



Carillion-Buckingham Joint Venture

Home Farm Barn and Access Road Preliminary Ecological Appraisal

East West Rail Core Works

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RSK



RSK GENERAL NOTES

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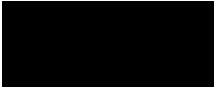

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment.

EXECUTIVE SUMMARY

1. This report presents the results of a Preliminary Ecological Appraisal for a proposed barn and access track to be constructed as part of the East West Rail project. The barn will be constructed at Home Farm, near Merton in Oxfordshire. The barn and most of the track have been consented, but plans for a small section of new track adjacent to the railway have been altered.
2. The report is based on information collected in a field survey completed in December 2014 and a background data search of existing ecological information including records from the Thames Valley Environment Record Centre.
3. The proposed track will result in the loss of habitats including arable field margins, semi-improved grassland and fallow agricultural land. The track will also cross two branches of the New River Ray. Within a 10 m buffer area are hedgerows, scrub, woodland and rough grassland. There is suitable habitat on site for amphibians, Badgers, nesting birds, Otters, reptiles and Water Voles.
4. The location of the barn is within 10 m of Wendlebury Meads and Mansmoor Closes Site of Special Scientific Interest (SSSI), and partly within the Otmoor Conservation Target Area (CTA). There is an existing project method statement for works within 500 m of the SSSI, and this should be followed for the Home Farm works to ensure there are no impacts on the SSSI.
5. Most of the habitats that will be impacted are of low botanical and conservation value, but a detailed assessment is required for the semi-improved grassland field. Detailed assessments may also be required for the rivers. This should be confirmed once details for the crossings are available.
6. Detailed surveys are required on the rivers for evidence of Otters and Water Voles and to determine if the development will impact these species.
7. Great Crested Newts and Common Lizards and Grass Snakes are known to be present near the proposed track route. Construction of the track and barn will need to take place under agreed Ecological Method Statements to mitigate any potential risk of committing an offence related to any of these species.
8. The development offers the opportunity for several enhancements including the creation of new wildflower rich habitats, filling gaps in hedgerows and providing nesting or roosting opportunities for birds and bats.

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1 INTRODUCTION

1.1 Purpose of this Report

This report presents the results of ecological field surveys (and a background data search) undertaken in connection with the proposed construction of an access track and a new barn at Home Farm, near Merton in Oxfordshire (Ordnance Survey grid reference for barn location SP 559 179). The proposed route to the farm track would run from an existing farm gate near Merton (at SP 57283 17383) parallel to the M40 motorway and crosses under the M40 adjacent to the railway (at SP 56143 18324). The track will be approximately 2.1 km in length. It will require a 4 m wide corridor to include the concrete track and grass verges on either side. *Figure 1* shows the site location and an aerial photograph of the site.

Most of the proposed track route and the barn were given consent as part of the main project (Environmental Resources Management 2009). Plans for the track have been updated to include a new track section adjacent to the railway between the M40 and the new barn location. This report presents information on the whole track route and barn to be considered in its entirety. The proposed development is necessary as part of the East West Rail Core Works package.

1.2 Ecological Background

The proposed new barn location is in an arable field adjacent to the railway. The route for the new track that will connect this barn to public roads will run through arable fields and pasture adjacent to the M40. The track will pass under the M40 at an existing railway over-bridge. The track will cross two branches of the New River Ray.

The track and barn lie in the Upper Thames Clay Vales National Character area, a low-lying, clay-based, flood plain landscape. Most of the proposed route is on clay-based soils, although the area close to Merton is in a limestone area. Immediately to the south-west of the proposed barn location is Wendlebury and Mansmoor Closes SSSI, designated for its unimproved meadows.

1.3 Structure of the Report

The remainder of this report is structured as follows:

- *Section 2* describes the survey and assessment methods;
- *Section 3* presents the survey results;
- *Section 4* evaluates the results;
- *Section 5* lists the references;

- *Section 6* provides the figures;
- *Appendix A* explains the protected species legislation;
- *Appendix B* presents the botanical target notes;
- *Appendix C* provides the botanical data;
- *Appendix D* provides notable species records from the background data search;
and
- *Appendix E* provides details of the abbreviations used in the text.

2 METHODS

2.1 General

The Phase 1 Habitat Survey and habitat assessment for protected vertebrates was carried out by Dr Steven Heathcote on the 12th December 2014. Steven is a Consultant Ecologist and Botanical Specialist with over 3 years' experience, and is a Full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

2.2 Background Data Search

A search was made for reference materials relating to the ecology of the Home Farm site, and a list of sources is given in *Table 2.1* below.

Table 2.1. Data Sources used in the background data search

Information Obtained	Available From
Protected and Noteworthy species-records	Thames Valley Environmental Records Centre
Designated site locations and citations	Thames Valley Environmental Records Centre
Designated site locations and citations	Natural England website
Designations and legal protection of noteworthy species	Joint Nature Conservation Committee (JNCC) website
Designated site information	Berks, Bucks & Oxon Wildlife Trust website
Details of species and habitats listed on the Oxfordshire Local Biodiversity Action Plan	Local BAP website
Information on Broad and Priority Habitats and Species Action Plans for the UK	UK Biodiversity Action Plan (UKBAP) website
Satellite imagery	Bing Map

A search was made for details of statutory designated sites (mostly internationally and nationally important sites for ecology) and non-statutory designated sites (mostly sites that are important in a county, district or local context) within 1 km of the site boundary. A search was also made for records of noteworthy species within the same 1 km area. Species included in the search parameters were:

- European protected species (listed on *Schedules 2 and 4 of The Conservation of Habitats and Species (Amendment) Regulations 2012*);
- nationally protected species under *Schedules 1, 5 and 8 of The Wildlife & Countryside Act 1981* and *The Protection of Badgers Act 1992*;

- species listed as Critically Endangered, Endangered or Vulnerable on the *IUCN Red List*
- all species listed on the RSPB *Birds of Conservation Concern 2002-2007* as Red or Amber;
- Nationally Rare or Nationally Scarce species;
- Notable invertebrates; and
- Species of Principal Importance under *The Natural Environment and Rural Communities (NERC) Act (2006)*.

In addition, information was reviewed from existing survey reports related to the East West Rail project.

2.3 Phase 1 Habitat Survey

The habitat survey centred on the Phase 1 Habitat Survey approach (Joint Nature Conservation Committee 2010) as extended for use in Environmental Impact Assessments (Institute of Environmental Assessment 1995). This involves the following elements:

- Habitat mapping using a set of standard colour codes to indicate habitat types on a Phase 1 Habitat Map (*Figure 3*); and
- Description of features of possible ecological or nature conservation interest in notes relating to numbered locations on the Phase 1 Habitat Map, called 'Target Notes'. These are provided in *Appendix B*.

Basic Phase 1 Habitat Survey methods are described in detail in Joint Nature Conservation Committee (JNCC 2010). Limits to the achievable reliability of the method are discussed in Cherrill & McClean (1999).

Plant nomenclature in this report follows Stace (2010) for native and naturalised species of vascular plant. Introduced species and garden varieties were identified using the relevant texts. Plant names in the text are given with scientific names first, followed by the English name in brackets. Doubtful identifications are preceded by 'cf.' placed before the specific epithet where the plant is very probably the species indicated, but it is impossible to distinguish it from similar members of the genus with certainty. Nomenclature for mosses and liverworts follow Hill *et al.* (2008). Names of National Vegetation Classification (NVC) communities and sub-communities follow Rodwell (1992, 2000).

2.3.1 Invasive Plant Species

The site was surveyed for invasive plant species listed on *Schedule 9 of The Wildlife and Countryside Act 1981 (as amended)*.

2.4 Habitat Assessment for Protected Vertebrates

2.4.1 General

The suitability of the site for protected animals was assessed. Taking into account the location and habitats at the site, assessment was carried out for:

- Badger (*Meles meles*);
- bat species (foraging and roosting);
- nesting birds;
- Great Crested Newt (*Triturus cristatus*) and other amphibians;
- reptile species; and
- Otter (*Lutra lutra*) and Water Vole (*Arvicola amphibius*).

Further details of the assessment methods are given below.

2.4.2 Badgers

The site was assessed for areas that might be used by Badger for commuting, foraging and sett-building. Signs of Badgers include setts, tracks, footprints, hair on barbed wire fences, feeding signs, and dung pits.

2.4.3 Bats

Habitats were assessed for their suitability for commuting and foraging bats. Areas of particular interest vary between species, but generally include habitats with good numbers of insects, such as woodland, scrub, hedges, watercourses, ponds, lakes and species-rich or rough grassland.

Trees, buildings, and other structures were identified if they obviously had potential to house roosting bats (Hundt 2012). This involved consideration of the age and condition of the structure, and identification of features that roosting bats may favour (e.g. holes, cracks and cavities that might be used as bat-entrance points or roost sites).

If any definite evidence of bats had been found (such as actual sightings, droppings, urine stains, odour, scratch marks, grease stains and feeding remains), they would have been recorded, though finding such evidence is unlikely at this level of survey.

2.4.4 Nesting Birds

We assessed the suitability of the site for nesting birds. Birds nest in a wide variety of habitats including scrub woodland, hedges and trees, as well as on open ground.

2.4.5 Great Crested Newts

Although standing water is essential for breeding, Great Crested Newts are terrestrial for most of the year and have been recorded up to 500 m from their breeding ponds (Beebee & Griffith 2000). Therefore, we assessed the site for its suitability to support both terrestrial and breeding Great Crested Newts. Suitable breeding ponds are typically well-vegetated, relatively clean and unpolluted, have few fish or wildfowl, and are likely to retain water throughout most (but not necessarily all) summers. Highly

suitable terrestrial habitats include woodland, scrub and tussocky grassland, though Great Crested Newts can be found in a broad range of sub-optimal habitats as well. Habitat suitability for other amphibians is also assessed.

2.4.6 Reptiles

The site was assessed for reptiles, with particular attention to features that provide suitable basking areas (e.g. south-facing slopes), hibernation sites (e.g. banks, walls, piles of rotting vegetation) and opportunities for foraging (e.g. rough grassland and scrub).

The site was assessed for its suitability for each of the three most common reptile species. Specific habitat requirements differ between species. Common Lizards (*Zootoca vivipara*) use a variety of habitats from woodland glades to walls and pastures, although one of their favoured habitats is rough grassland. Slow-worms (*Anguis fragilis*) use similar habitats to Common Lizards, and are often found in rank grassland, gardens and derelict land. Grass Snakes (*Natrix natrix*) have broadly similar requirements to Common Lizards with a greater reliance on ponds and wetlands, where they prey on Common Frogs (*Rana temporaria*) (Beebee and Griffith 2000).

2.4.7 Otter and Water Vole

The site was assessed for suitable habitat for Otters and Water Voles. Otters are largely but not exclusively dependant on aquatic habitats including streams and lakes. Water Voles use a wide variety of aquatic features. Standing and flowing water bodies were assessed for depth, clarity and obvious signs of pollution. The banks were assessed for suitability for burrowing and the diversity of vegetation was noted for its suitability as a food for Water Vole. A search was made for signs including burrows, lawns of grazed grass, other feeding signs or droppings.

2.5 Limitations

Surveys done in late autumn or winter (October to March) are generally considered sub-optimal. They can usually describe habitat types adequately, but many plant species (including invasive species) may be unidentifiable or altogether died-away. An out-of-season survey often provides information sufficient to inform planning, but further survey in spring or summer may be required.

2.6 Validity of Data

According to Natural England advice, survey data should not be over two years old for medium-high impact schemes or multi-plot or phased developments. Surveys up to four years old may be acceptable for low impact schemes, as long as the habitats have not changed significantly in that time period. Where a European Protected Species (EPS) licence is required after the grant of planning permission, Natural England expects applicants to check - by walk-over survey not more than 3 months before the



submission of a licence application - that conditions have not changed significantly since surveys were carried out for the original planning application.

3 RESULTS

3.1 Background Data Search

3.1.1 Biodiversity Action Plans (BAPs)

Under *Section 41 of The Natural Environment and Rural Communities (NERC) Act 2006*, a total of 56 Habitats of Principal Importance (HoPI) are listed and 943 species. These habitats and species were previously referred to as UK BAP priorities. Habitats on site meet the HoPI types for Hedgerows.

The latest Oxfordshire Local Biodiversity Action Plan (LBAP) lists no Habitat Action Plans (HAPs) or Species Action Plans (SAPs). Instead, a Conservation Target Area (CTA) approach is used to deliver BAP habitat targets at a landscape scale. There are currently 36 CTA sites in Oxfordshire that cover a number of priority habitats. The site boundary is within the Otmoor CTA, and is located in the north-east of the 1,918 hectare CTA. Otmoor CTA includes the following priority habitats;

- Floodplain Grazing Marsh;
- Hedgerows;
- Lowland Fen;
- Lowland Meadow;
- Reedbed; and
- Rivers.

3.1.2 Designated Sites

3.1.2.1 Statutory Sites

There is one statutory designated site within 1 km of the site boundary, namely Wendlebury Meads and Mansmoor Closes Site of Special Scientific Interest (SSSI). Wendlebury Meads and Mansmoor Closes SSSI is located approximately 5 m to the south of the site boundary, the site is shown in *Figure 2a*.

Wendlebury Meads and Mansmoor Closes SSSI comprises traditionally-managed unimproved neutral meadows that support a complex variety of plant communities that have developed in response to varying management, drainage and soils. The majority of the meadows comprise calcareous clay pasture communities, which are now rare owing to agricultural improvement and urbanisation. There is a diverse assemblage of floral species, with over 160 species recorded. Hedges separating the fields add to botanical diversity of the site. Almost all of the fields have ridge and furrow topography which is evidence of past ploughing and are of landscape and archaeological importance. The SSSI is important for birds and invertebrates, particularly butterflies. Species of note include Snipe, Curlew, Golden Plover and Barn Owl.



Image 1. Wendlebury Meads and Mansmoor Closes SSSI section closest to the proposed barn location.

3.1.2.2 SSSI Impact Risk Zones

The site intersects nine SSSI Impact Risk Zones. Three of the Zones state that Natural England should be consulted for “All planning applications – except householder applications”.

3.1.2.3 Non-statutory Sites

There are three non-statutory designated sites within 1 km of the site boundary, comprising one Local Wildlife Sites (LWS) which is also an Ancient Semi-Natural Woodland (ASNW) and one Wildlife Trust Reserve (WTR). These sites are listed in *Table 3.1* in order of proximity to the site; short descriptions are given for the sites.

Table 3.1. Non-Statutory Sites within 1 km of the Site Boundary.

Site Name	Designation	Approximate Distance (m)
Woodside Meadow	WTR	280
Woodside Meadow WTR comprises a species-rich wildflower meadow within Wendlebury Meads and Mansmoor Closes SSSI.		
Warmough Copse	LWS & ASNW	470
Warmough Copse comprises coppiced ancient woodland dominated by <i>Fraxinus excelsior</i> (Ash), <i>Populus alba</i> (White Poplar) and <i>Quercus</i> sp. (Oak). The shrub layer had abundant <i>Corylus avellana</i> (Hazel) and the field layer includes <i>Hyacinthoides non-scripta</i> (Bluebell), <i>Lamium galeobdolon</i> (Yellow Archangel), <i>Anemone nemorosa</i> (Wood Anemone) and <i>Conopodium majus</i> (Pignut). The site is important for Badger, Black Hairstreak and birds.		

3.1.3 Protected and Noteworthy Species

At least 151 noteworthy species are recorded from places within 1 km of the site boundary. Of these, 4 are amphibians, 74 are birds, 65 are invertebrates, 3 are plants, 4 are mammals (of these, 2 are bats) and 1 is a reptile. Species that are protected by law under *Schedules 2 and 4 of The Conservation of Habitats and Species*

(Amendment) Regulations 2012, The Wildlife and Countryside Act 1981 or The Protection of Badgers Act 1992 and have been recorded in the search area are listed in the table below and are shown in Figure 2b. A full species list is given in Appendix D.

Table 3.2. Protected Species Records within 1 km of the Site Boundary.

Latin Name	Common Name	Designation	Within 100m	Within 1km
Amphibians				
<i>Lissotriton helveticus</i>	Palmate Newt	WCA5.9.5		<input checked="" type="checkbox"/>
<i>Lissotriton vulgaris</i>	Smooth Newt	WCA5.9.5		<input checked="" type="checkbox"/>
<i>Rana temporaria</i>	Common Frog	WCA5.9.5		<input checked="" type="checkbox"/>
<i>Triturus cristatus</i>	Great Crested Newt	EPS (Sch2), WCA5.9.1		<input checked="" type="checkbox"/>
Birds				
<i>Alcedo atthis</i>	Common Kingfisher	WCA1.1	P	P
<i>Anas acuta</i>	Northern Pintail	WCA1.2	P	<input checked="" type="checkbox"/>
<i>Anser anser</i>	Greylag Goose	WCA1.2		<input checked="" type="checkbox"/>
<i>Aythya marila</i>	Greater Scaup	WCA1.1	P	<input checked="" type="checkbox"/>
<i>Bucephala clangula</i>	Common Goldeneye	WCA1.2	P	<input checked="" type="checkbox"/>
<i>Charadrius dubius</i>	Little Plover	WCA1.1	P	P
<i>Cygnus columbianus</i>	Tundra Swan	WCA1.1	P	<input checked="" type="checkbox"/>
<i>Cygnus cygnus</i>	Whooper Swan	WCA1.1	P	<input checked="" type="checkbox"/>
<i>Falco columbarius</i>	Merlin	WCA1.1	P	<input checked="" type="checkbox"/>
<i>Falco peregrinus</i>	Peregrine Falcon	WCA1.1	P	P
<i>Falco subbuteo</i>	Eurasian Hobby	WCA1.1	P	<input checked="" type="checkbox"/>
<i>Limosa limosa</i>	Black-tailed Godwit	WCA1.1	P	P
<i>Milvus milvus</i>	Red Kite	WCA1.1		<input checked="" type="checkbox"/>
<i>Tringa nebularia</i>	Common Greenshank	WCA1.1	<input checked="" type="checkbox"/>	
<i>Tringa ochropus</i>	Green Sandpiper	WCA1.1	P	<input checked="" type="checkbox"/>
<i>Turdus iliacus</i>	Redwing	WCA1.1	P	<input checked="" type="checkbox"/>
<i>Turdus pilaris</i>	Fieldfare	WCA1.1	P	<input checked="" type="checkbox"/>
<i>Tyto alba</i>	Barn Owl	WCA1.1		<input checked="" type="checkbox"/>
Plants				
<i>Hyacinthoides non-scripta</i>	Bluebell	WCA8		<input checked="" type="checkbox"/>
Invertebrates				
<i>Satyrrium pruni</i>	Black Hairstreak	WCA5.9.5		<input checked="" type="checkbox"/>
<i>Satyrrium w-album</i>	White-letter Hairstreak	WCA5.9.5	P	<input checked="" type="checkbox"/>
<i>Thecla betulae</i>	Brown Hairstreak	WCA5.9.5	P	<input checked="" type="checkbox"/>
Reptiles				
<i>Natrix natrix</i>	Grass Snake	WCA5.9.1		<input checked="" type="checkbox"/>
Mammals				
<i>Meles meles</i>	Eurasian Badger	BA	<input checked="" type="checkbox"/>	
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	EPS (Sch2), WCA5.9.1		<input checked="" type="checkbox"/>

Latin Name	Common Name	Designation	Within 100m	Within 1km
<i>Plecotus auritus</i>	Brown Long-eared Bat	EPS (Sch2), WCA5.9.1		<input checked="" type="checkbox"/>

Note - P relates to records with 4 figure or tetrad grid references that could potentially be anywhere within a 1 km or 2 km square.

3.2 Habitats and Plants

3.2.1 General

The habitat types and *Target Notes* are mapped in *Figure 3*. The detailed *Target Notes* are given in Appendix B. The habitats are split into two, those that lie directly on the route of the proposed track and barn, and those habitats within the 10 m corridor.

Vegetation types that lie directly on the route of the track are:

- Arable fields, fallows with tall ruderals and field margins;
- Semi-improved grassland;
- Rivers (The New River Ray);
- Ephemeral and short perennial vegetation; and
- Hard-standing.

Additional vegetation types within the 10 m corridor but outside the current track route and barn location are:

- Broad-leaved woodland and trees;
- Continuous and scattered scrub;
- Hedgerows;
- Rough grassland;
- Improved grassland;
- Ditches; and
- Bridges.

Some unimproved grassland located in Wendlebury Meads and Mansmoor Closes SSSI was recorded within the buffer area for this site. To prevent repetition, this habitat is discussed under the SSSI section (*Section 3.1.2*), and not as a separate habitat.

3.2.2 Arable field and field margins

The alignment of the eastern half of track runs through farmland parallel to the M40. The track runs through three large arable fields, one active arable field (*Target Note 1*), and two that have been left fallow (*Target Notes 19* and *33*). The active arable field is

the only one on the limestone (and not clay) and had a moderate diversity of weed species amongst the winter wheat crop.

The fallow fields are overgrown primarily with tall ruderal vegetation typical of nutrient-enriched soils with species such as *Cirsium vulgare* (Spear Thistle), *Helminthotheca echinoides* (Bristly Oxtongue) and *Urtica dioica* (Common Nettle). The clay soil creates areas of impeded drainage so *Juncus inflexus* (Hard Rush), *Pulicaria dysenterica* (Common Fleabane) and *Ranunculus repens* (Creeping Buttercup) are locally frequent in these fields. A search of the fallow adjacent to the SSSI (*Target Note 33*) failed to identify any notable plant species listed in the SSSI citation that may be colonising into the fallow, although the time of year for this is sub-optimal.



Image 2. The fallow field described in *Target Note 33* with a photo looking from the barn location towards the east.

The arable fields all have rough grassland field margins. The field margin in the field closest to Merton village (*Target Note 3*) is on the limestone, and had a moderate diversity of grasses and forbs, including *Leucanthemum vulgare* (Oxeye Daisy) and *Rumex acetosa* (Common Sorrel). These field margins do not appear to have been specifically managed for wildlife, so are not considered to meet the criteria for the Arable Field Margins Habitat of Principal Importance.



Image 3. Field margins described in *Target Note 3*. The gappy hedge (*Target Note 4*) is on the left.

The other field margins (*Target Note 23* and *33*) were dominated by *Arrhenatherum elatius* (False Oat-grass) and had a higher frequency of invading scrub and ruderals.

3.2.3 Semi-improved grassland

The proposed track runs along the edge of a large semi-improved grassland field described in *Target Note 13*. The field has evidence of old earthworks or drainage features, indicating that it has not been ploughed for a long time. The abundance of *Lolium perenne* (Perennial Rye-grass) and *Trifolium pratense* (Red Clover) indicates agricultural improvement. However the presence of *Cynosurus cristatus* (Crested Dog's-tail) indicates the potential for some botanical interest.



Image 4. The semi-improved grassland field (*Target Note 13*) looking along the track alignment towards the southern branch of the New River Ray.

3.2.4 Rivers (The New River Ray)

The proposed track crosses two branches of the New River Ray. The main channel of the smaller branch (*Target Note 12*) was overgrown with *Glyceria maxima* (Reed Sweet-grass). The larger channel (*Target Note 18*) was free of emergent vegetation apart from at the margins. The Environment Agency considers the larger branch to be of 'Moderate' ecological quality (Environment Agency 2015), and therefore they would not be expected to meet in the criteria for the 'Rivers' Habitat of Principal Importance. Both branches of the rivers have been heavily modified where they are crossed by the M40. The rivers are widened and much shallower under the bridges.



Image 5. The main branch of the New River Ray



Image 6. The river channel showing the modified channel where the M40 passes overhead

3.2.5 Ephemeral and short perennial vegetation

There is a single small area of ephemeral and short-perennial vegetation on the raised gravel track at a railway crossing (*Target Note 39*) with species typical of disturbed ground and shallow soils.

3.2.6 Hard-standing

The railway corridor is currently a long line of ballast and bare soil while track works are underway. There is some re-growth of tall ruderals at the edge of the track (*Target Note 35*) where the soil and ballast have been undisturbed for a while.

3.2.7 Broad-leaved woodland and trees

The areas of broad-leaved woodland are all associated with the M40 embankments (*Target Notes 22 and 31*). The planted species (such as *Corylus avellana* (Hazel), *Populus tremula* (Aspen) and *Quercus robur* (Pedunculate Oak)) have been joined by other species such as *Acer pseudoplatanus* (Sycamore), *Betula pendula* (Silver Birch) and *Rubus fruticosus* agg. (Bramble). This woodland almost certainly originated as planting when the M40 was constructed in the late 1980s, but is mapped as semi-natural as a result of the absence of management and the development of a complex canopy.

The line of *Salix fragilis* (Crack-willow) is mapped as plantation (*Target Note 16*), but most likely originated with the same M40 planting scheme. The uniform size of the stand means it has been mapped as plantation.

There is a single, isolated mature *Fraxinus excelsior* (Ash) tree, located adjacent to the proposed track route (*Target Note 37*). The tree has a cover of lichens on the trunk. The tree does not appear large enough to be considered a veteran tree.

3.2.8 Continuous and Scattered Scrub

There are several areas of continuous broad-leaved scrub along the M40 corridor (*Target Note 6, 14, 24, 26 and 29*). This scrub is similar to the young broad-leaved woodland described above, and is likely to develop into young woodland over time. Throughout this scrub are suckering patches of the neophyte *Cornus sericea* (Red-osier Dogwood).

There are two areas of scrub that have grown up along the railway boundary fence (*Target Note 28 and 36*) consisting primarily of *Crataegus monogyna* (Hawthorn) and *Rubus fruticosus* agg. (Bramble).

There is an area of scattered scrub on the railway embankment and within the railway corridor (*Target Note 40*) formed primarily of dense *Prunus spinosa* (Blackthorn).

There are few patches of dense *Rubus fruticosus* agg. (Bramble) scrub (*Target Note 10, 17, 39*) in neglected areas that escape any management.

3.2.9 Hedgerows

There is a native, intact hedgerow with standard trees that forms the boundary between the field with the proposed new barn location and the Wendlebury Meads and Mansmoor Closes SSSI site (*Target Note 42*). The proposed barn location is within 5 m of the hedgerow at its closest. Hedgerows are listed on the SSSI citation as an important (and ancient) feature. This hedgerow is dominated by *Crataegus monogyna* (Hawthorn), and has a standard *Pyrus* sp. (Pear) and two *Quercus robur* (Pedunculate Oak).

There is a gappy, defunct hedgerow adjacent to the south-east end of the track (*Target Note 4*). This hedgerow, which has significant gaps and is close to becoming scattered scrub, has a high diversity of woody species including the calcicole *Rhamnus catharticus* (Buckthorn).

Both of these hedgerows meet the criteria for the 'Hedgerows' Habitat of Principal Importance.

3.2.10 Rough grassland

There are large areas of rough grassland on the M40 embankment (*Target Note 25*) and the minor road at Merton (*Target Note 5*). This grassland had a rough, tussocky structure, with *Arrhenatherum elatius* (False Oat-grass) and *Deschampsia cespitosa* (Tufted Hair-grass) both prominent. Both scattered scrub and tall ruderals were present throughout the grassland.

3.2.11 Improved grassland

There is a small, disturbed area of coarse grasses in an area around an existing barn (*Target Note 41*).

3.2.12 Ditches

There are a number of ditches (dry or with shallow, stagnant water) along the base of the M40 and minor road embankments (*Target Notes 4, 7, 8, 15, 21 and 32*). These ditches are presumably designed to carry water drained from the roads into the main waterways during high rainfall. Most of these ditches are at the base of the north-east facing embankment, and all are heavily shaded. There were only small, isolated patches of aquatic vegetation including stands of *Phragmites australis* (Common Reed) and *Typha latifolia* (Bulrush).

There is a small stretch of ditch along the railway edge (*Target Note 38*). The ditch is heavily shaded with no aquatic or emergent vegetation.

3.2.13 Bridges

There are three modern, concrete bridges adjacent to, or over, the route (*Target Notes 11, 16 and 30*). These bridges take the M40 over the rivers and railway. The north sides of these concrete bridges have a low diversity of bryophytes.

3.2.14 Non-native Invasive Species

No non-native, invasive species were recorded on site or within 10 m of the site boundary.

3.3 Assessment for Protected Species

3.3.1 Badger

Badgers are known to be present in the area, and at its most northerly point the track passes within 100 m of an artificial badger set (*Animal Note 6*). There was evidence of badgers throughout the area. There is a network of tracks running along and across the proposed new track route.

No setts were found on, or within 30 m, of the proposed track, although areas of the M40 embankment could not be accessed for a detailed search.

3.3.2 Bats

The background data included records of two species of bat within 1 km of the track.

The three bridges along the proposed track route are modern concrete structures with no obvious features suitable for roosting bats.

There are mature trees along the M40 embankment including *Salix fragilis* (Crackwillow) and *Populus tremula* (Aspen). These are relatively fast-growing trees, and despite their size, had no obvious bat roost features, and all are considered to be Category 3 trees.

The mature *Fraxinus excelsior* (Ash) tree was assessed but had no obvious roost features (*Animal Note 7*). However, the tree is of a size and ages where potential features could be found by a tree-climbing survey, so the tree is considered to be a Category 2 tree.



Image 7. The mature *Fraxinus excelsior* (Ash) tree (*Animal Note 7*).

3.3.3 Birds

The scrub and woodland along the railway and road embankments are suitable for nesting birds, as is the mature *Fraxinus excelsior* (Ash) tree and the two hedgerows.

The fallow arable fields could potentially support both ground nesting birds and provide feeding resources for wintering birds.

3.3.4 Great Crested Newts

Great Crested Newts are known to be present in the area, and the fence from a translocation is present around the northern point of the track.

The potential breeding water bodies within 500 m were assessed as part of the wider project and reviewed recently (RSK 2014a). The details of these water bodies are summarised in *Table 3.3*. The ditches along the M40 embankment are considered too shallow and too heavily shaded to be suitable breeding locations for Great Crested Newts.

The rough grassland field margins and semi-improved grassland fields are suitable terrestrial habitat for amphibians (including Great Crested Newts), although the New River Ray presents a significant barrier to migration. The fallow fields are sub-optimal habitat, having a more open vegetation structure. However, vegetation will increase over time (particularly through the spring of 2015) and the fields will become increasingly suitable for amphibians.

Table 3.3. Details of the ponds found on the site and within 500 m of site. The sections are taken from the division of ponds in RSK (2014a).

Water body ID and type	Distance from site (m)	Relevant Historic Data
Section C		
66	459	GCN absent in 2009 surveys
68	493	GCN present in 2009 – medium sized meta-population
69	455	Unsuitable (not surveyed) in 2009
70	295	Unsuitable (not surveyed) in 2009
71	306	GCN present in 2009 – medium sized meta-population
72	226	GCN present in 2009 – medium sized meta-population
73	320	No access in 2009
Section D		
74	317	GCN present in 2009 – medium sized meta-population
75	315	GCN present in 2009 – medium sized meta-population
76	443	Not accessed
77	464	Dry in spring 2009
Other Water bodies		
K	155	Assumed isolated by M40
L	136	Assumed isolated by M40

3.3.5 Reptiles

There is a single record of Grass Snake within 1 km, from the fields north of the proposed track (*Figure 2b*). No reptiles were recorded from surveys, which were

carried out along the railway line (just to the north of the point where the track meets the railway corridor) as part of the surveys to inform the Environmental Statement (Environmental Resources Management 2009). There are unverified reports of sighting of Common Lizards along the railway embankments adjacent to the proposed new access track in 2014.

The rough grassland and scrub along the road embankments and field margins is suitable for reptiles. The rivers (and particularly the bridge at *Target Note 16*) may cause some fragmentation of habitat, but otherwise there is a relatively large continuous area of habitat from the railway corridor to the south-east. The fallow arable fields are less suitable, but will increase in suitability if left fallow.

3.3.6 Otter and Water Vole

Both branches of the New River Ray are suitable for Water Voles, and the larger channel is suitable for Otters. No obvious evidence was seen of either species, but a thorough search of the river banks was not possible.

The ditches appear too shallow and lack any vegetation cover, so are unlikely to be used by either species. However, if Water Voles were present in the river, they could potentially use the ditches as a small part of their range.

4 EVALUATION

4.1 Designated Sites

4.1.1 Statutory Designated Sites

The proposed location for the barn (and end of the access track) is within 10 m of the Wendlebury Meads and Mansmoor Closes SSSI boundary. There is potential for direct and indirect impacts from the construction phase of the works. These impacts and the necessary mitigation measures are discussed in a Method Statement prepared for the works on the rail (RSK 2014b). This Method Statement is also relevant for the works to the access track and barn, and the Method Statement should be followed for all construction work within 500 m of the SSSI boundary.

In the operation phase the drainage of water from the barn and access track should be planned to prevent any run-off going directly into the SSSI. Lighting for the barn should also be designed to prevent any impacts on the SSSI.

4.1.2 Non-statutory Designated Sites

The Woodside Meadow WTR is part of the SSSI, and will be protected by the measures described for the SSSI above. Warmough Copse is over 400 m from the site, and is sufficiently isolated from the proposed barn and track that no impacts are likely.

4.1.3 Otmoor CTA

The barn and the western end of the track lie within the Otmoor CTA. This aims of the CTA are to protect and restore semi-natural habitats. The barn and track will not result in the loss of CTA habitats, and could be used as an opportunity to create some areas of target habitat. 'Wildflower meadow' is the most appropriate habitat to target, and strips could be created alongside the track, without taking too much arable farmland.

4.2 Habitats and Plants

The proposed new track route has to cross two branches of the New River Ray. The river is an important ecological feature in the landscape. The proposed methods of crossing are not currently available, but should be designed to minimise the direct loss of river bed and bank vegetation. A construction method statement should also be produced and reviewed by relevant statutory bodies to ensure impacts during construction are kept to a minimum. Once crossing methods are decided, detailed surveys of the river corridor are likely to be required. This survey should be carried out between June and September.

The track route also passes through a large semi-improved grassland field. Given the timing of survey, it was not possible to provide an accurate assessment of the botanical

value of this field. The track will pass along the heavily-shaded edge of this field, so is unlikely to impact any potentially species-rich areas of the field. Ideally a detailed botanical survey should be carried out in advance of construction as close as possible to early summer (June – July) to provide an accurate assessment of the value of the field. If any species-rich areas are found on the track alignment, the topsoil should be removed as stored separately, and used to re-instate grassland along the margins of the track.

The remaining habitats that will be lost are common and widespread habitats of low botanical value.

Adjacent to the proposed track and barn location are two Hedgerows that meet the criteria of Habitats of Principal Importance under *Section 41 of The Natural Environment and Rural Communities (NERC) Act*. These features will need to be protected during the development. This should be done using root-protection zones, from which all vehicles are excluded.

4.2.1 Non-native Invasive Species

No non-native, invasive species were recorded during the survey. Given the time of year, it is possible, but unlikely that these species are present but were not visible at the time of survey. A walkover in the summer, or immediately prior to construction would confirm that there are no non-native, invasive species present.

4.3 Protected Species

4.3.1 Badger

The new track and barn will pass over some established Badger paths. During construction, excavations should be closed overnight, and any lighting used should be directed away from areas used by Badgers.

4.3.2 Bats

There is a single Category 2 tree that could potentially have bat roosts. This tree should be retained. If it has to be removed, it should be inspected using canopy access methods to confirm there are no hidden features suitable for roosting bats.

There should only be a negligible loss of bat foraging habitat. During construction, care should be taken to ensure any night-time lighting is directed away from features that bats could use for commuting.

4.3.3 Birds

No tree or scrub removal is anticipated as part of these works. Should this become necessary it will take place outside of the breeding bird season (which runs from March to August, inclusive). Where this is not possible, a search for any nesting birds prior to

vegetation clearance will be undertaken by an ecologist. If any nests are found, they will be protected by an exclusion zone until the young have fledged.

4.3.4 Great Crested Newts

Terrestrial habitat, suitable for Great Crested Newts, and within 250 m of a known breeding pond will be lost. The amount of each habitat type that will be lost, separated by distance from the nearest breeding pond, is given in *Table 4.1*. These were used to carry out a risk assessment following Natural England’s licence risk assessment. This suggests that an offence (disturbing, harming or obstructing Great Crested Newts) is highly unlikely (*Table 4.2*) assuming there are no impacts on individual animals. We therefore consider it to be acceptable to work under a Method Statement, using precautionary working methods. This Method Statement would need to include hand-searches of all suitable habitat by an ecologist.

Table 4.1. Details of the ponds found on the site and within 500 m of site. The sections are taken from the division of ponds in RSK (2014a).

Habitat	Area of habitat 100 – 250 m from breeding ponds (m ²)	Area of habitat 250 – 500 m from breeding ponds (m ²)
Arable (fallow)	1785	2554
Bare ground	91	3873
Dense scrub	-	583
Rough grassland	442	1197
Tall ruderal	-	4680

Table 4.2. The Natural England risk assessment calculator using the habitat areas provided above, and based on the areas given in *Table 4.1*.

Component	Likely effect (select one for each component; select the most harmful option if more than one is likely; lists are in order of harm, top to bottom)	Notional offence probability score
Great crested newt breeding pond(s)	No effect	0
Land within 100m of any breeding pond(s)	No effect	0
Land 100-250m from any breeding pond(s)	0.1 - 0.5 ha lost or damaged	0.1
Land >250m from any breeding pond(s)	1 - 5 ha lost or damaged	0.04
Individual great crested newts	No effect	0
	Maximum:	0.1
Rapid risk assessment result:	GREEN: OFFENCE HIGHLY UNLIKELY	

4.3.5 Reptiles

Reptiles, particularly Common Lizards and Grass Snakes, could potentially be present along most of the proposed track route. The loss of habitat will have a negligible impact on any reptile populations, but there remains a risk of killing or injuring individual

reptiles in the absence of mitigation. In order to avoid potential killing or injuring of any reptiles, a Reptile Method Statement will need to be followed. There is an existing Method Statement for works in areas of reptiles at Wolvercote Tunnel and Langford Industrial Estate (BSG Ecology 2013). This method statement is considered appropriate for the works on the Home Farm barn and access track, except it will not be possible to re-instate the habitats once construction is completed. This Method Statement should therefore be reviewed and updated prior to the start of works.

4.3.6 Otter and Water Vole

A detailed survey for any evidence of Otters and Water Voles should be carried out at the crossing points and within 250 m of both branches of the New River Ray. If either of these species are present, then the river crossings will need to be designed to ensure they do not have any long-term impacts on the populations of these species.

4.4 Ecological Enhancements

The development offers the opportunity to provide ecological enhancements to the landscape, such as:

- New wildflower-rich field margins adjacent to the track in the arable field areas. This will provide an increase in nectar and pollen resources, as well as providing suitable terrestrial habitat for amphibians and reptiles;
- The gaps in the hedgerow along the minor road at Merton should be planted with native species appropriate to the hedgerow. This will improve the habitat connectivity, and potentially provide more flowers and fruits for wildlife; and
- Depending on the design of the barn, some artificial nest boxes for birds, and or artificial bat roosts should be included on appropriate parts of the structure.

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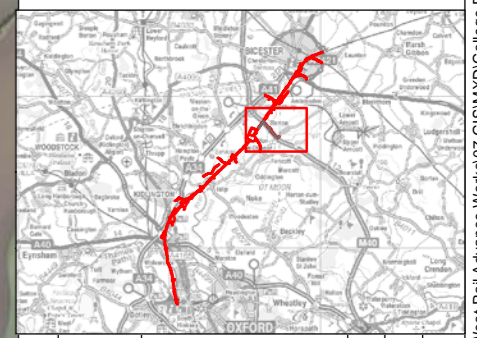
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- Legend:**
- Proposed barn and access track
 - Access track



Rev	Date	Description	Drm	Chk	App
00	19.02.15	855375	RG	RB	TC

East West Rail



TITLE:
Figure 1
Site Location Plan and Aerial
Photograph

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Copyright © 2013 Esri, DeLorme, NAVTEQ, TomTom, Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

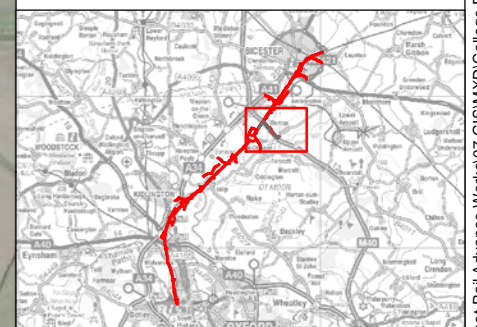


- Legend:**
- Proposed barn and access track
 - Access track
 - 1km buffer
 - Site of Special Scientific Interest (SSSI)
 - Ancient Semi-Natural Woodland (ASNW)
 - Local Wildlife Site (LWS)
 - Wildlife Trust Reserve (WTR)

Warmough Copse LWS & ASNW

Woodside Meadow WTR

Wendlebury Meads and Mansmoor Closes SSSI

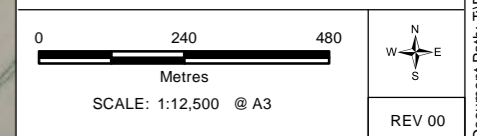


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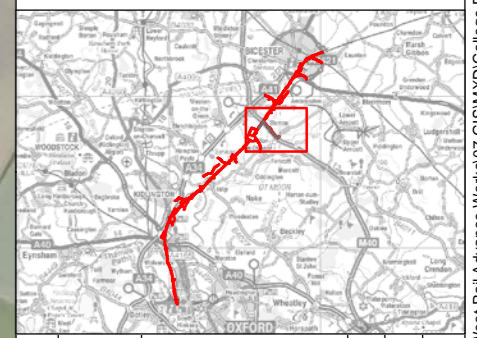
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Designated Sites within 1 km



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



- Legend:**
- Proposed barn and access track
 - Access track
 - 1km buffer
 - Extent of tetrad or 4 figure grid reference
 - ◆ Amphibian
 - ◆ Great Crested Newt
 - Bird
 - ▲ Bluebell
 - ▼ Black Hairstreak
 - ▼ Brown Hairstreak
 - ▼ White-letter Hairstreak
 - Brown Long-eared Bat
 - Common Pipistrelle
 - Eurasian Badger
 - ★ Grass Snake



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East West Rail

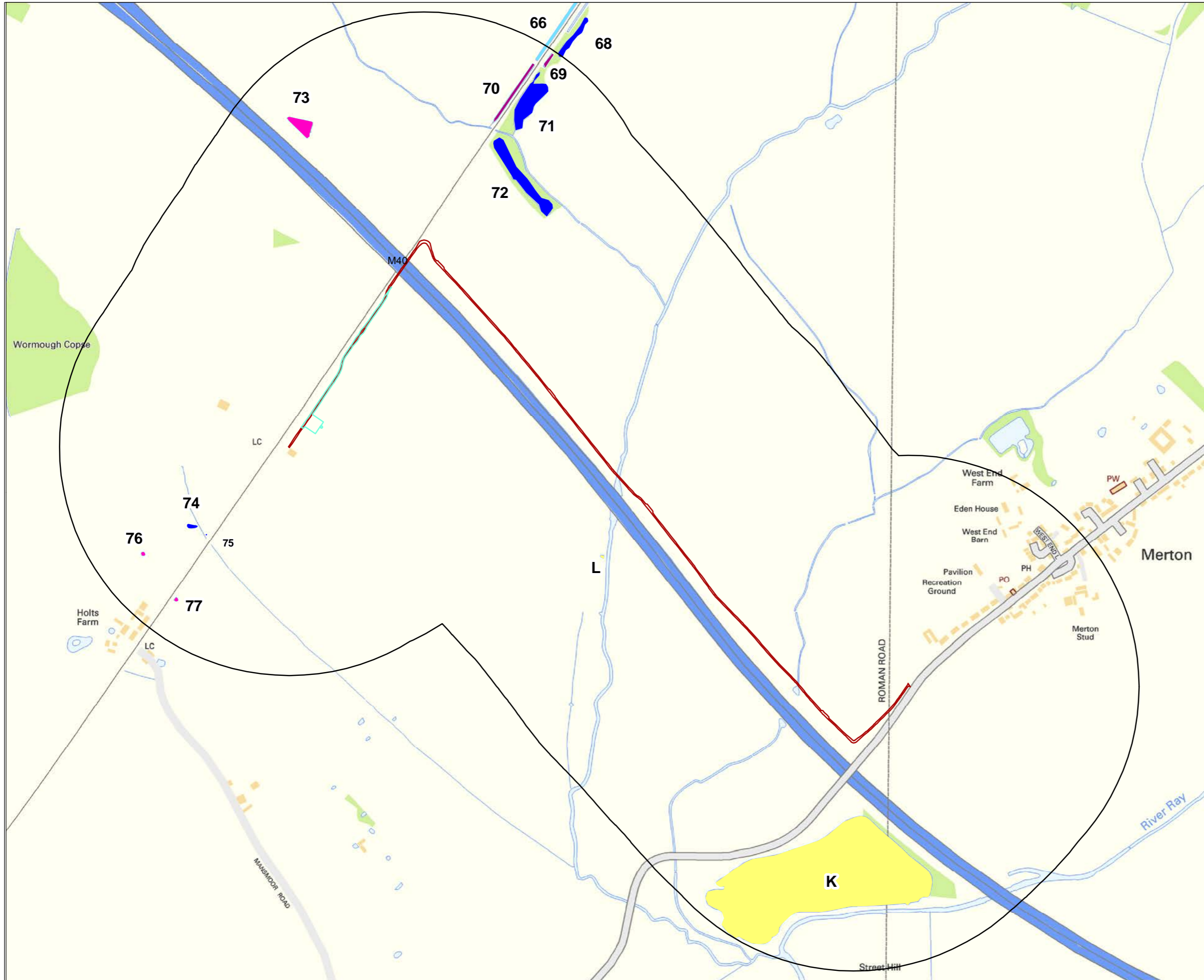
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Protected Species within 1 km
Confidential

0 300 600

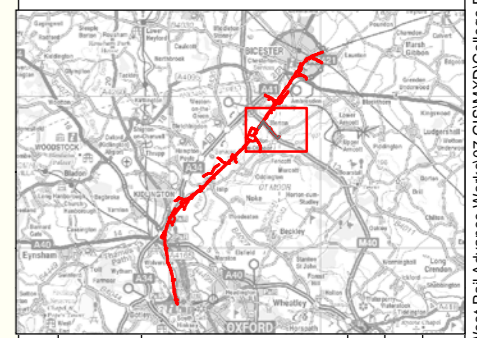
Metres

SCALE: 1:15,000 @ A3

REV 00



- Legend:**
- Proposed barn and access track
 - Access track
 - 500m buffer
- Water Bodies**
- GCN present
 - GCN absent
 - Unsuitable for GCN
 - Assumed barrier
 - No access \ no information \ waterbody absent



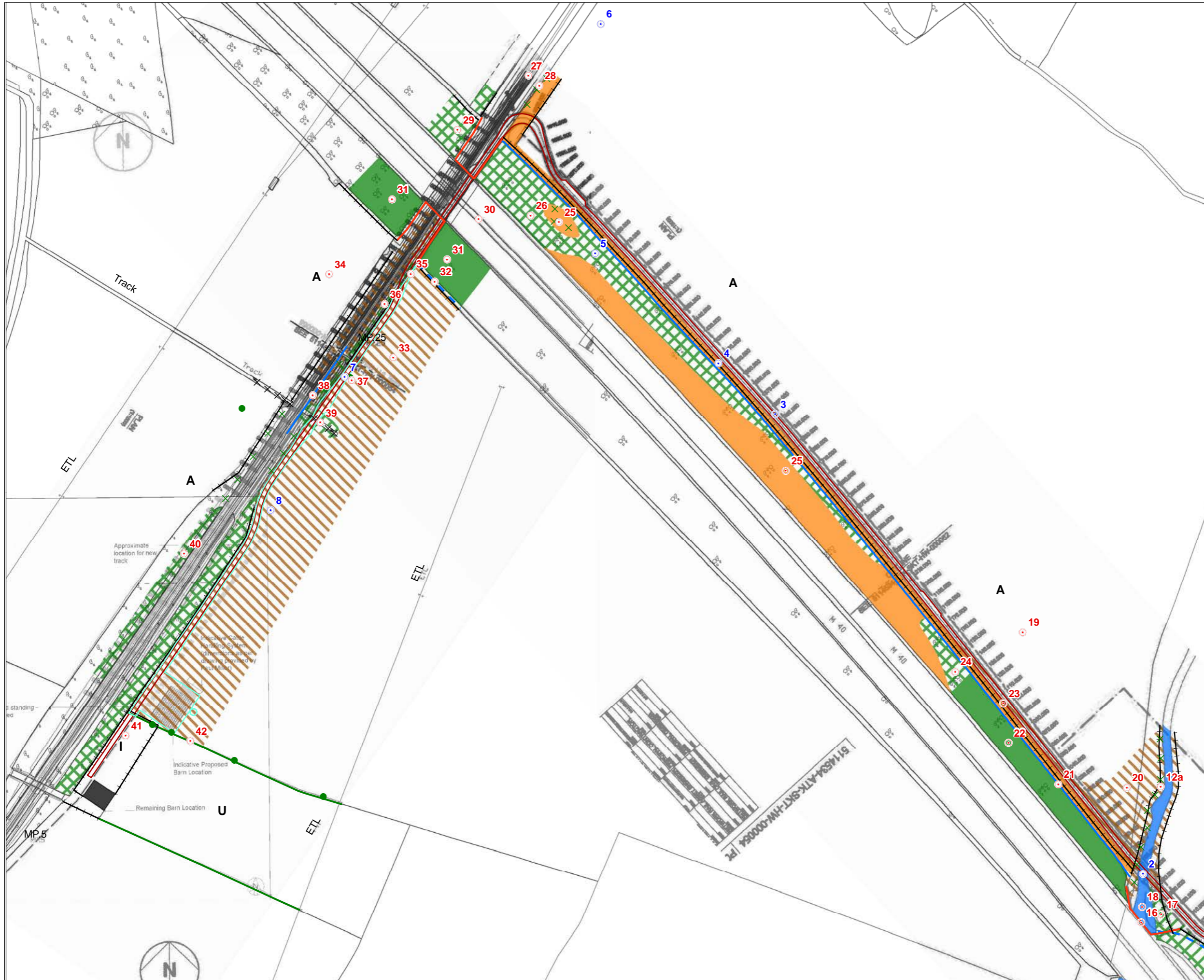
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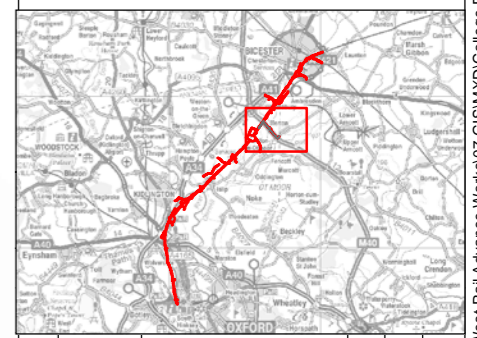
TITLE: Figure 2c
Water Bodies within 500 m

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Metres
SCALE: 1:8,000 @ A3

REV 00



- Legend:**
- Proposed barn and access track
 - Access track
 - Broad-leaved semi-natural woodland
 - Broad-leaved plantation woodland
 - Dense scrub
 - Rough grassland
 - Tall ruderal
 - Running water
 - Building
 - Bare ground
 - Broad-leaved tree
 - Scattered scrub
 - Ephemeral / short perennial Unimproved grassland
 - Semi-improved
 - Improved
 - Arable
 - Intact hedge
 - Gappy hedge
 - Ditch
 - Dry ditch
 - Wall
 - Fence
 - Botanical target note
 - Animal target note



Rev	Date	Description	Dm	Chk	App
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East West Rail

TITLE: Figure 3
Phase 1 Habitat and Protected Species Survey - Map 1

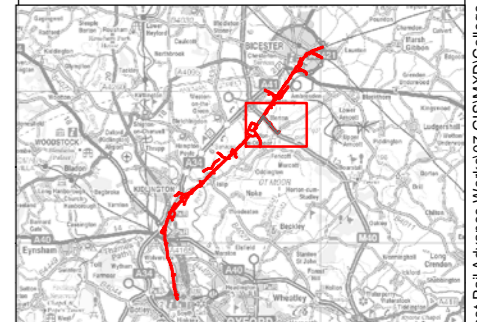
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REV 00



- Legend:**
- Proposed barn and access track
 - Access track
 - Broad-leaved semi-natural woodland
 - Broad-leaved plantation woodland
 - Dense scrub
 - Rough grassland
 - Tall ruderal
 - Running water
 - Building
 - Bare ground
 - Broad-leaved tree
 - Scattered scrub
 - Ephemeral / short perennial Unimproved grassland
 - Semi-improved
 - Improved
 - Arable
 - Intact hedge
 - Gappy hedge
 - Ditch
 - Dry ditch
 - Wall
 - Fence
 - Botanical target note
 - Animal target note



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East West Rail



TITLE: Figure 3
Phase 1 Habitat and Protected Species Survey - Map 2

SCALE: 1:2,500 @ A3

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APPENDIX A - RELEVANT LEGISLATION

General

This section briefly describes the legal protection afforded to the protected species referred to in this report. It is for information only and is not intended to be comprehensive or to replace specialised legal advice. It is not intended to replace the text of the legislation, but summarises the salient points.

Badger

Meles meles (Badger) is protected in Britain under the *Protection of Badgers Act 1992* and *Schedule 6 of the Wildlife and Countryside Act 1981* (as amended).

The legislation affords protection to Badgers and Badger setts, and makes it a criminal offence to:

- wilfully kill, injure, take, possess or cruelly ill-treat a Badger, or to attempt to do so;
- interfere with a sett by damaging or destroying it;
- to obstruct access to, or any entrance of, a Badger sett; or
- to disturb a Badger when it is occupying a sett.

Bats

All species of British bat are protected by *The Wildlife and Countryside Act 1981* (as amended), extended by the *Countryside and Rights of Way Act 2000*. This legislation makes it an offence to:

- intentionally kill, injure or take;
- possess or control;
- intentionally or recklessly damage, destroy or obstruct access to a breeding site or resting place; and
- intentionally or recklessly disturb whilst the animal occupies a breeding site or resting place.

Bats are also European Protected Species listed on *The Conservation of Species and Habitats Regulations 2010* (as amended). This legislation makes it an offence to:

- deliberately capture, injure or kill;

- deliberately disturb, including in particular any disturbance which is likely (a) to impair their ability - (i) to survive, to breed or reproduce, or to rear or nurture their young; or (ii) hibernate or migrate, where relevant; or (b) to affect significantly the local distribution or abundance of the species to which they belong;
- damage or destroy a breeding site or resting place; and
- possess, control, transport, sell, exchange, or offer for sale or exchange.

Birds

Birds general protection

All species of bird are protected under *Section 1* of the *Wildlife and Countryside Act 1981* (as amended). The protection was extended by the CRoW Act.

The legislation makes it an offence to intentionally:

- kill, injure or take any wild bird;
- take, damage or destroy the nest of any wild bird while that nest is in use or being built; or
- take or destroy an egg of any wild bird.

Birds (specially protected species)

Certain species of bird are listed on *Schedule 1* of the *Wildlife and Countryside Act 1981* (as amended) and receive protection under *Sections 1(4)* and *1(5)* of the Act. The protection was extended by the CRoW Act. The legislation confers special penalties where the above mentioned offences are committed for any such bird and also make it an offence to intentionally or recklessly:

- disturb any such bird, whilst building its nest or it is in or near a nest containing dependant young; or
- disturb the dependant young of such a bird.

Common Reptiles

Lacerta vivipara (Common Lizard), *Natrix natrix* (Grass Snake), *Anguis fragilis* (Slow-worm), and *Vipera berus* (Adder) are listed under *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), in respect of *Section 9(5)* and part of *Section 9(1)*. This protection was extended by the CRoW Act.

Under the above legislation it is an offence to:

- intentionally or deliberately kill or injure any individual of such a species; or

- sell or attempt to sell any part of the species alive or dead.

Great Crested Newts

Triturus cristatus (Great Crested Newt) is listed on *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), and receives full protection under Section 9. This species is also listed as a European Protected Species on *The Conservation of Species and Habitats Regulations 2010* (as amended) which gives it full protection under *Regulation 39*. Protection was extended by the *Countryside and Rights of Way Act 2000* (the CROW Act).

Under the above legislation it is an offence to:

- kill, injure or take an individual of such a species;
- possess any part of such species either alive or dead;
- intentionally or recklessly damage, destroy or obstruct access to any place or structure used by such species for shelter, rest, protection or breeding;
- deliberately take or destroys the eggs of such an animal;
- intentionally or recklessly disturb such a species whilst using any place of shelter or protection; or
- sell or attempt to sell any such species.

The Great Crested Newt is included as a Priority Species in the UK Biodiversity Action Plan (UKBAP) and also as a species of principal importance for the conservation of biological diversity in England under Section 74 of the CROW Act.

Water Vole

Arvicola amphibius (Water Vole) is fully protected under *Section 9* of *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended). Protection was extended by the *Countryside and Rights of Way Act 2000*.

Under this legislation, it is an offence to:

- intentionally kill, injure or take (capture) a Water Vole;
- possess or control a live or dead Water Vole, or any part of a Water Vole;
- intentionally or recklessly damage, destroy or obstruct access to any structure or place which Water Voles use for shelter or protection, or to intentionally or recklessly disturb Water Voles while they are using such a place; or
- sell, offer for sale or advertise for live or dead Water Voles.

The Water Vole is included as a Priority Species in the UK Biodiversity Action Plan (UKBAP).

APPENDIX B - TARGET NOTES

Botanical Target Notes

Target Note 1. An arable field with a recently sown crop of *Triticum* cf. *aestivum* (Winter Wheat) with small limestone stones amongst the topsoil. There are scattered weeds including *Galium aparine* (Cleavers), *Geranium molle* (Dove's-foot Crane's-bill), and *Taraxacum* agg. (Dandelions).

Target Note 2. A gravel farm track with uneven surface and pooling water.

Target Note 3. A recently-mown arable field margin approximately 4 m wide, with rutting caused by vehicles. The field margin is grazed by rabbits. The field margin is predominantly grasses with a moderately diverse sward, including the grasses *Agrostis capillaris* (Common Bent), *Arrhenatherum elatius* (False Oat-grass), *Dactylis glomerata* (Cock's-foot), *Elytrigia repens* (Common Couch), *Festuca rubra* (Red Fescue), *Lolium perenne* (Perennial Rye-grass), *Phleum pratense* (Timothy), *Poa trivialis* (Rough Meadow-grass) and *Schedonorus arundinaceus* (Tall Fescue). Forbs in the sward included *Daucus carota* ssp. *carota* (Wild Carrot), *Leucanthemum vulgare* (Oxeye Daisy), *Rumex acetosa* (Common Sorrel) and *Taraxacum* agg. (Dandelions). The bryophytes *Calliergonella cuspidata* and *Kindbergia praelonga* are present throughout.

Target Note 4. A gappy hedge over a wooden fence. The hedge is approximately 1.5 m tall and wide, with about 40% gaps. There is a dry, shaded ditch along the south side of the fence. There is a single standard *Carpinus betulus* (Hornbeam) tree about 6 m tall. The woody species in the hedge are diverse and include, *Crataegus monogyna* (Hawthorn), *Corylus avellana* (Hazel), *Prunus spinosa* (Blackthorn), *Rhamnus catharticus* (Buckthorn), *Sambucus nigra* (Elder) and *Ulmus procera* (English Elm), with climbing *Hedera helix* (Ivy) and *Rubus fruticosus* agg. (Bramble) throughout. The field layer consists of species from the adjacent grassland field margin and road verge.

Target Note 5. The road verge consists of rough grassland with tall herbs dominated by *Arrhenatherum elatius* (False Oat-grass) and referable to the NVC type **MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community**. The sward is 30–50 cm high away from the road edge.

Target Note 6. An area of dense scrub cut to approximately 1.5 m high. This area is a dense stand of *Cornus sericea* (Red-osier Dogwood). Towards the south the scrub includes planted *Quercus robur* (Pedunculate Oak), approximately 4–5 m tall, with *Cornus sericea* (Red-osier Dogwood) limited to gaps. The scrub continues along the bank between the field and the M40 motorway. Along this bank the scrub is a mixed plantation including *Acer pseudoplatanus* (Sycamore), *Corylus avellana* (Hazel), *Crataegus monogyna* (Hawthorn) and *Fraxinus excelsior* (Ash). There are also scattered *Rosa* sp. (Rose). The field layer is shaded and largely bare, with some scattered *Rubus fruticosus* agg. (Bramble).

Target Note 7. The ditch around the boundary of the field is slightly deeper, and held approximately 10 cm of stagnant water at the time of survey. There is *Juncus inflexus* (Hard Rush) in the ditch, and the steep earth banks are covered in *Carex* spp. (Sedges) and bryophytes, except where shaded. The ditch is culverted at the field corner.

Target Note 8. A continuation of the ditch described in *Target Note 7*, but becoming deeper towards to river, with apparently stagnant water approximately 50 cm deep and wide. The earth banks are steep, and approximately 75 cm above the water level. Marginal vegetation includes *Ranunculus repens* (Creeping Buttercup), *Rorippa* sp. (A Water-cress) and *Scrophularia cf. auriculata* (Water Figwort).

Target Note 9. An area of embankment up to the M40, supporting grassland. The area was not accessed for a detailed assessment, but appeared to be referable to the NVC type **MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community** with tussocky *Deschampsia cespitosa* (Tufted Hair-grass) also prominent. Patches of tall ruderals were also present including *Angelica sylvestris* (Wild Angelica), *Cirsium vulgare* (Spear Thistle) and *Chamerion angustifolium* (Rosebay Willowherb).

Target Note 10. A patch of dense *Rubus fruticosus* agg. (Bramble) scrub.

Target Note 11. A concreted bridge over a branch of the New River Ray. The bridge has a moderate cover of bryophytes typically found on concrete including *Brachythecium rutabulum*, *Encalypta cf. vulgaris*, *Grimmia pulvinata*, *Orthotricum diaphanum* and *Syntrichia ruralis* ssp. *ruralis*.

Target Note 12. A branch of the New River Ray. The channel is approximately 2 m wide, and densely overgrown with emergent *Glyceria maxima* (Reed Sweet-grass). The banks are approximately 1 m high earth banks, with tall herbs including *Angelica sylvestris* (Wild Angelica), *Epilobium hirsutum* (Great Willowherb), *Glyceria maxima* (Reed Sweet-grass) and *Urtica dioica* (Common Nettle). There are scattered *Salix cinerea* (Grey Willow) trees along the bank. The river is widened to approximately 8 m and is shallower towards the bridge under the M40. Here the aquatic vegetation includes *Apium nodiflorum* (Fool's Water-cress), *Callitriche cf. platycarpa* (Various-leaved Water-starwort) and *Sparganium erectum* (Branched Bur-reed). The banks are also shallower and include additional species such as *Deschampsia cespitosa* (Tufted Hair-grass) tussocks and *Filipendula ulmaria* (Meadowsweet).

Target Note 13. A large semi-improved grassland field used as pasture. The soil appears to be high in clay, and consequently had areas of shallow standing water. Improvement of the field is indicated by the abundance of *Lolium perenne* (Perennial Rye-grass) and *Trifolium repens* (White Clover) throughout the sward. Other grasses present include *Agrostis stolonifera* (Creeping Bent), *Cynosurus cristatus* (Crested Dog's-tail), *Dactylis glomerata* (Cock's-foot), *Deschampsia cespitosa* (Tufted Hair-grass), *Phleum pratense* (Timothy), *Poa trivialis* (Rough Meadow-grass) and *Schedonorus arundinaceus* (Tall Fescue). Wetter areas also included tussocks of *Juncus inflexus* (Hard Rush). The forbs in the sward included *Cirsium arvense*

(Creeping Thistle), *Cirsium vulgare* (Spear Thistle), *Daucus carota* ssp. *carota* (Wild Carrot), *Prunella vulgaris* (Selfheal), *Ranunculus repens* (Creeping Buttercup) and *Rumex crispus* (Curled Dock).

Target Note 14. A line of planted *Salix* cf. *fragilis* (Crack-willow) at the base of the road embankment. The trees are approximately 12-15 m tall. In places *Corylus avellana* (Hazel) scrub is present in the understory. On the embankment above the planted trees is a continuation of the scrub described in *Target Note 6*. This area could not be accessed for a detailed assessment.

Target Note 15. A dry ditch parallel to the boundary fence. The ditch is approximately 1 m deep and heavily shaded and full of leaf litter from the adjacent trees. There is a single stand of *Phragmites australis* (Common Reed) in a small un-shaded gap.

Target Note 16. A concrete bridge where the New River Ray passes under the M40. The bridge is similar in structure and bryophyte flora to the one described in *Target Note 11*.

Target Note 17. A patch of dense scrub on a shallow bank of the river adjacent to the bridge. The scrub is primarily *Rubus fruticosus* agg. (Bramble) with some *Crataegus monogyna* (Hawthorn) bushes and *Fraxinus excelsior* (Ash) saplings. Scattered throughout are tall herbs and grasses including *Elytrigia repens* (Common Couch), *Epilobium hirsutum* (Great Willowherb), *Phalaris arundinacea* (Reed Canary-grass) and *Urtica dioica* (Common Nettle).

Target Note 18. The main channel of the New River Ray. The River is approximately 3 m wide and at the time of survey has a high flow rate and high sediment load. Any aquatic vegetation present was obscured by the sediment. The marginal vegetation has recently been cut, but appeared to include *Apium nodiflorum* (Fool's Water-cress), *Glyceria maxima* (Reed Sweet-grass) and *Typha latifolia* (Bulrush). The earth banks are 1-2 m high with 45° slope and the vegetation is primarily *Rubus fruticosus* agg. (Bramble) and *Urtica dioica* (Common Nettle) and scattered trees of *Crataegus monogyna* (Hawthorn), *Rosa canina* agg. (Dog-rose) and *Salix cinerea* (Grey Willow). The river channel is wider and shallower by the bridge, with marginal *Salix cinerea* (Grey Willow) scrub.

Target Note 19. A fallow arable field with the stubble from the previous crop left *in situ*. The field has been colonised by a range of arable weeds, the more abundant species including *Capsella bursa-pastoris* (Shepherd's-purse), *Daucus carota* ssp. *carota* (Wild Carrot), *Helminthotheca echioides* (Bristly Oxtongue), *Plantago major* (Greater Plantain), *Ranunculus repens* (Creeping Buttercup), *Sisymbrium officinale* (Hedge Mustard) and *Urtica dioica* (Common Nettle).

Target Note 20. A set-aside corner of the arable field with a mosaic of grassland and tall herb vegetation. The soil is poorly draining, and *Angelica sylvestris* (Wild Angelica) and *Pulicaria dysenterica* (Common Fleabane) were both frequent in the vegetation. In many places *Urtica dioica* (Common Nettle) was dominant.

Target Note 21. A stagnant, heavily shaded ditch with approximately 5 cm water in a 20 cm wide channel. In more open places, some small stands of *Typha latifolia* (Bulrush) are present.

Target Note 22. An area of young secondary woodland along the M40 embankment. The woodland is primarily (and presumably planted) *Populus tremula* (Aspen) with extensive suckering forming a dense ticket. There are some *Betula pendula* (Silver Birch), *Cornus sericea* (Red-osier Dogwood), *Corylus avellana* (Hazel) and *Salix cinerea* (Grey Willow) scattered throughout.

Target Note 23. The field margin of the fallow arable field is a 3 m wide grassland strip. The grassland is dominated by *Arrhenatherum elatius* (False Oat-grass) and *Rubus fruticosus* agg. (Bramble) scrub is invading. Other prevalent species include *Heracleum sphondylium* (Hogweed), *Ranunculus repens* (Creeping Buttercup) and *Senecio jacobaea* (Common Ragwort).

Target Note 24. Areas of low scrub on the M40 embankment *Cornus sericea* (Red-osier Dogwood), *Cornus sanguinea* (Dogwood), *Crataegus monogyna* (Hawthorn) and *Rosa canina* agg. (Dog-rose). There are tall herbs and grasses throughout. Towards the top of the embankment *Rubus fruticosus* agg. (Bramble) becomes dominant.

Target Note 25. An area of rough grassland and scattered scrub on the M40 embankment. The grassland appeared to be referable to the NVC type **MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community** with *Deschampsia cespitosa* (Tufted Hair-grass) tussocks and scattered *Crataegus monogyna* (Hawthorn), *Fraxinus excelsior* (Ash) and *Rosa* sp. (Roses). The area could not be safely accessed for detailed assessment.

Target Note 26. Dense scrub on the M40 embankment. The scrub is mostly 4-5 m tall with some taller trees and almost qualifies as young secondary woodland. The main woody species are *Fraxinus excelsior* (Ash), *Quercus robur* (Pedunculate Oak) and *Ulmus procera* (English Elm). There are scattered bushes of *Cornus sericea* (Red-osier Dogwood), *Corylus avellana* (Hazel) and *Salix cinerea* (Grey Willow). The ground-layer has a dense cover of leaf litter.

Target Note 27. The (former and future) railway, with raised ballast currently part of the active works site. The railway corridor has been cleared of vegetation.

Target Note 28. A line of species-poor scrub along the (former) boundary fence between the field and the railway. The main woody species in *Crataegus monogyna* (Hawthorn), with abundant *Rubus fruticosus* agg. (Bramble) throughout. A significant proportion of the main stems have been cut and left *in situ*.

Target Note 29. An area of continuous scrub with the same structure and species as that described in *Target Note 26*.

Target Note 30. The M40 motorway. The motorway passes over the railway corridor (and proposed new track location) on a large concrete bridge.

Target Note 31. Young secondary woodland on the south-east-facing M40 embankment. The woodland has a complex canopy, with the tallest trees around 6-8 m. The woody species include *Alnus glutinosa* (Alder), *Corylus avellana* (Hazel), *Fraxinus excelsior* (Ash) and *Quercus robur* (Pedunculate Oak). The understory was largely bare, with a dense covering of leaf litter.

Target Note 32. A dry ditch full of leaf litter and overgrown by *Rubus fruticosus* agg. (Bramble).

Target Note 33. A large, fallow arable field. The field appears not to have been cultivated this year, and consequently the vegetation is predominantly tall ruderals. There was evidence of deer grazing across the field. The field margins are grassier, and the grass is spreading into the main part of field but the vegetation still has a high proportion of tall ruderals. The tall herbs present include *Arctium minus* agg. (Lesser Burdock), *Cirsium vulgare* (Spear Thistle), *Epilobium hirsutum* (Great Willowherb), *Epilobium montanum* (Broad-leaved Willowherb), *Helminthotheca echioides* (Bristly Oxtongue), *Rumex crispus* (Curled Dock), *Senecio jacobaea* (Common Ragwort) and *Urtica dioica* (Common Nettle). The main grasses present are *Agrostis stolonifera* (Creeping Bent), *Alopecurus myosuroides* (Black-grass), *Arrhenatherum elatius* (False Oat-grass), *Bromus* cf. *secalinus* (Rye Brome) and *Lolium perenne* (Perennial Rye-grass) along with the sedge *Carex flacca* (Glaucous Sedge). *Juncus inflexus* (Hard Rush) tussocks indicate wetter parts of the field, and are associated with patches of *Cardamine flexuosa* (Wavy Bitter-cress) and *Ranunculus repens* (Creeping Buttercup). A large number of unidentifiable seedlings were present in more open areas.

Target Note 34. A recently-ploughed arable field with a young *Triticum* cf. *aestivum* (Winter Wheat) crop.

Target Note 35. Areas of trackside vegetation where there has been a regrowth of *Urtica dioica* (Common Nettle) in areas not recently disturbed by construction activities.

Target Note 36. A line of continuous scrub along the railway boundary fence, dominated by *Rubus fruticosus* agg. (Bramble). There are bushes of *Crataegus monogyna* (Hawthorn) and *Prunus spinosa* (Blackthorn) scattered along the fence.

Target Note 37. A mature *Fraxinus excelsior* (Ash) tree in the fallow arable field. The trunk is approximately 1 m diameter and the southern side has a dense cover of lichens.

Target Note 38. A stagnant ditch with less than 5 cm of water. The ditch is heavily shaded by scrub and has no aquatic vegetation.

Target Note 39. A gravel track running down from the railway to the field with ephemeral and short perennial vegetation. The vegetation includes *Ceratodon purpureus*, *Helminthotheca*

echioides (Bristly Oxtongue), *Plantago lanceolata* (Ribwort Plantain) and *Poa annua* (Annual Meadow-grass). On the banks either side of the track there is dense *Rubus fruticosus* agg. (Bramble) scrub.

Target Note 40. Dense stands of *Prunus spinosa* (Blackthorn) scrub on raised embankments either side of the railway. Amongst the scrub are some scattered *Quercus robur* (Pedunculate Oak) trees, *Rosa* sp. (Rose) bushes and climbing *Rubus fruticosus* agg. (Bramble).

Target Note 41. A heavily disturbed farm yard, used for storing soil. There is a species-poor cover of coarse grasses in less-disturbed places.

Target Note 42. A native, intact hedgerow with standard trees. The hedgerow is approximately 2 m tall and 1.5 m wide. It has a few small gaps, and there is a post-and-wire fence to maintain stock-proofing. The base of the woody species indicates historic coppicing and laying. The standard trees are a *Quercus robur* (Pedunculate Oak) and cf. *Pyrus* sp. (Pear). The main woody species in the hedge is *Crataegus monogyna* (Hawthorn), with *Rubus fruticosus* agg. (Bramble) and *Rosa canina* agg. (Dog-rose) throughout.

Animal Target Notes

Animal Notes 1 and 2. Both branches of the New River Ray are suitable for Otters and Water Voles. They are also likely to support a diverse aquatic invertebrate fauna.

Animal Note 3. There is a badger track parallel to the fence, with a number of places where the track branches under the boundary fence.

Animal Note 4. The rough grassland field margins are suitable for amphibians and reptiles.

Animal Note 5. Trees and scrub along the motorway embankment are suitable for nesting birds.

Animal Note 6. An artificial badger sett, located over 50 m north-east of the proposed track. The sett has been constructed as part of other works on the East West Rail project.

Animal Note 7. A mature *Fraxinus excelsior* (Ash) tree that is of a size and age where bat roost features could be found by tree-climbing surveys. No features were obvious from the ground.

Animal Note 8. A fallow arable field with grassy margins. There are numerous Badger tracks. The field also has low suitability for amphibians and reptiles.

APPENDIX C - BOTANICAL DATA

This is a list of plant species recorded during the site visit on 12th December 2014.

Plant species list for the site.

Species	DAFOR		
	Fallow arable fields and arable field margins	Semi-improved grassland	Hedges, scrub and woodland
Woody species			
<i>Acer pseudoplatanus</i> (Sycamore)	-	-	r
<i>Carpinus betulus</i> (Hornbeam)	-	-	vr
<i>Cornus sericea</i> (Red-osier Dogwood)	-	-	lf
<i>Corylus avellana</i> (Hazel)	-	-	r
<i>Crataegus monogyna</i> (Hawthorn)	-	-	r
<i>Fraxinus excelsior</i> (Ash)	-	-	r
<i>Prunus spinosa</i> (Blackthorn)	-	-	lf
<i>Quercus robur</i> (Pedunculate Oak)	-	-	lf
<i>Rhamnus catharticus</i> (Buckthorn)	-	-	vr
<i>Rosa</i> spp. (Roses)	-	-	r
<i>Rubus fruticosus</i> agg. (Bramble)	r	-	f to d
<i>Salix cinerea</i> (Grey Willow)	-	-	o
<i>Salix fragilis</i> (Crack-willow)	-	-	o
<i>Sambucus nigra</i> (Elder)	-	-	o
<i>Ulmus procera</i> (English Elm)	-	-	r
Forbs			
<i>Alopecurus myosuroides</i> (Black-grass)	r	-	-
<i>Arctium minus</i> agg. (Lesser Burdock)	o	-	-
<i>Arenaria serpyllifolia</i> (Thyme-leaved Sandwort)	r	-	-
<i>Arrhenatherum elatius</i> (False Oat-grass)	lf	-	-
<i>Agrostis capillaris</i> (Common Bent)	o	-	-
<i>Agrostis stolonifera</i> (Creeping Bent)	o	f	-
<i>Angelica sylvestris</i> (Wild Angelica)	o	-	-
<i>Anthriscus sylvestris</i> (Cow Parsley)	o	-	-
<i>Brassica nigra</i> (Black Mustard)	r	-	-
<i>Bromus hordeaceus</i> (Soft-brome)	-	r	-
<i>Bromus secalinus</i> (Rye Brome)	lf	-	-
<i>Capsella bursa-pastoris</i> (Shepherd's-purse)	r	-	-
<i>Cardamine hirsuta</i> (Hairy Bitter-cress)	r	-	-
<i>Carex flacca</i> (Glaucous Sedge)	r	-	-
<i>Chamerion angustifolium</i> (Rosebay Willowherb)	r	-	-

Species	DAFOR		
<i>Cirsium arvense</i> (Creeping Thistle)	r	r	-
<i>Cirsium vulgare</i> (Spear Thistle)	-	r	-
<i>Cynosurus cristatus</i> (Crested Dog's-tail)	-	o	-
<i>Dactylis glomerata</i> (Cock's-foot)	o	f	-
<i>Daucus carota</i> ssp. <i>carota</i> (Wild <i>Carex xrotae</i>)	o	o	-
<i>Deschampsia cespitosa</i> (Tufted Hair-grass)	-	o	-
<i>Elytrigia repens</i> (Common Couch)	o	-	-
<i>Epilobium</i> cf. <i>montanum</i> (Broad-leaved Willowherb)	o	-	-
<i>Erysimum cheiranthoides</i> (Treacle-mustard)	r	-	-
<i>Festuca rubra</i> (Red Fescue)	f	-	-
<i>Galium aparine</i> (Cleavers)	r	-	-
<i>Geranium dissectum</i> (Cut-leaved Crane's-bill)	o	-	-
<i>Geranium molle</i> (Dove's-foot Crane's-bill)	o	-	-
<i>Glechoma hederacea</i> (Ground-ivy)	o	-	-
<i>Juncus inflexus</i> (Hard Rush)	r	o	-
<i>Leucanthemum vulgare</i> (Oxeye Daisy)	r	-	-
<i>Lolium perenne</i> (Perennial Rye-grass)	f	a	-
<i>Linaria vulgaris</i> (Common Toadflax)	r	-	-
<i>Phleum pratense</i> (Timothy)	r	o	-
<i>Helminthotheca echioides</i> (Bristly Oxtongue)	lf	-	-
<i>Plantago major</i> (Greater Plantain)	o	-	-
<i>Poa trivialis</i> (Rough Meadow-grass)	r	a	-
<i>Prunella vulgaris</i> (Selfheal)	o	r	-
<i>Ranunculus repens</i> (Creeping Buttercup)	o	o	-
<i>Rumex acetosa</i> (Common Sorrel)	r	-	-
<i>Rumex crispus</i> (Curled Dock)	r	o	-
<i>Schedonorus arundinaceus</i> (Tall Fescue)	a	o	-
<i>Senecio vulgaris</i> (Groundsel)	r	-	-
<i>Senecio jacobaea</i> (Common Ragwort)	lf	-	-
<i>Sisymbrium officinale</i> (Hedge Mustard)	o	-	-
<i>Solanum nigrum</i> (Black Nightshade)	r	-	-
<i>Sonchus oleraceus</i> (Smooth Sow-thistle)	r	-	-
<i>Stellaria media</i> (Common Chickweed)	r	-	-
<i>Taraxacum</i> spp. (Dandelions)	o	o	-
<i>Trifolium pratense</i> (Red Clover)	r	r	-
<i>Trifolium repens</i> (White Clover)	r	f	-
<i>Tripleurospermum inodorum</i> (Scentless Mayweed)	r	-	-
<i>Urtica dioica</i> (Common Nettle)	r	-	-
Bryophytes			
<i>Brachythecium rutabulum</i>	o	-	-
<i>Calliergonella cuspidata</i>	r	lf	-

Species	DAFOR		
<i>Kindbergia praelonga</i>	o	o	-
<i>Tortula modica</i>	o	-	-

APPENDIX D – NOTEWORTHY SPECIES RECORDS

Table D1 displays noteworthy species records that are located within 1 km of the site boundary. These species records were obtained from Thames Valley Environmental Records Centre. The Latin and common names for species are given as well as their level of designation. A glossary defining abbreviations used in the table is given in Table E1, Appendix E. If a species is not included in the table below it does not necessarily mean the species is absent from the search area, but rather that data-holding organizations do not have records of it in these locations.

Table D1: Noteworthy Species Records within 1 km of the Site Boundary

Latin Name	Common Name	Designation
Amphibians		
<i>Lissotriton helveticus</i>	Palmate Newt	WCA5.9.5
<i>Lissotriton vulgaris</i>	Smooth Newt	WCA5.9.5
<i>Rana temporaria</i>	Common Frog	WCA5.9.5
<i>Triturus cristatus</i>	Great Crested Newt	EPS (Sch2), WCA5.9.1, S41
Birds		
<i>Actitis hypoleucos</i>	Common Sandpiper	Amber
<i>Alauda arvensis</i>	Sky Lark	Red, S41
<i>Alcedo atthis</i>	Common Kingfisher	WCA1.1, Amber
<i>Anas acuta</i>	Northern Pintail	WCA1.2, Amber
<i>Anas clypeata</i>	Northern Shoveler	Amber
<i>Anas crecca</i>	Eurasian Teal	Amber
<i>Anas platyrhynchos</i>	Mallard	Amber
<i>Anas strepera</i>	Gadwall	Amber
<i>Anser anser</i>	Greylag Goose	WCA1.2, Amber
<i>Anthus pratensis</i>	Meadow Pipit	Amber
<i>Apus apus</i>	Common Swift	Amber
<i>Aythya ferina</i>	Common Pochard	Amber
<i>Aythya fuligula</i>	Tufted Duck	Amber
<i>Aythya marila</i>	Greater Scaup	WCA1.1, Red, S41
<i>Branta leucopsis</i>	Barnacle Goose	Amber
<i>Bucephala clangula</i>	Common Goldeneye	WCA1.2, Amber
<i>Calidris alpina</i>	Dunlin	Red
<i>Carduelis cannabina</i>	Common Linnet	Red, S41
<i>Charadrius dubius</i>	Little Plover	WCA1.1
<i>Charadrius hiaticula</i>	Ringed Plover	Amber
<i>Chroicocephalus ridibundus</i>	Black-headed Gull	Amber
<i>Columba oenas</i>	Stock Pigeon	Amber
<i>Cuculus canorus</i>	Common Cuckoo	Red, S41

Latin Name	Common Name	Designation
<i>Cygnus columbianus</i>	Tundra Swan	WCA1.1, Amber, S41
<i>Cygnus cygnus</i>	Whooper Swan	WCA1.1, Amber
<i>Delichon urbicum</i>	House Martin	Amber
<i>Emberiza calandra</i>	Corn Bunting	Red, S41
<i>Emberiza citrinella</i>	Yellowhammer	Red, S41
<i>Emberiza schoeniclus</i>	Reed Bunting	Amber, S41
<i>Falco columbarius</i>	Merlin	WCA1.1, Amber
<i>Falco peregrinus</i>	Peregrine Falcon	WCA1.1
<i>Falco subbuteo</i>	Eurasian Hobby	WCA1.1
<i>Falco tinnunculus</i>	Common Kestrel	Amber
<i>Gallinago gallinago</i>	Common Snipe	Amber
<i>Haematopus ostralegus</i>	Eurasian Oystercatcher	Amber
<i>Hirundo rustica</i>	Barn Swallow	Amber
<i>Larus canus</i>	Mew Gull	Amber
<i>Larus fuscus</i>	Lesser Black-backed Gull	Amber
<i>Larus marinus</i>	Great Black-backed Gull	Amber
<i>Larus ridibundus</i>	Black-headed Gull	Amber
<i>Limosa limosa</i>	Black-tailed Godwit	WCA1.1, Red, S41
<i>Locustella naevia</i>	Common Grasshopper Warbler	Red, S41
<i>Lymnocyptes minimus</i>	Jack Snipe	Amber
<i>Milvus milvus</i>	Red Kite	WCA1.1, Amber
<i>Motacilla cinerea</i>	Grey Wagtail	Amber
<i>Motacilla flava subsp. flavissima</i>	Yellow Wagtail	Red, S41
<i>Muscicapa striata</i>	Spotted Flycatcher	Red, S41
<i>Numenius arquata</i>	Eurasian Curlew	Amber, S41
<i>Oenanthe oenanthe</i>	Northern Wheatear	Amber
<i>Passer domesticus</i>	House Sparrow	Red, S41
<i>Passer montanus</i>	Eurasian Tree Sparrow	Red, S41
<i>Phalacrocorax aristotelis</i>	Shag	Amber
<i>Phoenicurus phoenicurus</i>	Common Redstart	Amber
<i>Phylloscopus trochilus</i>	Willow Warbler	Amber
<i>Picus viridis</i>	Green Woodpecker	Amber
<i>Pluvialis apricaria</i>	European Golden Plover	Amber
<i>Prunella modularis</i>	Hedge Accentor	Amber, S41
<i>Pyrrhula pyrrhula</i>	Common Bullfinch	Amber, S41
<i>Rissa tridactyla</i>	Black-legged Kittiwake	Amber
<i>Saxicola rubetra</i>	Whinchat	Amber
<i>Scolopax rusticola</i>	Eurasian Woodcock	Amber
<i>Sterna hirundo</i>	Common Tern	Amber
<i>Sturnus vulgaris</i>	Common Starling	Red, S41
<i>Sylvia communis</i>	Common Whitethroat	Amber
<i>Tachybaptus ruficollis</i>	Little Grebe	Amber
<i>Tringa nebularia</i>	Common Greenshank	WCA1.1
<i>Tringa ochropus</i>	Green Sandpiper	WCA1.1, Amber

Latin Name	Common Name	Designation
<i>Tringa totanus</i>	Common Redshank	Amber
<i>Turdus iliacus</i>	Redwing	WCA1.1, Red
<i>Turdus philomelos</i>	Song Thrush	Red, S41
<i>Turdus pilaris</i>	Fieldfare	WCA1.1, Red
<i>Turdus viscivorus</i>	Mistle Thrush	Amber
<i>Tyto alba</i>	Barn Owl	WCA1.1, Amber
<i>Vanellus vanellus</i>	Northern Lapwing	Red, S41
Invertebrates		
<i>Acinia corniculata</i>	A True Fly	RDB (EN)
<i>Acronicta psi</i>	Grey Dagger	S41
<i>Acronicta rumicis</i>	Knot Grass	S41
<i>Acupalpus exiguus</i>	a Beetle	Notable:B
<i>Agabus (Agabus) uliginosus</i>	a Beetle	Notable:B
<i>Agrochola litura</i>	Brown-spot Pinion	S41
<i>Agrochola lychnidis</i>	Beaded Chestnut	S41
<i>Allophyes oxyacanthae</i>	Green-brindled Crescent	S41
<i>Amphipyra tragopoginis</i>	Mouse Moth	S41
<i>Anthracus consputus</i>	a Beetle	Notable:B
<i>Apamea anceps</i>	Large Nutmeg	S41
<i>Apamea remissa</i>	Dusky Brocade	S41
<i>Aporophyla lutulenta</i>	Deep-brown Dart	S41
<i>Arctia caja</i>	Garden Tiger	S41
<i>Astenus (Astenus) immaculatus</i>	a Beetle	Notable
<i>Asteroscopus sphinx</i>	Sprawler	S41
<i>Atethmia centrigo</i>	Centre-barred Sallow	S41
<i>Badister (Badister) unipustulatus</i>	a Beetle	Notable:B
<i>Bembidion (Bembidion) quadripustulatum</i>	Scarce Four-dot Pin-palp	S41, Notable:B
<i>Bembidion (Diplocampa) clarkii</i>	a Beetle	Notable:B
<i>Bembidion (Semicampa) gilvipes</i>	a Beetle	Notable:B
<i>Caradrina morpheus</i>	Mottled Rustic	S41
<i>Cassida nobilis</i>	a Beetle	Notable:B
<i>Coenonympha pamphilus</i>	Small Heath	S41
<i>Diarsia rubi</i>	Small Square-spot	S41
<i>Diloba caeruleocephala</i>	Figure of Eight	S41
<i>Ecliptopera silaceata</i>	Small Phoenix	S41
<i>Ennomos fuscantaria</i>	Dusky Thorn	S41
<i>Falagria sulcatula</i>	a Beetle	Notable
<i>Graphiphora augur</i>	Double Dart	S41
<i>Hepialus humuli subsp. humuli</i>	Ghost Moth	S41
<i>Hipparchia semele</i>	Grayling	S41
<i>Hoplodrina blanda</i>	Rustic	S41
<i>Hydraecia micacea</i>	Rosy Rustic	S41

Latin Name	Common Name	Designation
<i>Lasiommata megera</i>	Wall	S41
<i>Lebia (Lamprias) chlorocephala</i>	a Beetle	Notable:B
<i>Longitarsus dorsalis</i>	a Beetle	Notable:B
<i>Lycia hirtaria</i>	Brindled Beauty	S41
<i>Malacosoma neustria</i>	Lackey	S41
<i>Melanchra persicariae</i>	Dot Moth	S41
<i>Mesoligia literosa</i>	Rosy Minor	S41
<i>Mythimna comma</i>	Shoulder-striped Wainscot	S41
<i>Noctua orbona</i>	Lunar Yellow Underwing	S41
<i>Orthosia gracilis</i>	Powdered Quaker	S41
<i>Pelurga comitata</i>	Dark Spinach	S41
<i>Pterostichus (Pediis) longicollis</i>	a Beetle	Notable:B
<i>Pyrgus malvae</i>	Grizzled Skipper	S41
<i>Satyrium pruni</i>	Black Hairstreak	WCA5.9.5
<i>Satyrium w-album</i>	White-letter Hairstreak	WCA5.9.5, S41
<i>Scotopteryx chenopodiata</i>	Shaded Broad-bar	S41
<i>Sepedophilus pedicularius</i>	a Beetle	Notable
<i>Spilosoma lubricipeda</i>	White Ermine	S41
<i>Spilosoma luteum</i>	Buff Ermine	S41
<i>Tachyporus formosus</i>	a Beetle	Notable:A
<i>Thecla betulae</i>	Brown Hairstreak	WCA5.9.5, S41
<i>Tholera cespitis</i>	Hedge Rustic	S41
<i>Tholera decimalis</i>	Feathered Gothic	S41
<i>Timandra comae</i>	Blood-Vein	S41
<i>Tournotaris bimaculatus</i>	a Beetle	Notable:B
<i>Trichiura crataegi</i>	Pale Eggar	S41
<i>Tyria jacobaeae</i>	Cinnabar	S41
<i>Watsonalla binaria</i>	Oak Hook-tip	S41
<i>Xanthia gilvago</i>	Dusky-lemon Sallow	S41
<i>Xanthia icteritia</i>	Sallow	S41
<i>Xanthorhoe ferrugata</i>	Dark-barred Twin-spot Carpet	S41
Plants		
<i>Dactylorhiza viridis</i>	Frog Orchid	S41
<i>Hyacinthoides non-scripta</i>	Bluebell	WCA8
<i>Tolypella intricata</i>	Tassel Stonewort	RDB (EN), S41
Mammals		
<i>Lepus europaeus</i>	Brown Hare	S41
<i>Meles meles</i>	Eurasian Badger	BA
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	EPS (Sch2), WCA5.9.1
<i>Plecotus auritus</i>	Brown Long-eared Bat	EPS (Sch2), WCA5.9.1, S41
Reptiles		
<i>Natrix natrix</i>	Grass Snake	WCA5.9.1, S41

APPENDIX E – ABBREVIATIONS

Table A4 displays abbreviations of protected species legislation.

Table A4: Glossary of Abbreviations Used in this Report

Code	Full Title	Explanation
Amber	Amber list	Amber listed species have a population status in the UK of medium conservation concern.
BA	The Protection of Badgers Act 1992	Legislation making it an offence to kill, injure or take a Badger, or to damage or interfere with a sett unless a licence is obtained from a statutory authority.
BAP	Biodiversity Action Plan	A plan that identifies threats to significantly important species and habitats, and sets out targets and actions to enhance or maintain biodiversity.
DA	The Deer Act 1991	All wild deer with the exception of Muntjac (<i>Muntiacus reevesi</i>) and Chinese Water deer (<i>Hydropotes inermis</i>) are protected by a closed season.
EPS (Sch 2)	European Protected Species (Schedule 2)	Animals protected on <i>Schedule 2 of the Conservation (Natural Habitats &c.) Regulations 1994</i>
HAP	Habitat Action Plan	A plan that identifies threats to a priority habitat and sets out targets and actions to enhance or maintain that habitat.
IUCN	International Union for Conservation of Nature and Natural Resources (also known as The World Conservation Union)	A worldwide partnership and conservation network to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.
LBAP	Local Biodiversity Action Plan	A plan that identifies threats to locally important species and habitats, and sets out targets and actions in Species Action Plans and Habitat Action Plans to enhance or maintain biodiversity at the county or regional level.
LHAP	Local Habitat Action Plan	A plan that identifies threats to a locally important priority habitat and sets out targets and actions to enhance or maintain that habitat.
LSAP	Local Species Action Plan	A plan that identifies threats to locally important species, and sets out targets and actions to prevent losing that species from the local area.
Notable	Scarce and threatened invertebrates	Invertebrate species which are estimated to occur within the range of 16 to 100 10km squares but subdivision into Notable A and Notable B categories is not possible as there is insufficient information available).
Notable:A	Scarce and threatened invertebrates	Taxa which do not fall within Red Data Book categories but which are none-the-less uncommon in Great Britain and thought to occur in 30 or fewer 10km squares of the

Code	Full Title	Explanation
		National Grid or, for less well-recorded groups, within seven or fewer vice-counties.
Notable: B	Scarce and threatened invertebrates	Taxa which do not fall within Red Data Book categories but which are none-the-less uncommon in Great Britain and thought to occur in between 31 and 100 10km squares of the National Grid or, for less-well recorded groups between eight and twenty vice-counties.
NN	Nationally Notable	Designation for invertebrate taxa that are thought to be notably important in the UK.
NR	Nationally Rare	Species in 15 or fewer hectads in Great Britain.
NS	National Scarce	Species in 16-100 hectads in Great Britain.
Red	Red List	Red listed species have a population status in the UK with high conservation concern.
RDB	Red Data Book Species	Species identified in one of the UK Red Data books.
RDB(CR)	Critically Endangered	An IUCN Red List designation for species at an extremely high risk of extinction.
RDB(EN)	Endangered	An IUCN Red List designation for species at a very high risk of extinction.
RDB(VU)	Vulnerable	An IUCN Red List designation for species at high risk of extinction.
SAP	Species Action Plan	A plan that identifies threats to significantly important species, and sets out targets and actions to prevent losing that species to extinction.
S41	<i>The Natural Environment and Rural Communities (NERC) Act (2006)</i>	Species of Principal Importance under <i>The Natural Environment and Rural Communities (NERC) Act (2006)</i>
WCA	<i>The Wildlife and Countryside Act 1981 (as amended)</i>	Containing 4 Parts and 17 Schedules, the Act covers protection of wildlife (birds, and some animals and plants), the countryside, National Parks, and the designation of protected areas, and public rights of way. All wild plants in Britain are protected from intentional uprooting by an unauthorized person, but land owners, land occupiers, persons authorized by either of these or persons authorized in writing by the Local Authority for the area are exempt. Protection for some species may be limited to certain Sections of the Act (e.g. S13(2)).
WCA1	Schedule 1 of <i>The Wildlife and Countryside Act 1981 (as amended)</i>	This Schedule lists birds protected by special penalties at all times, but virtually all wild birds have some protection in law. Acts which are prohibited for all wild birds (except derogated 'pest' species) include intentional killing, injuring or taking; taking, damaging or destroying nests in use or being built; taking or destroying eggs; possessing or having control of (with certain exceptions but including live for dead birds, parts or derivative); setting or permitting certain traps, weapons, decoys or poisons. Selling,

Code	Full Title	Explanation
		<p>offering or exposing for sale, possessing or transporting for sale any live wild bird, egg or part of an egg or advertising any of these for sale, or dead wild bird including parts or derivatives are also prohibited. Many birds must be formally registered and ringed if kept in captivity.</p> <p>Schedule I WCA birds are additionally protected from intentional or reckless disturbance while building a nest, or when such a bird is in, on or near a nest containing eggs or young, or intentional or reckless disturbance of dependent young.</p>
WCA5	Schedule 5 of <i>The Wildlife and Countryside Act 1981</i> (as amended)	Schedule 5 animals are protected from intentional killing, injuring or taking; possessing (including parts or derivatives); intentional or reckless damage, destruction or obstruction of any structure or place used for shelter or protection; selling, offering or exposing for sale, possessing or transporting for the purpose of sale (alive or dead, including parts or derivatives). Protection of some species is limited to certain Sections of the Act (e.g. S9(1), S9(4a), S9(4b), S9(5)).
WCA5.9.1	Section 9 (1) under Schedule 5 of <i>The Wildlife and Countryside Act 1981</i> (as amended)	Protection limited to intentional killing, injury or taking.
WCA5.9.4a	Section 9 (4a) under Schedule 5 of <i>The Wildlife and Countryside Act 1981</i> (as amended)	Protection limited to damaging, destroying, or obstructing access to, any structure or place used by the animal for shelter or protection.
WCA5.9.5	Section 9 (5) under Schedule 5 of <i>The Wildlife and Countryside Act 1981</i> (as amended)	<p>Protection limited to selling, offering for sale, possessing or transporting for purpose of sale, or advertising for sale, any live or dead animal, or any part of, or anything derived from, such animal.</p> <p>Note that all cetaceans (whales and dolphins) and the Basking Shark (<i>Cetorhinus maximus</i>) are now protected from intentional or reckless disturbance.</p>
WCA8	Schedule 8 of <i>The Wildlife and Countryside Act 1981</i> (as amended)	Plants and fungi protected from intentional picking, uprooting, destroying, trading (including parts or derivatives), etc.