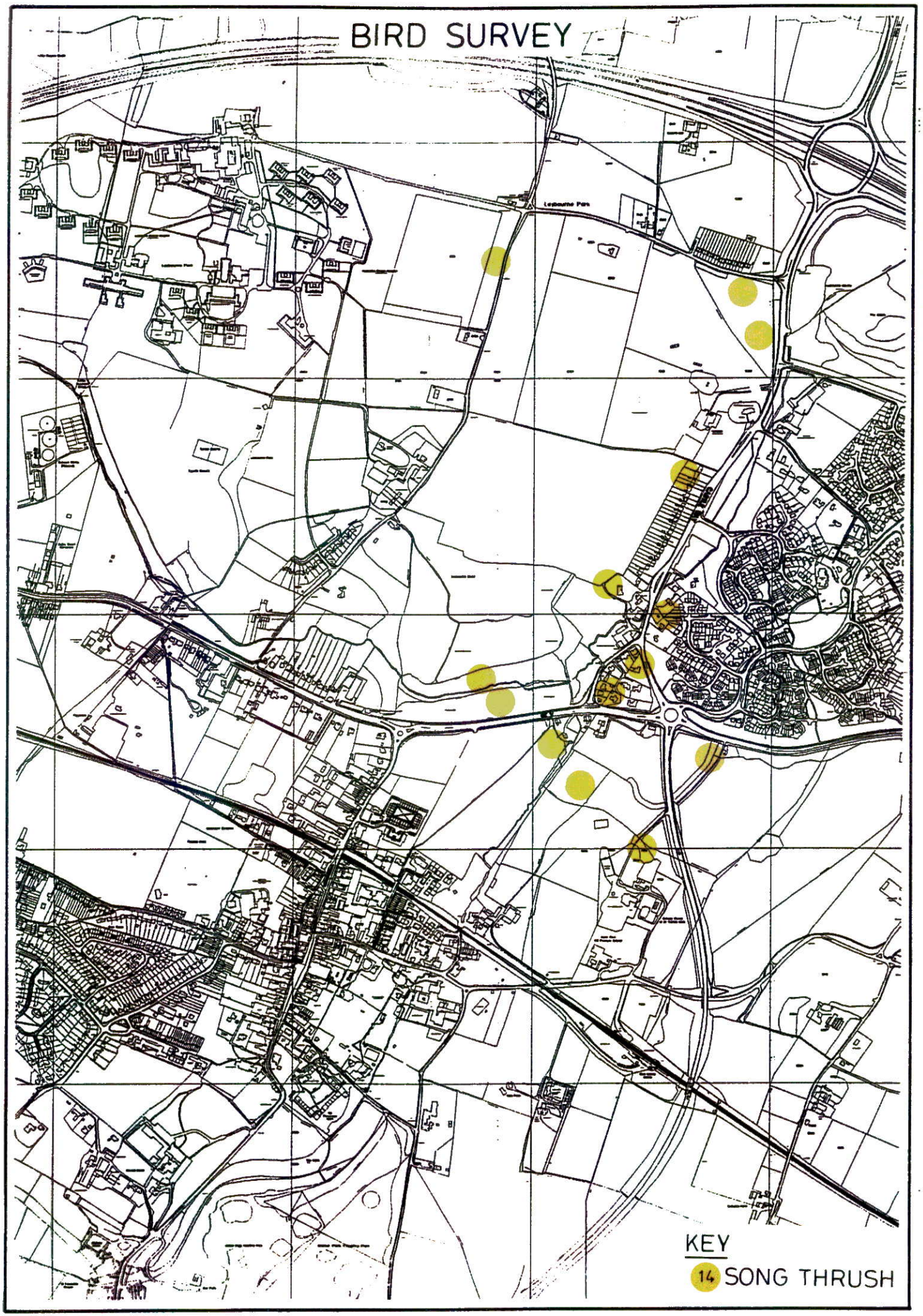
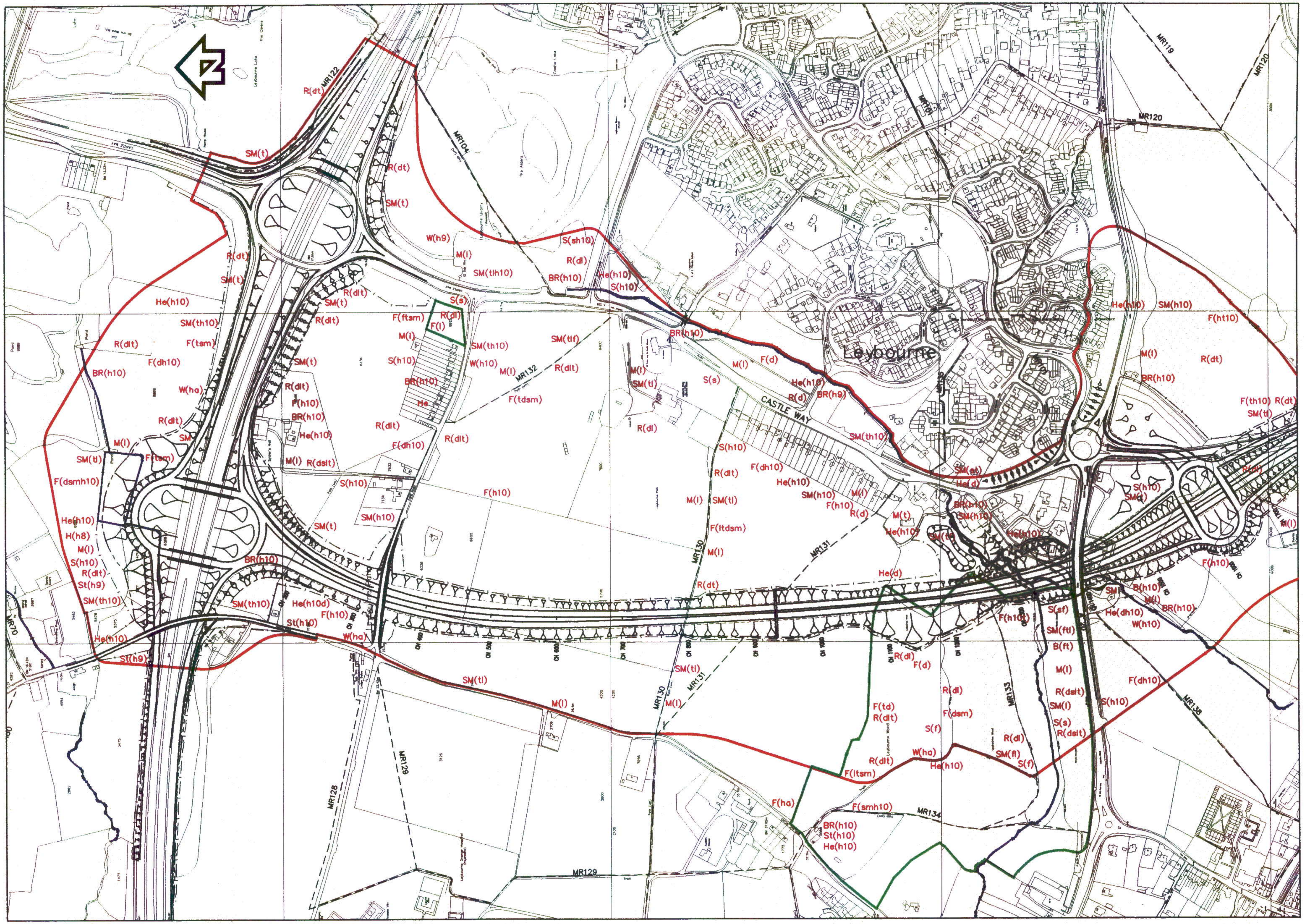
KEY
12 DUNNOCK


BIRD SURVEY
KEY
27 BLACKBIRD


BIRD SURVEY
KEY
14 SONG THRUSH


BIRD SURVEY
KEY
20 BLUE TIT

STUDY AREA Figure 1.



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R(dt)
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CASTLE WAY
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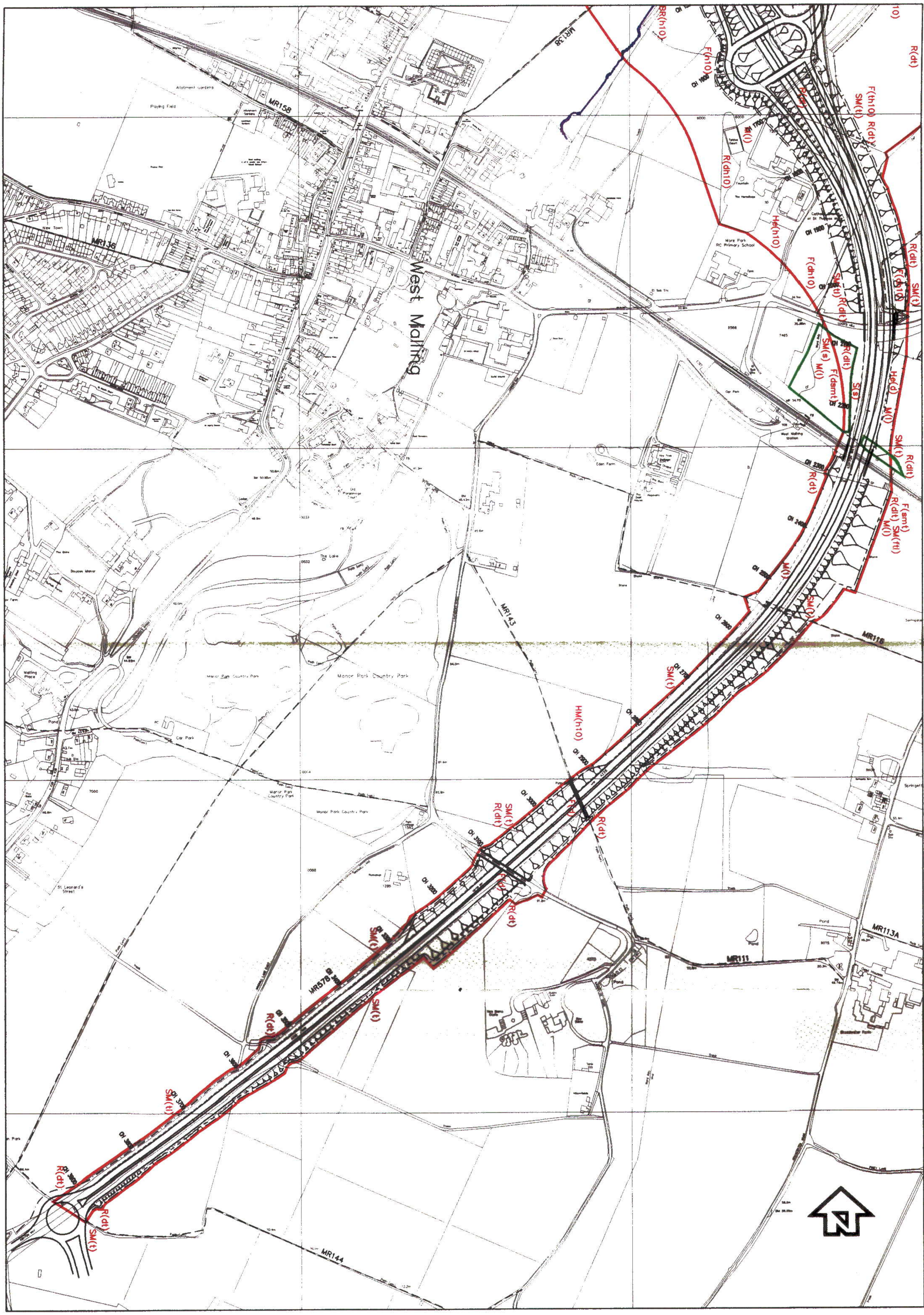

West Malling
MR158
MR136
MR143
MR578
MR144
MR118
MR113A
MR111
Allotment Gardens
Playing Field
Manor Park Country Park
Eden Farm
St Leonard's Street
Car Park
Pond
HM(h10)
BR(h10)
F(h10)
R(dh10)
H(dh10)
F(dh10)
F(th10)
SM(t)
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M(l)
S(s)
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He(d)

GLOW WORM SITES