



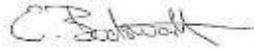
Land North of Witney and West End Link

Preliminary Ecological Appraisal

February 2015

on behalf of West Oxfordshire District Council

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1 Executive Summary

West Oxfordshire District Council is in the process of preparing a new Local Plan to replace the existing plan adopted in 2006. As part of this process, the Council has published a Local Plan Housing Consultation Paper which identified Land to the North of Witney as a draft Strategic Development Area (SDA) for approximately 1,000 homes. A pre-requisite of the draft allocation is the provision of a new river crossing known as the West End Link (WEL).

This report presents a Preliminary Ecological Appraisal of the Land North of Witney and the West End Link. The Land North of Witney is located beyond the northern edge of the town in West Oxfordshire. The main section of the site is located to the west and north of Middlefield Farm and to the south and south-east of Down Hill Farm, between Hailey Road and New Yatt Road. A further parcel of land is located to the east, between New Yatt Road and Woodstock Road (A4095). The approximate Ordnance Survey grid reference for the centre of the site is SP 361 114. The WEL crosses the floodplain of the River Windrush between West End and the Burford Road, to the north-west of Bridge Street. The approximate Ordnance Survey grid references for the start and end points of the WEL are SP 355 105 and SP 353 103.

The methodology for this study follows the *Guidelines for Preliminary Ecological Appraisal* as developed by the Chartered Institute of Ecology and Environmental Management (CIEEM 2013). The assessment includes the following elements:

- A desk study to identify sites, habitats and species of nature conservation importance;
- Phase 1 habitat survey (JNCC 2010);
- An extension of the basic survey methodology to provide details on notable or protected habitats, and the potential for habitats to support notable or protected species;
- Definition of the criteria for valuing habitats (CIEEM 2006);
- The collation and presentation of relevant ecological data including an appraisal of the importance of ecological features present;
- Presentation of a Phase 1 Habitat Plan;
- A preliminary assessment of the likely impact of the development;
- Identification of potential constraints and recommendations for design options to avoid significant effects on ecological features/resources;
- Recommendations for mitigation as far as possible;
- Establishing the requirement for detailed/further surveys;
- Identifying potential enhancement opportunities; and
- Presentation of an Ecological Constraints and Opportunities Plan.

There are no statutory or non-statutory sites of nature conservation importance within or adjacent to the study areas. The Land North of Witney is dominated by areas of arable farmland, improved grassland and amenity grassland; habitats that are considered to be of low ecological value. The most important habitat features of the Land North of Witney are the hedgerows which form field boundaries, as well as areas of plantation woodland. The majority of the hedgerows are species-rich and some have associated features including mature trees, ditches, streams and parallel hedges. With regard to protected and notable species, arable farmland and improved grassland offer very little in the way of suitable habitat. The exception to this is ground-nesting bird species such as the skylark and grey partridge and the brown hare, which uses farmland for breeding and foraging. Hedgerows and areas of plantation woodland offer potential habitat to breeding birds, roosting, foraging and dispersing bats, reptiles, hedgehogs and other small mammals. The seasonal watercourses within the site are not considered to be suitable habitats for water voles and otters.

The WEL is distinct and separate from the Land North of Witney and it crosses the River Windrush and its floodplain. Habitats present within the zone of influence of the WEL include buildings, hard-standing, improved grassland, scrub and trees, tall ruderal vegetation and the riverine habitat of the River Windrush. The most ecologically important feature of the WEL is the River Windrush and the

route crosses three streams of the river. The river and its associated bankside habitats are also considered to be the most valuable for protected and notable species and the species assemblage is likely to include wetland birds, water voles, otters and grass snakes. Bats will also be using the watercourse for foraging and movement.

Constraints to development within the Land North of Witney include the presence of species-rich hedgerows and seasonal watercourses, and the retention of these habitat features is recommended in order to avoid significant impacts on valued habitats and protected/notable species. However, there are significant opportunities for development within areas of arable farmland and agriculturally improved grassland. Development within these areas would need to be sensitive to the presence of ground-nesting birds, brown hares and foraging/dispersing bats along hedgerows.

Given the fact that the majority of habitats are considered unsuitable for protected and/or notable species, development has the opportunity to offer ecological enhancements through the creation of habitats and the addition of habitat features. Enhancement measures may include:

- Native tree and shrub planting within landscaping, gardens and within new areas of plantation woodland that may be used for screening
- Creation of species-rich areas of grassland, either within open spaces or along retained habitat features such as hedgerows and watercourses
- Erection of bat boxes
- Erection of bird boxes (including house sparrow boxes)
- Creation of log piles
- Creation of ponds

With regard to design options, it is recommended that the existing network of hedgerows is retained and that these areas are buffered from disturbance; this should include a lighting strategy to provide 'dark corridor's along which bats can disperse.

The main constraint to the WEL is considered to be the crossing of the River Windrush and the potential direct and indirect impacts that this may have on the running water habitat and protected/notable species. Development of the WEL will need to be sensitive to potential impacts on the watercourse, both *in situ* and downstream which may have knock-on effects on Grimes Meadow and Little Grimes Local Wildlife Site (LWS). Constraints associated with protected and/or notable species along the WEL are mainly associated with species that are likely to occur along the watercourses. This includes water voles, otters and bats, and may also include white-clawed crayfish. There may also be impacts resulting from the loss of breeding bird habitats.

Opportunities for ecological enhancement in the immediate vicinity of the WEL are considered to be relatively limited, given the nature of the development, although significant habitat enhancements are possible within the wider context of the River Windrush floodplain. However, there are opportunities to provide enhancements for protected species within new structures and within the wider landscape, if this is possible. With regard to structures themselves, bat roosting opportunities could be provided within new bridge. Even small-scale measures such as the inclusion of integrated bat boxes within the fabric of the bridge may provide roosting sites to bat species. Opportunities within the wider context could include a number of measures such as the creation of log piles and erection of bat boxes. However, the majority of these are likely to rely on whether habitat enhancements can be achieved within the wider context of the WEL.

Recommended further survey work for protected and notable species include a breeding bird survey, bat survey (of buildings, trees and bat activity), great crested newt survey (if significant areas of hedgerow and plantation woodland are to be directly affected/lost) , badger survey, water vole survey and otter survey. The water vole and otter surveys are only considered necessary in association with the WEL and are not required for the Land North of Witney.

2 Introduction

2.1 Site Description & Context

This report presents a Preliminary Ecological Assessment/Appraisal of the Land North of Witney and the West End Link (WEL). For the purposes of this report, the Land North of Witney is referred to as 'the site' and the route of the West End Link is referred to as the 'WEL'.

The site is located beyond the northern edge of the town of Witney in West Oxfordshire. The main section of the site is located to the west and north of Middlefield Farm and to the south and south-east of Down Hill Farm between Hailey Road and New Yatt Road. A further parcel of land is located to the east, between New Yatt Road and Woodstock Road (A4095). The approximate Ordnance Survey grid reference for the centre of the site is SP 361 114. The WEL crosses the floodplain of the River Windrush between West End and the Burford Road, to the north-west of Bridge Street. The approximate Ordnance Survey grid references for the start and end points of the WEL are SP 355 105 and SP 353 103. Please refer to Appendix 2 for site location plans.

The town of Witney is located within the Thames and Avon Vales Natural Area, as defined by Natural England. The Natural Area is a river valley landscape of floodplains, small fields, hedgerows and willows. Woodland is common on the slightly higher ground, particularly around the ancient royal forests of Braydon and Bernwood. The Natural Area also has a series of flooded gravel pits which form a series of wetlands of high nature conservation value. The water is often highly alkaline and of good quality, and a number of the pits are developing into marl lakes that contain a diverse range of aquatic plants, marginal plants and invertebrates.

The route of the WEL falls within the Upper Windrush Conservation Target Area (CTA) and the eastern boundary of the site lies adjacent to the Wychwood & Lower Evenlode CTA. Both the site and the WEL fall within the Wychwood Project Area. The WEL is also located within the 'Windrush in Witney' Policy Area of the adopted Local Plan and lies adjacent to the Witney Conservation Area.



Figure 1: Aerial photograph showing the boundary of the Land North of Witney (the site) and the numbered fields within the site.

2.1.1 Land North of Witney

The site comprises a number of arable fields and improved/amenity grassland areas set within a network of hedgerows (see Figure 1); for the purposes of this report the fields have been numbered from 1 to 10. The site encompasses a shallow valley and a narrow watercourse runs from the north to the south through the middle of the site, being fed by seasonal watercourses (drains/ditches) to the site's north and eastern sides. Small patches of plantation woodland occur along the northern and north-eastern boundaries of the site, and three small ponds are associated with these boundaries. The site includes a separate arable field located between New Yatt Road and Woodstock Road, to the east of the main body of the site. The buildings and playing field of The King's School are also located within the site.

Open countryside is located to the north, west and east of the site, with built residential development of the town of Witney to the site's southern boundary. The wider landscape beyond the town is largely agricultural and dominated by arable farmland and improved pasture set within a network of hedgerows. Woodland tends to be relatively scarce, with the exception of Cogges Wood, located approximately 700m to the east of the site boundary. The habitats of Cogges Wood link into further woodlands and parkland habitats of Eynsham Hall to the east.

2.1.2 West End Link (WEL)

The route of the WEL crosses the River Windrush and its floodplain to the north-western side of Bridge Street, between West End and the Burford Road (see Figure 2). The route crosses a number of different habitat types including running water (three streams of the River Windrush) agriculturally improved grassland, tall ruderal vegetation associated with areas of periodic inundation, scattered trees and scrub. In addition, a building (dwelling) and yard are located along the route, as well as an area of hard-standing with buddleia scrub, trees and ruderal vegetation. The dominant feature of the WEL is the River Windrush and its floodplain. The route of the WEL crosses three watercourses; a semi-natural channel of the river, a former mill race (of the former Woodford Mill) and a channel which takes over-flow from the mill race. Habitats along the floodplain are dominated by improved and semi-improved pasture, pollarded willow trees and ruderal/inundation vegetation. To the north and south are areas of residential development within the town of Witney. As well as referring to the course of the WEL, the report also takes into account the 'zone of influence' of the WEL and this includes an approximate 50m zone either side of the proposed route.



Figure 2. Aerial photograph showing the approximate route of the West End Link (WEL), indicated by a yellow dashed line.

2.2 Proposals

West Oxfordshire District Council is in the process of preparing a new Local Plan to replace the existing plan adopted in 2006. As part of this process, the Council published a Local Plan Housing Consultation Paper which identified Land to the North of Witney as a draft Strategic Development Area (SDA) for approximately 1,000 homes. A pre-requisite of the draft allocation is the provision of a new river crossing known as the West End Link (WEL).

2.3 Aims of Study

The key purpose of this study is to provide a Preliminary Ecological Assessment/Appraisal of the Land North of Witney and proposed West End Link. The appraisal will be used by West Oxfordshire District Council to inform the emerging West Oxfordshire Local Plan in particular the Council's consideration of whether the sites should be included in the final pre-submission draft Local Plan and if they are included, what mitigation measures should be sought to minimise the impact of the development on biodiversity and to deliver net gains where possible.

The ecological assessment is consistent with guidance published by the Chartered Institute of Ecology and Environmental Management (CIEEM) including the *Guidelines for Preliminary Ecological Appraisal* and the *Guidelines for Ecological Impact Assessment*. The preliminary ecological assessment will help to inform the plan making process and any subsequent Ecological Impact Assessment (EclA) should a planning application come forward.

The aims of this study are to describe and evaluate the habitats present within the site and to assess the potential for the site to support protected and/or notable species. The report discusses the potential impacts of potential development on the ecology of the site and WEL, on valued habitats and on protected/notable species. This study also aims to identify ecological constraints and opportunities, and makes recommendations to avoid/minimise the ecological impacts. Preliminary recommendations are made for mitigation, compensation and enhancement measures in light of the impact assessment. Recommendations for further ecological survey work are also made where appropriate.

Key outputs of the study include:

- The collation and presentation of relevant ecological data including an appraisal of the importance of ecological features present;
- A description of the habitats on site and the scoping of their potential to support protected or notable species;
- A preliminary assessment of the likely impact of the development;
- Identification of potential constraints to the proposed development and the provision of recommendations for design options to avoid significant effects on ecological features/resources;
- Recommendations for mitigation as far as possible, including those that will be required, and those that may be required;
- Establishing the requirement for detailed/further surveys;
- Identifying potential enhancement opportunities; and
- Presenting the ecological constraints and opportunities in an Ecological Constraints and Opportunities Plan (Appendix 4).

3 Methodology

The methodology for this study follows the *Guidelines for Preliminary Ecological Appraisal* developed by the Chartered Institute of Ecology and Environmental Management (CIEEM 2013). The objective of the guidance is to provide best practice guidance for those undertaking preliminary ecological appraisals, setting out the minimum standards required. The preliminary ecological assessment presented here includes the following elements:

- A desk study to identify notable or protected sites, habitats or species potentially affected by the proposal under consideration;
- Survey based on the Phase 1 habitat survey (JNCC 2010) or equivalent;
- An extension of this basic survey methodology to provide further details in relation to notable or protected habitats present within the survey area, or in relation to habitats present that have the potential to support notable or protected species;
- Target notes to provide supplementary information on features too small to map, or supplementary details, for example relating to species composition, structure and management;
- 'Zone of influence', 'survey area' and 'desk study area' defined in terms of the site and its surrounds;
- Definition of the criteria for valuing habitats and species (CIEEM 2006).

3.1 Desk Study

The Thames Valley Environmental Records Centre (TVERC) was contacted to collate records that it holds for protected and notable species, and statutory/non-statutory sites of nature conservation importance within a 2km radius of the Land North of Witney and the WEL. The information gathered is used to put the site into an ecological context and to provide a baseline to the preliminary ecological assessment.

The Multi-Agency Geographic Information for the Countryside website (www.magic.gov.uk) was also searched for information regarding internationally protected sites (e.g. Special Areas of Conservation) within 5km of the site. Other Internet resources interrogated as part of the desk study include:

- The Ordnance Survey - www.ordnancesurvey.co.uk
- Bing Maps – www.bing.com/maps
- Google Earth – <https://earth.google.com/>

The UK Post-2010 Biodiversity Framework (formerly the UK Biodiversity Action Plan) and Oxfordshire Biodiversity Action Plan (BAP) were also consulted to gather information pertaining to priority habitats and species for conservation action at the national and local level.

Maps and aerial photographs were studied in order to place the site in an ecological context and to assess the nature of the habitats which bound the study areas.

3.2 Extended Phase 1 Habitat Survey

An extended Phase 1 Habitat Survey was conducted on 26th November 2014 by Edward Bodsworth MA PhD MCIEEM and Tracy Gray BSc GradCIEEM, with the assistance of Owen Crawshaw BSc. Dr Bodsworth has been a full member of the Chartered Institute of Ecology and Environmental Management since 2005 and has been undertaking ecological surveys for over eleven years.

Weather on the day of the survey was cool (7°C), dry and overcast (100% cloud, some mist) with a light breeze (Beaufort Scale 1).

A walkover of the site and WEL was conducted and a description of the habitats present was prepared using standard Phase 1 habitat survey methodology (JNCC 2010). Target notes were prepared on features of particular ecological interest and an assessment was made of the sites potential to support protected and notable species (such as species listed within the UK Post-2010

Biodiversity Framework and species of principle importance to the conservation of biodiversity in England as listed within Section 41 of the NERC Act 2006). Evidence of protected species was also looked for during the survey.

Hedgerows were assessed for their 'importance' in accordance with the Hedgerows Regulations 1997 and the under the criteria of the UK Post-2010 Biodiversity Framework. Under the Hedgerow Regulations, an 'important' hedgerow meets one of the following ecological criteria:

- The hedgerow contains species in part I of Schedule 1; Schedule 5; or Schedule 8 of the Wildlife and Countryside Act 1981; or various other defined species including certain Red Data Book species;
- The hedgerow is adjacent to a public right of way (not counting an adopted highway) and at least 4 woody species as defined in Schedule 3 of the regulations plus at least two associated features (see below); or
- The hedgerow includes one or more of the following:
 - i. At least 7 woody species;
 - ii. At least 6 woody species plus at least three associated features (see below);
 - iii. At least 6 woody species including a black poplar; large-leaved lime, small-leaved lime or wild service tree;
 - iv. At least 5 woody species and at least 4 associated features.

Associated features are as follows:

- A bank or wall for at least half the length;
- A ditch for at least half the length;
- Gaps over no more than 10% of the length;
- At least one standard tree per 50m;
- At least 3 ground flora woodland species as defined in Schedule 2 of the Regulations within 1m of the hedgerow;
- Connections scoring 4 or more points, where connection a hedgerow counts as one, a broad-leaved woodland or pond counts as two; and
- A parallel hedge within 15m.

3.3 Preliminary Survey of Watercourses

A preliminary survey of watercourses was undertaken to assess habitat suitability for water voles *Arvicola amphibius* and otters *Lutra lutra* and to look for evidence of these two species.

The water vole survey and habitat assessment was undertaken with reference to the *Water Vole Conservation Handbook* (Strachan & Moorhouse 2006). A systematic search of the watercourses was undertaken and the surveyors looked for water voles and evidence of water voles such as:

- Feeding signs, including feeding stations and characteristically gnawed vegetation;
- Latrines and individual droppings;
- Burrows, nests and feeding lawns (areas of shortly-grazed grassland at the entrance to a burrow); and
- Footprints and obvious runways in vegetation and along the edge of the watercourses.

Running water habitats were assessed for their suitability for water voles and notes were made on the presence of emergent and submerged aquatic vegetation, the presence of earth banks, permanent running water and overhanging vegetation. During the survey, observations were also made for otter footprints, spraints and feeding remains. The watercourses were assessed for their potential to offer foraging habitat and shelter to otters.

Watercourses were also assessed for their potential to support populations of white-clawed crayfish *Austropotomobius pallipes*. White-clawed crayfish live in streams, brooks, rivers, lakes, reservoirs

and water-filled quarries. They prefer clear, well-oxygenated water without too much fine sediment, with calcareous streams and rivers forming an ideal habitat. Typical habitat features favoured by white-clawed crayfish include crevices in rocks, gaps between stones, submerged plants and tree roots, which all provide refuges for them to hide in. White-clawed crayfish feed on most organic matter. This typically includes fallen leaves, dead fish and other animals but also live organic matter is eaten, such as aquatic invertebrates and vegetation, as well as other crayfish.

3.4 Preliminary Bat Survey/Assessment

A preliminary survey/assessment of buildings within the site was also undertaken as part of this study. The survey involved external examination of buildings in order to assess the buildings' potential to offer shelter for roosting bats. The external elevations were inspected for evidence of bats including, bat droppings, urine stains, feeding remains (such as moth wings) and characteristic fur staining around access points. Potential access for bats into buildings was noted, as well as the presence of voids within buildings where bats could find shelter.

The bat survey was undertaken according to best practice guidelines published by the Bat Conservation Trust (Hundt 2012). The study takes into account the structure and ecological context of the property, including the following factors which may increase the likelihood of roosting bats being present (Hundt 2012):

- Age of the building (pre-20th Century or early 20th Century construction)
- Nature of construction; traditional brick, stone or timber construction
- Large and complicated roof void with unobstructed flying spaces
- Large (>20 cm) roof timbers with mortice/tenon joints, cracks and holes
- Entrances and gaps for bats to fly and crawl through
- Poorly maintained fabric providing ready access points for bats into roofs, walls; but at the same time not being too draughty and cool.
- Roof warmed by the sun, south-facing roofs in particular
- Weatherboarding and/or hanging tiles with gaps
- Undisturbed roof voids
- Buildings and built structures in proximity to each other providing a variety of roosting opportunities throughout the year
- Buildings or built structures close to good foraging habitat, in particular mature trees, parkland, woodland or wetland, especially in a rural setting.

The following criteria are used to determine the level of 'bat roost potential' within buildings:

- None – There are no features that roosting bats could use for shelter. No further surveys are required.
- Negligible – While presence cannot be absolutely discounted, no obvious features that could be used by bats for shelter are identified. No further surveys are required.
- Low – A small number of potential roosting features are identified. These features are most likely to offer shelter to small numbers of non-breeding and non-hibernating bats. One further survey (dusk/dawn watch) is likely to be necessary.
- Moderate – Several potential roost features are identified. Features have the potential to offer shelter to several bats, several species and/or a breeding colony. The site is set within suitable habitat for foraging and commuting bats. Two further surveys (dusk/dawn watches) are likely to be necessary.
- High – Particular features of potential significance for roosting bats are identified such as inaccessible loft spaces, deep cavities and crevices. Surrounding habitat is of high quality for foraging and commuting bats and the site is connected with the wider landscape by strong

linear features that could be used by bats. Three further surveys (dusk/dawn watches) are likely to be necessary.

A preliminary survey of trees was also undertaken in order to assess the potential of the trees to support roosting bats. Trees were assessed from ground-level as either having no, low, medium or high potential to shelter roosting bats according to the criteria shown in Table 1.

Table 1. Criteria for the assessment of trees for roosting bats (Hundt 2012)

Potential	Features of tree
Category 3 (No)	Trees with no potential to support roosting bats i.e. No loose bark, ivy, splits, cracks or holes.
Category 2 (Low)	Trees with no obvious potential, although the tree is of a size and age that elevated surveys may result in cracks or crevices being found; or the tree supports some features which may have limited potential to support bats i.e. Sparse ivy covering, minor branch splits, small sections of loose or flaking bark.
Category 1 (Medium)	Trees with definite bat potential, supporting fewer suitable features than Category 1* or with potential for use by single bats. Dense ivy, more significant branch splits, downward developing holes, small cavities.
Category 1* (High)	Trees with multiple, highly suitable features capable of supporting larger roosts i.e. Upward developing holes and/or deep splits and cracks, dense ivy, woodpecker holes, lifting bark or multiple features in the same tree.

3.5 Evaluation Methodology

The evaluation of ecological features and resources follows the geographic frame of reference presented within the *Guidelines for Ecological Impact Assessment* (CIEEM 2006). The CIEEM guidelines recognise that ecological evaluation is a 'complex and subjective process' but provides key considerations to apply when 'applying professional judgement to assign values to ecological features and resources'. These include consideration of: geographic frame of reference; site designations and features; biodiversity value; large populations or important assemblages of species; potential or supporting value; social value and economic value.

Focusing on assessments of biodiversity value, there are various characteristics that can be used to identify ecological resources or features that are likely to be important in terms of biodiversity. These include:

- Rare or uncommon species in the local, national or international context;
- Endemic or locally distinct sub-populations of a species;
- Species on the edge of their distribution;
- Notably large populations of animals or concentration of animals considered uncommon or threatened in a wider context;
- Species, rich assemblages of plants or animals;
- Ecosystems and their component parts, which provide the habitats required by the above species, populations and/or assemblages;
- Plant communities (and associated animals) considered typical of valued natural/semi-natural vegetation types; and
- Habitat diversity, connectivity and/or synergistic associations.

In this report, habitats are assigned to a value relating to their geographic frame of reference, using the following scale:

- International
- UK
- National (England)
- Regional (South East)
- County (Oxfordshire)
- District (West Oxfordshire)

- Local or parish (Witney)
- Immediate zone of influence of the site (Site)
- Negligible

Regarding protected and notable species, an assessment of habitat suitability and potential presence of species has been undertaken, given the results of the desk study and field surveys. However, since detailed surveys for protected/notable species have not been undertaken, species or species groups have not been evaluated relating to the hierarchy above. Instead, the potential presence of species is discussed, as well as potential impacts on species and their habitats.

4 Results & Evaluation

4.1 Desk Study

4.1.1 Sites of Nature Conservation Importance

Please refer to Appendix 5 for a plan showing Sites of Nature Conservation Importance from within the desk study area.

4.1.1.1 Statutory Sites

There are no statutory sites of nature conservation importance within 2km of the site and WEL.

There are no internationally designated sites of nature conservation importance (for example Special Areas of Conservation) within a 5km radius of the site and WEL.

4.1.1.2 Non-statutory Sites

There are no non-statutory sites of nature conservation importance within the site or WEL, or within close proximity to their boundaries.

However several Local Wildlife Sites (LWS), and other sites of conservation importance, are present within the 2km search radius (see Table 2 and Appendix 5 for further details).

Table 2. Summary of non-statutory sites within the 2km search radius (see Appendix 5 for a plan of the sites)

Site name	Designation	Distance	Habitat Type
Cogges Wood	Local Wildlife Site	700m E	Ancient Woodland
Crawley Marsh	Local Wildlife Site	1.5km W	Unimproved Meadow
Crawley Mead	Local Wildlife Site	2km W	Fen/Grazing Meadow
Eynsham Hall Park West Woods	Local Wildlife Site	2km E	Ancient Woodland
Grimes Meadow & Little Grimes	Local Wildlife Site	770m SE of WEL	Swamp/Grazed Marshland
Limestone Bank near Crawley	Local Wildlife Site	1.3km W	Limestone Grassland
Maggots Grove Wood	Local Wildlife Site	2km W	Broadleaved Woodland
Manor Farm Meadow	Local Wildlife Site	1.6km W	Lowland Meadow
Minster Lovell Meadow	Local Wildlife Site	2km W	Grazed Meadow
Priest Hill Lane Banks	Proposed Local Wildlife Site	1.3km NE	Calcareous Grassland
Langel Common	Other	1.5km S	Semi-improved Grassland
Witney Lake and Meadows	Other	2km S	Lowland Meadow

The following sections summarise the ecological value of Cogges Wood Local Wildlife Site and Grimes Meadow and Little Grimes Local Wildlife Site (see Appendix 5). These two sites are considered to be the most relevant to the proposals within the Land North of Witney and the WEL. Other sites are considered to be too distant from the site to warrant detailed discussion within this

study, or are considered to be ecologically isolated and separate from the habitats within the site and WEL.

Cogges Wood Local Wildlife Site (LWS)

Cogges Wood LWS is the closest non-statutory site of nature conservation importance to the site and is located approximately 700m from the site's eastern boundary. Cogges Wood is an area of broad-leaved ancient woodland, with additional areas of ancient woodland that have been replanted with conifers. A range of woodland plant species have been recorded from Cogges Wood including wood sorrel *Oxalis acetosella*, bluebell *Hyacinthoides non-scripta*, primrose *Primula vulgaris* and sanicle *Sanicula europaea*. The woodland connects into adjacent woodland of Eynsham Hall which together provide extensive and valuable habitat for a variety of bird species.

Grimes Meadow and Little Grimes (LWS)

Grimes Meadow and Little Grimes LWS is located along the River Windrush approximately 700m downstream from the WEL. Grimes Meadow is an area of grazed marshland, along with sedge dominated swamp habitat. Past records place the rare slender spike-rush *Eleocharis uniglumis* within the site, along with marsh arrow grass *Triglochin palustre* and round-fruited rush *Juncus compressus*. The adjacent area of Little Grimes consists of fen habitat.

All Local Wildlife Sites are considered to be of **ecological value at the county level**.

The route of the WEL falls within the Upper Windrush Conservation Target Area (CTA) and the eastern boundary of the site lies adjacent to the Wychwood & Lower Evenlode CTA (see Appendix 5). The Upper Windrush CTA includes the valley of the River Windrush, as well as areas of the surrounding limestone hills and plateau. Important habitats include lowland meadows, wet grassland and floodplain grazing marsh, swamp and fen. Limestone grassland occur on banks along the river and within some of the northern valleys, where there are also areas of woodland. Target habitats for restoration, creation and management include lowland meadow, grazing marsh, fen, wet woodland and habitats of the river corridor.

In addition, West Oxfordshire District Council has established the 'Windrush in Witney', looking at the Windrush Valley as it passes through Witney. It is considered by the Council that this area provides a very important setting to the town and has great landscape and nature conservation value. The project provides guidance for the management of the area in order to protect and enhance its special landscape, character, ecological, cultural and recreational value. The following targets are noted under the Project:

- NCO1: Encourage the protection, restoration and enhancement of unimproved neutral grassland through, for example, the establishment of a conservation grazing project for the study area;
- NCO2: Encourage the protection, restoration and enhancement of wetland habitat and the river corridor.
- NCO3: Encourage continuing survey work such as ecological surveys undertaken as an integral part of planning applications;
- NCO4: Safeguard priority habitats and species in accordance with relevant Biodiversity Action Plans;
- Habitat Action Plans and Species Action Plans by, for instance, improving the habitats for otters and water voles;
- NCO5: Encourage the management of scarp slope scrub; and
- NCO6: Encourage the restoration of creeping marshwort in accordance with the Local Species Action Plan.

The Wychwood & Lower Evenlode CTA includes areas located within the ancient Wychwood Forest, extending down to Eynsham Hall Park. Ancient woodland is the dominant habitat feature, with parkland, species-rich hedgerows, limestone grassland and heathland also forming part of the habitat mosaic. Cogges Wood LWS is located within the CTA. Target habitats for creation and

management include lowland mixed deciduous woodland, hedgerows, arable field margins and ponds.

4.1.2 Protected/Notable Species Records

The Thames Valley Environmental Records Centre (TVERC) holds no records of protected or notable species from within the site, along the course of the WEL, or within the zone of influence of the WEL. However, the Records Centre holds a number of records pertaining to species of bird, mammal, invertebrate, reptile, fish, amphibian, plant and lichen from within the 2km search radius. Not all of these species are discussed in depth within this section of the report, and full details of the data search results can be found in Appendix 6. Species records which are considered to be most relevant to the site, given the nature of the habitats present and the proximity of the record to the site, are discussed below.

4.1.2.1 Birds

A large majority of the species records held by TVERC pertain to species of bird. This includes species of farmland, woodland and wetland habitats. The bird records are extensive and full details are provided within Appendix 6.

However, species recorded from the surrounding area that may be relevant to the site include bullfinch *Pyrrhula pyrrhula*, linnet *Carduelis cannabina*, starling *Sturnus vulgaris*, dunnoek *Prunella modularis*, song thrush *Turdus philomelos*, redwing *T. iliacus*, fieldfare *T. pilaris*, yellowhammer *Emberiza citronella*, corn bunting *Miliaria calandra* and kestrel *Falco tinnunculus*. These species occur within farmed habitats and can use hedgerows, trees and woodland as nesting sites. Several of these species were noted during the field survey. The records also include ground-nesting farmland species such as the grey partridge *Perdix perdix*, skylark *Alauda arvensis* and golden plover *Pluvialis apricaria*.

The data held by TVERC include a number of records for the barn owl *Tyto alba* from Merryfield Farm, the buildings of which are located close to the eastern boundary of the site. Barn owls nest within farm buildings, hollow trees and will also adopt barn owl boxes. This species typically feeds on voles and other small rodents living within field margins and grassland habitats.

There are five records of tree sparrow *Passer montanus* pertaining to University Farm (SP 355 118), which is located approximately 360m to the north-west of the site. The records from 1998 describe young individuals, suggesting past breeding activity of this species within the local area. Tree sparrows typically prefer nest sites close to wetland habitat and tend to avoid intensively managed farmland (Field & Anderson 2004). House sparrows *P. domesticus* have also been recorded from several locations within the search area. This species uses houses for nesting and is likely to be absent from the majority of the site due to the lack of suitable breeding habitat.

Several wetland species have been recorded in association with the River Windrush, and thus may be relevant to the WEL. Mallard *Anas platyrhynchos* and tufted duck *Aythya fuligula* have both been recorded along the river, within the zone of influence of the WEL. Common snipe *Galinago gallinago* have been recorded approximately 1.6km upstream and other wetland species known to occur along of the River Windrush are kingfisher *Alcedo atthis*, little grebe *Tachybaptus rufficolus*, Eurasian teal *Anas crecca* and northern lapwing *Vanellus vanellus*.

4.1.2.2 Plants

There are records of several notable plant species from Cogges Wood, located approximately 700m to the east of the site. Species that have been recorded from within the woodland include bluebell *Hyacinthoides non-scripta* and yellow vetchling *Lathyrus aphaca*. Two species of moss, namely Starke's pottia *Pottia starkeana* and many-fruited beardless moss *Weissia multicepsularis* have also been recorded from Cogges Wood.

4.1.2.3 Invertebrates

There are records of the small heath butterfly *Coenonympha pamphilus* from a location approximately 240m to the south-east of the site. The small heath occurs in grassland habitats, particularly drier grasslands that are unimproved or semi-improved. The larval food plants are fine grasses, especially fescues *Festuca* spp., meadow grasses *Poa* spp. and bents *Agrostis* species. Butterfly species recorded from Cogges Wood include grizzled skipper *Pyrgus malvae*, grayling *Hipparchia semele*, large tortoiseshell *Nymphalis polychloros* and purple emperor *Apatura iris*. Recordings of the species date from 1981 and are unlikely to provide an accurate indication of the species' current status within the local area.

With the exception of a single record of cinnabar moth *Tyria jacobaeae* all other moth records come from Cogges Manor Farm which is located approximately 1km to the south-east of the WEL. Species of moth recorded from 1982 to 1998 include Lackey *Malachosoma neustria*, mottled rustic *Caradrina morpheus*, mouse moth *Amphipyra tragopoginis*, common rustic *Hoplodrina blanda*, shoulder-striped wainscoat *Mythimna comma*, white ermine *Spilosoma lubricipeda* and the ghost moth *Hepialus humuli*. Although these species are listed as priorities under Section 41 of the NERC Act 2006, they are relatively common and widespread, occurring in a number of habitats including woodland, hedgerow, scrub and gardens. Many of the species feed off herbaceous plants and shrubs during their larval phases.

A number of records of Coleopteran (beetle) species are held for Cogges Manor Farm, Manor Farm Meadow (LWS) and Crawley Mead (LWS). Several species including *Benbicheon gilvipes* and *Badister unipustulatus* are associated with habitats on wetter ground and/or slow moving streams. Other species such as the thick-legged flower beetle *Ischnomera cyanea* and the black-headed cardinal beetle are typical of hedgerow habitat, the former is often found within hawthorn. Species considered as pests of arable crops have also been recorded within the local area, the large flax flea beetle *Aphthona euphorbiae* feeds on the seed of flax and linseed crop, while the barley flea beetle *Phyllotreta vittula* is a specialist pest associated with cereal crops and their wild relatives.

The data search returned no records of white-clawed crayfish from the River Windrush or its tributaries.

4.1.2.4 Amphibians

The great crested newt *Triturus cristatus* has been recorded from a single location within the search area. The record pertains to Coral Springs, located approximately 2km to the south-west of the WEL, on the far side of the town of Witney. The record relates to individual male and female adult newts caught by netting in May 2007. There are no records of this species from ponds located to the north side of Witney.

Other amphibian species recorded within the local area include common frog *Rana temporaria*, common toad *Bufo bufo* and smooth newt *Triturus vulgaris*.

4.1.2.5 Reptiles

Records of three reptile species occur for Cogges Manor Farm, located approximately 1.1km to the south-east of the WEL. All of the records are over 10 years old and detail separate individual recordings of common lizard *Zootoca vivipara*, grass snake *Natrix natrix* and slow worm *Anguis fragilis*, from a period of 1983-1989.

4.1.2.6 Mammals

Bats

There are no records of bat species from the site or from the route of the WEL. The nearest records of bat species are two records of the common pipistrelle *Pipistrellus pipistrellus* from a location approximately 220m to the south-west of the site boundary (SP 360 108). Other species of bat recorded within the wider landscape include brown long-eared bat *Plecotus auritus* (a record of bat

droppings) from a dwelling in New Yatt (dated 2013) and Natterer's bat *Myotis nattereri* from the village of Hailey in 2005.

Other bat species that are known to occur within the local area are Leisler's bat *Nyctalus leisleri*, soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula* and Daubenton's bat *Myotis daubentonii* (Windrush Ecology Ltd. private records). Daubenton's bats have been recorded foraging along the River Windrush close to the route of the WEL. Soprano pipistrelles have also been recorded along the River Windrush and noctules are known to fly over the town on occasion.

Badger

There is a record of a dead badger along the A4095 approximately 950m to the east of the site, as well as several other records of dead badgers on roads around the town. The closest known badger sett is located at Bathing House Farm approximately 470m to the west of the WEL route.

Otter

Otters have been recorded from the River Windrush on numerous occasions, with records dating from 2004 to 2009. The records mostly pertain to field signs, including spraints and footprints along the river. Several of the records come from near the A40 bypass bridge (SP 3593 0864), although there are records of the species from upstream and downstream of where the WEL crosses the River Windrush.

Although there are no records of otters from the site (the Land North of Witney), an otter was observed alongside the A4095 near the village of North Leigh, to the north-eastern side of Witney, in 2012. The otter was seen moving from a ditch into a hedgerow alongside the road.

Otters are believed to have returned to the River Windrush in 2004. The species experienced a national decline in the late 1950s to the late 1970s as a result of pesticides used in intensive agriculture. Otters have been recorded as breeding within the River Windrush since 2004 and are thought to have re-established themselves within the watercourse, as a result of movement of the species from rivers in Gloucestershire, along with the help of a small re-introduction programme by the Otter Trust which involved the release of a small population in the Upper Thames.

Water Vole

Water voles have been recorded from numerous locations along the River Windrush, as well as from other streams, wetlands and watercourses that link into the river. The records cover a wide period, and date from 1981 to 2013 and include stretches of river upstream and downstream of the WEL.

There are no records of water voles from the site (the Land North of Witney).

Brown Hare

The Records Centre holds three records for brown hares *Lepus europaeus* from within the 2km search radius, dating from before 1985, 1999 and 2010. Brown hares tend to have a wide range and the species will use arable farmland for breeding and foraging.

Other Species

Other records of mammals include European hedgehog *Erinaceus europaeus*, the majority of these records are from within the town of Witney the closest record comes from a residential garden 350m south of the WEL, dated 2007. Polecat *Mustela putorius* has also been recorded within the search area as recently as 2011, a dead individual was noted along the A40 road approximately 1.6km to the south-east of the site. There is also a single record of a harvest mouse *Micromys minutus* from Cogges Manor Farm in 1993.

4.2 Habitats

Appendix 1 presents photographs of the Land North of Witney and WEL. Appendix 2 illustrates the location of the sites and provides an aerial photograph of the sites and surrounding area. A Phase 1 Habitat Plan with Target Notes (TN) is presented in Appendix 3.

4.2.1 Land North of Witney

For the purpose of this report the Land North of Witney has been divided into ten fields, numbered F1 to F10 (see Figure 1). The following sections should be cross-referenced to Figure 1 for the locations of fields and field boundaries.

4.2.1.1 Arable Land

The majority of the site comprises arable land which is currently under cultivation. Fields F1-F6 & F8 are all under arable cultivation and comprise areas of bare ground. The margins of the arable fields support sparse vegetation including spear thistle *Cirsium vulgare*, cock's-foot *Dactylis glomerata*, false oat-grass *Arrhenatherum elatius*, cut-leaved crane's-bill *Geranium dissectum*, field speedwell *Veronica persica*, creeping buttercup *Ranunculus repens*, cow parsley *Anthriscus sylvestris*, cleavers *Gallium aparine*, white dead-nettle *Lamium album* and dandelion *Taraxacum officinale*. Field F10 is also under arable cultivation, with hedgerows along its northern, eastern and southern boundaries. This field is much the same as the arable fields within the main body of the site, with a grassy margin of false oat-grass and cock's-foot with creeping buttercup, field speedwell, cut-leaved crane's-bill, white dead nettle, white clover *Trifolium repens* and hogweed *Heracleum sphondylium*.

The fields are intensively managed and the margins do not appear to be managed specifically to provide benefits for wildlife. Given this, the fields are not considered to meet the criteria for 'arable Field Margins' under the UK Biodiversity Framework. The cultivation of the land has resulted in the presence of little or no vegetation within the fields and the habitat is considered to be of **negligible ecological value**.

4.2.1.2 Improved Grassland

Field F7 comprises an area of agriculturally improved grassland which appears to have been sown. The field is a mown paddock with cock's-foot, false oat-grass, Timothy grass *Phleum pratense* and Yorkshire fog *Holcus lanatus*. Herbaceous species present include cow parsley, hogweed *Heracleum sphondylium*, white dead-nettle, broad-leaved dock *Rumex obtusifolius*, creeping buttercup *Ranunculus repens*, sow thistle *Sonchus arvensis* and red clover *Trifolium pratense*.

Field F9 is another area of improved grassland located between two hedgerows (H13 & H14). The grassland is heavily grazed by horses resulting in a short sward; the identification of grasses to species level was therefore not possible in this field. Herbaceous species noted within the grassland include white clover *Trifolium repens*, dandelion, creeping buttercup and broad-leaved dock.

The areas of improved grassland appears to have undergone agricultural improvement and are species-poor. The habitat does not meet the criteria for any of the valued grassland habitats listed under the UK Biodiversity Framework, such as 'Lowland Meadows'. Given this the habitat is considered to be of **negligible ecological value**.

4.2.1.3 Hedgerows

The majority of the field boundaries are marked by hedgerows and hedgerows are perhaps the most distinctive habitat features of the site as a whole. Table 3 provides details of each of the hedgerows, which have been numbered H1 to H19 for the purposes of this report (TN 1 to TN 19). The location of each hedgerow is shown on the Habitat Plan in Appendix 3.

The majority of the hedgerows are species-rich and many have associated features such as a wet or dry ditch, standard trees and parallel hedgerows. The majority of the hedgerows are considered to meet the criteria for 'important' hedgerows under the Hedgerows Regulations 1997. Hedgerows are considered to be the most ecologically valuable feature of the site and offer habitat connectivity through what is an otherwise poor (arable/farmed) environment. Given the fact that all intact hedgerows meet the criteria for 'Hedgerows' under the UK Biodiversity Framework, and the fact that many of the hedgerows are also species-rich and 'important' under the Hedgerows Regulations 1997, hedgerows are considered to be of **district ecological value**.

Having said this, a number of hedgerows are considered to have become defunct and these all occur along the southern boundaries of the site, where there are adjacent areas of residential development. Along these boundaries, the hedges have many gaps and do not form a continuous row of shrubs and trees. In addition, these boundaries contain other features such as fences, walls and ornamental planting associated with the adjacent gardens and residences. Such boundaries occur along the southern sides of Field 5, Field 6 and Field 7, as well as the south-western boundary of Field 10. Defunct hedgerows are considered to be of **ecological value within the context of the site** only.

4.2.1.4 Plantation Woodland

Areas of young, planted woodland occur along at the northern and eastern boundaries of the site. These areas are of a similar age and are densely planted with hazel, beech, dog rose, field maple, sycamore, oak, cherry and ash. The ground flora within the habitat is relatively sparse and includes ground ivy, cow parsley, white-dead-nettle, cleavers, bramble, teasel, broad-leaved dock, creeping buttercup, cock's-foot and false oat-grass. The woodland to the north-east of Field 3 has a stream flowing north-south, through the centre of the woodland. Another area of plantation woodland is located to the immediate south of Field 9. This small plantation is dominated by semi-mature black poplars, with ash, hawthorn, blackthorn, field maple and elder. A stream runs along the eastern side of the woodland.

Areas of plantation woodland tend to be relatively young, and appear to have been planted to provide shelter and screening within and around the site. However, the habitat has been planted with a number of native tree and shrub species and strengthens the network of hedgerows. Given this, areas of plantation woodland are considered to be of **local ecological value**.

Table 3. Summary table of hedgerows

Number	Location	Species present	Other features	Priority Habitat?	'Important'?
H1	Eastern boundary of Field 1	Hawthorn <i>Crataegus monogyna</i> Oak <i>Quercus robur</i> Field maple <i>Acer campestre</i> Sycamore <i>Acer pseudoplatanus</i> Dog rose <i>Rosa canina</i> Dogwood <i>Cornus sanguinea</i> Blackthorn <i>Prunus spinosa</i> Hazel <i>Corylus avellana</i> 8 woody species	Standard trees (including oak) <10% gaps along its length	Yes	Yes
H2	North-eastern boundary of Field 1	Ash <i>Fraxinus excelsior</i> Hazel Hawthorn Dogwood Blackthorn Field maple 6 woody species	Stream/wet ditch <10% gaps along its length Connections to other hedgerows	Yes	Yes
H3	Eastern boundary of Field 2	Hawthorn Blackthorn Ash Hazel 4 woody species	<10% gaps along its length	Yes	No
H4	Northern boundary of Field 2	Hawthorn Blackthorn Dogwood Field maple Sycamore Elder <i>Sambucus nigra</i> Elm <i>Ulmus procera</i> Dog rose 8 woody species	Dog's mercury <i>Mercurialis perennis</i> in ground flora <10% gaps along its length	Yes	Yes
H5	Western boundary of Field 3	Blackthorn Field maple Hawthorn Dog rose Sycamore Spindle <i>Euonymus europaeus</i> 6 woody species	Standard tree (single mature sycamore) Dry ditch (shallow) <10% gaps along its length	Yes	Yes
H6	Eastern boundary of Field 4	Hawthorn	Wet ditch	Yes	Yes

		Elm Ash Blackthorn Dogwood Sycamore Oak 7 woody species	Standard trees within small woodland <10% gaps along its length		
H7	Northern boundary of Field 4	Ash Elm Silver birch <i>Betula pendula</i> Oak Hawthorn Lime <i>Tilia</i> sp. Elder Field maple Beech <i>Fagus sylvatica</i> Crab apple <i>Malus sylvestris</i> Blackthorn Horse chestnut <i>Aesculus hippocastanum</i> Spindle Dog rose 14 woody species	Standard trees <10% gaps along its length	Yes	Yes
H8	Western boundary of Field 4	Hawthorn Field maple Elm Blackthorn 4 woody species	Dry and wet sections of ditch Parallel hedge <10% gaps along its length	Yes	No
H9	Southern boundary of Field 4	Crab apple Blackthorn Elm Field maple 4 woody species	Wet ditch >10% gaps along its length Boundary to adjacent dwellings/defunct hedge	No	No
H10	Northern boundary of Field 5 and Field 3	Hawthorn Dogwood Elm Ash Blackthorn Sycamore	Parallel hedge along right of way Old stone wall	Yes	Yes

		Hazel Field maple Dog rose 9 woody species			
H11	North-western boundary of Field 5	Hazel Elm Hawthorn Horse chestnut Cherry <i>Prunus avium</i> Beech Field maple 7 woody species		Yes	Yes
H12	Southern boundary of Field 5, Field 6 and Field 7	Ash Blackthorn Field maple Hawthorn Hazel 5 woody species plus Buddleia <i>Buddleja</i> sp. Garden privet <i>Ligustrum ovalifolium</i> Norway spruce <i>Picea abies</i> Cherry laurel <i>Prunus laurocerasus</i> Cypress <i>Cupressocyparis leylandii</i> Lilac <i>Syringa vulgaris</i> Purple plum <i>Prunus cerasifera</i>	>10% gaps along its length Defunct hedge along neighbouring properties	No	No
H13	Eastern boundary of Field 9	Elm Blackthorn Field maple Elder Hawthorn Ash Dog rose Hazel Crab apple Dogwood 10 woody species	Ditch - dry/wet sections Standard trees	Yes	Yes
H14	Western boundary of Field 9	Elm Blackthorn Ash Dogwood Hazel	Stream within ditch Standard trees <10% gaps	Yes	Yes

		Hawthorn Crack willow <i>Salix fragilis</i> 7 woody species	Dog's mercury within the ground flora		
H15	South-eastern boundary of sports field	Field maple Hawthorn Hazel Ash Oak Blackthorn Dogwood Elder 8 woody species	Dry ditch Parallel hedgerow <10% gaps along its length	Yes	Yes
H16	Northern boundary of Field 10	Dogwood Rose Blackthorn Field maple Spindle Hawthorn Elm 7 woody species	Dry ditch Parallel hedgerow <10% gaps along its length	Yes	Yes
H17	Eastern boundary of Field 10	Blackthorn Sycamore Rose Dogwood Hawthorn Spindle Field maple Elder 8 woody species	Ditch Standard trees <10% gaps along its length	Yes	Yes
H18	Southern boundary of Field 10	Blackthorn Sycamore Dog rose Dogwood Hawthorn Spindle Field maple Elder 8 woody species	Ditch Standard trees <10% gaps along its length	Yes	Yes
H19	Western boundary of Field 7	Blackthorn 1 woody species	<10% gaps along its length	Yes	No

H20	Western boundary of Field 10	Dogwood Ash Elder Hawthorn Dog rose Blackthorn Beech Hazel Sycamore 9 woody species Snowberry <i>Symphoricarpos</i> sp. Cherry laurel Horse chestnut Yew <i>Taxus baccata</i>	>10% gaps along its length Defunct hedgerow/garden boundary along residential properties to the north of Woodstock Road	No	No
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4.2.1.5 Running Water

The main area of the site comprises two sides of a shallow valley, with a stream flowing from the north to the south. Heavy and prolonged rain preceded the survey and the stream was in full flow on 26th November 2014. The stream appears to be fed by two watercourses; one which enters the site from the north and one which enters the site from the east. Both of these smaller watercourses were also in full flow. The stream which enters the site from the north is culverted under Field 3 and re-emerges to flow along Hedgerow H14, along the western side of Field 9.

The stream which enters the site from the east (TN 24) flows along a ditch between Field 1 and Field 2 before joining Hedgerow 13 to the eastern side of Field 9. The stream eventually dried out along Hedgerow 13, but appears to re-emerge as a shallow watercourse to the centre of Field 9, flowing to the south parallel with the stream along Hedgerow 14.

All of the streams appear to be seasonal, and no aquatic vegetation was noted along any of the watercourses. Unshaded watercourses tended to have grassy banks, whilst unshaded sections (under hedgerows) had bare earth banks or banks with hedgerow ground flora. It is considered likely that the watercourses are dry for much of the year, and only flow during periods of high rainfall.

The streams are likely to meet the criteria for 'Rivers' under the UK Biodiversity Framework. 'River' water bodies will qualify as a priority habitat either because they are considered to be near-natural, or because they fulfil one or more specific criteria relating to priority species or to particular habitat types, such as headwaters. Given this, and the fact that the streams are a distinctive habitat feature of the site and the site's landscape, the running water habitat is considered to be of **local ecological value**.

4.2.1.6 Ponds

Ordnance Survey maps indicate the presence of two ponds to the north-eastern corner of the site, to the corner of Field 1 (TN 21 & 22). At the time of the survey, these 'ponds' were 'widenings' of the wet ditch which runs along this boundary of the site. The 'widenings' contained flowing water and no obvious vegetation. It is considered that these are seasonally wet features that may retain some water when the ditch is in flood. However, these two 'widenings' are not considered to be ponds and support no aquatic or emergent vegetation. Ordnance Survey maps also indicate the presence of a well to the north-western corner of the site, to the east side of the Hailey Road. This well/waterbody was not found during the survey.

Situated between hedgerow H10 and Down Hill Farm, beyond the northern site boundary, is a small pond that is not shown on Ordnance Survey maps (TN 23). The approximate dimensions of the pond are 10m length and 3m width, with a depth of 0.5m to 1m. The water quality is considered to be moderate, although the pond is likely to be heavily shaded in the summer months. Aquatic flora includes fool's-water-cress *Apium nodiflorum*, brooklime *Veronica beccabunga* and common water starwort *Callitriche stagnallis*. Emergent vegetation was limited to yellow flag iris *Iris pseudacorus*. Species recorded around the edge of the pond include willow saplings, hawthorn and greater willowherb *Epilobium hirsutum*.

Ponds are a naturally biodiverse habitat as they can support aquatic plants, invertebrates and amphibians, amongst other species. Although the pond habitats are not extensive or particularly significant, they are considered to be a valued ecological feature of the site. In addition, biodiverse ponds may meet the criteria for 'Ponds' under the UK Biodiversity Framework. Given this, the ponds are considered to be of **local ecological value**. The two 'widenings' are located along a seasonal watercourse that is considered to be of local ecological value (see above).

4.2.1.7 Buildings

The only buildings within the site are the buildings of The King's School, located to the north-west of New Yatt Road (TN 20). The school buildings appear to date from the late 20th and early 21st Centuries and are of a modern construction. The buildings are constructed from a mixture of brick, stone and reconstituted stone, with pitched and hipped roofs of close fitting reconstituted stone tiles.

The buildings have single-storey and two-storey sections, with a more modern block located to the north-eastern side of the original school building. The buildings have a number of gable end and dormer window features with wooden boarding. Overall, the buildings are very well maintained and in a good state of repair. The buildings are surrounded by areas of hard-standing.

The buildings of The King's School are considered to be of **negligible inherent ecological value**; the potential value of buildings to protected/notable species is discussed in Section 4.4.

To the south-west of the school, and located outside of the site boundary, are the buildings of the former Middlefield Farm, now a residential development. The properties comprise a number of converted farm buildings, with some newer additions, that are of stone construction with reconstituted stone tiles. However, some of the older buildings have traditional, cut-stone tiles and some also appear to have loft spaces. Of particular note is an un-converted stone tower to the south side of the complex. This tower may offer habitat to roosting bats and nesting birds.

4.2.1.8 Amenity Grassland

To the east of the school buildings are the school playing fields. This is an area of mown amenity grassland. The sward is maintained short through regular mowing and the grassland is species-poor. The habitat does not meet the criteria for any of the valued grassland habitats listed under the UK Biodiversity Framework, such as 'Lowland Meadows'. Given this the habitat is considered to be of **negligible ecological value**.

4.2.2 West End Link

4.2.2.1 Buildings

To the south side of Hailey Road and its junction with West End is a dwelling and detached garage (TN 25). The buildings appear to date from the latter part of the 20th Century and are constructed from stone with pitched roofs of slate tiles. The buildings are in a very good state of repair and there are no obvious gaps within the stonework or under roof tiles. There appears to be a loft space above the dwelling and there may also be a loft above the garage. The buildings are set within a garden of paved hard-standing and amenity grassland, with a garden hedge alongside the road.

To the south of this dwelling is an access road which serves the nearby yard (see below). To the south of the access road is a collection of redundant farm buildings. These buildings mostly comprise makeshift shelters of concrete blocks and corrugated metal sheeting, although a few of the buildings are supported by stone walls. The dwelling and the derelict farm buildings are all considered to be of **negligible inherent ecological value**.

4.2.2.2 Hard-standing (Yard)

Part of the WEL passes through an existing yard which is currently used for the parking and storage of mobile homes, caravans, vehicles and containers (used by show-people). The yard comprises an area of hard-standing with a tall boundary hedge of Leyland cypress trees *Cupressocyparis leylandii*. The yard and its planted boundary are considered to be of **negligible ecological value**.

4.2.2.3 Improved Grassland

To the south of the yard is a field of agriculturally improved pasture within the floodplain of the River Windrush (TN 27). The grassland is used for grazing livestock and is very species-poor. Common grass species dominate the sward and herbaceous species include broad-leaved dock, stinging nettle, white clover, dandelion and creeping buttercup. The habitat does not meet the criteria for any of the valued grassland habitats listed under the UK Biodiversity Framework, such as 'Lowland Meadows'. Given this the habitat is considered to be of **negligible ecological value**.

4.2.2.4 Dense Scrub

To the east of the route of the WEL is a neglected field which has become overgrown with dense scrub and tall ruderal vegetation (TN 28). The scrub is dominated by bramble with hawthorn, sycamore, silver birch, willow, elder and ash also present. Tall ruderal vegetation includes broad-

leaved dock, great willow herb, stinging nettle and creeping buttercup. This area was largely inaccessible. The habitat does not meet the criteria for any valued habitats listed under the UK Biodiversity Framework. Given this the habitat is considered to be of **ecological value within the context of the site**.

4.2.2.5 *Running Water*

Three streams of the River Windrush will be crossed by the WEL (TN 30 & TN 31). One of these streams is a semi-natural watercourse which meanders through the floodplain. The other two are man-made channels which include the former mill race of Woodford Mill and an overflow channel from the mill race. Earth banks of the streams support tall vegetation of great willowherb, meadowsweet, reed sweet grass, weeping sedge, pond sedge and wild angelica.

All of the watercourses were fast-flowing and full of water at the time of the survey, and the bed of the river was obscured by the murky nature of the water column. However, the River Windrush is known to support a diversity of aquatic and emergent vegetation, and tends to have a sandy and muddy bed along this stretch of the river. The river offers potentially suitable habitat to fish, aquatic invertebrates, wetland birds, water voles, otters and white-clawed crayfish.

The River Windrush is considered to meet the criteria for 'Rivers' under the UK Biodiversity Framework. 'River' water bodies will qualify as a priority habitat either because they are considered to be near-natural, or because they fulfil one or more specific criteria relating to priority species such as otters and water voles. The River Windrush is not only a dominant ecological feature within West Oxfordshire, but it is considered to be a valued habitat within the Upper Thames Valley of Oxfordshire. Given this, the running water habitat is considered to be of **county ecological value**.

4.2.2.6 *Tall Ruderal Vegetation*

Between the streams of the River Windrush area areas of tall ruderal vegetation and scrub (TN 29). The dominant ruderal species are great willowherb, meadowsweet, nettle and teasel, with wild angelica, broad-leaved dock, creeping thistle, reed sweet grass, weeping sedge, pond sedge, cow parsley, creeping buttercup and meadow foxtail also present in abundance. Scrub is developing in inaccessible areas and includes hawthorn, bramble, sycamore and willow. The habitat does not meet the criteria for any valued habitats listed under the UK Biodiversity Framework. The habitat is considered to be of **ecological value within the context of the site**.

4.2.2.7 *Trees*

Alongside the River Windrush are a number of young and semi-mature crack willow trees. The trees are managed through pollarding. There are no mature or ancient willow pollards within the immediate area of the WEL. Young and semi-mature willow trees are considered to be of **ecological value within the context of the site**.

4.2.2.8 *Hard-standing & Scrub*

The area of land between the Burford Road and the mill race comprises hard-standing with dense scrub, dominated by buddleia *Buddleia davidii*, with bramble, elder, dog rose, hawthorn, and saplings of sycamore and silver birch (TN 32). In this area there are also a small number of semi-mature sycamore trees and a semi-mature copper beech. The hard-standing has been neglected for a number of years and tall ruderal vegetation has begun to colonise the area, particularly around the peripheries. Ruderal species include teasel, tall melilot, herb Robert, creeping buttercup, wild carrot, mugwort and stinging nettle. There is a stone wall along the northern side of the Burford Road and an old, collapsed stone wall within the area of hard-standing. Scrub and ruderal habitats, with some semi-mature trees, are considered to be of **ecological value within the context of the site**.

Table 4. Evaluation of habitats

Habitat	Value (Geographical Frame of Reference)
Land North of Witney	
Arable land	Negligible
Improved grassland	Negligible
Semi-improved grassland	Negligible
Hedgerows	District
Buildings	Negligible
Amenity grassland	Negligible
Broadleaved plantation woodland	Local
Running water	Local
Ponds	Local
West End Link	
Buildings	Negligible
Hard-standing (yard)	Negligible
Improved grassland	Negligible
Scrub	Site
Running water (River Windrush)	County
Tall ruderal vegetation	Site
Trees	Site
Hard-standing with scrub and tall ruderal	Site

4.3 Species

4.3.1 Land North of Witney

4.3.1.1 Birds

Bird species observed during the survey include robin *Erithacus rubecula*, blue tit *Cyanistes caeruleus*, collared dove *Streptopelia decaocto*, wood pigeon *Columba palumbus*, herring gull *Larus argentatus*, blackbird *Turdus merula*, starling *Sturnus vulgaris*, dunnock *Prunella modularis*, fieldfare, carrion crow *Corvus corone*, long-tailed tit *Aegithalos caudatus*, great tit *Parus major*, bullfinch, goldfinch *Carduelis carduelis*, chaffinch *Fringella coelebs*, red-legged partridge *Alectoris rufa*, wren *Troglodytes troglodytes*, jay *Garrulus grandarius*, yellowhammer, great spotted woodpecker *Dendrocopos major*, redwing and magpie *Pica pica*. A skylark *Alauda arvensis* was also observed within Field 8.

The majority of bird activity was associated with hedgerow and plantation woodland habitats, particularly along the northern boundary of the site where small flocks of redwing, fieldfare and yellowhammer were observed feeding within hedgerow. Hedgerows and trees offer suitable nesting habitats for breeding birds and the arable fields may also support ground-nesting species such as skylark and grey partridge. House sparrows were recorded in significant numbers along the south-eastern boundary of Field 10 as well as within the car park of The King's School. This indicates that house sparrows are breeding within buildings adjacent to the site boundary and are using the site for foraging.

Given the fact that suitable habitat is limited to hedgerows and plantation woodland, the species assemblage is likely to be characteristic of farmland habitats of lowland England, and rare species, or a very diverse assemblage of species, is unlikely to occur. However, the assemblage will include species such as the dunnock, starling, bullfinch, yellowhammer and song thrush, all of which are listed as priority species under the UK Biodiversity Framework and under Section 41 of the NERC Act 2006. The assemblage will also include species that are included on the Red and Amber Lists of Birds of Conservation Concern, such as song thrush and yellowhammer (Red List) and dunnock (Amber List). The site is considered to be largely unsuitable as a foraging habitat for barn owls (which favours rough grassland habitat) and the school buildings are unsuitable for this species.

4.3.1.2 Bats

The site provides very limited potential for roosting bats within trees and buildings. The buildings of The King's School are modern, in a very good state of repair and the solid stone/brick walls do not offer any obvious shelter for roosting bats. Although the tiles of the roofs may offer some shelter to smaller bat species such as pipistrelles, there are no missing tiles which could allow access for larger numbers of bats to the structure of the roofs. There also appears to be no loft spaces within the buildings which could provide shelter for species such as the brown long-eared bat. The school buildings have therefore been assessed as having negligible potential to offer shelter to roosting bats.

Certain buildings that occur off-site were noted as having higher bat roost potential and these include some buildings at Down Hill Farm (to the north-west) of the site boundary and some buildings at Middlefield Farm (to the south-east). One of the stone buildings that forms part of Down Hill Farm, exhibits a number of gaps within the stone walls that could offer shelter to roosting bats. At Middlefield Farm, the stone tower appears to have an internal space that bats could use for shelter and other buildings may also have loft spaces. In addition, buildings with traditional cut-stone tiles and stone walls may also offer shelter to crevice-dwelling species of bat. Bats roosting within buildings close to the site boundary may move into the site to forage and disperse.

Opportunities for bats to roost within trees is considered to be limited, as there are only a small number of mature trees that were noted to exhibit features that bats could use for shelter. However, it should be noted that a detailed survey of all trees was not undertaken. A lightning damaged tree is present within Hedgerow 1 and this tree has a cavity within its trunk, surrounded by dense ivy, this tree is assessed as having Category 1 (medium) potential to offer shelter to roosting bats. A dead oak tree with a rot hole in its trunk is present along Hedgerow 5; this tree is considered to have Category 1* (high) potential to shelter roosting bats. In addition, a mature ash with a rot hole is present in the south-east corner of Field 5 to the south end of Hedgerow 14; this tree was also assessed to have Category 1 (medium) potential for roosting bats. The trees are all present along hedgerows and form part of the overall network of hedgerow habitat. Bats may use the hedgerows for dispersing to and from roost sites. Bat species that favour tree roosts include noctule, Leisler's bat and pipistrelle species, all of which have been recorded from the local area.

Regarding foraging, potential foraging habitat is very much limited to sheltered areas along hedgerows and within and around areas of plantation woodland. Arable farmland and improved grassland are considered to be very poor habitats for foraging bats and the majority of bat species will tend to avoid dispersal across open fields, favouring the shelter of hedgerows for navigation.

4.3.1.3 Reptiles

Overall the habitats are considered to be very poor for reptile species, and reptiles are likely to be absent from much of the site. Areas of arable land and improved grassland are considered to be unsuitable for reptiles and suitable areas of habitat are limited to plantation woodland (where the ground layer is grassy and tussocky) and hedgerow margins. Given the nature of these habitats, the most likely species to be present are slow worm, common lizard and grass snake.

4.3.1.4 Amphibians

The pond near to Down Hill Farm, to the north-east of Field 5, may provide a habitat for breeding amphibians. A Habitat Suitability Index (HSI) assessment was conducted to establish an approximation of the pond's likelihood to contain great crested newts, taking into account the pond's characteristics (Oldham *et al.* 2000). The calculations resulted in a HSI value of 0.65, which classifies pond suitability for great crested newts as 'average'.

The two 'widenings' of the watercourse to the north-eastern side of the site (shown as ponds on Ordnance Survey maps) are not considered to be suitable for breeding amphibians. This is due to the fact that water flows through these small waterbodies and the waterbodies are unlikely to remain wet during periods of low rainfall. No aquatic vegetation (for egg-laying by amphibians) was noted in either pond.

4.3.1.5 Invertebrates

The arable farmland and improved grassland are unsuitable for protected and notable species of invertebrate, including the small heath butterfly, wall butterfly and grizzled skipper. Hedgerows and plantation woodland may offer habitats to common and widespread moth species, including species that are listed under the Biodiversity Framework and under Section 41 of the NERC Act 2006 such as the bordered gothic, grey dagger, brown-spot pinion and buff ermine. Hedgerows and plantation woodland may also support other species such as beetles, bees and wasps.

The seasonal streams are not considered to be suitable habitat for white-clawed crayfish. This is due to the ephemeral nature of the watercourses and the fact that the streams are likely to become dry for much of the year. The ponds and widenings of the ditches are also considered to be unsuitable for this invertebrate species.

4.3.1.6 Badger

No badger setts or evidence of badgers were found during the survey. Evidence gathered so far indicates that badgers are absent from the site. Arable farmland, improved grassland and hedgerows offer potential foraging habitats to badgers that may move into the site from adjacent areas.

4.3.1.7 Water Vole

No water voles, or evidence of water voles, were noted during the survey of the site. The streams that run through the site do not appear to be suitable for water voles. The streams are likely to be seasonal and do not support aquatic vegetation that would provide water voles with a food source. In addition, the watercourses are likely to dry out during the summer.

4.3.1.8 Otter

The streams within the Land North of Witney are not considered to be suitable for otters as breeding and foraging habitat. This is due to the fact that the streams are seasonal and only flow during times of wet weather and heavy rainfall, there is little cover for otters alongside these streams.

4.3.1.9 Hedgehog

Hedgerows and areas of plantation woodland offer suitable habitat to hedgehogs, and hedgehog faeces was noted along one of the hedgerows.

4.3.1.10 Brown Hare

Arable farmland can provide habitat for brown hares, which may breed within field margins and along hedgerows.

4.3.1.11 Other Species

No rare or uncommon plant species were noted during the survey and the site is considered to be unsuitable for plants such as sainfoin, rough marshmallow and round-fruited rush (plant species that have been recorded from the desk study area).

The site is considered to be largely unsuitable for others species such as the harvest mouse. This is due to the lack of suitable habitats.

4.3.2 West End Link

4.3.2.1 Birds

As with the Land North of Witney, trees and shrubs within the zone of influence of the WEL has the potential to offer nesting habitat to breeding birds. Given the nature of the habitats, the assemblage is likely to be typical of farmland and hedgerow habitats. However, the assemblage is likely to include species such as the dunnock and song thrush, all of which are listed as priority species under the UK Biodiversity Framework and under Section 41 of the NERC Act 2006. The assemblage will also include species that are included on the Red and Amber Lists of Birds of Conservation Concern, such a

song thrush (Red List) and dunnock (Amber List). Areas of improved grassland and tall ruderal vegetation are not considered to be suitable for ground-nesting species such as the skylark.

The distinctive feature of the WEL is the River Windrush and several wetland bird species have been recorded from the river and its environs. This includes the kingfisher, a species which is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Kingfishers create their nests within burrows in the river banks and use rivers for foraging. It is considered possible that kingfishers are present and breeding within the zone of influence of the WEL. Other species, such as ducks, may also use stands of emergent vegetation and the river banks as nest sites.

4.3.2.2 Bats

There are buildings within the zone of influence of the WEL and although the structures appear to have low potential to offer shelter to roosting bats, the presence of bats cannot be discounted at this stage. Further surveys of buildings for bats is recommended. The trees within the zone of influence of the WEL do not appear to offer shelter to bats and it seems likely that roosting bats are absent from the trees.

Perhaps the most pertinent issue with regard to bats and the WEL is the suitability of the riverine habitat for foraging and dispersal. The river is a significant ecological link through the landscape and several bat species are known to occur along the river. Bats may use the river as a dispersal route from roost sites within buildings of the town into the wider countryside. Although the bat assemblage is unlikely to be rare or overly diverse, it is likely to include species such as Daubenton's bat, common pipistrelle, soprano pipistrelle and noctule.

4.3.2.3 Reptiles

Tall ruderal vegetation alongside the River Windrush appears to be suitable habitat for grass snakes, and this species is known to occur from the local area. Grass snakes favour long vegetation and often occur along watercourses and in association with wetland habitats. Other species, such as slow worm and common lizard, are likely to be absent due to the lack of suitable habitats.

4.3.2.4 Amphibians

Running water does not offer breeding habitat to amphibians and there are no ponds within a 500m radius of the WEL from which amphibians could disperse into the area. Areas of hard-standing and improved grassland are considered to be unsuitable habitats for reptiles.

4.3.2.5 Invertebrates

Habitats that occur within the zone of influence of the WEL are not considered to be suitable for uncommon and rare terrestrial invertebrates. Areas of improved grassland, hard-standing, scrub and tall ruderal vegetation are likely to support a common assemblage of species.

The River Windrush offers potentially suitable habitat to white-clawed crayfish. The fast-flowing waters and sand, shingle and mud bed of the river appear suitable for the species and the river has its headwaters within the calcareous soils and substrates of the Cotswold Hills. However, it should be noted that signal crayfish *Pacifastacus leniusculus* are known to occur in abundance along this stretch of the river and the presence of this alien species may preclude the presence of our native crayfish. There are no existing records for whit-clawed crayfish held by the TVERC for the data search area.

4.3.2.6 Badger

No badger setts or evidence of badgers were found during the survey. Evidence gathered so far indicates that badgers are absent from the zone of influence of the WEL.

4.3.2.7 Water Vole

Although no water voles or evidence of water voles were observed during the survey of the WEL, this stretch of the River Windrush is considered to offer suitable habitat to the species and water

voles have been recorded upstream and downstream. Water voles may be present along all three streams of the River Windrush.

4.3.2.8 Otter

Although no otters or evidence of otters were observed during the survey of the WEL, this stretch of the River Windrush is considered to offer suitable habitat to the species and otters have been recorded upstream and downstream. Otters may be present along all three streams of the River Windrush and may use the watercourses for foraging dispersal. However, given the fact that the WEL is close to the centre of town and the area is used for recreation and dog walking, it seems unlikely that otters will be choosing to breed within the zone of influence of the WEL.

4.3.2.9 Other Species

The WEL and its zone of influence are considered unsuitable for other species such as badgers, hedgehogs, harvest mice and brown hares. This is partly due to the nature of the habitats present and partly due to the fact that the area is subject to flooding, inundation and waterlogging during periods of wet weather.

Table 5. Summary of species assessment

Habitat	Habitats
Land North of Witney	
Birds	Hedgerows and plantation woodland provide habitats to tree-nesting species Arable farmland provides foraging habitat and potential nesting habitat for skylarks
Bats	Buildings and trees provide possible roost sites, although the potential for roosts within buildings on site appears low. Buildings off site appear to have higher potential to offer shelter to bats (Middlefield Farm and Down Hill Farm) Hedgerows and plantation woodland provide foraging habitat and dispersal routes
Reptiles	Plantation woodland (ground layer) possible habitat for common reptiles
Amphibians	One pond provides potential breeding habitat for amphibians Terrestrial habitat limited to hedgerows and plantation woodland
Invertebrates	Potential habitat for invertebrates in the form of hedgerows and plantation woodland
Badger	No evidence of badger setts; farmland and hedgerows provide potential foraging habitats
Water Vole	Seasonal streams appear unsuitable for water voles
Otter	Seasonal streams appear unsuitable for otters
Hedgehog	Hedgerows and woodland provide potential shelter and breeding/hibernation habitat
Brown hare	Arable farmland provides potential foraging and breeding habitat
West End Link	
Birds	River Windrush provides potential habitat to wetland species such as the kingfisher. Trees and shrubs provide nesting and foraging habitats to tree-nesting species
Bats	The watercourses provide foraging and dispersal routes for bat species, particularly Daubenton's bat and pipistrelles Buildings provide potential roost sites although the potential for roosts to be present appears low
Reptiles	Tall ruderal habitats may provide suitable habitat for grass snakes
Amphibians	No breeding habitats for amphibians are present and amphibians unlikely to occur within terrestrial habitats
Invertebrates	The River Windrush provides habitat for aquatic invertebrates, including white-clawed crayfish, although this species may be absent due to the presence of signal crayfish
Badger	No evidence of badgers and habitats are likely to be unsuitable for the species
Water Vole	The River Windrush provides suitable habitat for shelter, foraging and breeding
Otter	The River Windrush provides suitable habitat for foraging and dispersal, possible breeding habitat also provided by riverine/bank habitats

5 Discussion

5.1 Constraints on Study Information

This study is a preliminary ecological assessment, and as such detailed searches for evidence of protected species, such as badger setts within dense areas of woodland planting, were not undertaken. In addition, the study was undertaken in late-November when particular plant species may not be detectable or identifiable. Buildings were only assessed from the outside and no internal inspections were undertaken for roosting bats or nesting birds.

The survey was undertaken after a period of heavy and prolonged rain and the watercourses, including the River Windrush, were very full. The high water level obscured much of the banks and the murkiness of the water made it hard to observe submerged vegetation. As a result, searches for evidence of water voles and otters was not as easy as it may have been if the water levels were lower and some evidence, such as droppings and footprints, may have been washed away.

5.2 Preliminary Assessment of Impacts

5.2.1 Designated Sites of Nature Conservation Importance

5.2.1.1 Statutory Sites

There are no predicted impacts on statutory sites of nature conservation importance as a result of development of the Land North of Witney or the WEL.

5.2.1.2 Non-statutory Sites

There are no foreseeable impacts of development within the Land North of Witney on non-statutory sites of nature conservation importance. The nearest Local Wildlife Site is Cogges Wood and there are no predicted direct or indirect impacts on woodland habitats within the LWS as a result of development within the site.

There are potential impacts on Grimes Meadow and Little Grimes LWS, as a result of the creation of the West End Link Road on the River Windrush, upstream of the designated sites. There is the potential for contamination/pollution of the watercourse with industrial material used in the creation of the new road. Pollutants could be transported by the river into Grimes Meadow and Little Grimes, with potentially harmful impacts on fish and invertebrate species with the possibility of damaging other species at higher trophic levels.

5.2.2 Habitats (Land North of Witney)

5.2.2.1 Arable Land

Development within arable land will result in no predicted ecological impacts. The habitat is considered to be of negligible ecological value and is of little value to protected/notable species.

5.2.2.2 Improved Grassland

Loss of improved grassland will result in no foreseeable ecological impacts. The grassland is species-poor and of negligible ecological value.

Whilst areas of arable land and improved grassland are of inherently low ecological value, these habitats currently form undeveloped buffer zones along more valuable habitat features such as hedgerows and watercourses.

5.2.2.3 Hedgerows

Removal of hedgerows as a result of development is likely to result in a significant adverse impact on the ecology of the site. Hedgerows are arguably the most valuable ecological features of the site and have been evaluated at the district level. The majority of the hedgerows are species-rich and meet the criteria for 'important' hedgerows under the Hedgerow Regulations.

5.2.2.4 *Plantation Woodland*

Although the areas of plantation woodland are relatively young, they have been planted with native species and are considered to form a valuable addition to the network of hedgerows. The areas of plantation woodland have been evaluated at the local level and loss of woodland is likely to result in significant adverse impacts on the ecology of the site.

5.2.2.5 *Running Water*

The seasonal streams are considered to be a valued ecological feature at the local level and loss of running water habitat is likely to result in significant adverse impacts on the ecology of the site. It is considered that restoration of the original course of the stream through the centre of the site offers an opportunity for ecological enhancement.

5.2.2.6 *Ponds*

The small ponds along the boundary of the site are considered to be of ecological value at the local level. Loss of ponds would therefore result in adverse ecological impacts at this level.

5.2.2.7 *Buildings*

The school buildings are considered to be of negligible ecological value. Given this, development which includes the school buildings will have no predicted impacts on valued habitats within the site.

5.2.2.8 *Amenity Grassland*

Development within areas of amenity grassland will have no foreseeable ecological impacts. This is due to the negligible value of the habitat.

5.2.3 *Habitats (West End Link)*

5.2.3.1 *Buildings*

Buildings within the zone of influence of the WEL are considered to be of negligible ecological value. Given this, development which includes buildings will have no foreseeable impacts on valued habitats.

5.2.3.2 *Yard*

Loss of the yard and its boundary hedge will result in no foreseeable ecological impacts. The yard is considered to be of negligible ecological value.

5.2.3.3 *Improved Grassland*

Development within areas of improved grassland will have no foreseeable ecological impacts. This is due to the negligible value of the habitat.

5.2.3.4 *Dense Scrub*

Areas of dense scrub within the zone of influence of the WEL are considered to be of ecological value at the site level. The habitat is dominated by common and widespread shrub and ruderal species and given this, small-scale habitat loss is unlikely to result in significant ecological impacts.

5.2.3.5 *Running Water*

The River Windrush is the most valuable habitat feature associated with the WEL and the river is considered to be of ecological value at the county level. Impacts on the watercourse could be direct such as destruction to bankside and riverbed habitats, as well as indirect, such as pollution or polluted run-off entering the watercourse.

Whilst several of the habitats that adjoin the River Windrush are considered to be of inherently low ecological value, such as improved grassland and tall ruderal vegetation, the watercourse and these habitats form a collective which constitutes the river corridor. Habitats adjoining the running water therefore provide context and a 'buffer' the valued habitat of the watercourse.

5.2.3.6 *Tall Ruderal Vegetation*

Development of the WEL may result in the loss of tall ruderal habitat. However, this habitat loss is unlikely to result in significant impacts on the overall ecology of the area. This is due to the relatively low ecological value of the habitat, the small-scale loss of habitat and the fact that tall ruderal vegetation is present along much of the River Windrush, both upstream and downstream from the proposed route of the WEL.

5.2.3.7 *Trees*

Development of the WEL is likely to result in the loss of a small number of young and semi-mature willow pollards along the River Windrush and semi-mature sycamore and beech within the area of buddleia scrub. These trees are considered to be of value at the site level and their loss is unlikely to result in significant ecological impacts within the wider context.

5.2.3.8 *Hard-standing & Scrub*

The area of buddleia scrub to the southern end of the WEL has developed within an area of neglected hard-standing and is considered to be of ecological value within the context of the site. Loss of this habitat will therefore have no foreseeable ecological impacts within the wider area.

5.2.4 *Species (Land North of Witney)*

5.2.4.1 *Birds*

Without appropriate timing, removal of trees, hedgerows and shrubs may result in direct impacts on active birds' nests and may result in the killing and injury of eggs and young. Development of arable farmland may result in the loss of habitat for skylarks and other ground nesting bird species. As with tree-nesting species, without appropriate timing development works may also result in the disturbance of ground-nesting birds' nests and the damage/destruction of nests.

5.2.4.2 *Bats*

Removal of mature trees may result in direct impacts of roost damage and destruction. Without appropriate mitigation, removal of mature trees may also result in the killing or injury of bats.

Although the buildings of The King's School are considered to have very low potential to offer shelter to roosting bats, alterations to the school buildings have the potential to directly affect roosting bats. The absence of bat roosts within the buildings should therefore be confirmed prior to any works to the school.

Although the buildings of Middlefield Farm and Down Hill Farm are located outside of the site boundary, certain buildings within these complexes are considered to have the potential to offer shelter to roosting bats. If significant roosts, such as maternity roosts, are present development may affect the bats through changes in the local environment, particularly as a result of hedgerow removal or lighting of hedgerows. If the changes are significant, this may result in the abandonment of roost sites. External lighting within the new development may have an impact on bats by affecting their activity and behaviour (see Section 5.2.5.2).

5.2.4.3 *Reptiles*

With the retention of areas of plantation woodland, there are no foreseeable impacts on reptiles. If areas of plantation woodland are affected, there is the potential for killing and injury of reptiles and habitat loss for common species.

5.2.4.4 *Water Vole*

There are no predicted impacts on water voles.

5.2.4.5 *Otter*

There are no predicted impacts on otters.

5.2.4.6 Hedgehog

Currently, there are no predicted impacts on other species such as amphibians and badgers as a result of the proposals.

5.2.4.7 Brown Hare

Development within arable land may result in habitat loss for brown hares.

5.2.5 Species (West End Link)

5.2.5.1 Birds

Without appropriate timing, removal of trees and shrubs may result in direct impacts on active birds' nests and may result in the killing and injury of eggs and young.

Development along the WEL may result in the disturbance of kingfishers and the destruction of habitat for this species, as well as other species of wetland bird. The habitat loss is likely to be relatively small-scale due to the nature of the development.

5.2.5.2 Bats

Roosting bats may be directly affected by the removal of buildings. Although the buildings appear sub-optimal for roosting bats, the removal of buildings may result in destruction or damage to roost sites and/or the killing injury and disturbance of bats.

Lighting of the new road link may have an impact on bats by affecting their activity and behaviour. Certain species of bat have been shown to be attracted to mercury vapour lamps which emit light over a very broad spectrum including UV light to which insects are particularly sensitive. Insects can be attracted in large numbers to mercury lamps and so can bats of the genera *Nyctalus* and *Pipistrellus*, including noctules *N. noctula* and common pipistrelles *P. pipistrellus* (Rydell and Racey 1993). Lighting has shown to have an opposite effect on certain other species, such as the lesser horseshoe bat *Rhinolophus hipposideros*, which have been shown to avoid areas of artificial light (Stone *et al.* 2009). Lighting along the road may spill into adjacent areas of riverine habitat and may affect bats that use the river for foraging and dispersal.

5.2.5.3 Reptiles

Tall ruderal vegetation along the watercourses, as well as areas of ruderal vegetation and scrub, may support populations of grass snakes. This species is likely to be present only in low numbers and will also use adjacent areas of habitat along the floodplain of the river. Without mitigation, works to create the new road route may result in the killing and injury of reptiles and the small-scale loss of habitat. It is considered that these potential impacts can be avoided through a mitigation strategy, including further survey work to determine presence or likely absence of the species.

5.2.5.4 Water Vole

The crossing of the River Windrush may result in the destruction and damage of water vole habitats. Without appropriate mitigation, works may also result in the killing, injury and disturbance of water voles. Further survey work is recommended for this species in order to determine the potential impacts on the species and its habitats.

5.2.5.5 Otter

Although otters are known from the River Windrush, it is considered that the habitats along the route of the WEL are sub-optimal for the species given the suburban nature of the surrounding area and the relatively high levels of human disturbance along this part of the river. However, the crossing of the River Windrush may result in the destruction and damage of otter habitat. Without appropriate mitigation, works may also result in the disturbance of otters. Further survey work is recommended for this species in order to determine the potential impacts on the species and its habitats.

5.2.5.6 *Other Species*

Currently, there are no predicted impacts on other species such as amphibians and badgers as a result of the proposals.

6 *Ecological Constraints & Opportunities*

Please refer to Appendix 4 for an Ecological Constraints and Opportunities Plan.

6.1 *Designated Sites of Nature Conservation Importance*

It is considered that the River Windrush will require protection from indirect impacts such as pollution and run-off in order to avoid potential impacts on Grimes Meadow and Little Grimes LWS. Whilst the LWS is located approximately 700m away from the WEL, it is downstream from the development and may experience indirect impacts as a result of hydrological changes and changes in water quality. The LWS is designated for its swamp and fen habitats, habitats which are sensitive to changes in hydrology and water quality.

Having said this, with an appropriate strategy in place to avoid such impacts, it is considered that the presence of the LWS should not pose a significant ecological constraint on the proposals. Mitigation is likely to include the adoption of the Environment Agency's Pollution Prevention Guidelines during construction and the design of a drainage strategy to take surface water, which is likely to be polluted, away from the river and through an appropriate sustainable drainage system.

6.2 *Land North of Witney*

6.2.1 *Habitats*

6.2.1.1 *Constraints*

It is considered that the majority of the site has little ecological constraints and development within areas of arable farmland, improved grassland and amenity grassland could take place without encountering any significant ecological constraints. Design options to avoid significant ecological impacts are likely to include development within areas of least ecological value (see Appendix 4) and the retention of all hedgerows. Hedgerows should be integrated into the overall landscaping of the new development to retain and enhance their ecological value.

Development is likely to be constrained by the presence of hedgerows, streams and plantation woodland and it is recommended that these habitat types are retained and protected within development proposals for the site. Protection is likely to include the establishment of appropriate buffer zones along retained hedgerows, alongside watercourses and around root protection zones. In summary, it is recommended that the following habitats are retained and protected:

- Hedgerows
- Plantation woodland
- Running water
- Ponds

6.2.1.2 *Opportunities*

Given the relatively low ecological value of the land, the scope for habitat enhancement within the site is considered to be considerable. Large expanses of open, arable farmland are present to the west and east sides of the site and there is relatively little habitat connectivity from east to west. Planting of new hedgerows, tree lines and the provision of gardens and open spaces (with tree and shrub planting) would all enhance the ecological value of the existing arable farmland. In addition, by retaining the existing hedgerows and providing new habitat connections into these, the ecological value of the site can be further enhanced.

The main opportunity for ecological enhancement is considered to be the central 'valley' which runs from north to south through the centre of the site. This valley comprises two species-rich hedgerows,

water courses and a small area of plantation woodland and in combination, these habitats make this central area one of the most ecologically interesting areas of the site. It appears as though the natural course of the stream is through the centre of the improved grassland, but that the stream has been diverted in the past along one or both of the hedgerow boundaries to this field (the water currently runs mostly along the western hedgerow). Although there may be hydrological reasons why this may not be possible, a potential ecological enhancement may be to re-instate the stream along the valley bottom, and to retain a 'buffer zone' of grassland either side of the stream between the two hedgerows. The watercourse could also be enhanced through further planting along its southern and north-eastern sections, where there is currently only grassy vegetation. The northern branch of the stream could also be taken out of the existing culvert and re-instated as an over-ground watercourse.

An area where ecological enhancement may be easily achieved is where former field boundaries, which now adjoin area of development along the northern edge of the town, have become degraded and defunct. In these areas, there appear to be former hedgerows that have become gappy, with remnant native species mixed with ornamental plants and non-native trees and shrubs. As a result, habitat connectivity from the west to the east, along the southern boundary of the site, is considered to be very poor. Enhancement could be in the form of hedgerow planting along this boundary, as well as the planting of small parcels of woodland, in order to provide habitats and habitat connections within this area. Hedgerow and woodland planting should comprise native species, preferably of local origin, which reflect the species assemblage that occurs within the existing hedgerows.

With regard to retaining and enhancing a habitat 'network' within a development, retention and enhancement of the central watercourse and Hedgerows 13 & 14 is likely to provide connections from the north to south, with replanted/enhanced hedgerows and woodland along the southern boundary forming west to east connections. These would link into the existing species-rich hedgerows and woodland parcels which already form strong habitat connections along the northern and eastern site boundaries. The new hedgerow network could be reinforced with copse planting (as exists along the northern boundary), as well as the creation of new ponds and areas of grassland habitat. In this way, a 'green infrastructure, could be established within the new development and this infrastructure would provide habitat connectivity as well as potential gains under the Wychwood and Lower Evenlode CTA (see further discussions below).

In very general terms, other ecological enhancements include:

- Native tree and shrub planting within landscaping, gardens and within new areas of plantation woodland that may be used for screening
- Creation of species-rich areas of grassland, either within open spaces or along retained habitat features such as hedgerows and watercourses
- Creation of dead wood habitat features such as log piles

Although the Land North of Witney is not located within the Wychwood and Lower Evenlode CTA, the eastern boundary of the site is located adjacent to the boundary of the CTA. Within the CTA, the following targets (that are relevant to the site) have been identified with regard to nature conservation:

- Lowland mixed deciduous woodland – restoration, creation and management
- Limestone grassland – restoration, creation and management
- Hedgerows – creation and management
- Arable field margins – creation and management
- Ponds – creation and management
- Traditional orchards – creation and management

Given the nature of the site, ecological enhancement opportunities that are possible within this wider context include the creation of new hedgerows, as well as the restoration of defunct field boundaries, the planting of new woodland areas to mimic and reflect the small areas of woodland planting that already exist along the northern boundary of the site and the creation of new ponds and the

management of existing ponds. The creation of arable field margins may not be appropriate within a residential or mixed development, as this habitat type involves the creation and management of grassland and wildflower headlands along existing arable farmland with the particular aim of providing habitats for arable weed species that have become scarce and in decline.

The creation of limestone (calcareous) grassland is possible, but given the fact that the existing land is largely arable farmland or improved grassland, achieving good-quality grassland is likely to require some significant changes to the soils and substrates, as well as ongoing management. This is not unachievable, but may require the stripping of fertile topsoil to expose subsoils and stony ground, as well as the sowing of an appropriate species mix to aid establishment and development of a botanically-rich sward. Without the removal of fertile soils, the creation of species-rich calcareous grassland may not be possible. However, it may be possible to establish a grassland that is more typical of lowland meadows, such as MG5 Grassland (as categorised within the National Vegetation Classification), without the need for large-scale changes to the soils/substrates.

6.2.2 Species

6.2.2.1 Constraints

As with habitats, there are considered to be little or no ecological constraints with regard to habitats and areas of arable farmland, improved grassland and amenity grassland. This is due to the fact that these habitats are considered to be of very low ecological value to most species. However, species which may need to be taken into account when considering development in these areas are:

- Skylark – potentially breeding and foraging within areas of arable farmland
- Brown hares – potentially breeding and foraging within areas of arable farmland

The most significant constraint with regard to species is likely to be those species that use hedgerow and plantation woodland habitats such as breeding birds, reptiles, hedgehogs and invertebrates. Loss of hedgerow and woodland is likely to result in habitat loss for these species and thus, retention of hedgerow and woodland habitats is likely to be required. Although the watercourses are not considered to be suitable for protected species, such as water voles, they are considered to be an important habitat feature which adds to the overall network of habitats.

As a generic recommendation, appropriate timing and careful clearance of woody vegetation will be required to avoid the bird breeding period (avoiding March to August, inclusive) and to avoid impacts of killing and injury to hedgehogs and other small mammals.

It is considered that development involving the school buildings is unlikely to result in any significant impacts on bats or their roost sites. However, there are buildings off-site (to the north-west and south-east) which have the potential to offer shelter to bats and the presence of bats within buildings may need to be taken into account when considering the layout and design of the new development. If bats are using these buildings for roosting, particularly if they are present within a maternity roost or in large numbers, then maintaining habitat connectivity, dark flight corridors and suitable foraging habitats are likely to be elements that need careful consideration. This may constrain the nature and layout of the development proposals within the areas of known bat roosts.

Trees that have the potential to offer shelter to roosting bats are located within hedgerows and as such, are likely to be retained. However, if roosting bats are confirmed as being present, similar considerations regarding the maintenance of habitat suitability and connectivity are likely to be necessary. Depending on the presence of roosting bats, and the overall levels of bat activity within the site, there may be a requirement for a lighting strategy to maintain dark corridors and suitable foraging areas for bats within the site.

6.2.2.2 Opportunities

Given the fact that the majority of habitats are considered unsuitable for protected and/or notable species, development has the opportunity to offer ecological enhancements through the creation of habitats and the addition of habitat features. Enhancement measures for species may include:

- Planting of native hedgerows, trees and shrubs
- Creation of species-rich grassland
- Erection of bat boxes
- Erection of bird boxes (including house sparrow boxes)
- Creation of log piles
- Creation of ponds

With regard to design options, it is recommended that the existing network of hedgerows is retained and that these areas are buffered from disturbance; this should include a lighting strategy to provide 'dark corridor's along which bats can disperse.

6.3 West End Link

6.3.1 Habitats

6.3.1.1 Constraints

The main, and obvious, habitat constraint with regard to the route of the WEL is the crossing of three streams of the River Windrush, and the associated impacts that this may have on the riverine and bankside habitats. Impacts may be direct or indirect and may occur during construction and operation. However, it is considered that appropriate design, protection and mitigation measures could address these constraints and allow for the river crossing to occur without resulting in significant residual impacts on river habitats.

An appropriate design is likely to include one which avoids direct impacts on the river habitats, and which provides a high enough space under the carriageway for species such as bats and birds can fly. Options which span all three streams of the river in one section may be the best in minimising direct impacts on habitats and indirect impacts on species moving under the bridge. This will also retain bank habitats and habitat between the streams, thus maintaining terrestrial habitat connectivity.

Other habitats affected by the proposed WEL are considered to be of low ecological value and loss of improved grassland, tall ruderal vegetation, scrub, trees and buildings is not considered to present any ecological constraints.

The issue of habitat connectivity is discussed further with regard to animal species, which are mobile and which may be directly affected by habitat severance caused by the WEL. With regard to habitats, it is considered that running water will be unaffected by habitat severance as the watercourses will be retained under a bridge crossing. However, other habitats (grassland, ruderal and bankside vegetation) are likely to be severed, to some extent, by the carriageway of the WEL. With regard to the habitats themselves, this is unlikely to result in a significant adverse impact, since grasslands etc. will persist on both sides of the route and are unlikely to change with regard to the species that they support. The main potential impacts of habitat severance are on animal species, and these are discussed more fully in Section 6.3.2.

6.3.1.2 Opportunities

Given that the WEL is a linear route, opportunities for ecological enhancement will only be possible within the wider context, within habitats that occur along the river and within the floodplain. Ecological opportunities within the wider context may include:

- The planting of trees along the river's edge, such as willow trees to create willow pollards in the future;

- The management of grassland and ruderal vegetation/inundation vegetation to enhance its botanical/biodiversity value;
- Creation of habitat features such as log piles; and
- Creation of species-rich grassland (lowland meadow grassland) within areas that are currently agriculturally improved grassland or areas of scrub and hard-standing.

With regard to the objectives of the Upper Windrush Valley CTA, within which the route of the WEL is located, the following targets are considered to be relevant within the wider context:

- Lowland meadow – restoration, creation and management
- Floodplain grazing marsh – restoration, creation and management
- Fen – restoration, creation and management
- Woodland and wet woodland – restoration, creation and management
- River corridor habitats – restoration, creation and management

It is considered that there is the potential to achieve several, or all, of these targets as a result of ecological gains from the WEL development. Nearby areas of grassland tend to be agriculturally improved and support low species diversity that is not characteristic of traditionally managed floodplain meadows. Improved grassland could be restored to semi-improved/unimproved lowland meadow through appropriate management or through more extreme measures such as re-sowing or topsoil stripping.

Woodland and wet woodland could be created through planting along watercourses and within specific woodland blocks or copses along the floodplain. Creation of river corridor habitats and fen is likely to require some re-engineering of watercourses to create new streams of the river, ox-bow lakes and backwaters which will resemble and mimic semi-natural habitats of the river. In this way, habitat enhancement measures within the wider context could contribute to the objectives of the CTA and are likely to result in a net gain in ecological value from the development of the WEL.

The route of the WEL is also located within the Windrush in Witney Project, which looks to provide ecological enhancements within the floodplain of the River Windrush as it passes through the town of Witney. The following targets have been identified within the project area:

- Encourage the protection, restoration and enhancement of unimproved neutral grassland through, for example, the establishment of a conservation grazing project;
- Encourage the protection, restoration and enhancement of wetland habitat and the river corridor.
- Encourage continuing survey work such as ecological surveys undertaken as an integral part of planning applications;
- Safeguard priority habitats and species in accordance with relevant Biodiversity Action Plans; Habitat Action Plans and Species Action Plans by, for instance, improving the habitats for otters and water voles;
- Encourage the management of scarp slope scrub; and
- Encourage the restoration of creeping marshwort in accordance with the Local Species Action Plan.

With regard to what might be achievable as a result of the development of the WEL, there are certainly opportunities to enhance grassland habitats along the floodplain, as many areas are agriculturally improved and under what appears to be a commercial/heavy grazing regime. Larger-scale enhancement measures could include works to create new streams and backwaters to the river (and it is understood that some works of this nature may have already been undertaken) and this will also provide further habitats for water voles and otters. Although the status of creeping marshwort within the project area is unknown to the authors, there may be some scope to create 'scrapes' or areas that provide suitable soil, substrate and hydrology for this species.

6.3.2 Species

6.3.2.1 Constraints

Constraints associated with protected and/or notable species along the WEL are mainly associated with species that are likely to occur along the watercourses. This includes water voles, otters and bats, and may also include white-clawed crayfish.

The presence of water voles and otters may present constraints with regard to habitat loss, as well as potential killing, injury and disturbance of these species. If present, it may be that a Water Vole Licence (granted under the Wildlife and Countryside Act 1981, as amended) and a European Protected Species (Otter) Licence (granted under the Conservation of Habitats and Species Regulations 2010) are required to allow for the proposals to proceed under the legal protection afforded to these species. These licences will allow for the loss of bank/riverine habitat for these species and the possible disturbance or displacement of water voles and otters during the works.

Although certain buildings along the WEL have been identified as having the potential to support roosting bats, the potential is considered to be low and significant constraints involving bat roosts are unlikely to occur. Bats are likely to use the watercourses for foraging and dispersal and potential impacts on these species will centre on potential changes in bat activity along the watercourses and along the floodplain in general. Potential impacts may include the physical severance of navigation, dispersal and foraging routes as a result of new bridges or river crossings, as well as impacts of vehicle strike and lighting along the route of the road.

As with any linear development that cuts across habitats, there is the potential for habitat severance and the loss of habitat connectivity for certain species. When considering watercourses, the issues of habitat severance have the potential to affect several species, including birds, bats, water voles and otters. Water voles and otters can obviously use the watercourse itself for dispersal, as well as moving over land. Therefore, with the retention of the flowing water under a bridge, in association with some bankside habitats, the issue of habitat severance should not be significant for these species. For otters, some measures to prevent animals from attempting to walk across the carriageway are likely to be required in order to avoid inadvertent killing/injury as a result of road traffic collisions. Water voles are unlikely to stray far from the banks of the river and so this type of impact is far less likely to occur.

When discussing animals that can fly, birds and bats, there are several factors to take into account. Both species groups will be able to fly under a bridge, if there is adequate space to do so, and so some connectivity over the watercourse can be maintained. However, there may also be an issue of animals colliding with traffic as they attempt to fly over the carriageway of the WEL and this issue will need to be addressed within the design of the bridge and the boundaries of the carriageway. Barriers or features to encourage bats and birds to fly under the bridge, or high up and over the carriageway, are likely to be required.

When discussing bats, there is the added issue of lighting along the WEL and how this may affect bat movement and dispersal along the watercourse and through the floodplain of the river. Again, one option is to encourage the majority of bat movement to be under the bridge, and for this an adequate flight space will be required, as well as a dark corridor for bats to move under the bridge without being affected by light spillage. When foraging over the surface of water Daubenton's bat tends to fly very close to the surface and thus, there may not be a major need for a large flight space. However, other species such as pipistrelles and noctules, tend to fly higher and so an adequate flight zone under the bridge will be required to cater for all bat species. Lighting along the carriageway will also need to be carefully considered and designed in order to provide dark corridors for bats where required as well as providing safe and lit areas for traffic. Lighting may also be used to discourage bat activity over certain areas of the carriageway.

Although it is considered that white-clawed crayfish are absent from this stretch of the River Windrush, potential impacts on this species include pollution and run-off entering the watercourse

during construction and during operation of the new road. However, with the adoption of appropriate pollution prevention measures, impacts of this nature could be avoided and are unlikely to present a significant constraint to the proposals.

There may also be impacts resulting from the loss of breeding bird habitats. The majority of habitat loss will be in the form of tree and scrub removal, which is likely to affect only common and widespread bird species and which presents no significant ecological constraints. However, the crossing of the watercourses will have to be considered with regard to wetland bird species, including species listed on Schedule 1 of the Wildlife and Countryside Act 1981, such as the kingfisher.

6.3.2.2 Opportunities

Opportunities for ecological enhancement as a result of the WEL are considered to be relatively limited with regard to protected species, given the nature of the development. However, there are opportunities to provide enhancements for protected species within new structures and within the wider landscape, if this is possible. As previously discussed, this may be possible through habitat creation and restoration with regard to watercourses, wetland habitats associated with the floodplain and through the creation of species-rich, lowland neutral grassland. Small-scale habitat enhancement may also provide suitable habitats for species such as creeping marshwort.

With regard to structures themselves, bat roosting opportunities could be provided within a new bridge, and certain species such as the Daubenton's bat and soprano pipistrelle are known to use roost sites within bridges. These species tend to favour roosts that are close to water and will adopt crevice roost sites within bridges. Even small-scale measures such as the inclusion of integrated bat boxes within the fabric of the bridge may provide roosting sites to bat species.

Opportunities within the wider context could include a number of measures such as the creation of log piles and erection of bat boxes. However, the majority of these are likely to rely on whether habitat enhancements can be achieved within the wider context of the WEL (as described above).

7 Further Surveys

7.1 Breeding Bird Survey

It is recommended that a breeding bird survey is undertaken to provide information on the species assemblage and on individual species of conservation concern. Best practice is to undertake three surveys during the period March to June, with the recording of bird nesting activity such as territorial or breeding behaviour, singing or calling, repeated territorial calls, territorial aggression, displaying, adults carrying food, nesting material or faecal sacs, juvenile birds and family groups. The surveys should aim to determine where the core areas of bird activity are and where different species are holding nesting territories. Breeding bird surveys are considered to be particularly important for species such as the skylark, which may be using the arable fields for breeding.

7.2 Bat Surveys

It is recommended that a detailed bat survey is undertaken of The King's School buildings, if these buildings are to be affected by the development. This should include an internal survey of all loft/attic spaces and may also include emergence watches at dusk and/or dawn. If required, the activity surveys would need to be undertaken in the period May to August inclusive.

In addition, it is recommended that the buildings to the north end of the WEL (dwelling and garage) are surveyed internally and externally for bats and evidence of bats. If necessary, these buildings should also be surveyed at dusk and/or dawn for bats emerging and re-entering the buildings. Up to three such surveys may be necessary in the period May to August, inclusive.

Although they are 'off-site' it is also recommended that bat surveys are undertaken at Down Hill Farm, the old bell tower to the south of the site and the dwelling within the site of the proposed West End Link. The surveys should involve a detailed internal and external inspection of the identified buildings for bats and evidence of bats (droppings, characteristic urine staining, scratch marks,

feeding remains *etc.*). Notes should be made on the relative freshness, shape and size of bat droppings and the location and quantity of any feeding remains. Careful external inspection should aim to identify any possible entry/exit points for bats into the fabric/structure of the building.

Bat activity surveys (walked transects and automated surveys) are also recommended for the Land North of Witney and the WEL. Such surveys will provide information on species that are present and foraging/moving through the site as well as overall levels of bat activity and where bat activity is concentrated within the site. With regard to the WEL, the surveys will determine which species are using the river for foraging and/or for dispersal.

Survey effort should follow best practice guidelines (Hundt 2012) and it is recommended that for the Land North of Witney one bat transect survey is undertaken each month from April to September, with at least one of the surveys comprising dusk and pre-dawn within one 24-hour period. In addition, automated bat detector surveys should collect data on five consecutive night during each month (April to September) from two locations per transect.

With regard to the WEL, it is recommended that transects are undertaken during three visits in the period June to August, with at least one of the three surveys comprising dusk and pre-dawn surveys within one 24-hour period. Automated surveys of the WEL should be undertaken at one location for three consecutive nights on three occasions in the period March to September.

7.3 Great Crested Newt Survey

It is considered that further survey work for great crested newts can be avoided, if areas of suitable habitat are retained for this species. Areas of suitable habitat include ponds, plantation woodland and hedgerows; unsuitable habitats are arable fields, improved grassland and amenity grassland. If habitat loss is restricted to areas of unsuitable habitat, then surveys of ponds are unlikely to be required.

If areas of potential terrestrial habitat are to be affected, then surveys of ponds within a 500m radius of the Land North of Witney are likely to be required. This will be necessary to provide information on whether breeding populations of great crested newts are present within ponds within a 500m radius of the site and if so, whether the newts will be moving into suitable habitats within the site during the terrestrial phase of their lifecycle. Maps of the site and surrounding area indicate that the following ponds are present within a 500m radius, and may require surveying, in addition to the one pond located to the north-western boundary of the site:

- University Farm – one pond to the north-west
- Down Hill Farm – two ponds to the north-west
- Merryfield Farm – two ponds to the north-east

Thus, there is the potential that six ponds will require further survey work if impacts on great crested newt terrestrial habitat are predicted. These surveys would need to be conducted during the newt breeding season (mid-March to mid-June) with surveys spread evenly within this time period in order to count the peak number of newts and to confirm or rule-out breeding. The *Great Crested Newt Mitigation Guidelines* recommend that these surveys include at least three survey techniques and in this case, bottle-trapping, torchlight survey and an egg search are likely to be the most appropriate.

Four surveys of each pond should be conducted initially in order to determine presence or likely absence of great crested newts. If the species is confirmed as being present, a further two surveys of each pond will be required to give an idea of population size.

Great crested newt surveys associated with the development of the WEL are not considered to be necessary at this stage.

7.4 Badger Survey

Although the current study indicates that badger setts are likely to be absent, it is recommended that a detailed survey for badgers is undertaken to confirm this. The survey should involve detailed searches for badger setts and evidence of badger activity including faeces, latrines, feeding scrapes, footprints, track ways and badger hairs. The aim will be to determine if there are any badger setts on site or adjacent to the site boundary that may be affected by the proposals. A badger survey along the route of the WEL is not considered to be necessary at this stage.

Such surveys are best undertaken when the vegetation is low and when badger activity is high, such as during the period February to April inclusive. During this period, badgers will be giving birth and rearing young and fresh evidence at sett entrances is often obvious.

7.5 Water Vole Survey of WEL

Further surveys for water voles is not considered necessary for the Land North of Witney. However, it is recommended that a detailed survey of the River Windrush and the immediate areas upstream and downstream of the proposed crossing of the WEL is undertaken for water voles.

It is recommended that the survey is undertaken when water levels are low and the river is not in flood. An ideal time of year would be the spring (March, April, May) when bankside vegetation is still relatively low and yet water voles are active. The survey should involve a detailed inspection of the river banks of all streams of the river and observations made for burrows, latrines, feeding stations, trackways and 'lawns' around burrows. If necessary, a boat could be used to observe the banks from the centre of the river.

7.6 Otter Survey of WEL

Further surveys for otters is not considered necessary for the Land North of Witney. However, it is recommended that a detailed survey of the River Windrush and the immediate areas upstream and downstream of the proposed crossing of the WEL is undertaken for otters.

It is recommended that the survey is undertaken when water levels are low and the river is not in flood. An ideal time of year would be the spring (March, April, May) when bankside vegetation is still relatively low and yet otters are active. The survey should involve a detailed inspection of the river banks (of all streams of the river) and observations made for otter holts, lying-up sites, footprints and spraints.

7.7 Reptile Survey of WEL

Reptile surveys are not considered to be necessary within the Land North of Witney, unless the proposals include the removal of plantation woodland (which may provide habitat for common species such as slow worm and common lizard).

Reptile surveys are recommended along the route of the WEL, due to the potential presence of grass snakes along the riverine habitat and within areas of tall ruderal vegetation. It is recommended that the reptile surveys include a transect walk to look for grass snakes as they bask, as well as the positioning of artificial refugia along the line of the transect. The refugia are used by reptiles for shelter and for basking and increase the likelihood of reptile observations.

It is recommended that at least 10 transect surveys are undertaken during the period April, May & June and/or September and October. This levels of survey effort should determine presence or likely absence and will also give an idea of population size should reptiles be present.

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9 Appendix 1. Photographs



Photograph 1. Buildings of The King's School.



Photograph 2. The wet ditch along the northern boundary of Field 1 (TN 24).



Photograph 3. The edge of the young planted woodland along the eastern boundary of Field 1.



Photograph 4. The stream flowing through the woodland at the northern edge of the site.



Photograph 5. A species-rich hedgerow.



Photograph 6. An arable field.



Photograph 7. A rot hole within a tree, assessed as having high potential for roosting bats.



Photograph 8. The tower at Middlefield Farm. This building is considered to have the potential to offer shelter to roosting bats.



Photograph 9. Mature trees along Hedgerow 6.



Photograph 10. The former mill race of Woodford Mill.



Photograph 11. A possible otter slide on the bank of the River Windrush.

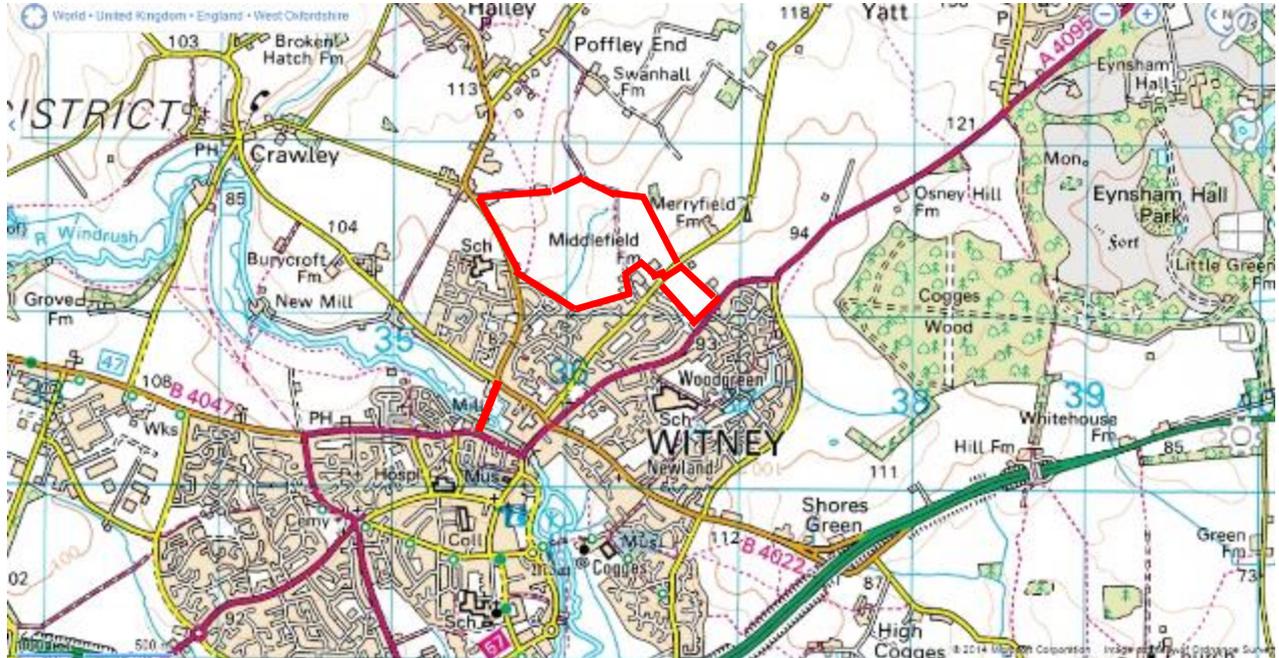


Photograph 12. A semi-natural channel of the River Windrush.

10 Appendix 2. Site Location Plans

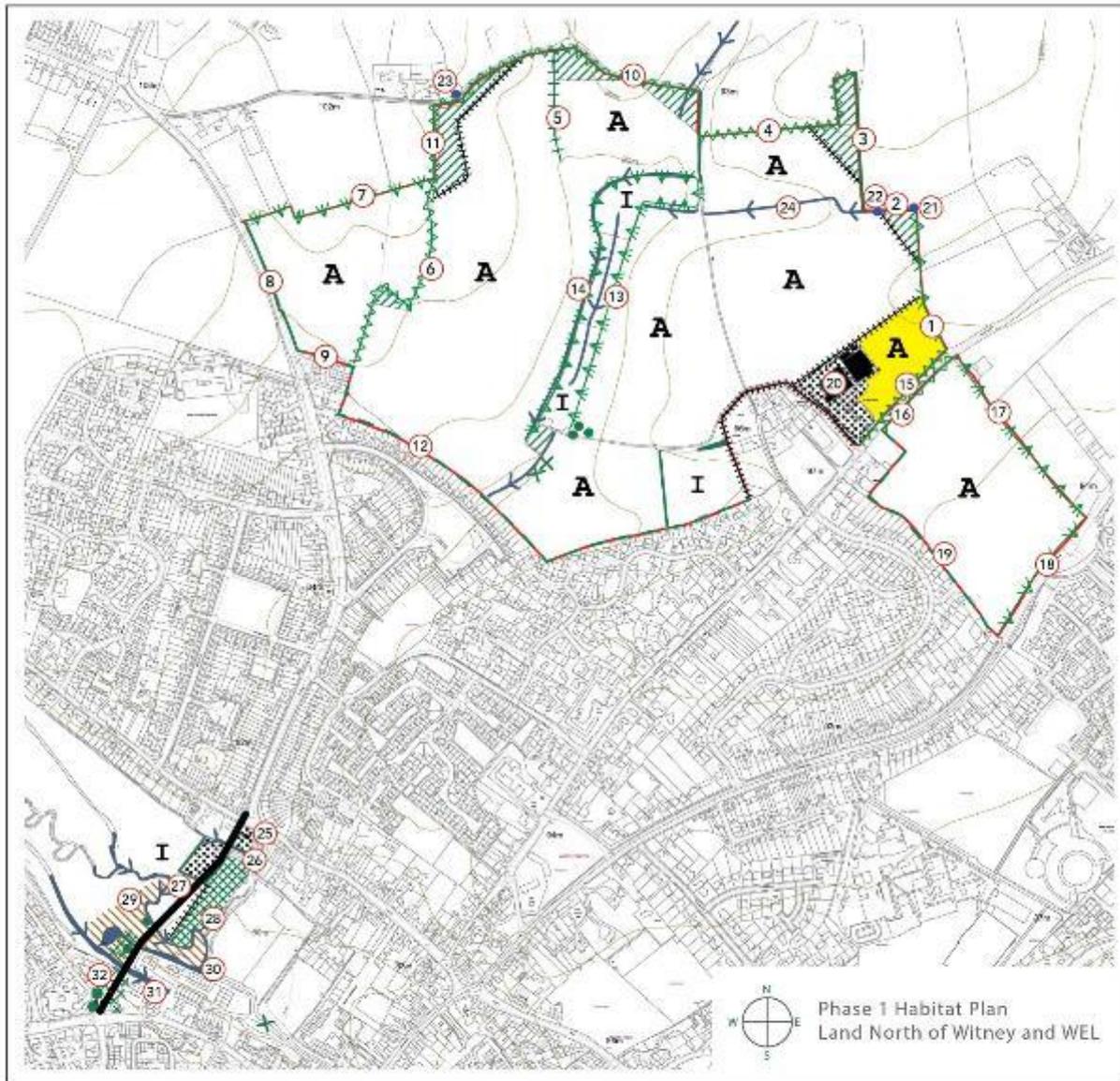


Aerial photograph showing the approximate survey area (outlined in red) of the Land North of Witney and the West End Link. Source: <https://earth.google.com/>



Ordnance Survey map showing the approximate site location (red outline) within the local area. Source: www.bing.com/maps

11 Appendix 3. Phase 1 Habitat Plan and Target Notes



Legend

	Defunct species poor hedgerow		Buildings
	Intact species poor hedgerow		Fence
	Intact species rich hedgerow		Ponds
	Intact species poor hedgerow with trees		Watercourses
	Intact species rich hedgerow with trees		Target note
	Plantation woodland		Car park / hard standing
	Amenity grassland		Tall ruderal vegetation
	Arable		Dense scrub
	Improved grassland		Scattered scrub
	Trees		



Project Name
Land North of Witney and WEL

Production Date
8th December 2014

Project Owner
TS

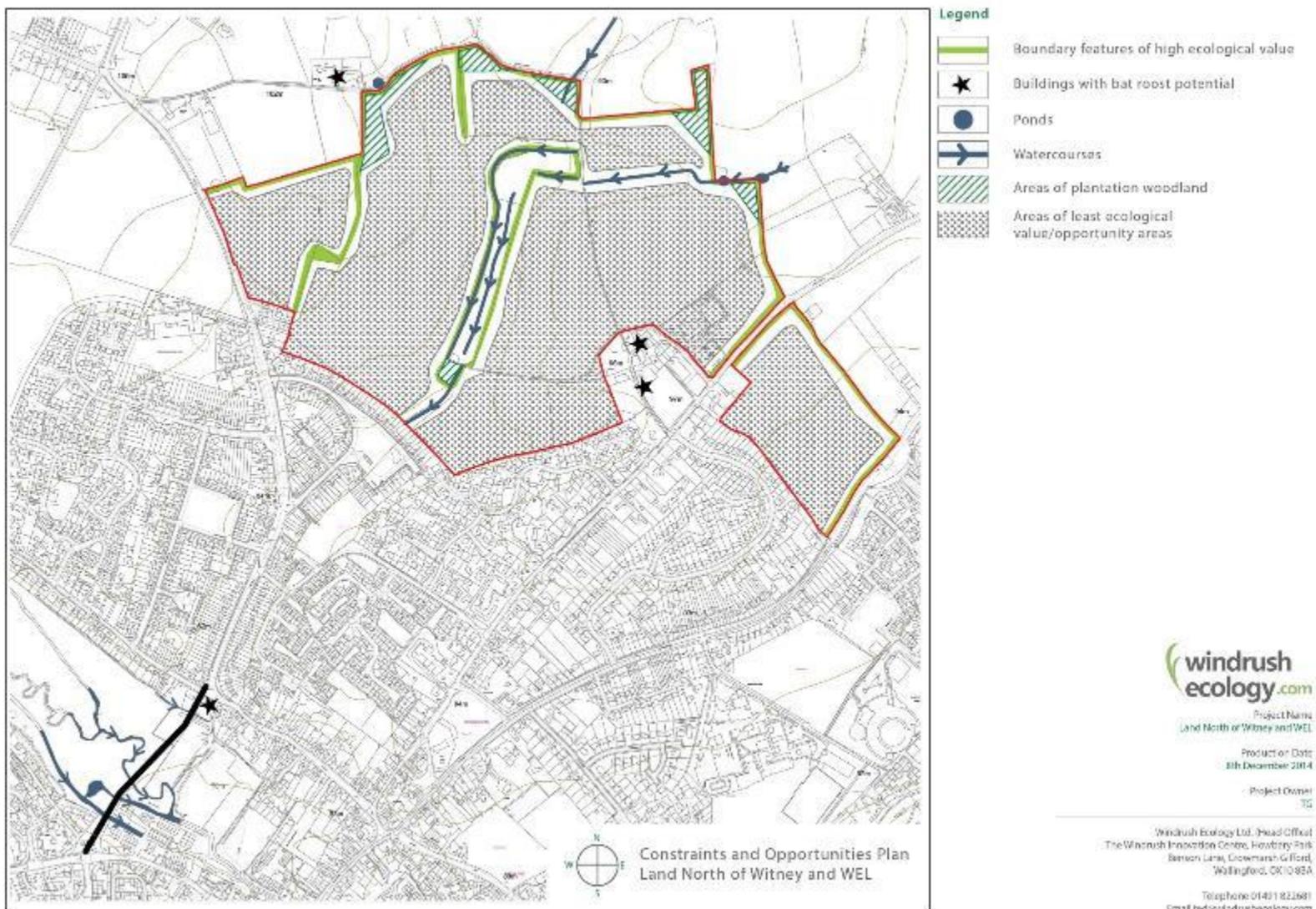
Windrush Ecology Ltd. (Head Office)
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Wallingford, OX10 8SA

Telephone 01491 822881
Email ted@windrush-ecology.com

Target Notes

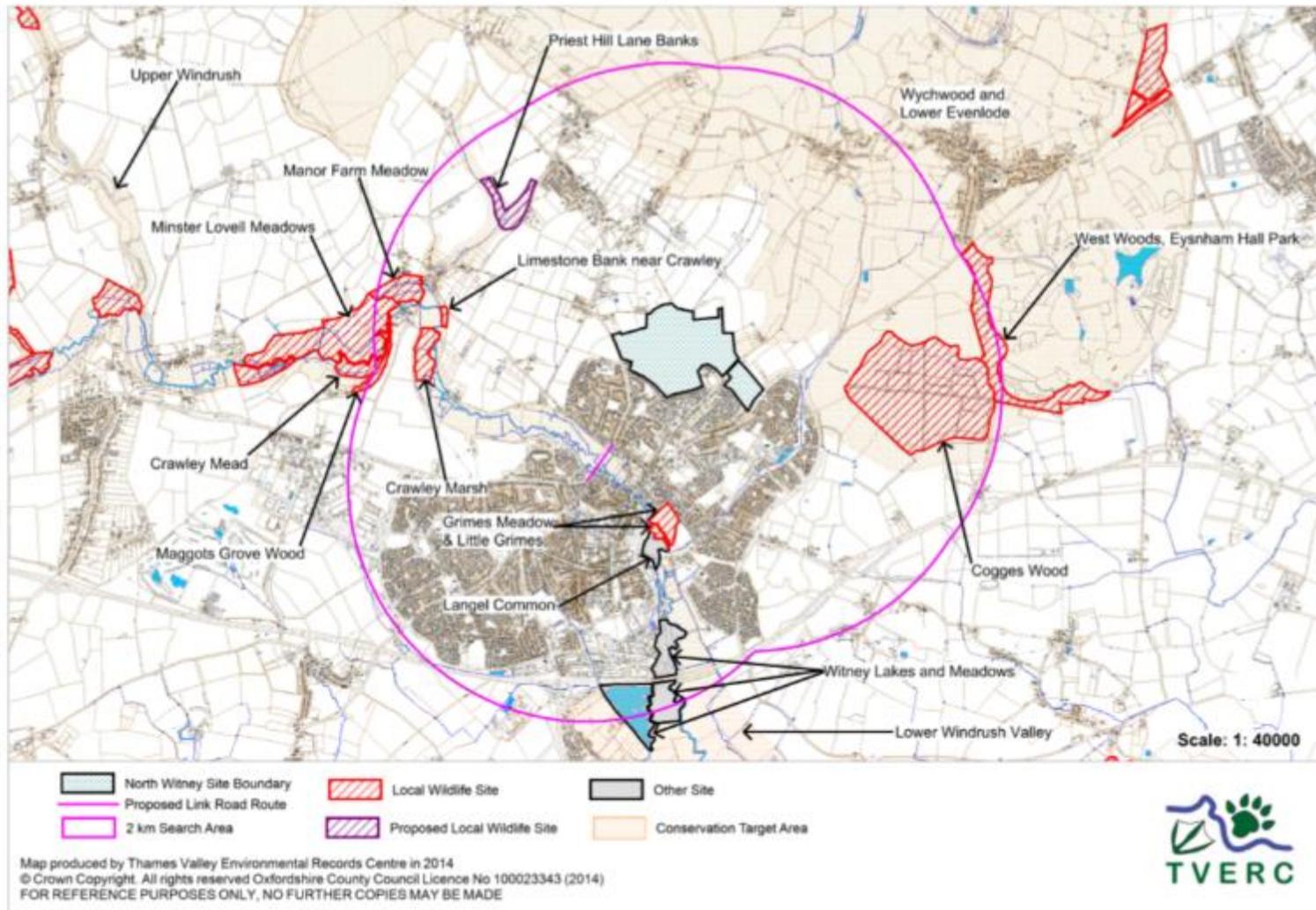
1. Hedgerow 1. Species-rich hedgerow with mature standard trees.
2. Hedgerow 2. Species-rich hedgerow with stream. Two 'widenings' of the stream; see Target Notes 21 and 22.
3. Hedgerow 3. Species-poor hedgerow.
4. Hedgerow 4. Species-rich hedgerow with dog's mercury and signs of laying in the past.
5. Hedgerow 5. Species-rich hedgerow with dry ditch and standard mature trees.
6. Hedgerow 6. Species-rich hedgerow with small copse.
7. Hedgerow 7. Species-rich hedgerow with mature standard trees.
8. Hedgerow 8. Species-poor hedgerow. Trimmed to approximately 2m. Dry and wet ditch and parallel hedgerow.
9. Hedgerow 9. Defunct hedgerow along boundary with adjacent dwellings. Species-poor.
10. Hedgerow 10. Species-rich hedgerow along right of way. Strip of plantation woodland and old stone wall.
11. Hedgerow 11. Species-rich hedgerow.
12. Hedgerow 12. Defunct hedgerow along boundary with adjacent residential area.
13. Hedgerow 13. Species-rich hedgerow along valley. Dry and wet ditches, mature trees.
14. Hedgerow 14. Species-rich hedgerow with dog's mercury in the ground flora. Stream running along western side of hedgerow.
15. Hedgerow 15. Species-rich hedgerow with standard trees. Parallel hedgerow.
16. Hedgerow 16. Species-rich hedgerow parallel to Hedgerow 15.
17. Hedgerow 17. Species-rich hedgerow with ditch and standard mature trees.
18. Hedgerow 18. Species-rich hedgerows with ditch and standard trees.
19. Hedgerow 19. Defunct hedgerow along boundary with adjacent residential area.
20. The King's School. Modern school buildings surrounded by areas of hard-standing and car parking. Playing fields to the eastern side of the school.
21. Small pond along stream. Pond comprises a widening of the stream and supports no obvious aquatic vegetation. Not considered to be suitable habitat for breeding amphibians.
22. Small pond along stream. Pond comprises a widening of the stream and supports no obvious aquatic vegetation. Not considered to be suitable habitat for breeding amphibians.
23. Small pond close to the boundary with Down Hill Farm. Pond is considered to be 'average' as a potential breeding habitat for great crested newts. Aquatic vegetation including fool's water cress and brooklime.
24. Running water along wet ditch. Banks of grassy vegetation. No aquatic vegetation. The water is likely to flow only during wet conditions.
25. Dwelling and garage with low potential to offer shelter to roosting bats.
26. Wet ditch along access track into yard. Tree line/hedge of willow, elm, hawthorn, blackthorn and bramble.
27. Field of improved grassland. Very species-poor and unsuitable for reptiles.
28. Area of dense scrub dominated by bramble, willow and hawthorn. Field maple, silver birch, ash, elder and great willowherb also present in abundance.
29. Tall ruderal vegetation in floodplain. Dominant species include great willowherb and meadowsweet.
30. Confluence of two streams of the River Windrush.
31. The former mill race of the former Woodford Mill.
32. Area of hard-standing with buddleia scrub and tall ruderal vegetation. Semi-mature sycamore and copper beech also present. Stone wall along the Burford Road.

12 Appendix 4. Constraints & Opportunities Plan



13 Appendix 5. Designated Wildlife Sites Map

Land to the North of Witney - Designated Wildlife Sites Map



14 Appendix 6. Data Search Results – TVERC Biodiversity Report