Gallagher Estates Ltd

Land North of Gavray Drive, Bicester

Environmental Impact Assessment
Scoping Report

February 2014

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APPENDICES

1.0 INTRODUCTION

Introduction

1.1 Gallagher Estates propose to submit a new outline planning application for the Gavray Drive site in Bicester. The planning history of the site is long and protracted. Gallagher Estates have concluded that in light of the time that has elapsed since the original application was submitted and the consents secured, it is appropriate that a new application is submitted based on a revised masterplan and up to date information.

1.2 This report fulfils two roles:

- The report provides Cherwell District Council (CDC) with sufficient information to undertake the formal pre-application process.

- Gallagher Estates seek to undertake an Environmental Impact Assessment to inform the new proposals. As such they request a Scoping Opinion from Cherwell District Council in accordance with Section 13 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2011. This Scoping Report sets out what Gallagher Estates propose the EIA to comprise and we welcome your formal comments.

Background

1.3 Outline planning consent was granted on appeal in July 2006 under application reference 04/02797/F, for "residential development (including affordable housing) incorporating a County Wildlife Site, together with land reserved for a primary school, community facilities, public open space, rail chord and structure planting" on land north of Gavray Drive, Bicester". An application to extend the life of that permission via the Town and Country Planning (General Development Procedure) (Amendment No.3) (England) Order 2009 (SI 2009 No.2261) which allows for applications to extend the time limits for implementation, was approved by Cherwell District Council in February 2012, under application reference 10/01167/OUT.

1.4 Following a successful judicial review, Cherwell District Council's decision to approve the application to extend the time limit for implementation of extant outline planning

permission was quashed by the High Court, on the 15 January 2013. The application remains with CDC to determine.

1.5 Gallagher Estates have taken the opportunity to review the previously permitted scheme and have concluded that a new outline planning application should be submitted for the site. This will be entirely separate from the previous consents and quashed decision. A new Environmental Statement will be submitted with the application to identify and assess the likely 'significant' effects that may arise from the proposed development. The ES will also address those matters raised in Cherwell District Council's Regulation 22 request dated March 2013 as well as those that are included in any formal scoping opinion that follows this formal request.

Pre-application Consultation

1.6 Gallagher Estates seek to engage with CDC via its formal pre-application process to ensure that the suite of documents submitted with the planning application, and their content, meet the requirements of CDC and its consultees.

1.7 The documents proposed to be submitted with the planning application will include the following. We would welcome CDC's confirmation that this list represents the suite of documents required.

a) Parameter Plans detailing land uses, building heights, density and access
b) Planning Statement
c) Design and Access Statement including Masterplan
d) Transport Statement
e) Travel Plan
f) Flood Risk Assessment and Drainage Details
g) Statement of Community Involvement

1.8 There are a number of specific questions and issues on which we request CDC's view as part of the pre-application process. These include the following:

a) what policies are relevant to the proposal and how they will be applied;

b) what is CDC's policy stance given that the site was formerly a Local Plan allocation and had an outline planning consent;

c) is there a requirement (or not) for a primary school on the site;

d) what transportation information is required;

e) what is the status of the Local Wildlife Site and can it now be accessible to the public and include newt ponds (LWS);

f) is there a requirement for a sequential test approach to flood risk;

g) the prospective Heads of Terms for a legal agreement.

EIA Scoping Opinion

1.9 In accordance with Section 13 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2011, the opinion of the local planning authority, Cherwell District Council (CDC), is sought, as to the information to be provided in the Environmental Statement (a "Scoping Opinion").

1.10 This Scoping Report outlines the scope of the Environmental Impact Assessment (EIA) that will accompany the application. It has been prepared by David Lock Associates with input from the wider EIA team including Gallagher Estates, JBA Consulting, Odyssey Markides, EDP, Kernon Countryside Consultants Limited and Arup. This Report will provide the background information to agree the scope of the EIA with CDC and statutory consultees.

1.11 The EIA Regulations require that any proposed development falling within the description of a ' Schedule 2 development' as defined by the Regulations will be required to be subject to an Environmental Impact Assessment where such development is likely to have 'significant' effects on the environment by virtue of factors such as its nature, size or location (Regulation 2).

1.12 No screening opinion has been sought from the Local Planning Authority to determine whether an EIA is required. The proposed development can be defined as Schedule 2 "urban development project" and exceeds the threshold of 0.5ha for Infrastructure Projects and although is not considered to be within an environmental sensitive location, in view of the scale of the project it is considered prudent to undertake an EIA and to prepare an ES.

1.13 The extent of the land to which this Scoping Report relates is defined in the Site Plan in **Appendix A**. The land to which the proposal relates is wholly within the administrative boundary of CDC. This Scoping Report outlines the nature and purpose of development, provides a description of the site and considers the potential effects of the development on the environment that will form the subject of the EIA.

1.14 This Report provides information on how the EIA process will be carried out and will set out the proposed format and structure of the formal ES.

2.0 SITE DESCRIPTION

2.1 The site is located in the south eastern quarter of Bicester, bounded by Gavray Drive to the south, the Birmingham to Marylebone rail line (Chiltern Line) to the north, the Oxford to Bletchley rail line to the west and Bicester's eastern bypass to the east. North of the site is Bicester Distribution Park, which provides a large footprint of B8 distribution units, with residential development south of Gavray Drive. Bicester town centre is located approximately 1.3km to the west of the site offering a full range of retail, commercial, employment and residential uses.

2.2 The site is agricultural in use, but is also used for informal recreation. Two public rights of way cross the site, linking Langford Village with Launton and Bicester Distribution Park.

2.3 The site is characterised by pasture, small linear field compartments and tall, mature boundary hedgerows. The dominant, physical elements within the site are the mature standard oak trees; there are no built structures on the land.

2.4 A water course, Langford Brook, flows through the middle of the site.

2.5 There are no designated heritage assets or statutory environmental designations within or adjoining the site.

3.0 THE PROPOSALS

3.1 An outline planning application is likely to be made for *residential development (including affordable housing) incorporating a Local Wildlife Site, together with land reserved for a primary school, community facilities, public open space, localised land remodelling and structure planting* on land north of Gavray Drive, Bicester. The description of development is likely to be similar to previous applications, however the developable area is reduced from that previously permitted.

3.2 A revised draft master plan is included as **Appendix B.** The draft master plan illustrates the principle that the current proposal will involve no residential development within the area designated as Local Wildlife Site.

3.3 The development footprint is significantly revised and reduced for the land to the east of Langford Brook. Critically, it takes the development footprint outside of the Local Wildlife Site designation, retains habitat outside of the LWS designation and reduces the extent of development interface with important hedgerows. This footprint reduces the potential level of impact on protected and notable species, including reptiles, great crested newts, bats and invertebrates.

3.4 Within this proposed development footprint, the proposals will retain mature trees and hedgerows where possible including the protected Root Protection Area measurements, rather than the previously used 1m offset from canopy.

Amount

3.5 Based on this development area, the site could deliver between 254 dwellings at 35 dwellings per hectare (dph) and 290 at 40 dph. As a result of a reduced developable area, the capacity of the site has fallen. We would welcome CDC's view on whether there is justification for the school at this reduced level of development. Without the school, the site could provide another 50 dwellings, with a maximum capacity of 340 dwellings.

Land Use

3.6 The application is likely to comprise provision of housing, areas of open space, a site reserved for a primary school (if deemed necessary) and community facilities.

Access

3.7 Access is taken from Gavray Drive. Good pedestrian and cycle connections will ensure that residents from both sites can move freely across Gavray Drive, circulating between Bicester Town centre and Langford Village Centre.

Landscaping

3.8 There are a number of trees, some subject of Tree Preservation Orders (TPO), hedgerows and ponds within the site, which will be retained where possible, and managed to enhance their wildlife value. New structure planting will reinforce the framework of existing vegetation.

Alternatives and Cumulative Development

3.9 The principle of development on the site has been established since its allocation for employment use in 1987, and later for residential-led development with ancillary education and transport uses in the Revised Deposit Draft Local Plan in 2002.

3.10 The site formed part of the district wide housing allocation in draft versions of Cherwell Local Plan. The Submission Cherwell Local Plan was formally submitted to the Secretary of State for Communities and Local Government on 31 January 2014. CDC's view on the position of the site in relation to policy would be welcome.

3.11 CDC's confirmation of any committed developments that should be taken into account is requested as part of this request for a scoping opinion.

4.0 APPROACH TO ENVIRONMENTAL IMPACT ASSESSMENT

4.1 The purpose of the EIA is to identify the likely 'significant effects' that may arise from the development. Each topic assessment will include an analysis of baseline conditions and environmental receptors, an assessment of impacts during construction and operation and any mitigation measures required. Any residual impact following mitigation will then be reported. The cumulative impacts of the development will also be considered.

4.2 Each technical chapter will be structured in a common format, as follows:

- an introduction;
- a description of methodology
- a summary of baseline conditions and survey results (if appropriate)
- a description of the predicted impacts of development during construction and in operation;
- a description of mitigation proposed to reduce the potential impacts of development; and
- a description of the anticipated residual impacts of development.

4.3 All effects will be assessed for significance based on agreed mitigation measures being in place. Some impacts cannot be directly mitigated and therefore compensatory measures may be required to offset the predicted adverse effects. Where such measures are proposed these will be described and taken into account in the assessment of significant effects.

Assessment Techniques and Evaluation of Significance

4.4 The potential effects of the development are assessed according to four criteria:

(i) geographical significance;
(ii) the nature of the impact;
(iii) the significance of the impact; and
(iv) duration of impact – whether the impact is temporary or permanent

4.5 The assessment of the significance of any impact is reflective of judgements made as to the importance and sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes.

4.6 The ES will describe the significance of predicted impacts using the following four terms:

Major positive or negative impact - where development would cause a significant deterioration or improvement to the existing environment. These impacts are likely to be important considerations in the planning process, depending on the scale and relative importance attached to the issues in planning policy and development plans terms.

Moderate positive or negative impact – where the development would cause a noticeable deterioration (or improvement) to the existing environment. Mitigation measures and design changes are likely to remove some but not all of the adverse effects upon the affected interest.

Minor positive or negative impact – where the development would cause a barely perceptible deterioration (or improvement) to the existing environment. Adverse impacts of this nature are not key issues.

No change or neutral effect/impact – no discernible deterioration or improvement to the existing environment.

4.7 Each chapter will also include a summary matrix outlining the results of the assessment process having taken into account the mitigation measures proposed as part of the application.

4.8 The ecology chapter will follow published CIEEM guidance which identifies whether or not an impact is likely to be significant (identified at a particular geographical scale) rather than the approach suggested here.

5.0 REVIEW OF POTENTIAL ENVIRONMENTAL EFFECTS

5.1 The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 require that Scoping Reports consider the potential effects of the development on the environment. This section aims to identify those aspects of the environment that may be "significantly" affected by the development, effects resulting from both construction and operational phases will be considered.

5.2 The 'significant' topics that require consideration as part of the assessment process are:

- Agricultural Land Classification and Farming
- Air Quality
- Arboriculture
- Archaeology and Heritage
- Ecology
- Hydrology and Drainage
- Landscape and Visual Amenity
- Noise
- Services and Utilities
- Socio-Economics
- Transportation and Access

5.3 The evaluation of the significance effects will enable the identification of mitigation measures to offset and/or minimise any adverse effects of the proposal. It also allows the mitigation measures to be fed into the design process.

Agricultural Land Classification and Farming

5.4 Kernon Countryside Consultants Limited will prepare the agricultural chapter of the Environmental Statement. This chapter will provide an assessment of the agricultural land quality and a review of current farming circumstances at the site.

5.5 The agricultural assessment will include a review of available results of Agricultural Land Classification (ALC) surveys, a review of current farming circumstances at the site and an assessment of the potential impacts of future development on agricultural land and the occupying farm business.

Potential Effects

5.6 The proposed development will result in permanent loss of agricultural land, both to the national resource of agricultural land and to the occupying farm business. In addition to an agricultural land resource, farmland also comprises a soil resource. The chapter will provide comment regarding mitigation against the loss of soil as a result of potential development.

Air Quality

5.7 Arup will prepare the air quality chapter of the Environmental Statement. The primary effect on local air quality will be from vehicular emissions from the highway network. The health and nuisance impacts of air quality and dust on sensitive receptors during the demolition, construction and operational phases of the development will also be considered.

5.8 The assessment will be undertaken following all relevant guidance produced by the Department of Environment, Food and Rural Affairs (Defra), the Institute of Air Quality Management (IAQM), the Design Manual for Roads and Bridges (DMRB) and Environmental Protection UK (EPUK). The assessment will also include a review of relevant national, regional and local planning policy.

5.9 Baseline conditions will be determined following a desk based study of available data from Cherwell District Council (CDC), the Environment Agency[1] and Defra[2] websites. Local authorities are required to assess air quality and produce progress reports annually under the Environment Act 1995, therefore this data will be used to inform the baseline assessment. All data to be used in the assessment are normally available publicly; however some consultation with the Environmental Protection department at CDC may be required to obtain the most recent air quality monitoring data and reports.

5.10 Air quality effects from construction will be assessed using the IAQM guidance[3], which seeks to determine the potential dust emissions from construction/demolition activities on site. For the operation of the proposed development, the DMRB guidance[4] provides a screening method for the assessment of local air quality effects. Traffic related effects during the operational phase will be assessed using the latest version of the DMRB screening tool, which will allow the calculation of the likely changes in air quality at nearby sensitive receptors as a result of changes in traffic flow and composition. Traffic data for the assessment will be obtained from the transport consultants and will comprise traffic volumes, speed and composition (%HDV).

[1] Environment Agency - http://www.environment-agency.gov.uk/default.aspx
[2] The Department of Environment, Food and Rural Affairs - http://laqm.defra.gov.uk/review-and-assessment/tools/tools.html
[3] Institute of Air Quality Management (2011) Guidance on the assessment of the impact from construction on air quality and the determination of their significance
[4] Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 (HA207/07)

5.11 Appropriate mitigation measures will be proposed during the construction assessment once the scale of the potential dust generating activities and the sensitivity of the area has been identified. These mitigation measures will promote the use of best practice in order to reduce the significance of effects from the construction works on local air quality.

5.12 Mitigation measures are unlikely to be required for the operational phase of the assessment unless the significance of the effects on local air quality is identified as substantial adverse.

Arboriculture

5.13 EDP will prepare the arboriculture chapter of the Environmental Statement, with the baseline report included as a technical appendix. The chapter will define the legislative and planning policy context surrounding the conservation and protection of the tree asset, the baseline conditions pertaining to the site, the nature and significance of any predicted effects, the scope of any mitigation and/or enhancement measures required to eliminate, minimise or offset those predicted effects and finally the significance of any long term residual effects persisting following their implementation.

5.14 The following will inform the preparation of the arboriculture ES chapter

- Full BS5837:2012 compliant tree survey
- BS5837 compliant report
- Arboricultural Impact Assessment

Tree Survey

5.15 Based on the topographic survey with all trees, groups of trees and hedgerows assessed for their quality and value and graded in accordance with section 4.5 and Table 1 of BS5837:2012 (cascade chart for quality assessment).

BS5837:2012 Compliant Baseline Report

5.16 Upon completion of the tree survey the findings will be presented in a baseline report that would include:

- Tree Survey Schedule summarising the survey process;
- Tree Survey Plans depicting the position, branch spread and grade of all surveyed items; and
- Tree Constraints Plans depicting the constraints posed by each surveyed item by virtue of their designated root protection area and branch spread, to be used as design tools to inform the masterplanning process.

Arboricultural Impact Assessment

5.17 Upon fixing of the Master Plan a desk based assessment will be undertaken to assess the impacts of the proposals on the standing tree stock and where practicable propose appropriate mitigation measures. This would include:

- Amendment of the baseline BS5837:2012 report to include a detailed impact assessment and mitigation proposals;
- Tree Protection Plan demonstrating losses/retention likely to arise from implementation of the design proposals; and
- Summary of tree losses inherent to the scheme and recommendations for future management of existing and proposed tree stock.

Archaeology and Heritage

5.18 The site does not contain any 'designated heritage assets' – as defined in Annex 2 of the NPPF and, whilst there are a number of such statutorily protected assets located in the wider landscape around the site, none are sufficiently close to the boundary to make it likely that they will experience a significant effect from the development.

5.19 Nevertheless, previous investigation of the site has recorded evidence for past human activity from at least the late prehistoric and Anglo-Saxon periods, with additional field investigation in adjacent areas (ahead of development schemes proceeding) having also identified evidence for Iron Age and Roman period settlement activity. As such, the site is concluded to contain undesignated heritage assets; with there also being potential for it to contain hitherto unrecognised/unrecorded archaeological remains.

5.20 At the same time, it is recognised that the fields and hedgerows located within the site could be of potential significance for their historic landscape value.

5.21 Accordingly, EDP will prepare the archaeology and heritage chapter of the Environmental Statement, to assess the impact of the proposed development on the historic environment, following the preparation of a comprehensive baseline report. Following consultation with the local authority's archaeological advisor; in this case the Historic Environment Team at Oxfordshire County Council, the ES chapter will be prepared, with the baseline report included as a technical appendix.

5.22 The chapter will define the legislative and planning policy context surrounding the conservation and management of the historic environment, the methodology employed in the identification and assessment of potentially significant effects, the baseline conditions pertaining to the site and its immediate environs, the nature and significance of any predicted effects, the scope of any mitigation and/or enhancement measures required to eliminate, minimise or offset those predicted effects and finally the significance of any long term residual effects persisting following their implementation.

5.23 The site has previously been subject of a programme of archaeological investigation, which not only comprised desktop work, but also the excavation of some trial trenches in those areas which were accessible and suitable, resulting in the agreement of a strategy for phased mitigation with the local authority's archaeological advisor. It is therefore expected that, whilst the baseline report will be brought up to date through

date through the incorporation of any new archaeological and heritage information of relevance, the previously agreed approach to (phased) post-consent investigation and recording remains robust and will form the basis for mitigation in this instance,

5.24 The baseline report will comprise the collection, collation and review of archaeological and heritage data from the Oxfordshire HER and the English Heritage NMR, the examination of historic maps at the county record office; with any information of relevance being checked and updated through the completion of a walkover survey. The latter, in addition, will aim to establish the current ground conditions within the site and outline any changes of significance during the period since the previous investigation.

5.25 However, in addition to a thorough review of the current archaeological position, in respect of the site and the surrounding area, the baseline report will also assess the nature and significance of historic landscape resources within the site, compared against publicly available datasets from elsewhere in the county/region.

Ecology

5.26 EDP will prepare the ecology chapter of the Environmental Statement. An Ecological Impact Assessment will be undertaken based on the ecology baseline. The ecology baseline has been fully updated during 2013 and a full account of the methodology and current ecology baseline is set out in **Appendix C.** No further ecology baseline surveys are proposed to be completed during 2014. The ecology baseline which will be used for the purpose of the assessment will include the full update completed during 2013 in addition to referencing to baseline information collated for the site since 2002.

5.27 The assessment will be made with reference to the Ecological Impact Assessment guidance published by the Institute of Ecology and Environmental Management (IEEM). The assessment of construction and operational impacts will be assessed in the absence of the Ecology Strategy but including the inherent measures which will be "built-in" to the proposals e.g. retention of hedgerows, historic field ponds, trees and Local Wildlife Site. The residual impacts will be determined once the Ecology Strategy is in place. Effects associated with any localised raising of ground levels will also be considered.

5.28 With respect to the Ecology Strategy, this will include the provision for an Ecology Construction Method Statement (ECMS) and Wildlife Management Plan (WMP). Heads of Terms for both documents will be included as part of the Environmental Statement.

5.29 The updated ecology ES chapter will consider the conformance of the proposals with respect to relevant legislation and planning policy, the latter at a national and local level.

Determination of Valued Ecological Receptors

5.30 Provisionally, based on existing information and subject to the findings of the updated baseline surveys, the following are likely to be considered the Valued Ecological Receptors (VERs) which will be subject an assessment of significant impacts:

Statutory Designations

- Wendlebury Meads and Mansmoor Closes SSSI;
- Otmoor SSSI.

5.31 Natural England has historically raised concerns regarding the potential for downstream impacts of the proposal, via adverse changes in water quality and/or flow within the Langford Brook, on two downstream SSSIs. The ecology chapter, with reference to the drainage chapter, will consider the potential for changes in water quality and/or flow in the Langford Brook with respect to the downstream SSSIs.

Non-statutory Designations

- Gavray Drive Meadows Local Wildlife Site

Habitats

- Grassland (to be considered in parallel to Gavray Drive Meadows LWS)
- Ecological Important Hedgerows (with reference to definition as set out in the Hedgerow Regulations 1997);
- Trees;
- Historic field ponds; and
- Langford Brook

Species

- Great Crested Newts
- Bats
- Reptiles
- Butterflies: black, brown and white-letter hairstreak butterflies

5.32 The species not currently considered to be VERs include:

- Marsh fritillary butterfly;
- Badgers;
- Otters;
- Water voles;
- The overall invertebrate assemblage; and
- The overall bird assemblage.

5.33 Although not VERs which would be subject to an assessment of significant impacts, it is recognised that any pertinent legal protection (e.g. to breeding birds under the Wildlife and Countryside Act 1981 (as amended)) associated with these non-VERs will also be covered for completeness by the updated Environmental Statement.

Hydrology and Drainage

5.34 JBA Consulting will prepare the hydrology and drainage chapter of the Environmental Statement. A desk study of local policy documents and flooding studies will be carried out to develop an understanding of the site and potential flood mechanisms.

5.35 The ES will provide a hydrology baseline and report the likely impact that the development would have on the hydrological regime of the immediate area, considering the effects of the proposed development on surface and groundwater flows and water quality during construction and operation. Where adverse effects are identified, mitigation measures will be recommended to minimise these effects.

Fluvial Flood Risk

5.36 Gavray Drive lies within flood risk zones 2 and 3, reflecting a medium to high risk. A Flood Risk Assessment study will be carried out using the Environment Agency's most up to date hydraulic modelling results (Product 4). This will examine the effect of the proposed development upon the existing hydrology and drainage of the site. The main flood risk to the site is considered to be from one source; Langford Brook which flows through the middle of the development site.

5.37 The specific methodology for defining and assessing flood risk is dictated by the requirements as set out in the NPPF.

Surface Water Drainage Strategy

5.38 Given the sensitive ecological nature of the site, it is anticipated that attenuated surface water runoff will be discharged into the public sewer. Greenfield runoff rates will be calculated for the site, and used to determine the likely size of surface water management features required within the site to meet the requirements of the Environment Agency and the SUDS Approving Body (Oxfordshire Co Co). Following agreement on predicted discharge rates and proposed discharge locations, a surface water drainage strategy will be produced, supported by hydraulic modelling of the proposed system (InfoWorks or MicroDrainage/WinDES software). A proposal will be submitted to Thames Water to confirm that the previously agreed discharge rates into the public sewer network still stand. Effects associated with any localised raising of ground levels will also be considered.

5.39 Natural England has historically raised concerns regarding the potential for downstream impacts of the proposal, via adverse changes in water quality and/or flow within the Langford Brook, on two downstream SSSIs. The hydrology chapter will consider the potential for changes in water quality and/or flow in the Langford Brook with respect to the downstream SSSIs.

Foul Water Drainage Strategy

5.40 A hydraulic model of the proposed foul drainage system will be developed using the MicroDrainage / WinDES software to confirm the existing public sewer network has sufficient capacity to access incoming flows from the site. Modelling results will be documented into a short Drainage Impact Assessment report which will then be submitted to Thames Water for their approval.

Floodplain compensation scheme

5.41 Part of the proposed development site lies within flood zone 3, as such a floodplain compensation scheme will be discussed with the Environment Agency in order to offset the impact of the proposal whilst mimicking current fluvial flow conveyance. Using the Environment Agency's most up to date hydraulic model of the Langford Brook and following analysis of available topographic survey data for the site, a level-for-level floodplain compensation scheme will be developed and submitted to the Environment Agency for approval. Effects associated with any localised raising of ground levels will also be considered.

Landscape and Visual Amenity

5.42 EDP will prepare the landscape and visual amenity chapter of the Environmental Statement. We therefore propose to initially produce a robust Landscape and Visual Impact Assessment (LVIA) such that the ES Chapter will essentially amount to a summary of this otherwise rather lengthy document. This is our usual approach to such projects and is normally acceptable to the planning authority.

5.43 Our Landscape and Visual Impact Assessment work is based on best practice guidance set out by the Landscape Institute and undertaken by suitably qualified or Chartered Landscape Architects.

5.44 The scope of work will involve the following stages:

- Desk study to establish the current landscape planning policy context and up to date local landscape constraints/issues. Modelling the Zone of Theoretical Visibility (ZTV) of proposed housing within the site using GIS software to prepare a three dimensional topographic model of the site and its landscape context to establish the maximum area of that context from which the site may be perceived;

- Site survey and visual assessment, to assess the baseline landscape character context and visual context, including photography of 'representative' photoviewpoints' during winter, if at all possible, to illustrate the range of views available towards the site. The extent of this survey would be driven by the 3D model prepares at the previous stage. EDP would consult with Council on proposed viewpoint selection;

- The findings of the above would be used to consider the landscape and visual effects of the proposals, including the mitigation proposed;

- The production of a complete Landscape and Visual Impact Assessment, incorporating the findings of the baseline work, assessing the implications of the proposed development at year 1 and year 15 and commenting on the mitigation measures and residual effects; and

- The preparation of a Landscape chapter of the Environmental Statement, summarising the findings of the LVIA report in a concise manner,

5.45 In essence the work will be broken down into three key stages:

(i) Baseline Assessment –establishing the existing landscape features, character, policy context and availability of views;

(ii) Assessment of Landscape Effects – based on a consideration of the proposals (both outline and detailed areas) we will use industry standard methodologies to assess the impacts resulting and the effectiveness of available mitigation measure;

(iii) ES Chapter – LVIA's are necessarily robust and lengthy, often running to well over a hundred pages. As such, our ES Chapter essentially amounts to a summary of this report, normally running to around 20 pages and utilising tabulated results for clarity and brevity.

Noise

5.46 Arup will prepare the noise chapter of the Environmental Statement. For the purposes of the EIA, "noise" is defined as any unwanted sound generated by the construction and operational phases of the development. There is a requirement to evaluate its potential effect on sensitive receivers within the vicinity of the proposed development. Cherwell District Council Environmental Health Department will be consulted as part of the EIA process to agree the assessment methodology, identify potentially sensitive receivers and discuss any other local issues relevant to the site.

Baseline

5.47 Baseline noise conditions will be identified through a measurement survey of existing background noise levels at sensitive locations around the site, to establish the lowest daytime, evening and night time noise levels. Ambient noise levels on site will also be measured to assist in the site suitability assessment also included in this report.

Proposed scope of assessment

5.48 A review of current legislation, national and local policy and guidance will be carried out to inform the assessment.

5.49 The proposed development has the potential to give rise to noise (including traffic) and vibrations during construction and operational noise associated with school and community facility and in relation to changes in traffic flow around the site.

5.50 In addition a site suitability assessment will be carried out and appended as a Technical Report to consider the noise climate at the site and determine its suitability for residential development using guidance and methodology agreed with the Local Authority.

5.51 It is considered that the distance of the rail line on the embankment, of at least 30 metres from the proposed closest residential development is sufficient to minimise the risk of vibration to the development. An assessment of vibration exposure arising from the rail line is therefore scoped out.

Proposed method of assessment

5.52 In the case of the noise assessment of site preparation and construction work, the potential effects would be temporary, whereas operational noise and the movement of vehicles to and from the site could potentially cause permanent noise issues.

5.53 The operation of the proposed development will give rise to noise emission which could potentially cause disturbance to nearby sensitive locations (the school and any ecological receptors). The various potential noise effects associated with the development would be assessed as part of the EIA to demonstrate that these issues have been properly considered. Should there be any significant effects identified, appropriate mitigation measures will be proposed to show that residual effects will be eliminated or minimised.

5.54 Construction noise and vibration levels will be assessed at an outline level, to examine the noisiest processes within each phase of the works and the duration of any resulting noise or vibration effects. The guidance in BS 5228: 2009 Code of Practice on Noise and vibration control on Construction and Open sites will be referred to in order to estimate noise levels where possible. Construction methodology information will be provided by the project engineers and appropriate assumptions made where information is unavailable. It is considered that this will provide sufficient information to adequately assess potential construction noise and vibration effects.

5.55 Operational traffic noise will be assessed using the guidance of Calculation of Road Traffic Noise (CRTN) as the calculation method and the Design Manual for Roads and Bridges (DMRB) as the guidance document for the assessment of the effect of road traffic impacts.

5.56 To ensure that the proposed development does not have an unacceptable noise effect on the surrounding area, appropriate noise targets would be specified based on the existing noise climate. Operational plant equipment noise associated with the non-residential buildings will be assessed using the guidance of British Standard BS 4142. BS 4142 gives a method for determining the likelihood of complaint from a new development. Although the scope of the Standard implies a limited application to just industrial situations, the assessment methods can be used to assess plant noise from other premises e.g. educational premises.

5.57 As part of the assessment procedure for an ES, there is a requirement that likely significant effects should be described and measures to control any significant adverse effects identified. The relevant methods for the assessment of each source

of noise would be adopted. Some of these describe specific requirements or thresholds for amelioration. If appropriate, mitigation would be recommended in outline to demonstrate how significant noise effects could be eliminated or minimised.

Services and Utilities

5.58 Gallagher Estates Ltd will prepare the services and utilities chapter of the Environmental Statement. The impact of the proposed development and construction work upon the existing infrastructure capacity and operation will be assessed in order to determine the requirements for any improvements to the existing services to accommodate the proposed development.

5.59 A review of statutory undertakers existing records will be undertaken to establish the baseline conditions regarding the provision of servicing of the existing site in relation to electricity, gas, water and telecommunications.

Electricity

5.60 There is an 11 KV cable in Gavray Drive fronting the proposed development. SSE Power Distribution have confirmed that the residential units of the site can be services, but they could not comment on the school without further details.

Gas

5.61 There is an existing 250mm Low Pressure Main in Gavray Drive fronting the proposed development. Liaison with the statutory undertaker will confirm whether there is sufficient capacity to serve the new development, or whether further reinforcement to the network may be required

Water

5.62 There is an existing 15" main crossing the eastern part of the site in a NE to SW direction, which will need to be reflected in the design of the Master Plan. There is a 200mm water main in Gavray Drive fronting the proposed development. Thames Water have concluded that the main in Gavray Drive has sufficient capacity to service the proposed development.

Telecommunications

5.63 BT have confirmed they have plant and ducts in the vicinity of the site and there will be no extra cost in relation to servicing the site

5.64 Notwithstanding the above, liaison with statutory undertakers will take place throughout the assessment process and the assessment will be carried out in accordance with published standards and guidelines.

Socio-Economics

5.65 David Lock Associates will prepare the socio-economic chapter of the Environmental Statement. This chapter will consider the socio economic issues relating to the proposed development and the likely impacts associated with an increase in population in the area, to include those who are resident, working and visiting.

5.66 Firstly an assessment of the baseline conditions will be carried out which will rely on collation of published census data, site assessments, consideration of relevant planning policy and consultation with appropriate bodies with respect to provision of facilities their capacity.

5.67 The socio-economic effects of the construction of the proposals will be also be assessed in terms of creation of jobs, temporary loss of amenity and disruption to services.

5.68 The socio economic impact of the proposed development will then be evaluated through the following means:

- projecting the likely population and mix of the development;
- assessing the levels of housing requirement in the area;
- assessing the effect of the economically active elements of the residential population on the labour market and the prospects for employment;
- assessing the effect of the development on primarily public services including education, social services, and health facilities;
- assessing the effect of the development on recreational and leisure facilities; and
- consulting the local authority, community groups, business representatives and police as appropriate.

5.69 Finally, the need for mitigation measures to address adverse effects will be considered and proposed and an assessment of any residual impacts following mitigation made.

Transportation and Access

5.70 Odyssey Markides will prepare the transport chapter of the Environmental Statement. Key transport and access issues for the development proposals relate to:

- The promotion of sustainable modes of transport for the development, including public transport, walking and cycling;

- Minimising the impact of additional vehicular traffic generation as a result of the development on the local highway network.

5.71 Gavray Drive is accessed direct from the A4421, which is part of the Bicester Eastern Distributor Route, connecting the A41 in the south to the A421 to the north. The site is therefore easily accessible from the strategic road network, by vehicles of all sizes.

5.72 The nearest rail stations to the site are Bicester North and Bicester Town, both of which are around 1500m away. There are several bus services passing through or near the Langford area of Bicester, with the Routes 22 and 23 running along Gavray Drive. In addition, Chiltern Railways operate a Taxibus service that covers Langford Village, stopping at Peregrine Way and Mallards Way and including Gavray Drive on its route.

5.73 Gavray Drive has 2m wide footways on either side. At its eastern end, pedestrian access to the town centre is achieved via a footpath link that runs over a level crossing to Launton Road. Immediately to the north of this access onto Launton Road is a toucan crossing. There are also several footpath links from Gavray Drive running to the south through Langford Village and the public open space.

Potential Effects

5.74 The EIA will address the following potential transportation and access related effects:

- Temporary generation of heavy goods vehicles (HGVs) during the demolition and construction works to include any traffic movements associated with the potential importation of fill;
- Effects of the development on traffic flows and capacities of the local highway network;
- Effects of the development on accessibility by sustainable modes.

Approach and Methodology

5.75 The planning application will be accompanied by a comprehensive Transport Assessment (TA) prepared in accordance with the DfT Guidance on Transport Assessment (March 2007). The TA will include an assessment of the potential effects as outlines above. The Transport Assessment will broadly follow those that were submitted in support of the previous applications for development on the site. Updated weekday peak period traffic surveys will be undertaken at the following junctions:

- Gavray Drive / Mallards Way
- Gavray Drve / Wretchwick Way
- Peregrine Way / Wretchwick Way
- Peregrine Way / Wretchwick Way / Neunkirchen Way

5.76 Beyond these junctions the level of additional traffic resulting from the development will be identified and justification why wider junction capacity assessment is not required. If the level of traffic is found to remain significant, further junctions will be assessed if necessary

5.77 Baseline junction models will be built using the observed traffic flows. Committed development will be identified and agreed with OCC / CDC. Background traffic will be growthed to the opening year of the development using factors from the NTM and TEMPRO and committed development traffic added to reflect a baseline scenario. The junctions will be re-assessed under these baseline flows.

5.78 Multi-modal traffic generation of the development will be estimated and the performance of the junctions will be re-assessed with the addition of development traffic. Where necessary appropriate mitigation measures will be identified. These may take the form of physical improvement measure or form park of the Travel Plan that will also accompany the application.

5.79 In addition, estimates of the type and quantum of traffic generated during the construction period will also be undertaken and the impact of these on the local road network will be identified. Measure to minimise this impact will be identified.

5.80 The TA will also demonstrate that the proposed site access operate acceptably and justify the level of parking provision proposed on site.

5.81 The ES would summarise the results of the TA in accordance with the requirements of the EIA Regulations. As such, the assessment would identify all likely significant

effects, provide an assessment of the environmental effects and a description of appropriate mitigation. The full TA would be appended to the ES.

6.0 The Environmental Statement

6.1 Schedule 4 of the EIA Regulations 2011 outlines the material required to be submitted as part of an Environmental Statement. In accordance with these regulations, the ES for this application will include the following:

- a description of the development;
- an outline of the main alternatives and the reasons for the choice made, taking into account the environmental effects;
- a description of the aspects of the environment likely to be significantly affected by the development;
- a description of the relevant policy background in relation to each environmental topic area;
- a description of the likely significant effects on the environment resulting from the development;
- a description of the mitigation measures to prevent, reduce or offset significant adverse effects;
- a non-technical summary; and
- a description of any difficulties encountered in compiling the information.

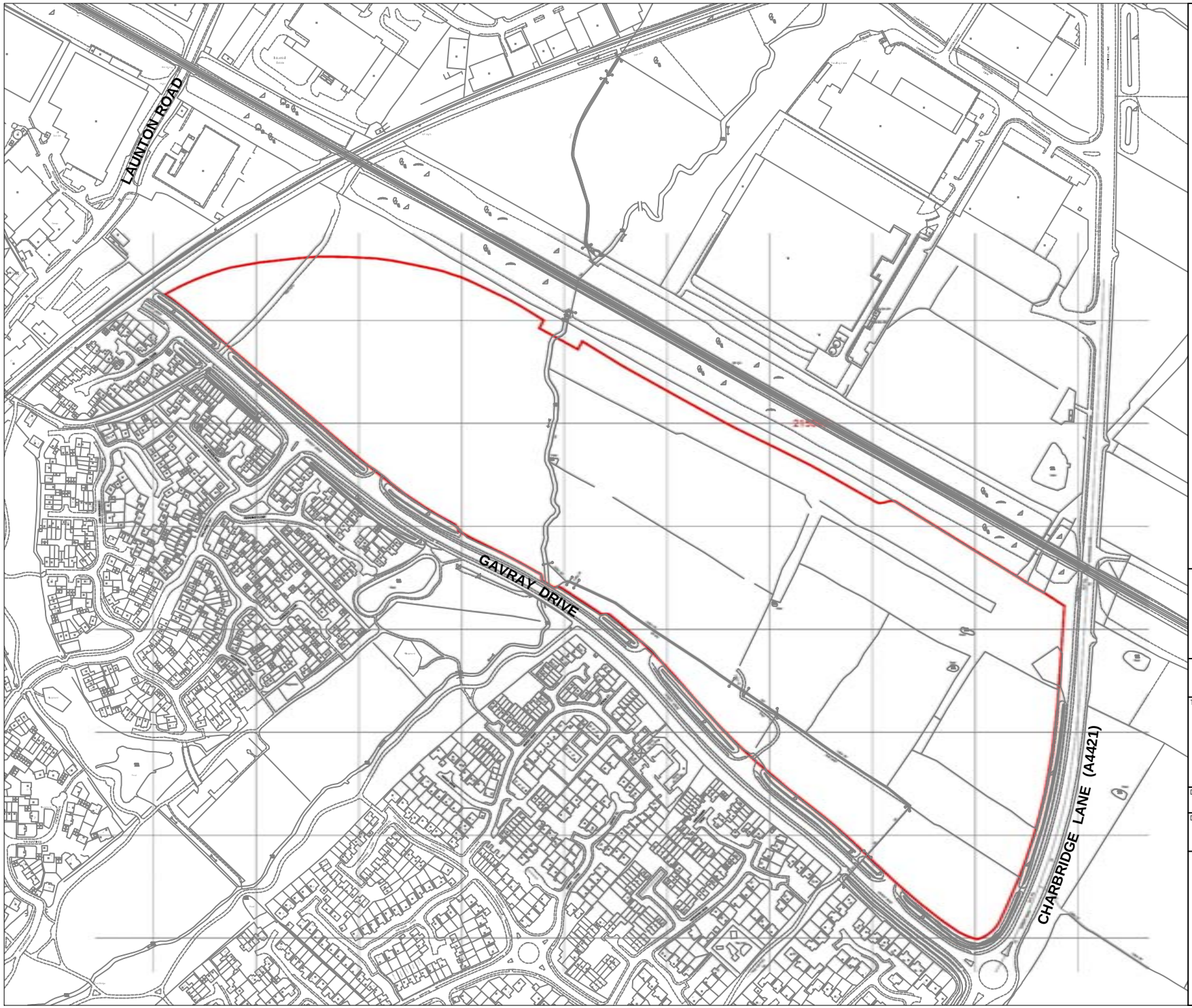
6.2 In accordance with the guidance, the ES will be structured in the following way:

- Non Technical Summary: Published separately, providing a concise non-technical explanation of the contents and conclusions of the ES.

- Environmental Statement Volume 1: setting out the assessment methodology and the likely impacts and mitigation strategies for each topic addressed; together with the figures and tables.

- Environmental Statement Volume 2: Technical Appendices – background technical data and plans used in the assessments by specialist consultants.

Appendix A: Site Plan



NOTE

This drawing is for information purposes only and not for use in construction.
Do NOT scale from this drawing.
All dimensions are to be checked on site and any discrepancies should be immediately reported to the originator of the drawing.
All information is copyright protected and may not be used or reproduced without prior permission.

Title

Gavray Drive
Site Location Plan

Date	Scale
05-02-14	1:5000 @ A4

Drawn	Designed	Approved	Drawing Number	
ADW	FR	---	JJG047 - 001	A

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Appendix B: Revised Master Plan

Gavray Drive: Revised Masterplan

Sketch of General Parameters

1:2,000@A1 / 1:4,000@A3

18.02.2014

David Lock Assoicates and Paul Drew Design for Gallagher Estates

Appendix C: Ecology Baseline Report (EDP, 2013)

Land North of Gavray Drive, Bicester, Oxfordshire

Ecology Baseline Report (2013)

Prepared by:
The Environmental Dimension partnership (EDP)

On behalf of:
Gallagher Estates Ltd

February 2014
Report Reference
EDP124_29

ENVIRONMENTAL PLANNING, DESIGN AND MANAGEMENT SERVICES
FOR ALL INVOLVED IN PROPERTY AND DEVELOPMENT

edp
THE ENVIRONMENTAL DIMENSION PARTNERSHIP

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Plan EDP 3	Great Crested Newt Survey Area and Pond Locations (EDP124/88 23 January 2014 JW/TW)
Plan EDP 4	Reptile Survey Area and Refugia Locations 2013 (EDP124/93 27 January 2014 124/93)
Plan EDP 5	Grassland NVC Communities (EDP124/94 28 January 2014 124/94)
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For EDP use	
Report no.	C_EDP124_29
Author	James Bird
2nd Read	Rob Rowlands
Formatted	Rebecca Coope
Proofed	Helen Brittain
Proof Date	4 February 2014

This version for electronic viewing only

Section 1
Introduction

1.1 The Environmental Dimension Partnership LLP (EDP) was commissioned by Gallagher Estates Ltd to update the ecology baseline for land north of Gavray Drive, Bicester, Oxfordshire. This report sets out the factual information collated during 2013, including the methodology of surveys and the findings of those surveys. It is proposed that this information, supplemented by ecological data collated for the site since 2002, will inform the application and ecological impact assessment for a new outline planning application which will be prepared and submitted for consideration to Cherwell District Council during 2014.

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Section 2
Scope of Work

2.1 The ecology baseline of the 2004 Ecology Environmental Statement Chapter has been updated in line with the Scope of Works outlined within EDP's Scoping report and those matters arising from consultee responses including those received from Cherwell District Council, Natural England and Berkshire, Buckingham and Berkshire Wildlife Trust (BBOWT).

2.2 The Scope of Work broadly includes the following:

i. Update Desk Study;

ii. Update Extended Phase 1 Survey; and

iii. Updated Detailed Habitat/Species Surveys.

2.3 The detailed methodologies employed to collate the updated ecology baseline are discussed in turn below.

Update Desk Study

2.4 The desk study is an important element of undertaking an initial ecological appraisal of a site proposed for development, since it enables the collation and review of contextual information such as designated sites together with known records of protected and priority species.

2.5 A desk study was originally completed in 2010. Thames Valley Environmental Records Centre (TVERC) was contacted for up-to-date ecological records for the site and its vicinity. Biodiversity information was requested on 12 June 2013. Records for international designations were sought for an area of 5km radius surrounding the site together with national/local designations and species records (excluding bats) within a 2km radius of the site. Bat records were sought within a 4km radius of the site.

2.6 In addition, given the butterfly interest of the site, butterfly records were requested from Butterfly Conservation (accessing both national and local (Thames Valley Branch) databases) for an area within 2km of the site; records of Marsh Fritillary butterfly were requested within a 15km radius of the site. Butterfly records were requested on 17 June 2013.

2.7 A search of the Multi-Agency Government Information Centre (MAGIC) website was also undertaken on 12 June 2013 to identify statutory designations within 2km for UK sites and 5km for European sites.

2.8 These search areas are considered sufficient to cover the potential zone of influence of potential development in relation to nationally important sites (or less), habitats and species.

2.9 Any pertinent information received as a result of the desk study has been included as **Appendix EDP 1** and specifically referenced within **Section 3**.

Updated Extended Phase 1 Survey

2.10 The survey technique adopted for the updated habitat assessment was at a level intermediate between a standard Phase 1 survey technique, based on habitat mapping and description, and a Phase 2 survey, based on detailed habitat and species surveys. The survey technique is commonly known as an Extended Phase 1 Survey.

2.11 This level of survey does not aim to compile a complete floral and faunal inventory for the site. The level of survey involves identifying and mapping the principal habitat types and identifying the dominant plant species present in each principal habitat type.

2.12 The aim of the updated survey was to broadly map and describe the current habitat distribution within the site and identify any significant material changes to the site since the original ecology ES chapter prepared during 2004. Normally, the Extended Phase 1 survey would also be used to scope actual or potential habitat and species constraints to inform further detailed surveys. However, mindful of the extent of existing information, and the scoping and consultation exercise already completed for the site, the actual and potential constraints related to this site are considered to have been fully scoped; this scope is reflected in the following methodologies.

2.13 The Extended Phase 1 survey of the site was undertaken on 11 June 2013 during suitably warm and dry conditions. The distribution of habitats within the site is illustrated in **Plan EDP 1**. In addition, any actual or potential protected species or species of principal importance are identified and scoped.

Updated Detailed Habitat/Species Surveys

2.14 With respect to the Scope of Works outlined within EDP's Scoping report and those agreed following consultee responses, a number of actual or potential ecological constraints were confirmed as requiring further investigation to inform the layout of a future development and support a planning application.

2.15 The following detailed Phase 2 surveys were therefore undertaken:

i. Updated Grassland Survey;

ii. Updated Bat Survey;

iii. Breeding Bird Surveys;

iv. Winter Bird Surveys;

v. Updated Great Crested Newt Survey;

vi. Updated Reptile Survey;

vii. Updated Badger Survey;

viii. Water Vole and Otter Survey;

ix. Harvest Mouse Survey;

x. Detailed Invertebrate Assessment; and

xi. Updated Butterfly Surveys (Marsh Fritillary/Brown Hairstreak/Black Hairstreak/ White-letter Hairstreak/Small Heath).

Updated Grassland Survey

2.16 The grassland survey completed during 2002 was updated with reference to published National Vegetation Classification (NVC) methodology. The aims of the survey were to establish if the grassland within the Local Wildlife Site (LWS) was still representative of designation as Local Biodiversity Action Plan (LBAP) Lowland Grassland, and to assess the value of the grassland within the wider site in respect of UK and Local Biodiversity Action Plan (BAP) habitats.

2.17 The grassland survey was completed over four survey visits between mid-June to the end of August 2013 which allowed for the identification for late flowering species such as *Carex spp.* The survey was restricted to fields to the east of Langford Brook. Full species lists were created for each of the fields and abundance was noted using the DAFOR scale (D=dominant, A=abundant, F=frequent, O=occasional, R=rare). Each field was subject to a walked 'W' transect to record wider plant species within the sward together with an evaluation of each plant species' abundance in reference to DAFOR.

2.18 In addition, thirty-nine 2m x 2m quadrats were taken throughout the site for comparison with the NVC. Quadrats were located within homogenous vegetation stands (Rodwell, British Plant Communities Volume 3, 1998). If the area was large enough, >10m^2, then at least three quadrats were taken in each community type recognised, for comparison with NVC. The quadrat data were then analysed using the ordination techniques TWINSPAN (Two-Way Indicator Species Analysis) and Decorana (Detrended Correspondence Analysis). Modular Analysis of Vegetation Information System (MAVIS) software was then used to determine the 'fit' of the vegetation surveyed to NVC sub-community types. Further details of the methodologies employed are detailed within the appended Botanical Survey Report (**Appendix EDP 2**).

Updated Bat Survey

2.19 The site supports a range of habitats with potential to support foraging and commuting bats including areas of broadleaved woodland, mature trees, hedgerows, scrub, grassland and ponds. In addition, a number of mature trees present within the site were considered to have potential to support tree roosting bats. The updated bat survey for the site was completed with reference to national best practice guidelines[1], and included the following investigations of:

i. Bat roosting in trees: Daytime visual assessment of mature trees with respect to their potential to support roosting bats; and

ii. Bat foraging/Commuting activity: Manual transect surveys of suitable habitats on site to update levels of bat activity.

Investigations of Bat Roosting in Trees

2.20 An assessment of all suitable trees on site to determine their potential to support roosting bats was undertaken by a Natural England bat licensed ecologist with assistance from an experienced bat surveyor, with reference to best practice guidelines. The survey was undertaken on 10 June 2013. Trees of sufficient maturity were individually examined from ground level, on all sides (where possible), using binoculars where appropriate, for the presence of potential bat roosting features, including:

- Natural holes;
- Woodpecker holes;
- Cracks/splits in major limbs;
- Loss/peeling/fissured bark;
- Thick-stemmed ivy (>5cm diameter); and
- Hollows/cavities/decay pockets.

2.21 The following categories for trees on site were used during the assessment:

i. Negligible potential

Trees that:

- Were not sufficiently mature to have developed potential bat roost features, or

[1] Hundt L (2012). *Bat Surveys: Good Practice Guidelines, 2nd Edition,* Bat Conservation Trust.

- Could be comprehensively surveyed and lacked any such suitable features.

ii. Low potential

Trees where:

- No potential roost features were identified but which could not be examined completely and were of sufficient maturity to support such features in locations not visible from the ground;
- No suitable features were identified but a large proportion of the tree was covered by ivy (not in itself acting as a potential feature) which could obscure any suitable features; or
- Such features appeared to be extremely limited, offering minimal roosting potential.

iii. Medium potential

Trees exhibiting:

- Only a small number of potential roost features; or
- Features in a very limited range of locations or orientations.

iv. High potential

Trees supporting:

- At least one roost feature that showed probable evidence of past use by bats;
- One type of well-developed potential roost feature in a wide range of locations or orientations;
- Several types of well-developed potential roost features; or
- Some combination of the above.

v. Confirmed bat roost

Trees with:

- Direct evidence of bat use (including oily stains around entrance holes, droppings or urine stains on bark below entrance holes, audible squeaking from within a suitable feature; or
- Historical evidence of bat use (i.e. desk study records, results of previous surveys).

Limitations

2.22 This type of assessment is based on features visible from ground level and is not considered a definitive survey for roosting bats. Due to the limitations of this type of survey the age, structure and overall condition of the tree are also used to guide this assessment and a precautionary approach adopted to ensure a comprehensive survey is undertaken. Additional survey work would be required to establish if any bats are roosting within the trees and if present, species, type of roost and how many bats are present should any trees of sufficient potential be subject to felling/tree surgery.

2.23 Given that the assessment was undertaken when the trees were in leaf, trees that were of a suitable size or age to support roosting bats, and that were not wholly visible from the ground owing to leaf cover, were classified as having low potential to support roosting bats, even where no specific features were visible. It is considered that this precaution ensures that the surveys undertaken were sufficiently robust to achieve the aims identified and correctly ascertain the likelihood of a tree supporting bat roosts.

Investigations of Bat Foraging and Commuting activity

Manual transect surveys

2.24 One survey visit was completed per transect during spring, summer and autumn (taken to be approximately May, July and September). An additional dawn activity survey was completed in July, resulting in two transect visits during this month. Dusk activity surveys were initiated 15 minutes before sunset and extended for 2 hours; dawn activity surveys were undertaken the morning after the previous night's dusk survey, commencing 2 hours prior to sunrise and finishing at sunrise. Sunrise and sunset times were taken as those times given on the BBC Weather website[2].

2.25 Weather conditions on each visit were optimum for bat surveys, being warm (with temperatures recorded ranging between 9.2°C and 25.2°C), little to no wind and no rain. The exact timing and weather conditions during each survey is provided in

[2] http://www.bbc.co.uk/weather/

Table EDP 2.1. The surveys are therefore not considered to be seasonally or climatically constrained.

Table EDP 2.1: Date, timing and weather conditions of bat activity surveys

Date	Timing	Sunset/ Sunrise	Weather Conditions			
			Temp (°C)	Cloud cover (%)	Precipitation	Wind (Beaufort scale)
20/06/13	21:14 – 23:30	21:27	20.8 - 21.0	5-20	Nil	0
11/07/13	21:13 – 23:22	21:22	13.2 - 25.2	0-5	Nil	0
12/07/13	03:21 – 04:59	04:59	9.2 – 10.2	5-15	Nil	0
07/08/13	20:37 – 22:44	20:44	14.5 – 20.7	5-40	Nil	0

2.26 Manual transect surveys were completed by experienced bat surveyors across four transect survey routes ranging from 1.9 to 2.1km in length. Transect routes were designed to cover all woodland, trees, hedgerows and other potential foraging or commuting habitat on site as illustrated on **Plan EDP 2**. All transects were led by a Natural England licenced bat worker with assistance by an experienced bat surveyor. Transect routes were walked at a slow and steady pace with between ten and twelve 'listening stops', lasting approximately five to six minutes each. All bats were recorded and their behaviour marked on survey maps in order characterise the value of the site and its component habitats to foraging and commuting bats.

2.27 Activity surveys were conducted using BatBox Duet or Pettersson D240x bat detectors connected to Edirol Digital recorders, or Wildlife Acoustics EM3 detectors. Observations of the time, location, and activity of all bats seen or heard were noted. Bats were identified on the basis of their characteristic echolocation calls, which were recorded and analysed using computer sonogram analysis (Batsound 4.03 and Analook 3.8v) to confirm species identification. Species of myotid bat and long-eared bat are difficult to tell apart solely from their echolocation calls and were therefore grouped as such.

Breeding Bird Surveys

2.28 The site supports a range of habitats suitable for breeding birds. In order to determine whether a valuable species assemblage is present or whether the site supports any scarce or protected species of birds, a breeding bird survey was undertaken.

2.29 The surveys were completed with reference to a standard methodology, entailing a modified Common Bird Census (CBC) 'territory mapping' approach, which involves the completion of three visits to the site, undertaken between approximately mid April and late July; i.e. at the height of the bird breeding bird season for lowland Britain.

2.30 Following best practice, the three survey visits were timed to start at, or just before, first light, to coincide with the period of peak activity for birds, most particularly passerine songbird species. They were also undertaken during suitable weather conditions; i.e. days/periods with strong winds and heavy or persistent rain were generally avoided. Survey visits were spaced approximately four weeks apart between early May and late June 2013.

2.31 In common with the CBC, the survey methodology involved walking to within 50m of all parts of the site and recording all bird species present and their activity status, with a particular emphasis placed upon those elements considered to relate to, or be indicative of, breeding. This ensured that the survey identified all birds using the margins of the site, as well as those in the interior.

2.32 The surveys were carried out at an appropriate time of year for the locality, and in suitable weather conditions. It is therefore considered that the results provide a representative overview of the breeding bird interest at the site. The dates of the three survey visits, and the weather conditions encountered, are summarised in **Table EDP 2.2**.

Table EDP 2.2: Date, timing and weather conditions during the breeding bird survey visits

Visit	Dates	Times	Cloud (%)	Rain	Wind	Temp	Visibility
1	09.05.13	0620-09.00	10-95	Nil	Still to start then strong breeze developed.	Mild	Good
2	30.05.13	0530-0845	100	Some light rain at times	Gentle-moderate breeze.	Mild	Moderate
3	19.06.13	0500-0845	85	Nil	Still.	Mild becoming warm	Moderate -Good

2.33 Following the completion of the surveys, the breeding status of each bird species identified at the site was determined according to the nature and frequency of the elements recorded, as set out in **Table EDP 2.3**.

Table EDP 2.3: Summary of field evidence used to determine breeding bird status

Status	Definition	Examples
Breeding	Definitive evidence of breeding recorded on at least one visit, or territorial behaviour suggestive of breeding recorded in the same location on two or more visits.	• Distraction display; • Nest building; • Nest with eggs; • Nest with young; • Used nest; • Recently fledged young; or • Adult carrying faecal sac/food.

Status	Definition	Examples
Possibly breeding	Territorial behaviour suggestive of breeding recorded in the same location on only one visit.	• Male in song; or • Adult giving alarm call.
Non-breeder	No territorial behaviour suggestive of breeding recorded.	• Feeding birds only; or • Birds flying over only.

2.34 An assessment of the individual bird species recorded at the site, as well as the overall assemblage, has been made with reference to the national conservation status of the different breeding species. These refer to the Birds of Conservation Concern[3] Report.

2.35 Appropriate consideration has also been given to the conservation status of each bird species at the local level. Accordingly, the Oxfordshire Ornithological Society's (OOS) publication Birds of Oxfordshire 2008[4] has been consulted to provide information on status of key species within Oxfordshire.

Barn owls

2.36 In order to account for barn owls which may be nesting on the site, a day time inspection of all mature trees on site to check for evidence of nesting owls was undertaken in conjunction with the day time visual assessments of mature trees for potential bat roosts undertaken on 10 June 2013, as detailed in paragraph 2.20. The survey comprised a search for evidence of barn owls including pellets, droppings and feathers in and around the base of all mature trees on site and an assessment of any features on the tree that may be suitable for roosting and/or nesting birds. The survey was undertaken from the ground with the use of a pair of binoculars.

Limitations

2.37 It is considered that the level of survey undertaken provides a detailed account of the breeding bird community within the site, together with an indication of the breeding abundances of each species. However, it should be noted that this level of survey will typically not provide exact breeding population figures for each species on site.

2.38 Due to the relatively low number of survey visits compared to the relatively detailed field evidence required to confirm breeding, the results may offer a range in the breeding population of certain species that is relatively large. This can be particularly true for cryptic or skulking species, or species that inhabit areas that are difficult to access, such as dunnock (*Prunella modularis*) breeding within dense scrub. As the site supports large areas of dense continuous scrub it is likely that the breeding population of some species may have been underestimated.

[3] Eaton, M.A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R.D., Aebischer, N.J., Gibbons, D.W., Evans, A. And Gregory, R.D. 2009 "*Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and Isle of Man*" British Birds, Vol. 102, pages 296-341.
[4] Oxfordshire Ornithological Society 2012. *Birds of Oxfordshire 2008.*

Winter Bird Surveys

2.39 The requirement for winter bird surveys is principally restricted to wetland sites that may support notable assemblages of waders and waterfowl[5]. The potential for such species to be present on site is low, being restricted to the small areas of marshy grassland, stream corridor and inundated areas of the arable Field (F13). However, the dense hawthorn and blackthorn scrub habitat present on site is also considered to have potential to support migratory flocks of thrushes and finches. Therefore, as a precaution and in response to consultees, a winter bird survey was undertaken to identify whether the site supports any notable species populations during the winter months.

2.40 Recognised winter bird survey methodology relates to wetland habitats and is therefore not considered to be applicable to the variety of habitats present on site. An adapted version of Wetland Bird Surveys (WeBs) and CBC was therefore employed comprising of monthly surveys undertaken between October and March. The surveys were timed to avoid adverse weather, such as heavy rain and high winds, which may affect the survey findings. As a result the December survey had to be postponed to the start of January. The surveys were undertaken during the mornings to coincide with higher levels of bird activity and lasted approximately two and a half to three hours. In common with the CBC, the survey methodology involved walking to within 50m of all parts of the site and recording all bird species present and their activity status, using recognised British Trust for Ornithology codes. To date four surveys have been undertaken, the details of which are provided in **Table EDP 2.4**, with a further two surveys programmed for February and March 2014.

Table EDP 2.4: Date, timing and weather conditions during the winter bird survey visits

Visit	Date	Start – Finish Time	Precipitation	Wind (Beaufort)	Visibility
1	23/10/13	07:55 – 10:20	None.	Light breeze	Good
2	27/11/13	08:45 – 11:45	None.	Light Breeze	Moderate
3	02/01/13	10:30 – 13:00	None.	Light Breeze	Good
4	23/01/13	09:05 – 11:40	Two 5 minute rain showers at 10:15 and 10:50.	Moderate Breeze	Moderate
5	Programmed for February				
6	Programmed for March				

2.41 The surveys were carried out by experienced surveyors, at an appropriate time of year for the locality, and in suitable weather conditions. It is therefore considered that the results provide a representative overview of the winter bird interest at the site and have not been limited by seasonal or climatic factors.

[5] Gilbert *et al* (1998) Bird Monitoring Methods: A manual of techniques for key UK species. RSPB.

2.42 An assessment of the individual bird species recorded at the site, as well as the overall assemblage, has been made with reference to the national and local conservation status of the different wintering species recorded according to data from the Birds of Conservation Concern, local and UK BAP priority species and the latest Oxfordshire Bird Report 2008.

Updated Great Crested Newt Survey

2.43 The ponds located within the site and within a 250m radius of the site boundary were subject to great crested newt surveys on a number of years since 2002. The original survey was completed in 2002 and 2004, with further updates undertaken in 2010 and 2012.

2.44 The 2013 updated great crested newt survey has been completed with reference to a standard methodology provided within Natural England's published guidance[6]. The ponds surveyed during 2012 were re-surveyed in 2013; a total of 11 ponds were surveyed including five ponds located on site and a further 6 ponds located within 250m from the site boundary, as illustrated on **Plan EDP 3**.

2.45 In accordance with published guidelines, the survey comprised the completion of six survey visits to ponds where great crested newts were found present within any one of the first four surveys undertaken. In those ponds where no great crested newts were recorded in the first four surveys, only four survey visits were completed. Surveys were completed in suitable weather conditions between mid-May to mid-June with half of all visits (3 no.) completed between mid-April and mid-May 2013.

2.46 Each survey visit was completed by a licensed great crested newt surveyor accompanied by an assistant. Each pond was subject to the use of three survey methodologies during each visit including bottle trapping, torching and egg searching. The weather conditions during surveys are detailed in **Table EDP 2.5**.

Table EDP 2.5 Dates and temperatures during the amphibian survey visits

Survey Visit	Date (evening)	Overnight Air Temp. (°C)	Overnight Water Temp. (°C)
1	09/05/2013	Min. : 7.1	Min. : 12.6
		Max. :12.8	Max. :16.8
2	13/05/2013	Min. : 3.8*	Min. : 10.7
		Max. :12.0	Max. :14.8
3	16/05/2013	Min. : 5.2	Min. : 10.1
		Max. :18.4	Max. :19.6

[6] English Nature (2001) *Great crested newt mitigation guidelines.* Peterborough, England.

Survey Visit	Date (evening)	Overnight Air Temp. (°C)	Overnight Water Temp. (°C)
4	20/05/2013	Min. : 11.3	Min. : 14.3
		Max. :17.0	Max. :18.6
5	04/06/2013	Min. : 9.1	Min. : 16.2
		Max. :27.2	Max. :21.8
6	06/06/2013	Min. : 7.4	Min. : 10.7
		Max. :23.2	Max. :19.2

2.47 The conditions were generally considered optimal for detecting the presence of great crested newts, although overnight minimum air temperature dropped below the recommended temperature for completing great crested newt surveys (5 °C) on one occasion; the minimum air temperature recorded on 13 May 2013 was 3.8°C. Minimum overnight water temperature on this night was 10.7 °C, and given the level of survey effort undertaken at this pond and those in the vicinity over the course of updating the ecology baseline and in previous baseline surveys, it is not considered that this significantly affected the validity of the results obtained. An updated Habitat Suitability Index (HSI) Assessment undertaken during the last survey visit to each pond.

Updated Reptile Survey

2.48 An update reptile survey was completed during 2013 to strengthen the baseline data gathered during the 2010 survey. A refugia-based reptile survey comprising a mixture of bitumen roofing felt and corrugated galvanised steel artificial reptile refugia was completed in all areas of suitable habitat to the east of Langford Brook where the coverage of scrub did not prevent access. A total of 489 bitumen felts were deployed, along with 14 corrugated tins, in locations illustrated on **Plan EDP 4**. Refugia were checked for the presence of reptiles on 20 separate survey visits; the level of survey effort applied being the recommended minimum required to establish a population size class estimate for widespread reptiles[7].

2.49 Survey visits were completed during suitable weather conditions between June and September 2013 (one survey visit was completed on 1 October 2013), with periods of extreme heatwave conditions experienced throughout the UK during the summer 2013 avoided where possible. During the survey visit dated 27 June 2013 reptile refugia within fields F1, F2 and F7 were not checked as the survey was ended early due to heavy rainfall. A summary of the date, timing and weather conditions during the reptile survey visits is provided in **Appendix EDP 3**.

2.50 During each survey visit, artificial refugia were individually checked by an experienced EDP Ecologist with any reptiles observed recorded, along with notes on their life stage

[7] Froglife (1999) Reptile Survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth.

(adult/juvenile) and sex where possible. To assign a level of relative importance to each of the fields with respect to their value to reptiles, the peak survey count[8] of individuals of a species recorded within each field was recorded.

2.51 To estimate the approximate population size class for each reptile species across the site, the peak survey count ('*highest number of individuals recorded*') was used, following the population size class categories, as derived from the 2011 withdrawn draft reptile mitigation guidelines[9], and summarised with respect to widespread reptiles in **Table EDP 2.6**.

Table EDP 2.6: Population Size Class Estimates

Species	Population Size Class Category		
	Small	**Medium**	**Large**
Slow-worm	< 10	10 - 40	> 40
Common lizard	< 5	5 - 20	> 20
Grass snake	< 5	5 - 10	> 10
Adder	< 5	5 - 10	> 10

2.52 In order to evaluate the value of respective fields within the site for those reptile species recorded, the relative importance (high, medium or low) of each field was determined based on the peak count of common lizards recorded within each field. Those fields of 'high' importance were those fields which supported a peak count of common lizard of greater than 20 individuals; 'medium' importance fields supported a peak count of between 5 to 20 individuals, and 'low' importance fields supported a peak count of less than 5 individuals.

Limitations

2.53 Although all reptile surveys undertaken at the site were done so in suitable weather conditions and within recognised optimal months for reptile surveys, surveys were not completed throughout the entire active season for reptiles. Surveys were completed within the months June to October 2013, and as such there was no survey effort applied during the early season spring period of the active reptile season. This may have reduced the likelihood of recording mobile reptile species such as adders which often utilise distinct spring breeding areas, which can be over several kilometres apart from summer foraging grounds and hibernating sites[10]. Therefore, adders (which were unrecorded during the 2013 updated reptile survey) may only use part of a site for a period of time within a survey season.

2.54 In addition, the detection of reptiles may have been hindered by the high levels of both public and dog disturbance to artificial reptile refugia, with surveyors reporting on a number of occasions that reptile refugia had been interfered with. Nevertheless, the

[8] Peak survey count - The highest number of individuals recorded during any one survey
[9] Natural England (2011) *Natural England Technical Information Note TIN102 Reptile Mitigation Guidelines.* WITHDRAWN
[10] Edgar, P., Foster, J. and Baker, J. (2010). Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.

surveys have been completed in accordance with best practice guidance[11], and a sufficient survey effort has been applied to estimate the reptile populations present on site.

Updated Badger Survey

2.55 During multiple annual visits to the site by EDP ecologists and other ecologists over a period of over 10 years no evidence of badger activity has been found within the site. The conditions within the site are generally considered unsuitable for sett construction. However, an updated badger walkover survey of the whole site was completed in response to the requirements of CDC's ecologist. As agreed with CDC's ecologist, access to all parts of the site was significantly limited by the presence of dense and impenetrable scrub which has developed as a result of several years of neglect of management.

2.56 The walkover survey was undertaken by an experienced ecologist on 11 June 2013, in combination with the Extended Phase 1 survey as discussed previously. During the survey any signs of badger activity such as holes, latrines, trails, snuffle holes and hairs on fencing or vegetation were recorded.

Water Vole and Otter Survey

2.57 No significant evidence of the presence of water voles or otters has been recorded during any of the previous survey efforts applied to the site. In order to satisfy the responses received from consultees during the original Scoping exercise, an updated water vole and otter walkover survey was undertaken of Langford Brook on 11 June 2013. The survey comprised a visual inspection of Langford Brook for characteristic signs of water voles, such as latrines, footprints, feeding caches, runs, holes and lawns. A visual search of Langford Brook for use by otters, which included evidence of prints, tracks, spraints, feeding remains and resting sites/holts, was also undertaken. Features considered to have the potential to be used as holts were also documented during the survey. The walkover survey was completed from the northern bank of Langford Brook at sections of the ditch where the surveyor could safely get to the waters edge. Access to the southern bank was restricted by the presence of dense tree cover immediately adjacent to the brook.

Harvest Mouse Survey

2.58 To establish the presence, or likely absence, of harvest mice on the site a hand search of tall grassland/ruderal vegetation for the presence of harvest mouse nests was undertaken by a team of five surveyors on 12 November 2013. The weather conditions during the survey were dry, sunny (5-10% cloud cover) and relatively mild for the time of year (8 to 10°C). The survey area broadly covered the whole site, but owing to the

[11] Froglife (1999) Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10, Froglife, Halesworth; DMRB (2005) Nature conservation advice in relation to reptiles and roads. Volume 10, Section 4, Part 7, HA/116/05. DMRB

significant amount of time and effort required in detecting harvest mouse nests, hand searches were largely confined to areas of the site which supported a tall grassland/ ruderal vegetation interface with scrub such as along hedgerow and wooded field boundaries and within areas of notably 'tussocky' grassland, which are generally considered to be offer preferred nesting locations for harvest mice[12]. Surveyors visually examined and thoroughly hand searched areas of suitable habitat to detect characteristic woven harvest mouse nests, with the location and description of any nests found recorded.

Detailed Invertebrate Assessment

2.59 A detailed assessment of the invertebrate species assemblage present on the site was undertaken by an experienced entomologist to update the baseline data gathered during 2005. The assessment comprised terrestrial and aquatic invertebrate sampling. The methodologies for which discussed in turn below as extracted from the invertebrate survey report provided in full in **Appendix EDP 4**.

Terrestrial Invertebrate Sampling

2.60 Terrestrial invertebrate sampling was undertaken on 6 occasions between June and October 2013 and included direct observation of invertebrates and the following active sampling methods:

i. Sweep-netting

- A stout hand-held net is moved vigorously through vegetation to dislodge resting insects. The technique may be used semi-quantitatively by timing the number of sweeps through vegetation of a similar type and counting selected groups of species.

ii. Beating trees and bushes

- A cloth tray, held on a folding frame, is positioned below branches of trees or bushes and these are sharply tapped with a stick to dislodge insects. Black or white trays are used depending upon which group of invertebrates has been targetted for search. Insects are collected from the tray using a pooter – a mouth-operated suction device.

iii. Suction Sampling

- Consists of using a converted leaf blower to collect samples from grass and other longer ground vegetation. The sample is then everted into a net bag and the invertebrates removed with a pooter. The advantage of suction sampling is

[12] Creswell, W. J. *et al.* (2012) UK BAP Mammals. Interim Guidance for Survey Methodologies, Impact Assessment and Mitigation. Southampton, UK.

that it catches species, which do not fly readily or which live in deep vegetation. It is particularly productive for Coleoptera, some Diptera and Arachnida.

2.61 Passive sampling of terrestrial invertebrates was also undertaken by means of pitfall trapping:

i. Pitfall trapping

- Vending-machine cups or similar are placed in the ground with the rim flush with, or slightly below, the surface. A fluid is added, containing ethylene glycol, sodium chloride and formalin with a little detergent to reduce surface tension. Traps may be covered or uncovered and are typically left in position for a month at a time. Invertebrates simply fall into the traps. This is the single most effective means of recording ground beetles (*Carabidae*) but is also effective for rove beetles (*Staphylinidae*), some other beetle groups, spiders and most non-insect soil-dwelling arthropods. Unlike pan traps, pitfall can be left *in* situ for a couple of weeks before they need to be examined;

- Traps were established on the second site visit (18 June) and operated throughout the survey period with samples collected during each site visit; and

- Pitfall traps were operated in fields 2, 4, 6, 7 and 12. An extensive network of pitfall traps was not established in every site compartment as pitfall trapping was designed only to obtain a representative sample of the invertebrate fauna.

Aquatic Invertebrate Sampling

2.62 Sampling of aquatic habitats presented a small challenge. Former ponds were either dry or nearly so during the sampling period such that the aquatic invertebrates normally present would have either migrated away or else entered dormant phases deep in the damp mud. Water was present in some ditches and as flooding on terrestrial fields. These areas were sampled using a pond net, with mesh diameter 0.75mm) as an underwater sweep net, taking care to ensure that as many potentially different habitat types were included (e.g., shaded and exposed, shallow and deep). In the ditches, which were deemed likely to be wet on a semi-permanent basis we also dredged debris to the bank and sifted through this by hand to collect any invertebrates that were visible.

2.63 Samples of aquatic invertebrates were preserved in dilute alcohol and retained for laboratory examination.

Updated Butterfly Surveys

2.64 A range of targeted surveys have been undertaken at the site with respect to the following UK BAP priority and/or notable butterfly species:

- Marsh fritillary (Euphydryas aurinia);

- Brown hairstreak (*Thecla betulae*);
- Black hairstreak (*Satyrium pruni*);
- White-letter hairstreak (*Satyrium w-album*); and
- Small heath (*Coenonympha pamphilus*).

2.65 The need for such surveys was informed by desk study records and/or in consultation with the local branch of Butterfly Conservation (BC), Cherwell District Council's Ecologist and Natural England.

2.66 The species in question have varying annual life cycles and life strategies, such that differing survey techniques were employed to maximise the likelihood detecting their presence and distribution within the site. The survey methodologies employed for each species are described in turn below.

Marsh Fritillary

2.67 Following an apparent sighting of a single adult marsh fritillary butterfly on the 30 May 2005 by a member of the public, a further six visits were completed to the site between the 2 June 2005 and 3 July 2005. No further adults were identified during these further visits. A larval web survey completed on the 26 August 2005 identified a single larval web on a food plant located in Field F7.

2.68 As part of an annual life cycle, the female adult marsh fritillary lays batches of up to 200 eggs on the underside of leaves of their host plant devil's-bit scabious (*Succisa pratensis*). The resulting larvae remain together and form a conspicuous silken web, on the leaves of the host plant, which is visible from July until mid-late September (depending on weather conditions). A larval web survey is therefore a very reliable method of detecting the presence of the marsh fritillary on a site, and also gives a good indication of breeding status.

<u>Larval Web Searches</u>

2.69 Between 2006 and 2013, a suitably experienced EDP surveyor has undertaken annual surveys to search for larval webs. Each survey involved hand searching of each devil's-bit scabious plant in the site to check for the presence of larval webs. The survey dates are as follows:

- 11 - 12 September 2006;
- 11 - 12 September 2007;
- 17 September 2008;

- 22 September 2009;
- 27 September 2010;
- 31 August 2011;
- 14 September 2012; and
- 29 August 2013.

2.70 The search centred on Field 7, where the density of devil's-bit scabious is highest, but all fields were searched for presence of host plant and larval webs.

2.71 The surveys were undertaken at an appropriate time of year, and in suitable weather conditions. The late September visits in 2009 and 2010 could have potentially missed larval webs if the larvae had dispersed in preparation for hibernation, however due to the mild temperatures at the time, this is unlikely. Therefore there are no significant seasonal or climatic limitations to the survey, particularly in view of the 8-year monitoring period.

Adult Searches

2.72 In addition to the annual larval web searches, surveys were undertaken in 2013 aimed at recording the adult butterfly (if present). The marsh fritillary butterfly is can be readily detected and identified in its adult stage. Three survey visits were undertaken in warm, dry conditions spanning the typical flight period for the species, namely 5, 12 and 18 - 19 June 2013. The final survey was combined with the first black hairstreak and small heath adult counts (more detail provided below) and therefore required two survey visits to cover the whole site.

2.73 All open grassland habitats within the site were surveyed for the species by walking a zig-zag route to observe/flush any marsh fritillary butterflies present.

2.74 The surveys were undertaken at an appropriate time of year, and in suitable weather conditions. While it is conceivable that a very small population could be overlooked using the method employed, this is very unlikely and even more so when coupled with the 8 years of larval web searches.

Brown Hairstreak

Records Collation

2.75 Members of Upper Thames Branch of Butterfly Conservation (BC UTB) were known to have recorded black hairstreak adults and brown hairstreak adults and eggs within the site in recent years. Thus, the Branch was contacted for its detailed records of

eggs/adults of these species. The data, covering the period 2005-2010 was received and reviewed on 18 July 2011.

2.76 A request to BC for any updated information was made in 2013, however no further surveys had been undertaken, or records had been collated, since 2010.

Egg Search

2.77 Adult brown hairstreaks are extremely difficult to survey, spending much of the time up in tree canopies and occurring at low densities. Egg searches of blackthorn (*Prunus spinosa*), the larval foodplant, during winter are a far more practical and reliable method of detecting the presence of this species. In this context, and given the quantity of existing egg search information, no adult searches were undertaken, however a targeted egg search was undertaken by EDP on 26 February 2013.

2.78 The egg search focussed on likely breaches of hedgerows and scrub lines containing blackthorn, with reference to the emerging masterplan at the time (see **Plan EDP 11**). The masterplan has subsequently changed, and the potential breach locations have therefore altered (and mostly reduced), however this data still provides a useful sample of the site as a whole.

2.79 Black hairstreak eggs can also occasionally be found during brown hairstreak egg searches, and therefore the 2013 survey provided an opportunity to search for eggs of both species.

Black Hairstreak

Records Collation

2.80 As described above, BC UTB were known to hold a small number of black hairstreak records from within the site. Further details of the sightings were therefore obtained.

Egg Search

2.81 As noted above, a sample of the blackthorn within the site was searched for brown and black hairstreak eggs in February 2013.

Adult Searches

2.82 Black hairstreaks are also extremely elusive, and all of their life stages are difficult to find, however surveying for adults is considered the most appropriate technique to establish their presence, distribution and abundance. The adults spend nearly all their time in the canopies of trees or dense scrub but at certain times they make short looping flights in and out of the tree tops. Butterflies can be seen from early morning to early evening with a peak of activity around midday.

2.83 Within the site the majority of potential breeding habitat, namely tall dense stands of blackthorn, occurs within the hedgerows/scrub bands on the field boundaries. Thus the survey involved mapping all potentially suitable areas of blackthorn and then undertaking timed searches of the blackthorn patches and surrounding scrub and trees. The searches were conducted by undertaking visual sweeps for black hairstreaks over the canopy of the scrub and trees and using high power close focussing binoculars to investigate potential sightings further. In addition potential nearby nectar sources such as the flowers of bramble (*Rubus fruticosus* agg.), knapweed (*Centaurea nigra*) and thistles (*Cirsium* spp.) were searched for the butterfly.

2.84 The patches, or groups of patches, of blackthorn which were the focus of the survey are shown on **Plan EDP 11** appended to this report. The survey was focussed on the area of the site to the east of the Langford Brook, as the presence of blackthorn in the area to the west was limited to a few scattered specimens.

2.85 The site was first surveyed over four days in 2011, namely 28, 29 and 30 June and 5 July. An updated survey was undertaken on three days in 2013, namely 18 -19 and 26 June and 5 July.

2.86 Surveys were timed to coincide with the likely peak flight period for black hairstreak and determined by the most suitable weather conditions. Surveys were undertaken no earlier than 10.30hrs and no later than 15.00hrs to coincide with highest levels of adult flight activity. The timings and conditions of the surveys are set out in **Table EDP 2.7**.

Table EDP 2.7: Timings and weather conditions during butterfly surveys

Survey Date	Air Temp (°C)	Cloud cover (%)	Wind (Beaufort)
28.06.11	18 - 20	100	1 - 3
29.06.11	18 - 23	40 - 90	1 - 4
30.06.11	17 - 20	50-65	0 - 3
05.07.11	24- 27	70-100 (hazy)	0 - 1
18.06.13	18 - 22	100	0 - 1
19.06.13	23 - 26	75	0 - 1
26.06.13	20 - 23	70	0 - 2
05.07.13	19 - 22	10	0 - 2

2.87 The weather conditions were generally very suitable for recording butterflies. The overcast conditions on 28 June 2011 and 18 June 2013 may have reduced flight activity by some species, including hairstreaks, although the temperatures were warm so this is unlikely to have been a significant limitation.

2.88 In addition to the above, separate adult searches were undertaken for white-letter hairstreak in 2013 (see below for more detail). This species has an overlapping flight period with black hairstreak and therefore provided a further opportunity to record the presence of black hairstreak.

White-letter Hairstreak

2.89 Targeted survey work for white-letter hairstreak butterflies was undertaken by BC specialist surveyors.

Elm Survey and Condition Assessment

2.90 The larval food plant of white-letter hairstreak is elm (*Ulmus* sp.). In preparation for a white-letter hairstreak egg search in 2011 (described in more detail below), all elms on the site and the 50m buffer zone around the site were counted and data collected on species and quality.

2.91 In May 2013, elm type, quantity and quality were also surveyed. The majority of elms were thought to be English elm (*Ulmus procera*) or an elm hybrid or type resembling English elm. Within this category there was, as is usual, a fairly wide range of hybrid material. There were also occasional trees which were much larger-leaved (with bolder stems, twigs and buds) 3 resembling the qualities of wych elm (*Ulmus glabra).* There were also a few examples of a smooth-leaved kind.

2.92 Following the visits in 2011 and 2013 elm was categorised into four quality levels in terms of suitability for white-letter hairstreak; poor, moderate, good or excellent (**Table EDP 2.8**). There was no elm on the site or buffer zone considered to be excellent quality. In the 2011 study it was noted that elm on the site was still being affected by Dutch Elm Disease (DED).

Table EDP 2.8: Elm quality definitions

Quality	Definition
Good	Usually a medium to larger tree, maybe with flower buds developing and wych elm-like qualities. All trees identified to this level of quality were felt to be able to support white-letter hairstreak even if eggs were not found.
Moderate	A medium sized elm or of sufficient, sheltered quality that could possibly be suitable for egg laying, more so if in a favourable location.
Poor	Tree not favourable for egg-laying due to a combination of small size, poor health (canker, DED), very small leaves and buds, and/or poor, exposed location.
Variable	A group of elms showing a combination of the above qualities.

Egg Searches

2.93 Searches of elm for white-letter hairstreak eggs were undertaken during 2011 and updated in 2013. During the first survey, undertaken between 7 and 10 November 2011, elms were systematically sampled by using a long-handled pruner to remove several branches form the top and sides of the elm trees and then searching the samples intensively for eggs.

2.94 An update egg search was undertaken on the 20 and 26 February 2013. The use of the long handled pruner to remove branches was limited during this survey, and instead

elms were examined in reach of the ground or by ladder. Once an egg was found in a particular section (i.e presence confirmed) no further elm was searched in that area.

Adult Searches

2.95 Adult surveys targeted areas where elm was of sufficient quality to support the butterfly but where no eggs had been recorded, where elm was inaccessible or where good stands of elm with ash were present.

2.96 The first survey was conducted on the 30 June 2013 at the beginning of the typical white-letter hairstreak flight period (and during the black hairstreak flight period). Two further surveys were conducted during the white-letter hairstreak flight period on the 11 July and 20 July 2013. Adult surveys were conducted by watching key ash trees, along with blackthorn and elm (respective larval foodplants for black hairstreak and white-letter hairstreak) in suitable weather conditions.

Small Heath

Field Survey

2.97 The small heath butterfly is can be readily detected and identified in its adult stage. All open grassland habitats within the site were surveyed for small heath by walking a zig-zag route to observe/flush any small heath butterflies present (see **Plan EDP 11**).

2.98 The site was surveyed for this species in 2011, and again 2013. In both years the surveys were undertaken in combination with the black hairstreak adult surveys (generally while walking from one blackthorn patch to the next) since their peak adult flight periods coincide. Thus the timings, conditions and site coverage of the small heath survey follows that described above in relation to the black hairstreak survey.

Section 3
Results

3.1 This section sets out the findings of the desk study, updated Extended Phase 1 survey and detailed Phase 2 survey work undertaken at the site during 2012 to 2013. The following should be read in conjunction with the related plans and appendices referenced throughout. The field, woodland, pond and hedgerow numbers used throughout this section refers to those illustrated on the **Plan EDP 1**.

Designated Sites

Statutory Designations

3.2 Internationally important statutory designated sites include Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites. Nationally important statutory designations are termed Sites of Special Scientific Interest (SSSIs) and locally important statutory designations are termed Local Nature Reserves (LNRs).

3.3 The site is not covered by any statutory designated sites, nor do any exist within the search area of the site. However, the following two nationally important designations which lie downstream of the site have been identified through correspondence with Natural England to be Valuable Ecological Receptors (VERs) with potential for downstream impacts via adverse changes in water quality and/or flow within the Langford Brook:

i. Wendlebury Meads and Mansmoor Closes (SSSI); and

ii. Otmoor SSSI.

3.4 These downstream SSSIs will be considered as VERs, and the impact of the potential changes in water quality on their designations assessed, within an Ecological Impact Assessment.

Non-Statutory Designations

3.5 Information on non-statutory designations has been received from TVERC, and is provided in full within **Appendix EDP 1**.

3.6 Within Oxfordshire, non-statutory designations for nature conservation are known as 'Local Wildlife Sites' (LWSs) and LNRs. The site lies within the Ray Conservation Target Area (CTS) (**Appendix EDP 5**), and is covered in part by Gavray Drive Meadows LWS

(the designation for which is included in **Appendix EDP 6**). Based on the LWS citation, the site is notable for the following:

i. Supports lowland meadow which is a UK priority BAP habitat;

ii. Supports reed bunting (*Emberiza schoeniclus*), song thrush (*Turdus philomelos*), bullfinch (*Pyrrhula pyrrhula*), linnet (*Carduelis cannabina*) and great crested newts (*Triturus cristatus*) which are UK Priority BAP species;

iii. Supports the nationally scarce ground beetle, *Bembidion gilvipes*; and

iv. Supports Birds of Conservation Concern[13], namely: bullfinch, reed bunting, song thrush, yellow hammer (*Emberiza citrinella*), linnet, dunnock (*Prunella modularis*) and willow warbler (*Phylloscopus trochilus*).

3.7 Three other LWSs lie within 2km of the site[14], namely:

i. Graven Hill – which lies approximately 2km to the south west of the site is notable for its woodland habitat and the species that it supports, namely grasshopper warbler (*Locustella naevia*) and willow warbler (*Phylloscopus trochilus*), and a number of ancient woodland indicator species;

ii. Bicester Airfield – which lies approximately 1.6km to the north of the site and is designated due to areas of species-rich grassland; and

iii. Meadows NW of Blackthorn Hill – which lies approximately 1.5km to the south east of the site and is designated due to meadow habitat.

3.8 In addition to the above, the south-east corner of Bure Park LNR lies approximately 2km to the north-west of the site, and is designated for its grass meadow, young broad leaved woodland, hedgerows and scrub habitats.

3.9 The following 'Proposed Local Wildlife Sites and Extensions' are also located within 2km of the site:

i. Bicester Airfield Proposed Extension – a proposed extension to the aforementioned Bicester Airfield;

ii. Skimmingdish Lane Fields - There is little information on this area although it includes rough grassland on old allotments, and was previously part of the proposed Bicester Airfield Site; and

[13] Gregory RD, Wilkinson NI, Noble DG, Robinson JA, Brown AF, Hughes J, Procter DA, Gibbons DW, and Galbraith CA (2002) The population status of birds in the United Kingdom, Channel Islands and Isle of Man: an analysis of conservation concern 2002-2007. *British Birds* 95: 410 – 450.
[14] Information supplied by the Thames Valley Environmental Records Centre during 2004.

iii. Jarvis Lane – a linear strip of trees and shrubs along a public right of way in Bicester, with a good range of woody species and a species-rich hedgerow. The site may have value for birds also.

3.10 The locations of the above non-statutory designated sites within 2km of the site are shown in a plan provided by the Thames Valley Environmental Records Centre, which is included as **Appendix EDP 7**.

Evaluation

3.11 Gavray Drive Meadows LWS partially covers the site and requires consideration within an Ecological Impact Assessment (EcIA) as a VER of county value. The remaining non-statutory designations discussed above are not considered to be affected by the proposed development and would be scoped out of an EcIA as a VER owing to their spatial separation and/or lack of ecological connections with site.

Habitats

3.12 The site is predominantly comprised of fields of semi-improved grassland, the majority of which are species-rich, with discrete areas of marshy grassland present within a number of the fields, often associated with ponds. Scrub encroachment has occurred across the site in recent years (post-2006), resulting in an overall reduction in both the quantity and quality of grassland on-site (as discussed in further detail below).

3.13 The north west third of the site supports two fields that were under arable cultivation at the time of the Update Extended Phase 1 survey. A network of hedgerows; a number of which have become outgrown and now form bands of dense scrub, border the fields and are mostly species-poor in nature. Narrow strips of broadleaved woodland border the railway embankment adjacent to the northern site boundary and along the roads adjacent to the site's southern and eastern boundaries. In addition, within the site, broadleaved woodland borders the stream separating the larger of the two arable fields from the remainder of the site and along the northern and western boundaries of Field 7.

3.14 A more detailed description of the habitats present within the site is set out below. The following descriptions should be read in conjunction with **Plan EDP 1** which illustrates the approximate extent of the habitat features on the site.

Semi-improved Grassland

3.15 Grassland fields occupy approximately two thirds of the site and have mostly been unmanaged in recent years, with the exception of Fields F3, F8 and F9 which are cut for hay. These fields support species-poor semi-improved grassland with a low diversity of herbaceous species and a relative lack of scrub encroachment in comparison to other fields within the site.

3.16 The remaining fields support species-rich semi-improved grassland of varying quality, with discrete areas of marshy grassland present within Fields F1, F2, F3, F10 and F11.

3.17 The most species-rich areas of grassland occur in Fields F6, F7, F11 and F12, where a number of species indicative of Lowland Meadow were recorded including great burnet (*Sanguisorba officinalis*), betony (*Stachys officinalis*) and devil's-bit scabious (*Succisa pratensis*).

3.18 As previously detailed, a number of the grassland fields (namely the entirety of Fields 5, 6, 11 and 12 and a portion of Fields 8 and 9) are designated as Gavray Drive Meadows LWS. This designation was attributed to the grassland habitats that these fields supported at the time of designation, which fell within the LBAP criteria for Lowland Meadow.

3.19 The detailed botanical survey of these and the other grasslands on site has determined that these fields continue to support grassland communities consistent with the criteria set out for the selection of County Wildlife Sites, and that two additional fields not currently within the LWS boundary are also considered to meet this criteria, namely Fields 1 and 3. However, at a national level, none of the grasslands are considered to meet the criteria for the UK BAP Priority Habitat Lowland Meadow since the criteria at a national level is much more strict. Full details of the grassland survey are set out within **Appendix EDP 2**.

3.20 The grasslands within Fields 1, 3, 5, 6, 11 and 12 are considered to be of County value owing to them meeting the criteria for CWS selection as LBAP Lowland Meadow habitat. Although they do not currently meet the stricter criteria applied to the UK BAP Priority Habitat Lowland Meadow, which encompasses the NVC communities MG5, MG4 and MG8, a number of the grasslands were shown to have weak affinities with the MG4 community which could indicate that prior to the cessation of management, these fields supported a much more valuable grassland community which would be expected to return with the initiation of a suitable management regime.

3.21 The remaining grasslands on site are of lower botanical value, although are still considered to be of at least local value. Those grasslands supporting marshy areas would also fall within the criteria for the UK BAP Priority Habitat Coastal and Floodplain Grazing Marsh. This Priority habitat is, however designated for its value to species such as wading birds rather than because it is floristically valuable.

Broadleaved Woodland and Mature Trees

3.22 Within the interior of the site, only two bands of broadleaved woodland are present. The broadleaved woodland which lines the stream bordering the eastern boundary of the large arable field is narrow in width and comprised of numerous mature trees, including willow (*Salix* sp.) and ash (*Fraxinus excelsior*), with a limited understorey. The strip of woodland bordering the western and northern boundaries of Field 7 has a shaded ride through the centre. The woodland canopy is dominated by ash, oak

(*Quercus robur*) and field maple (*Acer campestre*), with an understorey comprised predominantly of hawthorn (*Cratauegus mongyna*). This woodland has an impoverished groundflora comprised of dock (*Rumex* sp.) and chickweed (*Stellaria media*), with lots of bare earth present, although a small number of ancient woodland indicator (AWI) species were also recorded, comprising herb Robert (*Geranium robertianum*) and wood false brome (*Bracyhpodium sylvaticum*).

3.23 Other strips of broadleaved woodland occur along the site's southern and eastern boundaries and are likely to have originated from landscape planting alongside the roads. The southern woodland strips are discontinuous and dominated by ash and oak with an understorey of blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus* agg.). The woodland strip along the eastern site boundary is continuous, with a greater diversity of woody species, including hornbeam (C*arpinus betulus*) and dog rose (*Rosa canina*).

3.24 Mature trees occur not only within the woodland strips, but also within a number of the site's hedgerows. A number of these trees were determined to be of potential suitability to roosting bats, as discussed in further detail below.

3.25 The broadleaved woodland strips are considered to be of at least local value and fall within the criteria for both the LBAP and UK BAP Priority habitat Lowland Mixed Deciduous Woodland.

Hedgerows and Scrub

3.26 The site's hedgerows are not under regular management, and subsequently have become very dense and overgrown, resulting in a number now appearing as thick bands of scrub rather than hedgerows. The hedgerows and areas of scrub are predominantly species-poor, typically dominated by hawthorn, midland hawthorn (*Crataegus laevigata*) and blackthorn (*Prunus spinosa*), with willow occurring frequently where hedgerows/scrub are located alongside the site's ditch network. Scrub encroachment has affected a number of fields, with the densest areas present within the eastern portion of the site, although scattered scrub occurs throughout, with the exception of the three fields that are under active management (Fields 3, 8 and 9). These areas of dense and scattered scrub comprise mostly of hawthorn and bramble.

3.27 The network of hedgerows are of at least local value and fall within the criteria for both the LBAP and UK BAP Priority Habitat Hedgerows. The scrub, whilst of limited floristic value is of value for a range of protected/notable species, as detailed below.

Tall Ruderal

3.28 Areas of tall ruderal vegetation occur throughout the southern fields and comprises mostly of willowherb (*Epilobium* sp.), with some common nettle (*Urtica dioica*) and thistles (*Cirsium* sp.).

3.29 The areas of tall ruderal vegetation do not support any notable species of plant and as such are considered to be of negligible intrinsic value.

Arable

3.30 The north western third of the site is comprised of one large and one small arable field, separated by a species-poor hedgerow. Both fields had been recently ploughed at the time of the Update Extended Phase 1 survey.

3.31 The arable fields have been ploughed close to the field boundaries and did not support any valuable assemblages of arable weeds at the time of the Update Extended Phase 1 survey. As such, they are considered to be of negligible intrinsic value.

Aquatic Habitats

Ponds

3.32 The site supports a number of ponds as illustrated on Plan EDP 3. As discussed in greater detail in the relevant species section below all ponds on site were found to be breeding ponds for great crested newts. Individual pond descriptions for those ponds located on site are given below.

Pond 1 (P1)

3.33 This is a relatively small field pond located in the north east corner of Field F8. The pond is broadly circular; approximately 5m wide and long. The pond has shallow sloping sides with approximately a water depth of 0.5m toward the centre. The pond consists mainly of open water with a thick layer of dead vegetative material in the bottom. The margins of the pond are vegetated with small amounts of floating sweet grass, creeping bent and soft rush with an immature willow overhanging the eastern perimeter of the pond.

Pond 2 (P2)

3.34 Pond P2 lies within the eastern extent of Field F7. The pond is elongated and oval in shape, and approximately 5m long and 2m wide. The pond is overhung by dense willow scrub and is heavily shaded. The extent of open water is negligible and the macrophytes diversity is low, consisting of predominantly floating sweet grass, soft rush and creeping bent. The bottom of the pond consists of a dense accumulation of dead vegetative material, and the pond is heavily silted up, deoxygenated and turbid. The deepest part of the pond is characterised by water depths of approximately 0.25m, and it is considered that the pond is subject to frequent drying out. The abundance of macroinvertebrate fauna within the pond is negligible owing to the heavy shading, and poor water quality, of the pond.

Pond 4 (P4)

3.35 Pond P4 is located within Field 1 and constitutes a small (0.5m x 0.5m) pond. There is almost entirely no open water and the pond is full of floating sweet grass, reed mace, sedges and common duckweed. During periods of high water, adjoining small depressions and hollows created following disturbance to the field fill with water to increase the overall area of the pond. Hence, water depth within the pond varies, but within the small pond itself water depth is a maximum of 0.5m.

Pond 5 (P5)

3.36 Pond P5 is located in the south eastern portion of Field 2, adjacent to a line of mature standard oak trees. The pond consists of approximately five linear water bodies which seem to have formed within the furrows of the evident ridge and furrow system. Water levels within the pond fluctuate significantly and during dry periods the ponds hold little to no water. Aquatic vegetation consists of locally dominant floating sweet grass and dense algal growth. The ponds are heavily shaded by overhanging willow trees.

Pond 6 (P6)

3.37 Pond P6 lies along the western boundary of Field F9, within Hedgerow H4. The pond is broadly oval, approximately 4m long and 3m wide. The hedgerow encompasses and overhangs the western half of the pond. The eastern margin of P6 has shallow, sloping margins. During the course of the 2013 great crested newt surveys, the water depth of the pond fluctuated significantly. Generally water depth was no greater than approximately 20cm. The pond supports a dense sediment layer and is heavily silted and turbid. Aquatic vegetation within the pond was dominated by a dense mat of floating sweet grass.

3.38 In addition to the above, there are 6 ponds located off-site within 250m of the site boundary as illustrated on **Plan EDP 3**.

Ditches

3.39 The site supports a number of ditches, most of which are considered to be seasonally wet, as illustrated on **Plan EDP 1**. These ditches are generally located along field boundaries at the base of hedgerows and are of no greater than 0.5m in depth. At the time of survey all of the ditches were dry (with the exception of the wet ditch located within field F10, although it was considered that these could hold some water during periods of high water, certainly not year round.

Evaluation

3.40 Ponds are considered a UK BAP Priority Habitat and are afforded a local BAP. Collectively, the ponds are of relatively low quality in their own right, having been subject to a neglect of appropriate management over many years resulting in low

macrophyte and macroinvertebrate fauna, however owing to the confirmed presence of breeding great crested newts within each of the ponds, as discussed further below, ponds are considered of local to district value.

Species

3.41 The following descriptions of the populations of protected/notable species supported by the site is based on a combination of records received from the desk study, the findings of targeted Phase 2 surveys and incidental observations of species noted while undertaking unrelated field surveys.

Bats

Desk Study

3.42 The 2013 updated desk study returned few records of bats within 2km of the site. Records included a single record of common pipistrelle (*Pipistrellus pipistrellus*) and brown long-eared bat (*Plecotus auritus*), and three records of pipistrelle sp., none of which were from within the site.

Field Surveys

Bat Roosting in Trees

3.43 During the day-time assessment of mature trees within the site a total of 29 trees were identified as having the potential to support roosting bats. The overall distribution of these trees, and their level of bat roost potential, is summarised on **Plan EDP 6**. In addition, detailed descriptions of these trees, and their respective features with potential to support bat roost, are tabulated in **Appendix EDP 8**.

3.44 Of the individual trees that occur within the site, 4 were identified as having high potential, 10 were identified as having medium potential and 15 were identified as having low potential. With the exception of areas of the site to the west of Langford Brook, trees with bat roost potential were relatively evenly distributed across the site, but with a high concentration of medium potential trees within the strip of broadleaved woodland along the northern boundary of Field F7, and a concentration of mostly low potential trees with a single medium potential tree within Hedgerow H6. No conclusive evidence of roosting bats was encountered in any of the trees during the daytime assessments.

Bat Foraging/Commuting Activity

3.45 The following should be read in conjunction with Bat Transect Survey Results Plans (**Plans EDP 7**, **8** and **9**) which show the distribution of bat species across the site. During the 2013 update survey, six species of bat were recorded foraging and commuting

within the site including common pipistrelle, soprano pipistrelle (*Pipistrellus pygmaeus*), *myotis sp.*, a long-eared species (*Plecotus sp.*), noctule (*Nyctalus noctula*) and leisler's bat (*Nyctalus leisleri*).

3.46 During 2013, common pipistrelle (*Pipistrellus pipistrellus*) bats were the most frequently encountered species and were recorded widely across the site. No distinct preference for particular fields within the site is notable from the survey results, although hedgerows and woodland 'edge' habitats, along with areas of semi-improved grassland, are considered to provide moderate foraging and commuting opportunities.

3.47 During the transect surveys, soprano pipistrelle (*Pipistrellus pygmaeus*) bats were also recorded across the site but not as widely, nor in as great an abundance, as common pipistrelle bats.

3.48 With respect to Myotis species, due to the difficulties in identifying species of this genus to species level based on their echolocation calls no attempt is made to differentiate which species of *Myotis* bat were recorded within the site. Low numbers of myotis recordings were made during the transect surveys, with a slightly greater concentration in and around Field F11, a large, unmanaged semi-improved grassland field.

3.49 Noctule bats were infrequently recorded across the site; due to the height at which this species forages it is difficult to relate or attribute their distribution to specific habitat features on the ground.

3.50 Two recordings of long-eared species were made during the course of the 2013 update survey. It is likely that this species is more widespread across the site than this as their quiet echolocation calls are often not detected by bat detectors.

3.51 A single recording of a leisler's bat was made along Hedgerow H8.

3.52 The range of bat species encountered during the surveys undertaken at the site between 2002 and 2013 are summarised within **Table EDP 3.1**. The species encountered during the 2013 surveys are broadly similar to those recorded during the surveys undertaken within previous years. The main differences being that Serotine bats have not been recorded since the 2002 surveys, and whilst long-eared bat was not recorded during 2002 and 2004 it has subsequently been recorded in 2010 and 2013. Furthermore, Leisler's bat was only recorded in 2013, and not in previous surveys.

Table EDP 3.1: Summary of bat species recorded on site during 2002 to 2013 sampling periods

	2002	**2004**	**2010**	**2013**
Common pipistrelle	✓	✓	✓	✓
Soprano pipistrelle	✓	✓	✓	✓
Myotis sp.	✓	✓	✓	✓
Noctule	✓	×	✓	✓
Serotine	✓	×	×	×
Long-eared sp.	×	×	✓	✓

	2002	2004	2010	2013
Leisler's bat	×	×	×	✓

Evaluation

3.53 Detailed surveys have confirmed that the site supports a typical assemblage of common and widespread bat species, which has not changed significantly throughout the period surveys of the site have been undertaken. Despite the presence of good quality foraging habitats throughout the site, the abundance of bats recorded was generally relatively low, which is considered to be a reflection of the site's urban edge location and the resulting high levels of artificial illumination of habitats. In summary, the overall bat assemblage on site is considered to be of no more than local value.

Breeding Bird Surveys

Desk Study

3.54 Relatively few records of birds were returned by TVERC during the course of the desk study. Records of the following species were returned from within the site, including the Red Listed common songthrush and Amber Listed kestrel, green woodpecker, dunnock, common whitethroat and kingfisher.

3.55 In addition to those records directly from the site, records of Red List species pertinent to those habitats supported by the site include the Red Listed grasshopper warbler, and Amber Listed willow warbler and common bullfinch.

Species Richness

3.56 A total of 37 species of bird were recorded within the site during the three breeding bird survey visits. Of those, 23 (i.e. 62%) were confirmed as breeding, based on the behaviour that they exhibited during the survey visits. In addition, a further 9 species (i.e. 24%) were recorded as possible breeders because direct evidence of breeding was not observed, but the species was found to occur within suitable habitat. The remaining 5 species (i.e. 14%) were regarded as non-breeders because they were not observed to display any territorial behaviour and/or because there was a lack of appropriate breeding habitat for them within the boundary of the site.

3.57 Those species recorded during the survey that receive legal protection under Schedule 1 of the Wildlife and Countryside Act (1981), and those that are of conservation concern, in terms of being listed as UK BAP Priority Species or Red/Amber Listed Species of Conservation Concern are listed, along with their on-site breeding status, in **Table EDP 3.2**. **Appendix EDP 9** defines the on-site breeding status, and provides further details on the on-site population (where possible) and distribution of each species recorded.

Table EDP 3.2: Legal protection and conservation status of birds recorded during the survey

Species	Schedule 1	UK BAP	Conservation Status	On-site Status
Barn owl (*Tyto alba)*	✓		Amber List	Non-breeder
Red kite *(Milvus milvus)*	✓	-	Amber List	Non-breeder
Song thrush (*Turdus philomelos*)	-	✓	Red List	Breeding
Starling (*Sturnus vulgaris*)	-	✓	Red List	Breeding
Cuckoo (*Cuculus canorus*)	-	✓	Red List	Possibly breeding
House sparrow (*Passer domesticus*)	-	✓	Red List	Possibly breeding
Bullfinch (*Pyrrhula pyrrhula*)	-	✓	Amber List	Breeding
Common whitethroat (*Sylvia communis*)	-	-	Amber List	Breeding
Dunnock (*Prunella modularis*)	-	-	Amber List	Breeding
Green woodpecker (*Picus viridis*)	-	-	Amber List	Breeding
Willow warbler (*Phylloscopus trochilus)*	-	-	Amber List	Breeding
Mallard (*Anas platyrhynchos*)	-	-	Amber List	Possibly breeding
Stock dove (*Columba oenas*)	-	-	Amber List	Possibly breeding
Swallow (*Hirundo rustica*)	-	-	Amber List	Non-breeder
Swift (*Apus apus*)	-	-	Amber List	Non-breeder

Abundance

3.58 In terms of abundance, two breeding species were found to have confirmed on-site populations recorded in double-figures with a further five species possibly present in double figures. These species were comprised of both common resident passerines and migrant songbirds; wren (*Troglodytes troglodytes*) and common whitethroat both had populations of at least 10 pairs. The following species were also present in good numbers: blackbird (*Turdus merula*), dunnock, robin (*Erithacus rubecula*), black cap

(*Sylvia atricapilla)* and chiffchaff (*Phylloscopus collybita)*. Common whitethroat, chiffchaff and blackcap are largely migrant species.

Distribution

3.59 In terms of distribution, it was clear that a greater assemblage and diversity of birds was present across the mosaic of habitats to the east of the brook. The variety of habitats present offers greater opportunities for nesting and foraging birds and for a wider range of species in comparison to the western Fields F13 and F14. Fields F13 and F14 do provide some foraging opportunities, but nesting sites are limited to the boundary habitats and the short section of Hedgerow H2. The fields to the west of the brook are more disturbed by humans, particularly dog walkers. The central and eastern sections of the site are less disturbed due to the density of undergrowth, with the main footpath being used along the southern boundary of the site.

3.60 The distribution of birds throughout the hedgerow network and areas of woodland to the east of the brook are rather heterogeneous. Some key areas of the site in terms of both assemblage and frequency were noted in the semi-improved grassland fields which contain a high percentage of scrub and tall ruderal vegetation bounded by mature hedgerows and/or mature trees. These areas comprise of Fields F1, F4, F5, F6, F10 F11 and F12.

3.61 The following paragraphs evaluate the importance of 'breeding' and 'potentially breeding' species of conservation concern, together with the overall bird assemblage of the site. The current national and local conservation status of the birds recorded during the survey, along with details regarding their breeding status and distribution, is detailed in **Appendix EDP 9**.

Schedule 1 Species

Barn Owl

3.62 In relation to the survey work undertaken for barn owls, no direct evidence of barn owls nesting on site was recorded during the daytime assessments of mature trees or during the Breeding Birds Survey (BBS) surveys. However, due to their age and structure many of the mature trees on site, including those trees identified as having potential to support roosting bats, also have the potential to support nesting barn owls. Incidentally, during one of the great crested newt torchlight surveys on 4 June 2013 a pair of barn owls were flushed out of T2, a mature oak tree, located along Hedgerow H8. Subsequent inspection of the tree in daylight found no further evidence to confirm that barn owls were nesting in the tree, although it was considered that that nesting of barn owls in the tree cannot be ruled out.

3.63 The site is also considered to support foraging opportunities for barn owls particularly in the drier areas of grassland across the site which are likely to support a good abundance of small mammals.

3.64 Barn owl is considered a Schedule 1 bird species and an Amber List Species of Conservation Concern. Within Oxfordshire, Oxfordshire Ornithological Society (OOS) consider the species an 'uncommon breeding resident.' Owing to the lack of direct evidence of barn owl nesting on site and only the single sighting of two individuals, the population of barn owls on the site is considered of site value.

Red kite

3.65 A single red kite was observed potentially foraging over the site during the BBS, flying across field F11. Red kite has also been observed flying over the site during other ecological surveys. There is no evidence to suggest that this species was breeding on site in 2013, although suitable habitat in the form of mature trees is present and there is potential for this species to use the site for nesting in the future. This species is now widely established across the county and birds will forage and nest close to residential areas. The population of red kites using the site is therefore considered of site value.

Red List Species

Breeding Species

Starling

3.66 One pair of starlings was confirmed breeding within a cavity in a mature oak tree at the eastern end of Hedgerow H6, and the site is considered likely to provide nesting opportunities for a greater number of pairs within cavities in mature trees. The site also provides some foraging opportunities; a group of ten birds were seen aerial hawking for insects above Field F13.

3.67 Starling is a UK BAP species. OOS (2012) state that starlings are still a common resident across the county but recognise that there has been a decline in the breeding population. The on-site breeding population is considered of no more than local value.

Song thrush

3.68 The site provides both good nesting and foraging opportunities for song thrush through the mature hedgerow boundaries and strips of broadleaved. Between five and eight pairs of song thrush were recorded on the site.

3.69 Song thrush is Red List for its long-term 'severe' decline in the UK breeding population (Eaton *et al*., 2009). The species is a UK BAP species. At a county level it is considered a common resident but the OOS speculate that there may be a decline of this species in sub-urban areas.

3.70 Due to the recognition of the site's habitats in the contexts of the local area, and the common status of the species locally, the population of the species recorded on the site is considered of local value.

Possible breeders

House Sparrow

3.71 House sparrow was seen across the site, foraging and calling but no breeding was confirmed. Although suitable nesting habitat is present in the form of areas of hedgerow and scrub, the species is considered more likely to be nesting within adjacent residential properties, and the site is considered more important as a foraging resource. A group of approximately eight birds recorded in and around field F11 represents the greatest level of activity recorded on site, with smaller groups or pairs observed along the southern boundary of field F6, foraging in Field F10 and in Hedgerow H10.

3.72 This species is Red List for its 'severe' decline (greater than 50%) in the UK breeding population over both the last 25 years, and also over the 'long-term' (since 1969) (Eaton *et al*., 2009). The species is afforded a UK BAP. Within Oxfordshire, house sparrows are considered an '*abundant resident*' though populations are showing a recent decline. From the BBS findings it is considered that the on-site population is of no more than local value.

Cuckoo

3.73 A single cuckoo was observed in Hedgerow H8 and heard calling just to the east of the site during the same survey visit. The site is suitable for this species in that it supports a good population of dunnocks (one of the preferred host species of cuckoos), although no evidence to confirm breeding was confirmed.

3.74 Nationally the species is Red Listed due to a breeding decline of more than 50% over the last 25 years as well as longer term decline observed since 1969. The species is also subject to a UK BAP. At a county level, the cuckoo is classed as a 'declining summer visitor'; the OOS (2012) recorded a total of 85 records across the whole county in 2008.

3.75 It is considered that the site is suitable to support a low number of this species. Considering the decline of this species and the habitats available locally, the population of cuckoo on the site is deemed of no more than local level.

Amber List Species

Breeding Species

Green Woodpecker

3.76 The on-site breeding population of green woodpecker is considered to be between one and two pairs. Birds displaying breeding behaviour were recorded within the woodland close to the railway embankment to the north of the site. A bird was also recorded along Hedgerow H6.

3.77 The species is amber-listed due to being a 'Species of European Conservation Concern'. However, it is not considered to be of conservation concern within the UK and, on a regional level, OOS (2012) describe this species as a, '*fairly common resident*'. The population supported by the site is assessed to be of no greater than site value.

Willow Warbler

3.78 During the BBS, two to four pairs of willow warblers were recorded across the site, with birds observed in the eastern section of the site within scrub and wooded areas.

3.79 Willow warbler is Amber List for its 'moderate' decline (between 25-50%) in the UK breeding population over both the last 25 years, and also over the 'long-term' (since 1969) (Eaton *et al*., 2009). The OOS class the species as a '*common summer resident with evidence of a recent decline*'. Despite the decline, this species was still Oxfordshire's commonest breeding warbler in 2008. Considering the above, the on-site population is considered to be of no more than local value.

Common Whitethroat

3.80 Common whitethroat was one of the most numerous breeding species recorded on site, with an estimated 10-18 pairs. The mosaic of habitats present to the east of Langford Brook and the availability of dense scrub for nest sites makes the site ideal habitat for this species.

3.81 The species is amber-listed due to recent moderate (i.e. 25-50%) declines in their UK breeding populations (Eaton *et al*., 2009). Within Oxfordshire, it is considered to be a 'common summer visitor' OOS (2012) but there is no estimation of the number of pairs across the county. Due to the high numbers of pairs supported by a relatively small area of habitat the population of common whitethroats is considered to be of local to district value.

Dunnock

3.82 The site provides good breeding habitat for dunnock, particularly with regard to the areas of dense scrub throughout the site. The on-site breeding population was considered to be between 7 and 14 pairs.

3.83 Dunnock are an Amber List species owing to recent moderate (i.e. 25-50%) declines in their UK breeding populations (Eaton et al., 2009). Within Oxfordshire, OOS (2012) maintain the species to be a 'common and widespread resident'. It is therefore considered that the site supports a population of local value.

Bullfinch

3.84 At least one pair of bullfinch are considered to have nested on site along the central Hedgerow H6. Bullfinch are quite a secretive species and it can be hard to get accurate

estimations of breeding pairs. The site is very suitable for this species which prefers habitats with large areas of scrub so it is likely that the on-site population is greater than one pair. The central and eastern sections of the site also provide a good foraging resource for this species.

3.85 Bullfinch are a UK BAP species and are also Amber Listed due to recent moderate declines in populations. They are classed as a '*common resident*' in the county. The on-site population of this species recorded is considered of no more than local value.

Possible Breeders

Mallard

3.86 Mallard was only seen on site during the BBS during the April visit. The site does not support optimal habitat for this species to nest, but there is some limited potential along Langford Brook and water bodies across the site.

3.87 Mallard is Amber List for its 'moderate' decline (between 25-50%) in its UK non-breeding population size (i.e. wintering population) over both the last 25 years and also over the 'long-term' (since 1969) (Eaton *et al*., 2009). OOS (2012) describe mallard as a '*very common resident* '. The population of mallard recorded on the site is considered to be of *site value*.

Stock Dove

3.88 A single stock dove was recorded singing along Hedgerow H6. The only other observation was of a pair of birds foraging in Field F13.

3.89 Stock dove is Amber List as a result of at least 20% of the European breeding population being found in the UK (Eaton *et al*., 2009). At a county level, OOS (2012) consider this species to be a '*numerous resident'*. The population of stock dove recorded is considered of no more than site value.

Non-breeding Species of Conservation Concern

Amber List

Swifts and Swallows

3.90 For both species, only single birds were seen on one occasion. One swift was seen flying over field F2 on visit 3 and one swallow was seen over field F1; both appeared to be foraging. As both species use buildings for breeding, there is no suitable nesting habitat available on site. Overall, the site seems to be of low value for these species.

The Overall Assemblage

3.91 The assemblage of breeding bird species recorded at the site is considered to be typical for the range and quality of habitats present, and for its geographic and topographic location. Despite the site's location within a relatively urban/residential area, the site supports a range and abundance of species more commonly associated with wider areas of countryside. For its size and location, the site supports a relatively high diversity of species owing to the range of semi-natural, largely undisturbed habitats present, though it is recognised that many of these species are common and widespread in the local area.

3.92 Due to the mosaic of habitats within a small area, the site supports good numbers of migrant songbirds such as common whitethroat, blackcap, chiffchaff and, as part of this 'migrant assemblage', small numbers of willow warbler (*Phylloscopus trochilus)* and lesser whitethroat (*Sylvia curruca).* Many of these species will also be present on the surrounding farmland but are unlikely to be present together over a similar area in the numbers found on site.

3.93 No Schedule 1 bird species have been recorded breeding on the site and indeed only 2 Red Listed species were confirmed to be breeding on site during the BBS. However, as discussed previously, the diversity, and abundance of some species of conservation concern on a site of this size is of note, particularly in a relatively urban setting and a number of bird populations of local value have been recorded. The breeding bird assemblage on the site is therefore considered to be of no more than district value.

Winter Bird Surveys

3.94 The results of the four wintering bird surveys undertaken to date are summarised below and provided in detail in **Appendix EDP 10**, including the species conservation status (both locally and nationally), their abundance and their on-site distribution.

3.95 A total of 41 species of bird were recorded within the site including twelve notable species that either receive legal protection under Schedule 1 of the Wildlife and Countryside Act (1981) or are of conservation concern, in terms of being listed as UK BAP Priority Species or Red/Amber Listed[15] Species of Conservation Concern, as summarised in **Table EDP 3.3**.

Table EDP 3.3: Legal protection and conservation status of birds recorded during the survey

Species	Schedule 1 WCA (1981)	UK BAP	Conservation Status
Fieldfare *(Turdus pilaris)*	✓	-	Red List

[15] Eaton et al *Birds of Conservation Concern 3: the Population and Status of Birds in the United Kingdom, Channel Islands and the Isle of Man*, British Birds, 102, Pages 296-341 (2009)

Species	Schedule 1 WCA (1981)	UK BAP	Conservation Status
Redwing *(Turdus iliacus)*	✓	-	Red List
Red kite *(Milvus milvus)*	✓	-	Amber List
Reed Bunting (*Emberiza schoeniclus*)	-	✓	Red List
Linnet (*Carduelis cannabina*)	-	✓	Red List
Starling (*Sturnus vulgaris*)	-	✓	Red List
Song thrush (*Turdus philomelos*)	-	✓	Red List
House sparrow (*Passer domesticus*)	-	✓	Red List
Bullfinch (*Pyrrhula pyrrhula*)	-	✓	Amber List
Black headed gull (*Chroicocephalus ridibundus*)	-	-	Amber List
Common Gull *(Larus canus*)	-	-	Amber List
Woodcock (*Scolopax rusticola*)	-	-	Amber List
Mistle thrush (*Turdus viscivorus*)	-	-	Amber List
Dunnock (*Prunella modularis*)	-	-	Amber List
Green woodpecker (*Picus viridis*)	-	-	Amber List

3.96 A relatively diverse range of species were recorded on site reflecting the variety of habitats that are present. In addition to common generalist species and winter migrants, a small number of more 'specialist' notable farmland, wetland and woodland species were also recorded in low numbers, namely red kite, linnet, reed bunting, black-headed gull, common gull and woodcock.

3.97 The majority of species were recorded regularly across the survey visits however numbers of certain species fluctuated significantly reflecting their migratory and/or gregarious flocking nature. The highest species counts related to flocks of over wintering redwing (peak count approximately 75 over one survey visit) and common residents which consistently returned double figure counts per survey, including, in order of prevalence, woodpigeon, blackbird, blue tit, magpie, great tit, crow and robin. Flocks of up to 19 black headed gulls were also recorded while records of pied wagtail and fieldfare ranged from none to eight and eleven respectively, reflecting the transient behaviour of these species over winter.

3.98 The distribution of records and species reflects the diversity and extent of habitats on site and the foraging/shelter opportunities that they provide. The most notable of these include the dense fruit bearing hawthorn and blackthorn scrub bounding the fields within the centre of the site and along the southern boundary which were found to support mixed flocks of overwintering thrushes (e.g. redwing, fieldfare, song thrush, mistle thrush and blackbird) and small groups of finches (e.g. bullfinch, chaffinch, goldfinch, greenfinch and linnet). In addition, the arable field within the sites western extent (Field F13) also supported foraging flocks of redwing, black headed gull and pied wagtail while the grassland fields and woodland provide foraging opportunities for a variety of species including most notably a single woodcock. Urban species such as starling and house sparrow were predominantly recorded flying over the site or along the southern boundary associated with the nearby residential gardens and housing while the raptors (buzzard, red kite and sparrowhawk) were each only recorded on single occasions hunting adjacent to the railway line along the sites northern boundary.

Red List Species

3.99 Of the Red Listed species only redwing, fieldfare and song thrush were recorded consistently across the surveys in association with the dense fruit bearing scrub habitat bounding the fields throughout the site and the arable field within the sites western extent. The majority of the thrush flocks recorded comprised of redwings, including a flock of approximately 50 birds foraging within the arable field on the fourth visit. Fieldfares and song thrushes were recorded in smaller groups or individually with a peak count of 7 and 8 birds respectively. Both redwing and fieldfare are listed on Schedule 1 of the WCA and the Red List of birds of conservation concern owing to the small and restricted breeding population present within the UK. They are however a common winter visitors and passage migrants both locally and nationally and as such the wintering populations recorded are considered to be of only local importance. Song thrush has been Red-Listed and is subject to its own BAP owing to a significant decline in population over the last 50 years, however, it is considered to be a common resident in Oxfordshire and the numbers recorded are not considered to be significant within more than a local context.

3.100 Four other Red List species were sporadically recorded on site in low numbers including: linnet on two occasions (max count 3 birds); reed bunting on one occasion (3 birds); starling foraging within Field F8 and flying over the site (max count 20 birds); and house sparrow on two occasions. All of these species are considered to be common residents in Oxfordshire and the habitats present are therefore only considered to be of site to local level importance to these species in winter.

Amber List Species

3.101 All of the amber-listed species recorded on site, with the exception of woodcock, black-headed gull and common gull, are common year-round residents which were also recorded during the breeding bird surveys and have been evaluated accordingly. Bullfinch was the only species recorded in significantly higher numbers during the winter

surveys (max total count of 13 on any survey) which may reflect their inconspicuous nature making them harder to record when trees are in leaf and/or an additional influx of birds in winter owing to the rich foraging opportunities afforded by the scrub habitat on site. The habitats on site are therefore considered to be local importance to this species in winter.

3.102 A single woodcock was flushed on two occasions from marshy grassland and encroaching scrub habitat located at the eastern end of Field 12. Woodcock is Amber Listed due to it being a species of conservation concern in Europe, however, it is common and widely distributed in the UK and there is known to be an over wintering population in Oxfordshire. The scrub, woodland and marshy grassland on site is therefore considered to be at most of local importance to this species.

3.103 Flocks of black-headed gulls were recorded on three of the visits foraging within the arable field around areas of inundation with a maximum count of 19 birds. A single common gull was recorded in the same field on the fourth visit. Both of these species although experiencing non breeding population declines in recent times, hence their amber listing, are common winter visitors in Oxfordshire and the arable habitat utilised for foraging is considered to be of at most local level importance to this species in winter.

Over Winter Assemblage

3.104 Subject to the remaining two surveys, the winter bird assemblage on site is considered to be relatively typical of an urban edge locality in lowland England being biased towards common generalist resident species and common winter migrants. However, owing to the quality of winter foraging afforded by the habitats present, in particular the dense fruit bearing scrub habitat, the species present are generally in relatively high abundance. The unmanaged, and relatively undisturbed areas (in the field centres) of the sward within the large semi-improved grassland fields immediately to the east of Langford Brook (Fields F11 and F12) were found to support a greater number of foraging birds than those managed grassland fields elsewhere on site (Fields F3, F8 and F9). A small number of species that would be more readily associated with the wider countryside are also present in low numbers reflecting the diversity but limited extent of habitats on site. While none of the species recorded are considered to be of significant ecological value at more than a site to local level, given the urban context of the site and the relative diversity and abundance of species recorded the overall assemblage is considered to be of local to district importance to wintering birds.

Updated Great Crested Newt Survey

Desk Study

3.105 The updated desk study returned 9 records from 2003 of great crested newts from a location at pond P9 as shown on **Plan EDP 3**.

Field Surveys

3.106 The findings of the 2013 survey are set out in **Appendix EDP 11** and a summary of the data compared to the previous surveys undertaken as discussed at paragraph 2.43 is summarised in **Table EDP 3.4**.

Table EDP 3.4: Comparison of the 2002 to 2013 great crested newt surveys

Pond	**Great crested newts**				
	2002	**2004**	**2010**	**2012**	**2013**
P1	0	1	1	2	4
P2	2	1	2	2	2
P3	2	10	0	No access	
P4	3	9	5	3	1
P5	0	1	1	3	1
P6	4	3	6	3	5
P7	-	-	-	26	65
P8	-	-	-	0	0
P9	-	-	-	24	5
P10	-	-	-	0	0
P11	-	-	-	26	22
Channel	4	1	-	0	Dry
Total Site Count	**15**	**26**	**15**	**89**	**105**

3.107 In comparison with earlier survey efforts applied to the site, the 2012 and 2013 surveys comprised a greater number of ponds (including those off-site ponds located within 250m of the site boundary). The overall population of great crested newts increased significantly between the 2010 and 2012 sampling periods, which is considered to be a factor of the above. However, comparison between 2012 and 2013 surveys shows that, at the meta-population level (inclusive of all ponds), there has been an increase in the 'total site count' of great crested newts from a peak count of 89 ('*medium population'*) in 2012 to 105 ('*large population'*) in 2013. The peak count of great crested newts recorded at individual ponds within the site in 2013 has not changed significantly from that recorded in 2012, suggesting that, despite any apparent evidence of management, ponds on site remain of value as aquatic habitats. Indeed, during 2013 great crested newts were recorded in each of the on-site ponds. Although great crested newt eggs were only found within ponds P1 and P2 on-site, it is considered that all ponds on site are breeding ponds.

3.108 With respect to those off-site ponds surveyed in 2013, a significantly greater number of great crested newts were recorded in pond P7 along with a reduction in the number within pond P9. This is considered to be partly due to the continued declining quality, and habitat suitability, of pond P9 as opposed to pond P7.

3.109 The population of great crested newts supported by the site is considered of district value.

3.110 In addition to the records of great crested newts gathered as discussed above, those ponds surveyed were found to support a number of smooth newts, and some palmate newts. A summary of the populations recorded throughout the 2002 to 2013 sampling periods is provided in **Table EDP 3.5**.

Table EDP 3.5: Comparison of the results of the 2002 to 2013 great crested newt surveys in respect of smooth newt and palmate newt

Pond	Smooth Newt					Palmate newt				
	2002	2004	2010	2012	2013	2002	2004	2010	2012	2013
P1	1	7	9	11	6	0	0	1	0	0
P2	1	3	1	5	0	0	0	0	0	0
P3	3	5	0	No access		0	0	0	No access	
P4	9	12	3	4	3	0	0	0	0	0
P5	35	10	21	2	4	0	0	0	0	0
P6	8	9	18	14	6	0	0	1	0	0
P7	-	-	-	3	1	-	-	-	0	0
P8	-	-	-	0	0	-	-	-	0	0
P9	-	-	-	6	1	-	-	-	0	0
P10	-	-	-	0	4	-	-	-	0	0
P11	-	-	-	2	4	-	-	-	0	0
Channel	4	2	-	3	Dry	2	0	-	0	Dry
Total Site Count	**61**	**48**	**52**	**50**	**29**	**2**	**0**	**2**	**0**	**0**

Updated Reptile Survey

Desk Study

3.111 No records of reptiles were returned by TVERC during the 2013 updated desk study.

Field Surveys

3.112 Reptile surveys undertaken throughout the site confirmed the presence of common lizard (*Zootoca vivipara*) and grass snake (*Natrix natrix*). Full details of the number of individuals of each reptile species recorded within each of the fields surveyed within the site are given in **Appendix EDP 12**. The distribution and abundance of the reptiles recorded are discussed in detail below, and should be read in conjunction with **Plan EDP 10** which illustrates the reptile survey results in terms of the relative importance of individual fields with respect to widespread reptiles.

Common Lizard

3.113 Common lizards were widely distributed across the site being recorded within every field to the east of Langford Brook. However, the relative abundance of common lizards varied throughout the site. Fields F1, F7, F11 and F12 supported the greatest abundance of common lizards and are considered of high importance to the population supported by the site. These fields show no sign of management over several years and are subject to very low levels of disturbance. Field F1 has an informal footpath along its northern boundary, as do Fields F11 and F12 along their western and eastern boundaries. The field centres however show evidence of public disturbance which is considered to be a major contributing factor to the high numbers of common lizards recorded within these fields. Fields F1 and F7 support a relatively low, open sward which significantly increases UV penetration to the ground thus favouring basking and foraging reptiles. Conversely, Fields F11 and F12 are dominated by tall growing grasses and ruderal species, resulting in a well-developed 'thatch' layer from previous year's fallen growth, which is considered to provide an invertebrate rich food source for common lizards to predate.

3.114 The following fields supported a lower abundance of common lizards but were still considered of relative medium importance due to the presence of peak survey counts of between 5 to 20 common lizards: Fields F3, F5, F6, F8, F9 and F10. The lowest abundance of common lizards was recorded within Field F2 which is considered due to the frequent flooding of this field, and the density of scattered trees and scrub as illustrated on **Plan EDP 1** which significantly reduces light levels in the field.

Grass Snake

3.115 The distribution of grass snakes within the site was poor; no sightings of grass snakes were made within many of the fields surveyed, with only Fields F1, F5, F8, F11 and F12 found to support grass snakes. However, given the mobility, and large home range, of this species it is considered likely that the species would use many of the other fields within the site also at certain times of the year. Certainly, owing to the grass snakes diet which consists primarily of common frogs, it is likely that the species would forage across the whole site as all of the fields are subject to seasonal flooding and can support sufficient aquatic resources to support common frogs, and other amphibians.

3.116 In terms of abundance, grass snakes were recorded only in low numbers within the site, which is partly considered due to the low population size of this species in general. The peak survey count of grass snakes was recorded within Field F12 suggesting this is of greater importance for the species, although the peak count was only higher than Fields F1, F5, F8 and F11 by one individual. Of note is the presence of grass snakes within Fields F1, F11 and F12 which were also found to be of importance to common lizards as discussed above.

Evaluation

3.117 The survey effort applied to the site during the 2013 update reptile survey was designed to include a sufficient number of survey visits to estimate the population size class of the species recorded, based on peak survey counts (as discussed at paragraph 2.48). The peak survey count of common lizards recorded across all twenty visits was 146, which represents a *large population*. The peak survey count of grass snakes was 3, representing a *small population*. Within the wider context of the site, the population of widespread reptiles present is considered to be of district level importance.

Updated Badger Survey

Desk Study

3.118 The updated desk study returned 2 records of badgers within 2km of the site, including one record of a dead badger just to the south of Gavray Drive, which adjoins the site along its southern boundary.

Field Surveys

3.119 The site offers moderately good foraging opportunities for badgers within the semi-improved grassland fields, dense hedgerows and woodland, although the site conditions are considered as generally unsuitable for sett building.

3.120 The badger walkover survey of the site did not record any evidence of badger presence, and due to the lack of any evidence of badger activity during numerous visits to the site over a period of ten years as discussed at paragraph 2.55, it is considered that badgers are not present on the site. As such, badgers should not pose a constraint to the development of the site.

Water Vole Survey

Desk Study

3.121 The 2013 desk study returned four records of water vole within 2km of the site, the nearest record, dated 2000, being immediately north of the northern boundary of the large arable field located to the west of Langford Brook (Field F13).

Field Surveys

3.122 No evidence of water vole activity was recorded during the detailed site survey for this species. The following paragraphs detail observations made on the section of Langford Brook within the site subject to survey in relation to their potential to support water voles.

3.123 The brook is a relatively small stream flowing north to south through the centre of the site. The ditch contains steep sides and areas of scrubby vegetation, with some mature trees which have exposed root systems close to the watercourse. The vegetation along the banksides varied greatly from areas which were almost entirely bare soil, to grassy banks and some areas of more ruderal vegetation. Water voles prefer sites with wide swathes of riparian vegetation[16] and as such the conditions along the ditch are considered unfavourable.

3.124 Furthermore, despite the suitability of the banks for burrow excavation, the majority of the banks lacked sufficient vegetation cover and were heavily shaded. The northern end of the Brook was found to be culverted under the railway embankment. It was considered that the ditch may be prone to seasonal drying out, or low water depth, at certain times of the year. The preferred water depth for water voles is approximately 1m which suggests that the ditch would not support suitable water depth throughout the breeding season, and as such the likelihood of the ditch supporting a breeding population is heavily reduced.

Otter Survey

Desk Study

3.125 No records of otters were returned from TVERC in the updated desk study.

Field Surveys

3.126 The walkover survey concluded that the areas of dense scrub, woodland and rough grassland to the east of the brook may be of interest to otters 'lying up' during the day. In addition, the Brook was considered to offer some suitable foraging opportunities for otters but this would be dependent on the presence of a sufficient fish stock.

3.127 No direct evidence of otters was identified during the walkover survey and otters were not considered to offer a constraint to the development of the site.

Harvest Mouse Survey

Desk Study

3.128 No records of harvest mouse were returned by TVERC during the 2013 updated desk study.

Field Surveys

3.129 The site is considered to support suitable habitat for harvest mice throughout. The presence of large areas of tall, unmanaged grassland with a significant scrub interface

[16] Strachan, R. et al. (2011) *Water Vole Conservation Handbook Third Edition*. Abingdon, UK.

including dense patches of bramble interspersed with grassland provides an abundance of suitable habitats for foraging and nest building harvest mice.

3.130 The detailed hand search of the site, as discussed in paragraph 2.58, found 4 harvest mouse nests in the following locations (field numbers represent those illustrated on **Plan EDP 1**):

i. South-east corner of Field F13;

ii. Along the southern boundary of Field F11;

iii. On the eastern boundary of Field F10; and

iv. In the south-west corner of Field F1.

3.131 Although only a small number of harvest mouse nests were recorded, it is considered that, as discussed above, the site supports an abundance of suitable habitats and as such it is expected that harvest mice would be present throughout the site. Particular fields considered to be of value to harvest mice include those fields supporting rough tussocky grassland, uncut fields, and particularly those interspersed or bordered with scrub, as such habitats are favourable to harvest mice[17].

Invertebrates

3.132 The site supports a varied mosaic of grassland, woodland, scrub and edge habitats that combine to satisfy the multiple requirements of a wide range of invertebrate species.

3.133 No invertebrate species that are afforded direct legal protection under any UK or European legislation were encountered during the survey. Full details of the notable species recorded during the 2013 detailed invertebrate survey are provided within the attached invertebrate survey report (**Appendix EDP 4**).

3.134 Overall it is considered that the invertebrate species assemblage supported by the site is of district value.

3.135 Specific discussion of the value of the site for butterflies is provided below.

Butterflies

Marsh Fritillary

3.136 No marsh fritillary larval webs have been found in any parts of the site during the annual larval web searches undertaken between 2006 and 2013. No adults were recorded during the targeted survey in 2013.

[17] Creswell, W. J. *et al.* (2012) UK BAP Mammals. Interim Guidance for Survey Methodologies, Impact Assessment and Mitigation. Southampton, UK.

3.137 During the course of the annual larval web searches it was noted that the habitat quality for the marsh fritillary was deteriorating owing to vegetation succession in the absence of any management. The devil's bit scabious had disappeared from some parts of the site where it was recorded in the early years of monitoring, having been shaded out by surrounding vegetation. In addition, where stands of the food plant persist, these are becoming increasingly overgrown with coarse grasses and bramble and, as a result, the basal leaves are less accessible to egg-laying females.

Evaluation

3.138 No evidence of marsh fritillary has been recorded within the site since 2005, and the deterioration of habitat quality reduces the likelihood of natural colonisation. In addition, no additional records of this species have been identified within a 15km radius of the site during the course of the updated desk study. It is therefore considered highly unlikely that population of this butterfly persists at the site.

Brown Hairstreak

Records Collation

3.139 The brown hairstreak records for the site received from the BC UTB are included in **Appendix EDP 13** to this report and summarised below.

3.140 BC UTB's most comprehensive search of the site for brown hairstreak eggs was undertaken last winter (2010/2011). The results of this search are detailed within **Appendix EDP 13**, and summarised graphically on **Plan EDP 12**. The search found eggs in many of the hedgerows and blackthorn scrub in the eastern half of the site, with 478 eggs recorded during 40hrs of search effort. The highest egg count for one hedgerow section was 91, recorded along the southern edge of the scrub band which forms the northern boundary of Field 10 (see **Plan EDP 12**). Comparisons with previous years are not straightforward, as the site coverage and survey effort during previous searches was different, however there is a strong indication that the numbers of eggs present increased significantly over the period 2005-2010.

3.141 Adult sightings are rare, however between 2005 and 2010 three sightings of adult brown hairstreaks were made by recorders from BC UTB. Their locations and dates are detailed within **Appendix EDP 13**, and illustrated on **Plan EDP 12**.

Egg Search

3.142 During the 2013 egg search, a total of 8 brown hairstreak eggs were recorded in four different blackthorn stands. The full details of the search, including minutes of survey effort, are provided in **Table EDP 3.6**, which should be read in conjunction with **Plan EDP 11** showing the search areas.

Table EDP 3.6: Summary of brown hairstreak egg search 2013

Blackthorn patch ID (ref Plan EDP 11)	Total survey effort (minutes)	No. eggs found
A	20	1
E	30	2
F	20	0
G	40	2
I	20	0
M	20	0
N	20	0
P	10	0
R	5	2
S & T	30	0
V	30	0
W	40	1

3.143 The findings of BC UTB's brown hairstreak egg search during winter 2010/11 confirm that the site supports a strong colony of this species. Eggs were found in low numbers in many of the hedges and in moderate to high numbers in a smaller number of hedges. The abundance of young unmanaged blackthorn, together with mature trees (particularly ash and oak and nectar sources), within the site provide optimal conditions for adults, eggs and larvae of the species.

3.144 It is not possible to compare the results of the 2013 egg search with the collated records due to the differences in sampling and surveyor effort, however the 2013 survey findings confirm the presence of the breeding colony. The abundance of eggs (and size of colony) is likely to fluctuate significantly from year to year depending on the weather conditions experienced during the preceding summer (i.e. during the adult flight period). It is likely that the poor/wet summer in 2012 reduced breeding success resulting in lower egg numbers on site the following winter, however conditions on site continue to be suitable and numbers may have recovered following the warm summer in 2013.

Evaluation

3.145 Brown hairstreak is a UK BAP priority species owing to its population decline. The strong colony present within the site, which appears to have expanded in recent years as the site has fallen into neglect, is considered to be of value at the county level.

Black Hairstreak

Records Collation

3.146 Between 2006 and 2010 recorders from BC UTB made eleven sightings of adult black hairstreaks. Their locations and dates are detailed within **Appendix EDP 13**, and illustrated on **Plan EDP 12**. Eight of these eleven sightings were made near the scrub band at the eastern end of field 12 (see **Plan EDP 12**). No records of black hairstreak eggs were reported.

Egg Search

3.147 No black hairstreak eggs were recorded during the 2013 brown hairstreak egg search.

Adult Searches

3.148 During the 2011 survey, one possible black hairstreak was observed on 5 July (at approximately 12.55hrs) between the two sections of blackthorn patch D (see **Plan EDP 11**). The butterfly was small and dark and is considered to have been either black hairstreak or white-letter hairstreak. The butterfly flew briefly over the blackthorn and then disappeared into a young elm tree *(Ulmus* spp.) before it could be identified. This behaviour suggests it is marginally more likely to be white-letter hairstreak, which breeds on elm, however this cannot be taken as definitive.

3.149 No black hairstreak butterflies were recorded during the three targeted surveys in 2013, however two adults were recorded during the first white-letter hairstreak adult search on 30 June 2013. Both butterflies were seen beside a large ash tree on the western boundary of Field 9 (see **Plan EDP 14**).

3.150 It is not possible to reliably estimate the size of the black hairstreak population supported by the site based on the available data. However the 2013 survey findings provide confirmation of continued presence and, taken with 11 further adult sightings between 2006 and 2010, suggest that a relatively stable breeding colony is present although no eggs have been found. Of the total of 13 known sightings, 10 of these were in close proximity to the large scrub band dividing Fields 12 and 13 from Field 9, suggesting this is a key habitat area for the species.

Evaluation

3.151 While not a UK BAP priority species, the black hairstreak has a very restricted distribution in the UK and Oxfordshire is at the western edge of its range. In this context the supported by the site is considered to be of value at county level.

White-letter Hairstreak

Elm Assessment and Egg Searches

3.152 **Table EDP 3.7** summarises the findings elm assessments and white-letter hairstreak egg searches undertaken in 2011 and 2013. These findings, together with the locations of the sample areas (A-P), are illustrated on **Plan EDP 13** and **14**.

Table EDP 3.7: Summary of white-letter hairstreak elm assessment and egg searches

Sample Area (Plan EDP 13 & 14)	Elm group size*	No. Elms (2013)	Elm quality (2013)	No. Eggs found (2011)	No. Eggs found (2013)
A	L	16	Moderate	0	0
B	SG	1	Good	2	3
C	L	2	Poor	0	0
D	L	25	Moderate	4	0
E	L	9	Good	1	1
F	L	15	Moderate	0	1
G	L	23	Good	6	2
H	SG	2	Good	0	1
I	SG	7	Moderate	3	0
J	L	20	Moderate	0	0
K	L	14	Moderate	2	0
L	L	12	Poor	0	0
M	L	12	Moderate	1	0
N	L	5	Poor	0	0
O	SG	5	Moderate	1	0
P	LG	Not surveyed		5	Not surveyed

* *Elm group size*: SG = Small Group (2-9); LG = Large Group (>9); L = Large Linear Groups

3.153 The 2013 assessment found most elms to be sufficient quality to support white-letter Hairstreak. 53% of elms were of moderate quality and 27% were good quality. 20% of elms were poor quality and not favourable for egg laying. All elms were in large groups; large linear groups or small groups. There was a decrease in the number of elms recorded at sample area A, as elms had been removed, damaged as part of the Bicester chord railway development.

3.154 The difference between the number of eggs recorded in 2011 (25) and 2013 (8) does not indicate a population decline, due to the difference in methodologies used and the poor 2012 summer affecting egg laying.

3.155 All eggs found in 2013 were recorded on elms of good or moderate quality. The eggs were located in five (33%) of the surveyed sample areas (A – O), compared to nine sample areas in 2011. However eggs were recorded in two sample areas (H and F), where they were not recorded in 2011. Eggs were not found in sample areas D, I, K, M or O where they were recorded in 2011.

Adult Searches

3.156 Four white-letter hairstreak adults were recorded in three sample areas (A, E and G) on the 11 and 20 June 2013 (see **Plan EDP 14**). No eggs had been recorded in section A but elms were of sufficient quality for egg laying.

3.157 Overall, eggs and adults have been found in eleven (69%) of the sample areas around the site in during 2011 and 2013. This suggests a relatively strong and stable breeding colony of the species is present.

Evaluation

3.158 White-letter hairstreak is a UK BAP priority species owing to its population decline but is still relatively widespread in England and Wales. The colony present within the site is considered to be of value at the district level.

Small Heath

3.159 No small heath butterflies were observed in the site during any of the surveys in 2011. However, a total of 5 adults were recorded during the 2013 surveys, as detailed in **Table EDP 3.8** and illustrated on **Plan EDP 11**.

Table EDP 3.8: Summary of small heath adult searches 2013

Survey date	No. adults seen	Location
18.06.13	1	Boundary between Fields 11 and 12 (gap at western end).
19.06.13	1	Eastern edge of Field 12.
	2	Centre of Field 9.
26.06.13	1	Eastern edge of Field 12.
05.07.13	0	-

3.160 The lack of recordings in 2011, and small numbers recorded in 2013 (a 'peak adult count' of 3), suggest that a relatively small population is present. Based on the availability of suitable breeding habitat within the site, together with a general lack of suitable habitat in the immediate surroundings, it is likely that the species is breeding within the site.

Evaluation

3.161 Small heath is a UK BAP priority species owing to its population decline but is still relatively widespread in the UK. The seemingly small colony present within the site is therefore considered to be of value at the district level.

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Appendix EDP 1
Thames Valley Environmental Records Centre Data Return

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Common Name	Scientific Name	Abundance/Stage/Record Type	Date	Grid Ref	Grid Ref Qualifier	Location	Further Location info
Round-fruited Rush	Juncus compressus		26/06/2003	SP612213		Meadows NW of Blackthorn Hill	Meadow C
Bluebell	Hyacinthoides non-scripta	locally abundant	28/04/1987	SP588204		Graven Hill	
Bluebell	Hyacinthoides non-scripta		14/06/2002	SP588204		Graven Hill	
Bluebell	Hyacinthoides non-scripta	Locally Frequent	14-Jul-11	SP588204		Graven Hill	Woodland
Tubular Water-dropwort	Oenanthe fistulosa		26/06/2003	SP612213		Meadows NW of Blackthorn Hill	Meadow C
Freshwater Crayfish	Austropotamobius pallipes		28/06/1994	SP58712148		A41 BICESTER (LANGFORD BROOK)	
beetle (Coleoptera)	Bembidion (Semicampa) gilvipes	Collection from 'grass-tussocks'	16/01/2003	SP5922	1 km record	Gavray Drive Meadows	feld 12
beetle (Coleoptera)	Bembidion (Semicampa) gilvipes	Collection from 'grass-tussocks'	16/01/2003	SP598222		Gavray Drive Meadows	field 11
beetle (Coleoptera)	Sepedophilus pedicularius	Collection from 'grass-tussocks'	16/01/2003	SP598222		Gavray Drive Meadows	Field 11
beetle (Coleoptera)	Sepedophilus pedicularius	Collection from 'grass-tussocks'	16/01/2003	SP6022	1 km record	Gavray Drive Meadows	Field 5
beetle (Coleoptera)	Amidobia talpa	Collection from 'grass-tussocks'	16/01/2003	SP5922	1 km record	Gavray Drive Meadows	Field 6
beetle (Coleoptera)	Philonthus fumarius	Collection from 'grass-tussocks'	16/01/2003	SP5922	1 km record	Gavray Drive Meadows	Field no number
Grizzled Skipper	Pyrgus malvae	Adults	14/06/2002	SP588204		Graven Hill	
Wood White	Leptidea sinapis	10 to 29	1995	SP601245			
Wood White	Leptidea sinapis	10 to 29	1995	SP601245		Whitecross Green Wood	
Brown Hairstreak	Thecla betulae	1	27/10/2005	SP599219		Gavray Drive Meadows	field 1, middle of northern boundary
Brown Hairstreak	Thecla betulae	1	27/10/2005	SP599220		Gavray Drive Meadows	field 2, northern boundary
Brown Hairstreak	Thecla betulae	2	27/10/2005	SP599222		Gavray Drive Meadows	field 7, middle of northern boundary
Brown Hairstreak	Thecla betulae	2 eggs	27/10/2005	SP59942226		Gavray Drive Meadows	Middle of northern boundary of Field 7
Brown Hairstreak	Thecla betulae	1 egg	27/10/2005	SP59992199		Gavray Drive Meadows	Middle of northern boundary of Field 1
Brown Hairstreak	Thecla betulae	1 egg	27/10/2005	SP60002204		Gavray Drive Meadows	Northern boundary of Field 2
Brown Hairstreak	Thecla betulae	1	27/10/2005	SP600221		Gavray Drive Meadows	field 3, middle of northern boundary
Brown Hairstreak	Thecla betulae	4	27/10/2005	SP600222		Gavray Drive Meadows	field 5, NE corner
Brown Hairstreak	Thecla betulae	1 egg	27/10/2005	SP60052216		Gavray Drive Meadows	Middle of northern boundary of Field 3
Brown Hairstreak	Thecla betulae	4 eggs	27/10/2005	SP60092222		Gavray Drive Meadows	NE corner of Field 5
Brown Hairstreak	Thecla betulae	1	27/10/2005	SP601219		Gavray Drive Meadows	field 17, middle of western boundary
Brown Hairstreak	Thecla betulae	1 egg	27/10/2005	SP60132201		Gavray Drive Meadows	Middle of western boundary of Field 17
Brown Hairstreak	Thecla betulae	1	27/10/2005	SP602221		Gavray Drive Meadows	field 17, middle of northern boundary
Brown Hairstreak	Thecla betulae	1 egg	27/10/2005	SP60242206		Gavray Drive Meadows	Middle of northern boundary of Field 17
Black Hairstreak	Satyrium pruni	2 Adults	15/06/2008	SP597222		Gavray Drive Meadows	
Black Hairstreak	Satyrium pruni	2 Adults	15/06/2007	SP5979222256		Gavray Drive Meadows	
Black Hairstreak	Satyrium pruni	1 Adult	22-Jun-10	SP598221		Gavray Drive Meadows	West
Black Hairstreak	Satyrium pruni	2 Adults	15/06/2007	SP5983222084		Gavray Drive Meadows	
Black Hairstreak	Satyrium pruni	3 Adults	27/06/2006	SP599221		Gavray Drive Meadows	Gavray Drive
Black Hairstreak	Satyrium pruni	2 Adults	22/06/2006	SP599221		Gavray Drive Meadows	Gavray Drive
Marsh Fritillary	Euphydryas aurinia		Jun-06	SP599222		Gavray Drive Meadows	
Wall	Lasiommata megera		22/08/1990	SP580212			
Wall	Lasiommata megera	1 Adult	1994	SP601245		Whitecross Green Wood	
Small Heath	Coenonympha pamphilus	1 Adult	06/07/1997	SP5823	1 km record	Bicester N	
Small Heath	Coenonympha pamphilus	Adults	26/06/2002	SP598222		Gavray Drive Meadows	Gavray Drive western fields
Small Heath	Coenonympha pamphilus	1 to 9	05/07/1991	SP601219		Oxon tetrad 6020	
Small Heath	Coenonympha pamphilus	1 to 9	05/07/1991	SP601221		Oxon tetrad 6020	
Small Heath	Coenonympha pamphilus	2 to 9	1997	SP603228		Launton Churchyard	
Ghost Moth	Hepialus humuli		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Oak Hook-tip	Watsonalla binaria		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Small Phoenix	Ecliptopera silaceata		06/06/2004	SP600240		Bicester Airfield	explosives dump area
White Ermine	Spilosoma lubricipeda		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Buff Ermine	Spilosoma luteum		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Cinnabar	Tyria jacobaeae		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Cinnabar	Tyria jacobaeae	Adults	24/06/2002	SP602220		Gavray Drive Meadows	Gavray Drive field 22 (renamed field 17)
Small Square-spot	Diarsia rubi		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Broom Moth	Melanchra pisi		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Shoulder-striped Wainscot	Mythimna comma		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Knot Grass	Acronicta rumicis		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Dusky Brocade	Apamea remissa		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Large Nutmeg	Apamea anceps		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Mottled Rustic	Caradrina morpheus		06/06/2004	SP600240		Bicester Airfield	explosives dump area
Smooth Newt	Lissotriton vulgaris	4 Adults	28/04/2003	SP601223		Bicester	
Smooth Newt	Lissotriton vulgaris	16 Adults	04/05/2003	SP601223		Bicester	
Smooth Newt	Lissotriton vulgaris	25 Adults	21/05/2003	SP601223		Bicester	
Smooth Newt	Lissotriton vulgaris	6 Adults	11/04/2003	SP601223		Bicester	
Smooth Newt	Lissotriton vulgaris	<4 Adults	Apr-02	SP60692255		Ditch, Sherwood Close, Launton	
Great Crested Newt	Triturus cristatus	26 Females	04/05/2003	SP601223		Bicester	

Common Name	Scientific Name	Abundance/Stage/Record Type	Date	Grid Ref	Grid Ref Qualifier	Location	Further Location info
Great Crested Newt	Triturus cristatus	26 Males	21/05/2003	SP601223		Bicester	
Great Crested Newt	Triturus cristatus	15 Females	21/05/2003	SP601223		Bicester	
Great Crested Newt	Triturus cristatus	21 Males	11/04/2003	SP601223		Bicester	
Great Crested Newt	Triturus cristatus	14 Females	11/04/2003	SP601223		Bicester	
Great Crested Newt	Triturus cristatus	69 Males	28/04/2003	SP601223		Bicester	
Great Crested Newt	Triturus cristatus	29 Females	28/04/2003	SP601223		Bicester	
Great Crested Newt	Triturus cristatus	51 Male	04/05/2003	SP601223		Bicester	
Great Crested Newt	Triturus cristatus	egg	13/04/2004	SP61682248		Paddock adj. to Launton Brook	
Common Toad	Bufo bufo	15 Adults	28/04/2003	SP601223		Bicester	
Common Toad	Bufo bufo	11 Adult	04/05/2003	SP601223		Bicester	
Common Toad	Bufo bufo	6 Adults	21/05/2003	SP601223		Bicester	
Common Toad	Bufo bufo	9 Adults	11/04/2003	SP601223		Bicester	
Common Frog	Rana temporaria	11 Adult	28/04/2003	SP601223		Bicester	
Common Frog	Rana temporaria	18 Adults	04/05/2003	SP601223		Bicester	
Common Frog	Rana temporaria	22 Adults	21/05/2003	SP601223		Bicester	
Common Frog	Rana temporaria	6 Adults	11/04/2003	SP601223		Bicester	
Common Frog	Rana temporaria	1 Adult	Apr-02	SP60692255		Ditch and pond, Sherwood Close, Launton	
Common Kestrel	Falco tinnunculus	2	19/08/2002	SP59702225		Gavray Drive Meadows	field 9 (renamed field 11)
Common Kestrel	Falco tinnunculus	4 Juveniles	12/06/2005	SP615217		Launton	
Common Kestrel	Falco tinnunculus	5 Juveniles	28/06/2004	SP615222		Launton	
Northern Lapwing	Vanellus vanellus	300	23-Feb-01	SP578217		Bicester	
Common Swift	Apus apus	Pairs	01/05/2009- 30/07/2009	SP577225		Sites along and near Kingsclere Road/ Chalvey Road, Bicester	
Common Swift	Apus apus		01/05/2010- 30/07/2010	SP577225		Sites along and near Kingsclere Road/Chalvey Road and Aldbourne Cres, Bicester	
Common Swift	Apus apus		01/05/2010- 30/07/2010	SP578224		Colne Close, Bicester	
Common Swift	Apus apus		01/05/2010- 30/07/2010	SP578225		Evenlode Close, Bicester	
Common Swift	Apus apus	nest record	01/05/2008- 31/08/2008	SP580225		Kings End, Bicester	
Common Swift	Apus apus	Pairs	01/05/2009- 30/07/2009	SP580225		West side of Kings End, Bicester	
Common Swift	Apus apus		01/05/2010- 30/07/2010	SP580225		West side of Kings End, Bicester, victorian properties	
Common Swift	Apus apus	nest record	01/05/2008- 31/08/2008	SP58202231		7 Cemetery Road, Bicester	
Common Swift	Apus apus	Pairs, nest record	01/05/2009- 30/07/2009	SP58202231		7, Cemetery Road, Bicester	
Common Swift	Apus apus	nest	01/05/2010- 30/07/2010	SP58202231		7, Cemetery Road, Bicester	
Common Swift	Apus apus	Pairs	01/05/2009- 30/07/2009	SP582230		New Road, Bicester	
Common Swift	Apus apus	nest	01/05/2010- 30/07/2010	SP582230		New Road, Bicester	
Common Swift	Apus apus		01/05/2010- 30/07/2010	SP582230		New Road, Bicester	
Common Swift	Apus apus	Pairs, nest record	01/05/2009- 30/07/2009	SP58232291		22, Field Street, Bicester	
Common Swift	Apus apus	nest	01/05/2010- 30/07/2010	SP58232291		22, Field Street, Bicester	
Common Swift	Apus apus	nest	01/05/2010- 30/07/2010	SP5838622327		Henley House, Causeway, Bicester	
Common Swift	Apus apus	nest record	01/05/2008- 31/08/2008	SP584223		Henley House, Causeway, Bicester	
Common Swift	Apus apus	Pairs, nest record	01/05/2009- 30/07/2009	SP584223		Henley House, Causeway, Bicester	
Common Swift	Apus apus		01/05/2010- 30/07/2010	SP586239		Southwold Estate, off of Buckingham Road, Banbury	
Common Kingfisher	Alcedo atthis		14/08/2003	SP60202345		Bicester Airfield	area 17 Stream
Hoopoe	Upupa epops		20/11/1980	SP588204		Graven Hill	Royal ordnance base, Graven Hill
Green Woodpecker	Picus viridis		28/04/1987	SP588204		Graven Hill	
Green Woodpecker	Picus viridis		16/01/2003	SP5922	1 km record	Gavray Drive Meadows	field 6
Sky Lark	Alauda arvensis	1	21/07/2009	SP608210		Meadows NW of Blackthorn Hill	Meadow NW of Blackthorn Hill South East Field
Sky Lark	Alauda arvensis		12/07/2004	SP611215		Meadows NW of Blackthorn Hill	Blackthorn Hill Extension Meadows 1,2 and 4
Sky Lark	Alauda arvensis	1	21/07/2009	SP612213		Meadows NW of Blackthorn Hill	Large Field
Sky Lark	Alauda arvensis	1	21/07/2009	SP612213		Meadows NW of Blackthorn Hill	Long thin field
Hedge Accentor	Prunella modularis		26/06/2002	SP598222		Gavray Drive Meadows	Gavray Drive western fields
Song Thrush	Turdus philomelos		26/06/2002	SP598222		Gavray Drive Meadows	Gavray Drive western fields
Common Grasshopper Warbler	Locustella naevia		28/04/1987	SP588204		Graven Hill	
Common Whitethroat	Sylvia communis		26/06/2002	SP598222		Gavray Drive Meadows	Gavray Drive western fields
Willow Warbler	Phylloscopus trochilus		28/04/1987	SP588204		Graven Hill	
Common Bullfinch	Pyrrhula pyrrhula		12/07/2004	SP607212		Meadows NW of Blackthorn Hill	Blackthorn Hill Extension Meadow 3
Common Bullfinch	Pyrrhula pyrrhula		12/07/2004	SP611215		Meadows NW of Blackthorn Hill	Blackthorn Hill Extension Meadows 1,2 and 4
Common Bullfinch	Pyrrhula pyrrhula	1	21/07/2009	SP612213		Meadows NW of Blackthorn Hill	Hedgerow
Common Bullfinch	Pyrrhula pyrrhula	1	21/07/2009	SP612213		Meadows NW of Blackthorn Hill	Small field (MG4)
Yellowhammer	Emberiza citrinella	1	07-Jul-99	SP605205		Bicester	
Yellowhammer	Emberiza citrinella		12/07/2004	SP607212		Meadows NW of Blackthorn Hill	Blackthorn Hill Extension Meadow 3
Yellowhammer	Emberiza citrinella	1	21/07/2009	SP608210		Meadows NW of Blackthorn Hill	Meadow NW of Blackthorn Hill South East Field
Yellowhammer	Emberiza citrinella	1	21/07/2009	SP612213		Meadows NW of Blackthorn Hill	Large Field
Yellowhammer	Emberiza citrinella		12/07/2004	SP614216		Meadows NW of Blackthorn Hill	Blackthorn Hill Proposed Extension Meadows, Meadow 5
European Water Vole	Arvicola amphibius		Jun-03	SP580230		Bicester	
European Water Vole	Arvicola amphibius		08/04/1999	SP580236		Ray Catchment	

Common Name	Scientific Name	Abundance/Stage/Record Type	Date	Grid Ref	Grid Ref Qualifier	Location	Further Location info
European Water Vole	Arvicola amphibius		Sep-03	SP581228		River Bure, Bicester	
European Water Vole	Arvicola amphibius		Feb-00	SP595226		Ray Catchment	
West European Hedgehog	Erinaceus europaeus	1	18/10/2006	SP582222		Bicester	
West European Hedgehog	Erinaceus europaeus	1	30/10/2006	SP582229		Bicester	
West European Hedgehog	Erinaceus europaeus	2	19/08/2006	SP585239		Bicester	
West European Hedgehog	Erinaceus europaeus	1	31/08/2007	SP587238		Bicester	
West European Hedgehog	Erinaceus europaeus	3	31/08/2007	SP587238		Bicester	
West European Hedgehog	Erinaceus europaeus	2	18/10/2006	SP587241		Bicester	
West European Hedgehog	Erinaceus europaeus	1	07/11/2006	SP591232		Churchill Road, Bicester	
West European Hedgehog	Erinaceus europaeus	1, dead on road	14/05/2006	SP592226		100m SW of bridge over Bicester Ring Rd, between Gavray Drive & Railway	
West European Hedgehog	Erinaceus europaeus	2	07/11/2006	SP596235		Bicester	
Pipistrelle Bat species	Pipistrellus		28-Jan-12	SP58812229		Bicester Town Council offices, Garth Park, Launton Road, Bicester, Oxon OX26 2PS	
Pipistrelle Bat species	Pipistrellus	94, Roost	24/07/1986	SP610225			
Pipistrelle Bat species	Pipistrellus	10 other	12/08/1987	SP612228			
Common Pipistrelle	Pipistrellus pipistrellus		13/01/1993	SP604228		Launton	
Brown Long-eared Bat	Plecotus auritus		28-Jan-12	SP58812229		Bicester Town Council offices, Garth Park, Launton Road, Bicester, Oxon OX26 2PS	
Eurasian Badger	Meles meles	1	13/08/2005	SP594241		Skimmingdish Lane, Bicester	
Eurasian Badger	Meles meles	1 Dead	02-Feb-12	SP595222		Gavray Drive, Bicester	
Polecat	Mustela putorius	1 dead on road	14/10/2006	SP596208		A41, nr.entrance to M.O.D. Bicester Graven Hill	

Data Origin	UK Legislation	European Legislation	Global IUCN Red List	UK Red List	UK BAP Status 2007	NERC Act 2006		2009 BOCC Status	Easting	Northing	Taxon Code
OLWS				post2001:NT					461200	221300	2400008550
BBOWT	W&C Act 1981, Schedule 8, Section 13 Part 2								458800	220400	2400010280
OLWS	W&C Act 1981, Schedule 8, Section 13 Part 2								458800	220400	2400010280
TVERC	W&C Act 1981, Schedule 8, Section 13 Part 2								458800	220400	2400010280
OLWS				post2001:VU	Priority Sp.	Section 41 Sp.			461200	221300	2400026410
EA	Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)		post94:VU		Priority Sp.	Section 41 Sp.			458710	221480	5600000221
LN							Nationally Notable B		459000	222000	7810351660
LN							Nationally Notable B		459800	222200	7810351660
OBRC							Nationally Notable		459800	222200	7811001670
OBRC							Nationally Notable		460000	222000	7811001670
OBRC							Nationally Notable		459000	222000	7811003495
OBRC							Nationally Notable B		459000	222000	7811008870
OLWS					Priority Sp.	Section 41 Sp.			458800	220400	8300002679
BBOWT	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460100	224500	8300002702
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460100	224500	8300002702
OLWS	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			459900	221900	8300002740
OLWS	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			459900	222000	8300002740
OLWS	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			459900	222200	8300002740
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			459940	222260	8300002740
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			459990	221990	8300002740
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460000	222040	8300002740
OLWS	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460000	222100	8300002740
OLWS	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460000	222200	8300002740
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460050	222160	8300002740
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460090	222220	8300002740
OLWS	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460100	221900	8300002740
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460130	222010	8300002740
OLWS	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460200	222100	8300002740
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460240	222060	8300002740
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)			post2001:EN					459700	222200	8300002746
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)			post2001:EN					459792	222256	8300002746
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)			post2001:EN					459800	222100	8300002746
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)			post2001:EN					459832	222084	8300002746
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)			post2001:EN					459900	222100	8300002746
UTBC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)			post2001:EN					459900	222100	8300002746
TVERC					Priority Sp.	Section 41 Sp.			459900	222200	8300002857
UTBC					Priority Sp.	Section 41 Sp.			458000	221200	8300002871
UTBC					Priority Sp.	Section 41 Sp.			460100	224500	8300002871
UTBC					Priority Sp.	Section 41 Sp.			458000	223000	8300002906
OLWS					Priority Sp.	Section 41 Sp.			459800	222200	8300002906
UTBC					Priority Sp.	Section 41 Sp.			460100	221900	8300002906
UTBC					Priority Sp.	Section 41 Sp.			460100	222100	8300002906
UTBC					Priority Sp.	Section 41 Sp.			460300	222800	8300002906
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400000026
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400002958
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400003161
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400003731
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400003732
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400003748
OLWS					Priority Sp.	Section 41 Sp.			460200	222000	8400003748
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400003852
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400003911
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400003985
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400004125
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400004203
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400004205
LN					Priority Sp.	Section 41 Sp.			460000	224000	8400004304
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460100	222300	10400000036
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460100	222300	10400000036
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460100	222300	10400000036
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460100	222300	10400000036
ORAG	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460690	222550	10400000036
OBRC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.	Section 41 Sp.			460100	222300	10400000090

Data Origin	UK Legislation	European Legislation	Global IUCN Red List	UK Red List	UK BAP Status 2007	NERC Act 2006		2009 BOCC Status	Easting	Northing	Taxon Code
OBRC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.	Section 41 Sp.			460100	222300	10400000090
OBRC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.	Section 41 Sp.			460100	222300	10400000090
OBRC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.	Section 41 Sp.			460100	222300	10400000090
OBRC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.	Section 41 Sp.			460100	222300	10400000090
OBRC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.	Section 41 Sp.			460100	222300	10400000090
OBRC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.	Section 41 Sp.			460100	222300	10400000090
OBRC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.	Section 41 Sp.			460100	222300	10400000090
BBOWT	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.	Section 41 Sp.			461680	222480	10400000090
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460100	222300	10400000120
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460100	222300	10400000120
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460100	222300	10400000120
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.	Section 41 Sp.			460100	222300	10400000120
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460100	222300	10400000288
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460100	222300	10400000288
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460100	222300	10400000288
OBRC	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460100	222300	10400000288
ORAG	Schedule 5, parts 5(a) and (b) (W&C Act 1981)								460690	222550	10400000288
OLWS								Amber List	459700	222250	10600002240
LN								Amber List	461500	221700	10600002240
LN								Amber List	461500	222200	10600002240
OOS					Priority Sp.	Section 41 Sp.		Red List	457800	221700	10600003000
CDC								Amber List	457700	222500	10600005200
LN								Amber List	457700	222500	10600005200
LN								Amber List	457800	222400	10600005200
LN								Amber List	457800	222500	10600005200
CDC								Amber List	458000	222500	10600005200
CDC								Amber List	458000	222500	10600005200
LN								Amber List	458000	222500	10600005200
CDC								Amber List	458200	222310	10600005200
CDC								Amber List	458200	222310	10600005200
LN								Amber List	458200	222310	10600005200
CDC								Amber List	458200	223000	10600005200
LN								Amber List	458200	223000	10600005200
CDC								Amber List	458230	222910	10600005200
LN								Amber List	458230	222910	10600005200
LN								Amber List	458386	222327	10600005200
CDC								Amber List	458400	222300	10600005200
CDC								Amber List	458400	222300	10600005200
LN								Amber List	458600	223900	10600005200
OLWS	Schedule 1 (W&C Act 1981)	Birds Dir (An 1)						Amber List	460200	223450	10600005280
OBRC	Schedule 1 (W&C Act 1981)								458800	220400	10600005400
BBOWT								Amber List	458800	220400	10600005460
OBRC								Amber List	459000	222000	10600005460
OLWS					Priority Sp.	Section 41 Sp.		Red List	460800	221000	10600005700
OLWS					Priority Sp.	Section 41 Sp.		Red List	461100	221500	10600005700
OLWS					Priority Sp.	Section 41 Sp.		Red List	461200	221300	10600005700
OLWS					Priority Sp.	Section 41 Sp.		Red List	461200	221300	10600005700
OLWS					Priority Sp. (Research only)	Section 41 Sp.		Amber List	459800	222200	10600006300
OLWS					Priority Sp.	Section 41 Sp.		Red List	459800	222200	10600006830
BBOWT					Priority Sp.	Section 41 Sp.		Red List	458800	220400	10600006950
OLWS								Amber List	459800	222200	10600007200
BBOWT								Amber List	458800	220400	10600007400
OLWS					Priority Sp.	Section 41 Sp.		Amber List	460700	221200	10600008610
OLWS					Priority Sp.	Section 41 Sp.		Amber List	461100	221500	10600008610
OLWS					Priority Sp.	Section 41 Sp.		Amber List	461200	221300	10600008610
OLWS					Priority Sp.	Section 41 Sp.		Amber List	461200	221300	10600008610
OOS					Priority Sp.	Section 41 Sp.		Red List	460500	220500	10600009190
OLWS					Priority Sp.	Section 41 Sp.		Red List	460700	221200	10600009190
OLWS					Priority Sp.	Section 41 Sp.		Red List	460800	221000	10600009190
OLWS					Priority Sp.	Section 41 Sp.		Red List	461200	221300	10600009190
OLWS					Priority Sp.	Section 41 Sp.		Red List	461400	221600	10600009190
BBOWT	Schedule 5 - all parts (W&C Act 1981, amended				Priority Sp.	Section 41 Sp.			458000	223000	10800000000
BBOWT	Schedule 5 - all parts (W&C Act 1981, amended				Priority Sp.	Section 41 Sp.			458000	223600	10800000000

Data Origin	UK Legislation	European Legislation	Global IUCN Red List	UK Red List	UK BAP Status 2007	NERC Act 2006		2009 BOCC Status	Easting	Northing	Taxon Code
BBOWT	Schedule 5 - all parts (W&C Act 1981, amended				Priority Sp.	Section 41 Sp.			458100	222800	10800000000
BBOWT	Schedule 5 - all parts (W&C Act 1981, amended				Priority Sp.	Section 41 Sp.			459500	222600	10800000000
PTES					Priority Sp.	Section 41 Sp.			458200	222200	10800000090
PTES					Priority Sp.	Section 41 Sp.			458200	222900	10800000090
PTES					Priority Sp.	Section 41 Sp.			458500	223900	10800000090
PTES					Priority Sp.	Section 41 Sp.			458700	223800	10800000090
PTES					Priority Sp.	Section 41 Sp.			458700	223800	10800000090
PTES					Priority Sp.	Section 41 Sp.			458700	224100	10800000090
PTES					Priority Sp.	Section 41 Sp.			459100	223200	10800000090
LN					Priority Sp.	Section 41 Sp.			459200	222600	10800000090
PTES					Priority Sp.	Section 41 Sp.			459600	223500	10800000090
TVERC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)							458810	222290	10800000500
OBG	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)							461000	222500	10800000500
OBG	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)							461200	222800	10800000500
NE	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)							460400	222800	10800000528
TVERC	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)			Priority Sp.	Section 41 Sp.			458810	222290	10800000570
LN	Badger Act 1992								459400	224100	10800000770
TVERC	Badger Act 1992								459500	222200	10800000770
LN					Priority Sp.	Section 41 Sp.			459600	220800	10800000840

Appendix EDP 2
Analysis of grassland plant communities at Gavray Drive, Bicester (Broadview Ecological Consultants R-13-003 15 September 2013)

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Broadview Ecological Consultants

Analysis of grassland plant communities at Gavray Drive, Bicester

Dr Grace O'Donovan MCIEEM

Report for EDP

R-13-003

15th September 2013

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Botanical survey, Gavray Drive, Bicester

1. Introduction

BEC was asked to conduct a National Vegetation Classification survey (NVC) at Gavray Drive, Bicester, to establish the nature of the grassland types present at a site c. 15.6ha in size (Grid. Ref. SP595226). The aim of the survey was also to assess the Wildlife Site eligibility (http://www.tverc.org/cms/content/local-wildlife-sites) and Local Biodiversity Action Plan (LBAP) status of the site (http://www.oncf.org.uk/biodiversity/Lowland%20Meadows%20and%20Floodplain%20Grazing%20Marsh.pdf). The location of the area sampled for botanical analysis is shown in Fig. 1. These meadows form a mosaic of damp fields with ponds, divided by thick hedges and old trees. Most of the fields are probably former hay meadows and grazing pasture over medieval ridge and furrow field patterns. An aerial view dated 2009 is shown in Fig. 2.

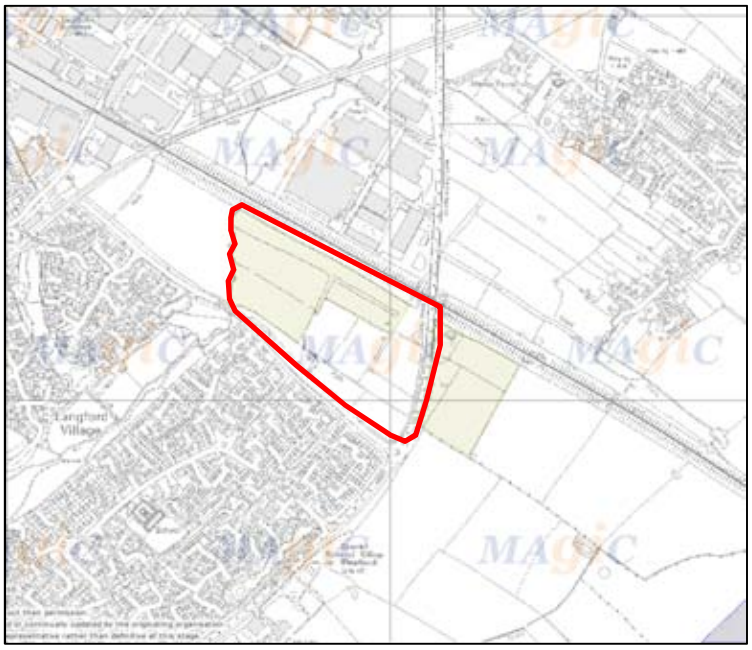


Figure 1 Botanical survey area at Gavray Drive, Bicester – outlined in red. Green area denotes BAP habitat (MAGIC).

The area to be surveyed was divided into fields labeled 1-12 (see Fig. 2). Fields 5, 6, 7, 11 and 12 have previously been designated as a Wildlife Site (Wildlife Site Citation (revised) 2003) and as an LBAP for Lowland Meadow (Fig. 1).

The aim of the survey was to establish if the Wildlife Site was still representative of designation as LBAP Lowland Grassland within the context of Oxfordshire County, and to investigate the adjacent fields within the site boundary for plant community structure.

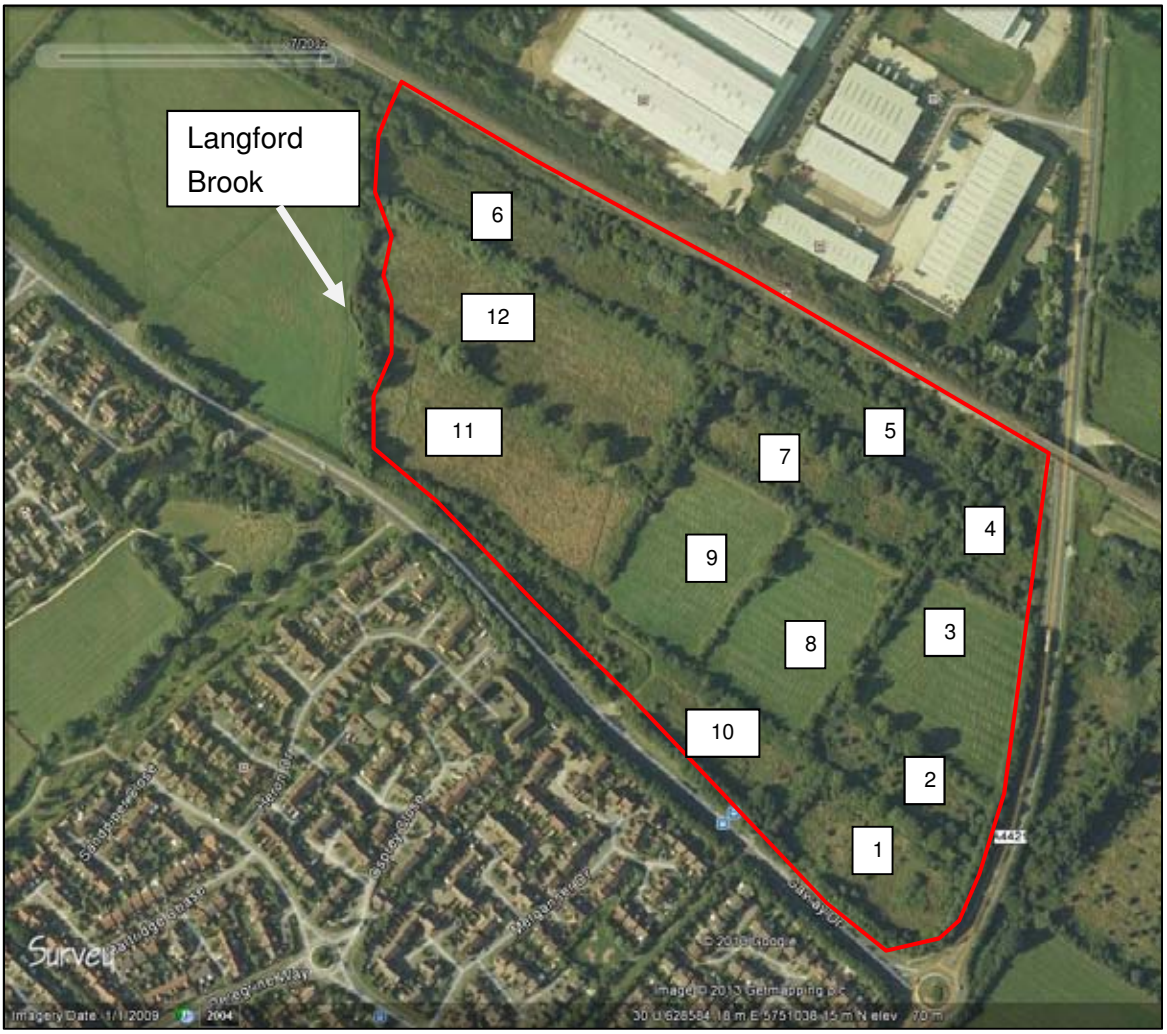


Figure 2 Aerial view of the grassland area surveyed (red outline) at Gavray Drive, Bicester. The 12 fields surveyed were named Areas 1-12 for mapping purposes (Google Earth 2009).

2. Methods

2.1 Field work

A grassland survey of this site was completed in 2002 by CPM (CPM 2002). This survey (2013) was carried out to provide an update on that survey and to determine the status of the grasslands present in relation to the National Vegetation Classification (NVC) for grasslands (Rodwell, British Plant Communities Volume 3., 1998). This grassland survey was restricted to the 12 fields east of Langford Brook (Fig. 2).

All 12 fields within the site boundary were visited and assessed for the presence of grassland areas for sampling. The field site was visited on a total of four days throughout the growing season; 9/6/2013, 10/6/2013, 7/8/2013 and 23/8/2013. This allowed for identification of late flowering species such as *Carex* spp..

Full species lists were created for each of the fields and abundance was noted using the DAFOR (D=dominant, A=abundant, F=frequent, O=occasional, R=rare) scale. Each field was walked in a zig-zag fashion to cover as much ground as possible. A full plant species list was taken to see if we could (i) pick up all the LBAP lowland grassland indicator species mentioned for the site and (ii) to ascertain their abundance and location.

Thirty-nine 2mX2m quadrats were then taken in total throughout the site for comparison with the National Vegetation Classification (NVC). Areas of differing grassland communities were identified if present in each field and mapped. If the area was large enough, >10m^2, then at least three quadrats were taken in each community type recognised, for comparison with NVC. Information regarding the characteristics of the sward and any small-scale topographical information such as relationship to ridge and furrow were noted.

Quadrats were located within homogenous vegetation stands (Rodwell, British Plant Communities Volume 3., 1998). Photographs were taken of the general view in each field (Section 3.1) and of each quadrat (Appendix 1). Quadrat data are to be found in Appendix 2. Quadrats were located spatially using a Garmin 12X GPS. The GPS co-ordinates were entered into Excel and imported directly into ARC10.1 as a .CSV file (Appendix 3), using Mastermap as a backdrop (Fig. 3).

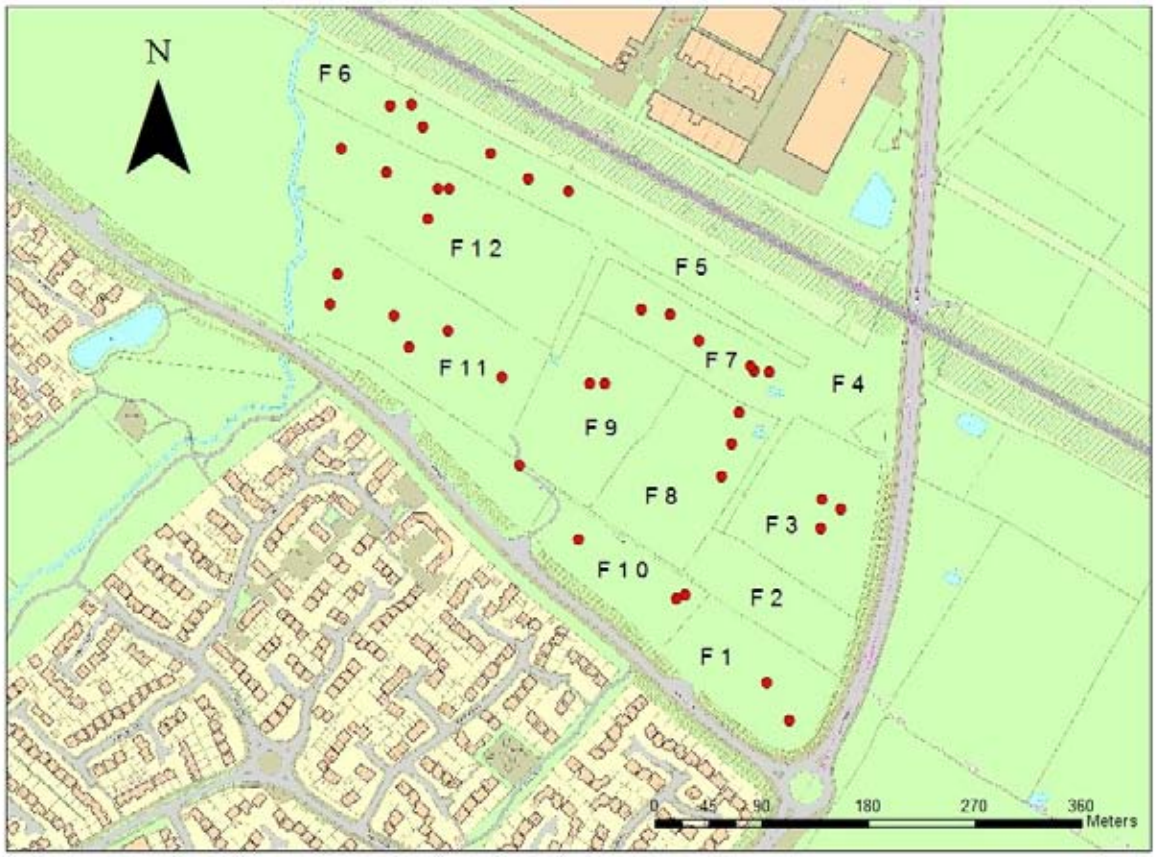


Figure 3 Quadrat positions (red dots) in relation to Field Number (F1-F12). No quadrats were taken in Fields 5, 4 and 2.

Floristic comparisons were made with National Biodiversity Action Plans for Lowland Meadows (UK BAP) and the Local Biodiversity Action Plan for Lowland Meadows and Floodplain Grazing Marsh (Oxfordshire LBAP). Criteria for Wildlife Site status were checked against the Thames Valley Environmental Record Centre's (TVERC) descriptions for Lowland Grassland types. Comments on the grasslands' relative importance regionally and nationally are made.

2.2 Ordination techniques: Twinspan and Decorana

Quadrat data (Appendix 2), were entered into Excel. The quadrats were initially analysed using the ordination techniques Twinspan (Two-Way Indicator Species Analysis) and Decorana (Detrended Correspondence Analysis) within software called PCORD (http://home.centurytel.net/~mjm/pcordwin.htm).

Twinspan constructs a dichotomous classification of the quadrats and then uses this classification to classify the species according to their ecological preferences (Hill, 2005). This produces a two-way ordered table, expressing the species' synecological relations. This analysis was carried out to objectively define the major groupings within the data set. Six

levels of division were chosen within the software as the best cut-off point to describe the vegetation types present.

Detrended Correspondence Analysis is a multivariate technique which produces a scattergram of the quadrats and species in multivariate space. This analysis is less rigid than Twinspan and aids observation of any ecological trends in the data, based on species presence and abundance. It also helps to identify any subtle differences and transitions in the plant community composition.

2.3 MAVIS

MAVIS (Modular Analysis of Vegetation Information System; http://www.ceh.ac.uk/products/software/CEHSoftware-MAVIS.htm); software was designed by the Centre of Hydrology and Ecology (CEH). It was used in this context to match the groupings produced by TWINSPAN to assign the vegetation stands objectively to NVC categories. A percentage similarity to NVC (sub)community types was produced. This allows for comments to be made on the closeness of the vegetation surveyed to true NVC classes.

3. Results

3.1 General Field descriptions

3.1.1 Field 1

The eastern end of Field 1 was heavily scrubbed up with mature trees present including oak (*Quercus* sp.), grey willow (*Salix cinerea*) and blackthorn (*Prunus spinosa*).There were 45 species recorded. According to the report by CPM (2002), the consensus was that topsoil had been removed and the area had suffered much disturbance in the past. No quadrats were taken in this area, due to the lack of open, grassy sward. However, towards the east end of the field, it became much wetter and a large area of marshy inundated grassland was identified (Fig. 4).

It was dominated by floating sweet-grass (*Glyceria fluitans*), flag iris (*Iris pseudacorus*), false fox sedge (*Carex otrubae* locally frequent), lesser pond sedge (*Carex acutiformis,* locally dominant) and rush species (*Juncus* spp.). This area was sufficiently large to take two quadrats.

Figure 4 Field 1 looking East.

3.1.2 Field 2

Field 2 was heavily scrubbed up by blackthorn, oak, grey willow, bramble and nettles, all locally dominant. There were 42 species recorded. A closed canopy had formed of oak (*Quercus robur*), 2-5m tall (Fig. 5), showing a late stage of succession here.

Figure 5 Field 2 showing a well developed canopy of trees.

However, there were deep channels present in the field which were waterlogged during the survey and these provided opportunities for sedges (hairy sedge, *Carex hirta*), rushes (compact rush *Juncus conglomeratus* and soft rush *Juncus effusus*) and floating sweet-

grass (*Glyceria fluitans*). Due to the lack of open grassland areas big enough, it was not possible to take quadrats here.

3.1.3 Field 3

Field three is a hay meadow and is dry, but having strong ridge and furrow formation, the west end is dominated by tongues of wet grassland aligned from west to east, interdigitating with the dry grassland (Fig. 6).

Figure 6 Field 3 showing the tongues of wet marshy grassland in the furrows of the ridge and furrow.

This is presumably due to impeded drainage on the west side. There were 27 species recorded. The dry area is fairly uniform throughout with a good cover of grass species Meadow foxtail (*Alopecurus pratensis*), Sweet vernal grass (*Anthoxanthum odoratum*), Yorkshire fog (*Holcus lanatus*) and meadow grass (*Poa pratensis*). Hard heads (*Centaurea nigra*) was also locally abundant in places. The wet areas were dominated by tufted hair grass (*Deschampsia caespitosa*), soft rush (*Juncus effusus*) and marsh trefoil (*Lotus pedunculatus*). Three quadrats were taken in the wetter areas. No quadrats were taken in the drier areas as similar vegetation occurred in Fields 8 and 9, where six quadrats were taken in all.

3.1.4 Field 4

Field 4 occupies the most north-easterly part of the site and is a quite small field in comparison to the others. There were 52 species recorded. It is currently heavily scrubbed up with blackthorn, oak, sycamore, ash and bramble. There were two small open areas with grassland predominating (Fig. 7) and these were relatively species-rich with devil's bit scabious (*Succisa pratensis*), tormentil (*Potentilla erecta*) and hard heads (*Centaurea nigra*).

Figure 7 An open grassy area in Field 4.

Wetter areas were populated by tufted hair grass (*Deschampsia cespitosa*), lesser pond sedge (*Carex acutiformis*), soft rush (*Juncus effusus*) and compact rush (*Juncus conglomeratus*). However, these were not uniform enough to take quadrats for NVC analysis.

3.1.5 Field 5

Field 5 is a linear field along the north edge of the site. It is part of the LBAP for Lowland Meadow. There were 50 species recorded. This area has scrubbed up considerably, with bramble (*Rubus fruticosus* agg.), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), sycamore (*Acer pseudoplatanus*) and oak (*Quercus robur*) (Fig. 8).

However, it is still quite species-rich with a mixture of wet grassland and marsh species (lesser pond sedge, hairy sedge, false fox sedge), rushes (soft rush, hard rush and compact rush), reedmace (*Typha latifolia*) and tufted hair grass. In more open grassy areas, devil's bit scabious (*Succisa pratensis*) was found along with tormentil (*Potentilla erecta*) and the grasses Yorkshire fog (*Holcus lanatus*), false oat grass (*Arrhenatherum elatius*), meadow foxtail (*Alopecurus pratensis*) and common bent (*Agrostis capillaris*). Despite the severe amount of scrub encroachment, the floristic diversity appears to be holding on. The herb species seemed to be more abundant close to the scrub edge, rather than in the rank grassland.

Figure 8 View of Field 5.

As a result of the severe scrub encroachment, there were no open grassy areas of sufficient size, quality or homogeneity to take quadrats for NVC analysis.

3.1.6 Field 6

Field 6 is part of the LBAP for Lowland Meadow. There were 45 species recorded. The north-west area was drier with large stands of false oat-grass dominating the vegetation (Fig. 9). Moving towards the south-east part, it became wetter with reed canary grass (*Phalaris arundinacea*) and lesser pond sedge (*Carex acutiformis*) dominating.

Figure 9 Field 6 looking south-east.

The site also became more species-rich towards the south-east end. There was scrub encroachment here, with bramble and grey willow. The field was divided into two sections and three quadrats were taken in each section (Fig. 3). Grass species found were meadow foxtail, false oat grass and Yorkshire fog and the only occurrence of meadow barley (*Hordium secalinum*). The wetter marshy grassland species predominated though, with four sedge species (hairy sedge, brown sedge, pond sedge and false fox sedge) and four rush species (soft rush, hard rush, compact rush and jointed rush (*Juncus articulatus*)). A single stand of common spotted orchid (*Dactylorhiza fuchsii*) was also found, and had been recorded in that field in a previous report (CPM 2002).

3.1.7 Field 7

Field 7 is part of the LBAP for Lowland Meadow. There were 48 species recorded. Six quadrats were taken in this field. This field suffers greatly from scrub encroachment but there are some open areas where it was possible to take quadrats (Fig. 10). Devil's bit scabious was found here and it was noted that it thrived better where the surrounding area had been grazed by rabbits. This had opened the sward sufficiently to allow the plant to spread.

Figure 10 General view of open area in field 7 where quadrats were taken.

This grassland type showed an emphasis towards an acid grassland with the presence of common bent (*Agrostis capillaris*), tormentil (*Potentilla erecta*), devil's bit scabious (*Succisa pratensis*) and sheep's bit (*Festuca ovina*). Other species present were betony (*Stachys officinalis*) and bird's foot trefoil *(Lotus corniculatus*). Parts of the area were also quite wet with three species of rush present (soft, jointed and compact rushes). Reed canary grass and tufted hair grass were locally abundant. Oak and ash saplings were noted in the open areas.

3.1.8 Field 8

Field 8 is a hay meadow and was relatively species poor with 24 species present. It is not part of the LBAP. Three quadrats were taken here. Meadow foxtail and Yorkshire fog are abundant, with occasional sheep's bit and smooth meadow grass. Perennial ryegrass (*Lolium perenne*) was occasional. Herb species locally abundant were meadow buttercup (*Ranunculus acris*), creeping buttercup (*Ranunculus repens*), with meadow vetchling (*Lathyrus pratensis*) occasional. No photograph was taken in Field 8 but it was very similar to Field 9 (Fig. 11).

3.1.9 Field 9

Field 9 is a hay meadow and was relatively species poor with 28 species present. It is not part of the LBAP. It is very similar in floristic composition to Field 8. Three quadrats were taken here.

Figure 11 View of Field 9.

3.1.10 Field 10

Field 10 is located on the south side of the site. It is not part of the LBAP. There were 39 species recorded. It is split by a public path and is linear in shape, tapering to the west. It is bordered by dense, mature hedgerows on all sides. Being close to the path and narrow in configuration, it has scrubbed up quite considerably with brambles (*Rubus fruticosus* agg.), particularly at the west end. Other invasive scrub species present were sycamore (*Acer campestre*) and blackthorn (*Prunus spinosa*) (Fig. 12). It is also quite disturbed, evidenced by the presence of nettle (*Urtica dioica*) and creeping thistle (*Cirsium arvense*). A wet grassland area was identified at the west end, dominated by floating sweet-grass (*Glyceria fluitans*), rushes (*Juncus* spp.) and Iris (*Iris pseudacorus*). Three quadrats were taken in this field.

Figure 12 Field 10 looking west.

3.1.11 Field 11

Field 11 is part of the LBAP Lowland Meadow and has 38 species recorded. Parts of Field 11 were highly disturbed with locally dominant stands of hairy willowherb (*Epilobium hirsutum*). This may have reflected the comments of there having been a fire here in an earlier survey (CPM 2002). There was a steady encroachment from the north of a line of oak saplings and rose (*Rosa canina*). Bramble growth dominated the southern boundary. The grassland in the middle was rank throughout due to lack of management and had meadow foxtail, Yorkshire fog, sweet vernal grass, cocksfoot (*Dactylis glomerata*) and red fescue (*Festuca rubra*) in moderate amounts. Great burnet (*Sanguisorba officinalis*) was also present. The field was roughly divided into a drier grassy area to the east and a wetter grassy area to the west (Fig. 13). Three quadrats were taken in each area.

Figure 13 Field 11 facing west.

3.1.12 Field 12

Field 12 is part of the LBAP for Lowland Meadow and has 33 species recorded. It is very similar to Field 11 in the vegetation type present, but there was a predominantly wet area roughly half way along on the north side (Fig. 14). As this field is also ridge and furrow, some of the furrows have become extremely wet, dominated by reed sweet grass (*Glyceria maxima*) and reed canary grass (*Phalaris arundinacea*). Five quadrats were taken in this field, three in the drier area, and two quadrats taken in the very wet area, although this is strictly more of a swamp vegetation community than a grassland community.

Figure 14 Field 12 in the wetter furrow areas.

3.2 DAFOR

DAFOR results for Gavray Drive site are shown in Table 1. A total of 154 grassland species (with some invading scrub saplings) were found. Additional species were found in this field season that were not recorded in 2002 (CPM, 2002); these are highlighted in green in Table 1. Others not found this season, compared to 2002, were highlighted in yellow. Some of the discrepancy is due to more scrub species being indentified this year, such as viburnum (*Viburnum opulus*) and elder (*Sambucus nigra*). By contrast, two sedge species were not found this season; glaucous sedge (*Carex flacca*) and spiked sedge (*Carex spicata*). Great burnet, a hay meadow indicator, was found in all of the LBAP fields except Field 5, and was missing from the non-LBAP fields. This was found in one more field than the 2002 survey. Two other hay meadow indicators, sneezewort (*Achillea ptarmica*) and pepper saxifrage (*Silaum silaus*), identified in the revised Wildlife Site Citation in 2003, were not found during this survey or in the CPM survey in 2002. Common spotted orchid (*Dactylorrhiza* cf. *fuchsii*) was only found in Field 6 this year, having been found in Fields 5 and 6 in 2002. Sheep's

fescue (*Festuca ovina*) was identified in Field 7 this year. This can be difficult to tell apart from red fescue, so may have been overlooked before.

Total number of species present in each field varied from 24 in Field 8, to 52 in Field 4. The LBAP fields 5, 6 and 7 identified for Lowland Meadow in the wildlife site citation had higher total species numbers than some of the non-LBAP fields, ranging from 45 species to 50 species (Table 2). However, two of the non-LBAP fields; Field 4 and Field 2, reached equivalent total species numbers, with 52 and 42 respectively. These were also relatively smaller fields but were heavily scrub-encroached with wet areas, which may have accounted for the higher species number overall.

In general there was not much difference in the species composition and number between the 2002 and the 2013 survey, despite the passage of time.

Table 1 Full species list for Fields 1-12 at Gavray Drive, Bicester. The DAFOR scale was used for abundance (D=dominant, A=abundant, F=frequent, O=occasional, R=rare. A prefix of L was used for 'locally') Species highlighted in yellow were found in a survey dated 2002 (CPM, 2002) but not found in this survey, and those highlighted in green are additional species identified in this survey.

Species/Field number	1	2	3	4	5	6	7	8	9	10	11	12
Acer campestre		O		R	R					LD		
Achillea millefolium											R	
Aegopodium podagraria												
Agrostis capillaris				F	F	F	A					
Agrostis stolonifera	LF	O										
Ajuga reptans			R								R	
Alopecurus geniculatus												
Alopecurus myosuroides		R										
Alopecurus pratensis	O	F	LA			R	A	LA	LA	LF	F	D
Angelica sylvestris					O	R					R	R
Anisantha sterilis					R				O	O		
Anthriscus sylvestris	O						O	O	LA	O	R	
Anthoxanthum odoratum			LA					O	LA	F	O	O
Arrhenatherum elatius	LA	F	O			F		F	LA	F		
Artemisia vulgaris	O			O						R		
Barbarea vulgaris					R							
Bromus hordeaceus									F	LA		
Calliergonella cuspidata	LD											
Calystegia sepium				O								
Cardamine flexuosa					R							
Cardamine pratensis			O				O		O			R
Carex acuta												
Carex acutiformis	LD			O		O						
Carex disticha						LA						
Carex flacca												
Carex hirta	O	O		O		O	F					O
Carex otrubae	LF				R	O				R		
Carex ovalis							O					
Carex spicata												
Centaurea nigra	O		LA	R						R	R	
Cerastium fontanum	O		O					O	O		R	R
Cirsium arvense	O	F	O	R	O	O	O	O	O	O	R	R
Cirsium palustre	O	F	R	F	F	F	F				R	O
Cirsium vulgare	O	R		O	O		O				R	
Convolvulus arvensis		O										
Crataegus monogyna					O							
Cynosurus cristatus	R											

Dactylis glomerata		O	O				O		O	F	F	R
Dactylorhiza sp.						R						
Daucus carota				O								
Deschampsia cespitosa	O	F	LA	F	F	LD	LA		O		F	F
Dipsacus fullonum				O								
Elytrigia repens		R										
Epilobium ciliatum		O		R	F	F	O					
Epilobium hirsutum	F	LD		F	O	F	O	R	LA		A	A
Epilobium CF. montanum	F						O		O	F	R	F
Equisetum arvense				R								
Festuca arundinacea		O				R						
Festuca pratensis												
Festuca ovina							LA					
Festuca rubra		O	O	O	F	O	F		O	LA	F	O
Filipendula ulmaria		O				F					R	F
Fragaria vesca												
Fraxinus excelsior				F	F	O				F	R	
Galium aparine	O				O				R			R
Galium palustre		R					F					R
Galium verum		R										
Geranium dissectum	R						R					
Glechoma hederacea	R						O					R
Glyceria fluitans		D								LD		
Glyceria maxima												LD
Heracleum sphondylium			R		O	O				O	O	
Hieracium agg.					R							
Holcus lanatus			F	F	F	F	O	LF	LF	LA	F	O
Hordeum secalinum						R						
Humulus lupulus											R	R
Hypericum hirsutum												
Hypericum perforatum				O	R							
Hypochaeris radicata												
Iris pseudacorus										R		
Juncus articulatus						R	O					
Juncus conglomeratus	LA	O		LF	O	R	LD					
Juncus effusus		R	LA		R	R	O			LF	R	
Juncus inflexus				LF	R	F			LA			R
Lactuca virosa											R	R
Lamium album											R	
Lathyrus pratensis	LF							O		R	O	
Leontodon cf. autumnalis	R											
Leucanthemum vulgare	LF		R	R								
Lolium perenne								O	O			
Lotus corniculatus							R					
Lotus pedunculatus	LA	O	LA		R	R	O				O	
Luzula campestris			R				F	O				
Lychnis flos-cuculi												R
Lycopus europaeus		O		R								
Lythrum salicaria												
Medicago lupulina												
Melilotus officinalis				O								
Mentha aquatica				R		R						
Myosotis arvensis												R
Myosotis scorpioides				R		R	R					
Persicaria maculosa				R								
Phalaris arundinacea						O	LD					LD
Phleum pratense		O				O	R					
Phleum bertolonii												
Picris echioides	R	R		R	R							
Plantago lanceolata						R						
Plantago major												
Poa pratensis	O	LA	LA		F		F	F	O	F		
Poa trivialis							O		O			
Polygonum persicaria				R						R		
Potentilla anserina						R						

Potentilla erecta				O	R		LA					
Potentilla reptans	LA		R	O		R	F	O		O	O	
Prunella vulgaris				R	R		R					
Prunus spinosa	LD	LD		O	O	R				O		
Pulicaria dysenterica				O								
Quercus robur	F	LD		O	O						O	R
Ranunculus acris		F	A					LA	O	F	R	R
Ranunculus ficaria	O										R	
Ranunculus repens			O	O	O	R	F	LA	O	F		
Rosa arvensis												
Rosa canina	O			O	R	F	R				R	R
Rubus fruticosus agg	LD	LD	R	F	LA	F	LA			LD	R	
Rumex acetosa	O		F			O	O	LA	F	O	O	
Rumex crispus	O		O						O	O	R	R
Rumex obtusifolius		O	R	R	R		R			O		
Rumex sanguineus		O		O	O	O	R					
Salix sp.				O	O							
Salix cinerea	LD	LD		O		O						
Sambucus nigra				R								
Sambucus nigra												
Sanguisorba officinalis		R		R		R	R	O			R	R
Scleropodium purum							LA					
Scrophularia auriculata	O	LD		R	R					R		
Senecio erucifolius		R										
Senecio jacobaea		O		F	R	O						
Silene latifolia												
Solanum dulcamara		O			R			O				
Sonchus arvensis												
Sonchus asper					R	O						
Stachys officinalis							F					
Stachys sylvatica					R					R	R	
Stellaria graminea					R		R		LF			
Succisa pratensis				O	R		LF					
Taraxacum agg.								R		O		
Torilisjaponica				R	O							
Trifolium campestre											R	
Trifolium dubium	R											
Trifolium medium					R	R						
Trifolium pratense	O							LA	LA	F	R	
Trifolium repens	O				O	O				O		
Trisetum flavescens												
Tussilago farfara	LA			R								
Typha latifolia					R							
Ulmus sp												
Urtica dioica		LD	O	O	F		R	O	O	LD	F	O
Veronica chamaedrys							LA	R				R
Viburnum opulus	O											
Vicia cracca	O	R		R	R		R	R				R
Vicia hirsuta	R											
Vicia sativa ssp. nigra										O		
Vicia tetrasperma												
x Festulolium loliaceum									O	LA		

Table 2 Total number of species recorded in Fields 1-12 in Gavray Drive. LBAP fields are highlighted in green.

Field number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Total species number	**45**	**42**	**27**	**52**	**50**	**45**	**48**	**24**	**28**	**39**	**38**	**33**

3.3 Ordination techniques

3.3.1 Detrended Correspondence Analysis

Detrended Correspondence Analysis (DCA) was conducted on the quadrat data set to detect any ecological trends such as wetness or dryness, or changes in soil pH reflected by the presence of neutral grassland- or acid grassland communities. It was also used to express the species- and quadrat data visually in multivariate space. This was useful for assigning the Twinspan groupings and NVC classifications in terms of multivariate analysis. The vegetation quadrats Q8A12 and Q10A12, taken in Field 12, were not included in the analysis as they were not strictly speaking a grassland community type but more of a fen community type. As a result, 37 quadrats were included in the analysis out of an original 39 quadrats.

The scattergram produced (Fig. 15) represents two dimensionless axes (1 and 2) which reflect the most variation explained by the data. These axes are orthogonal to each other (95.4%) and are therefore not co-correlated. The data presented in Fig. 15 are for the quadrat data only. Each triangle in the scattergram represents the quadrat number, followed by the field number (e.g. Quadrat 33 in Field 5 = 33A5).

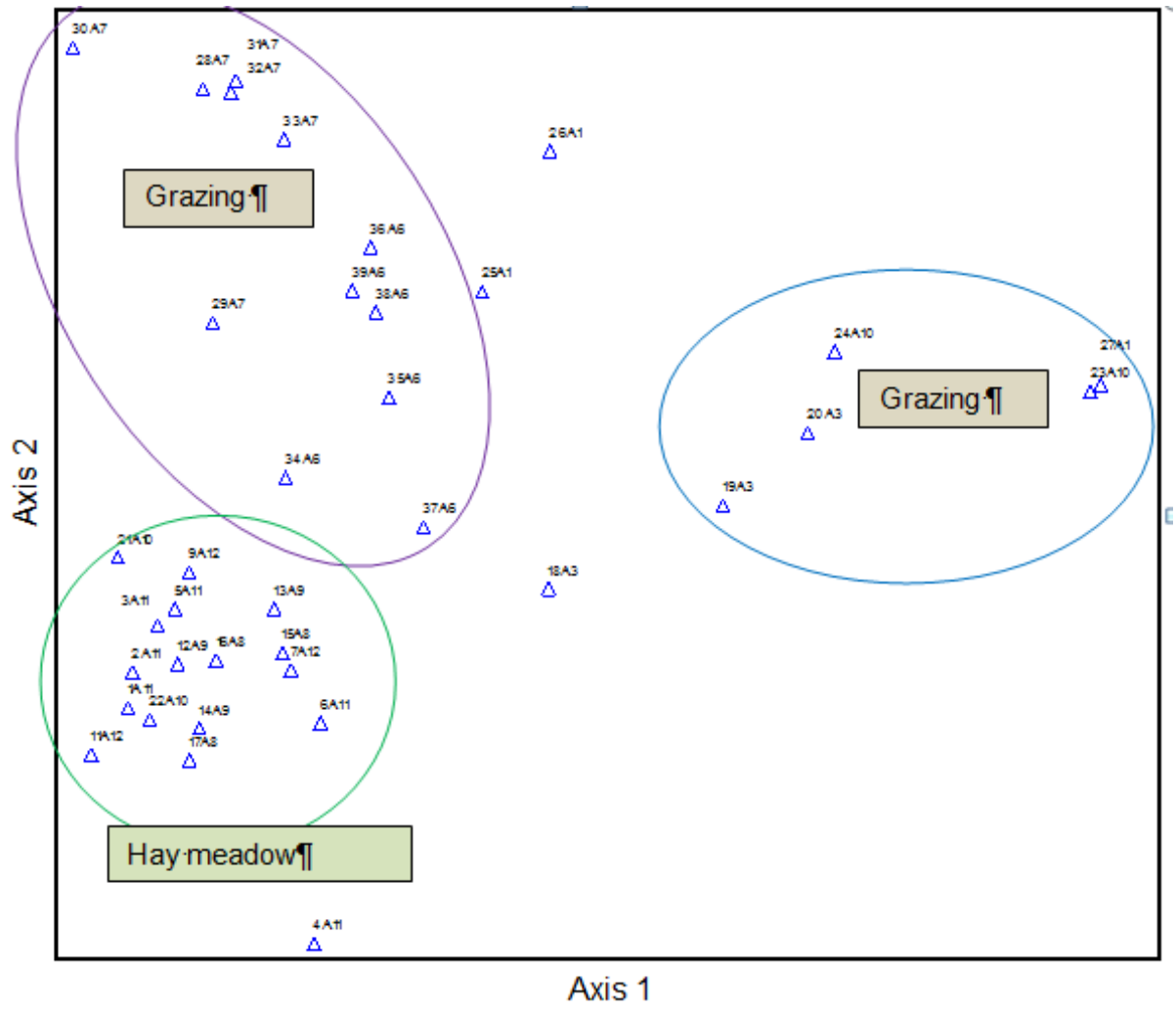


Figure 15 Detrended Correspondence Analysis quadrat scattergram. Coloured boxes suggest suitable management.

Axis 1 appears to represent a relatively dry to wet gradient from left to right, with quadrats of drier vegetation (e.g. Fields 8 and 9) on the left hand side of the scatter and wetter vegetation on the right hand side (e.g. wetter quadrats in Fields 3, 10 and 1). Axis 2 seems to reflect a change in pH in the vegetation, with neutral grassland quadrats situated in the lower left part of the quadrant (Fields 10 (dry end), 11, 12) and more acid grassland types on the upper left part of the quadrant (Fields 6 and 7).

The species scatter (Fig. 16) shows the species best associated with the quadrat data in Fig 15. Acid indicators such as tormentil (*Potentilla erecta*) and devil's bit scabious (*Succisa pratensis*) are situated in the top left hand corner, while more neutral grassland species are found in the bottom left hand corner e.g. meadow foxtail (*Alopecurus pratensis*), meadow vetchling (*Lathyrus pratensis*), false oat grass (*Arrhenatherum elatius*), and Great burnet (*Sanguisorba officinalis*). Wet indicator species are to be found on the right hand side of the scatter e.g. floating sweet grass (*Glyceria fluitans*), flag iris (*Iris pseudacorus*), soft rush (*Juncus effusus*) and marsh trefoil (*Lotus pedunculatus*).

The scatter on Axis 2 also reflects differences in past management as species in the top left had corner are most usually found in grazed areas, and species in the bottom left hand corner are associated with hay meadows as stated in the Wildlife Site citation (Lambrick, 2003).

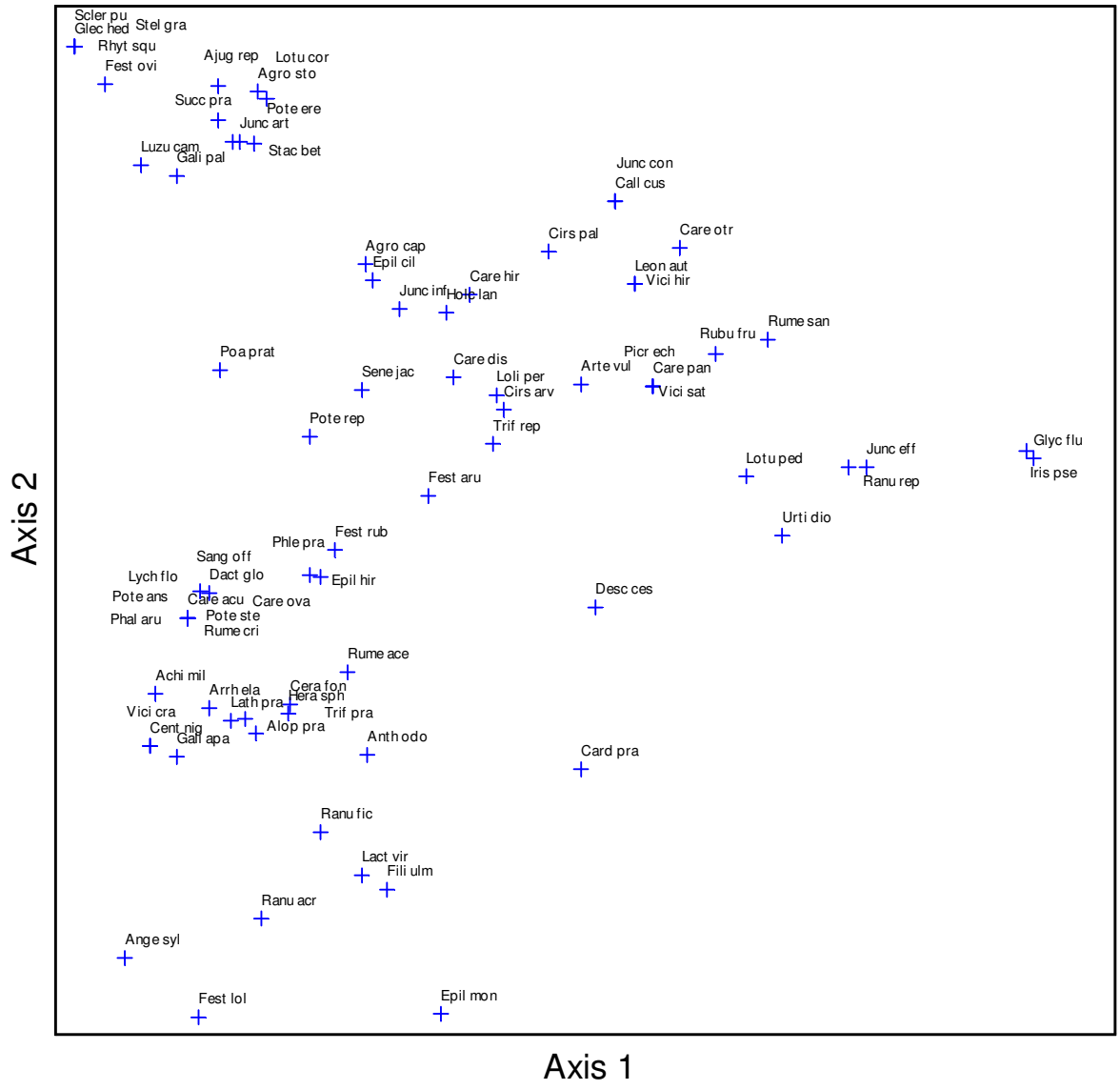


Figure 16 Species ordination along Axis 1 and Axis 2 (latin names shortened to 8 letters for the analysis).

Species abundances can also be shown separately in Decorana, whereby higher abundance is shown by larger triangle symbols in the quadrat scattergram.

For example, the distribution of devil's bit scabious (*Succisa pratensis*) can be seen in Fig. 17, where it is more abundant, e.g. Field 7 in the top left hand quadrant of the scatter. This is also true of the other acid indicator species' cover and abundance, such as common bent in Fig. 18.

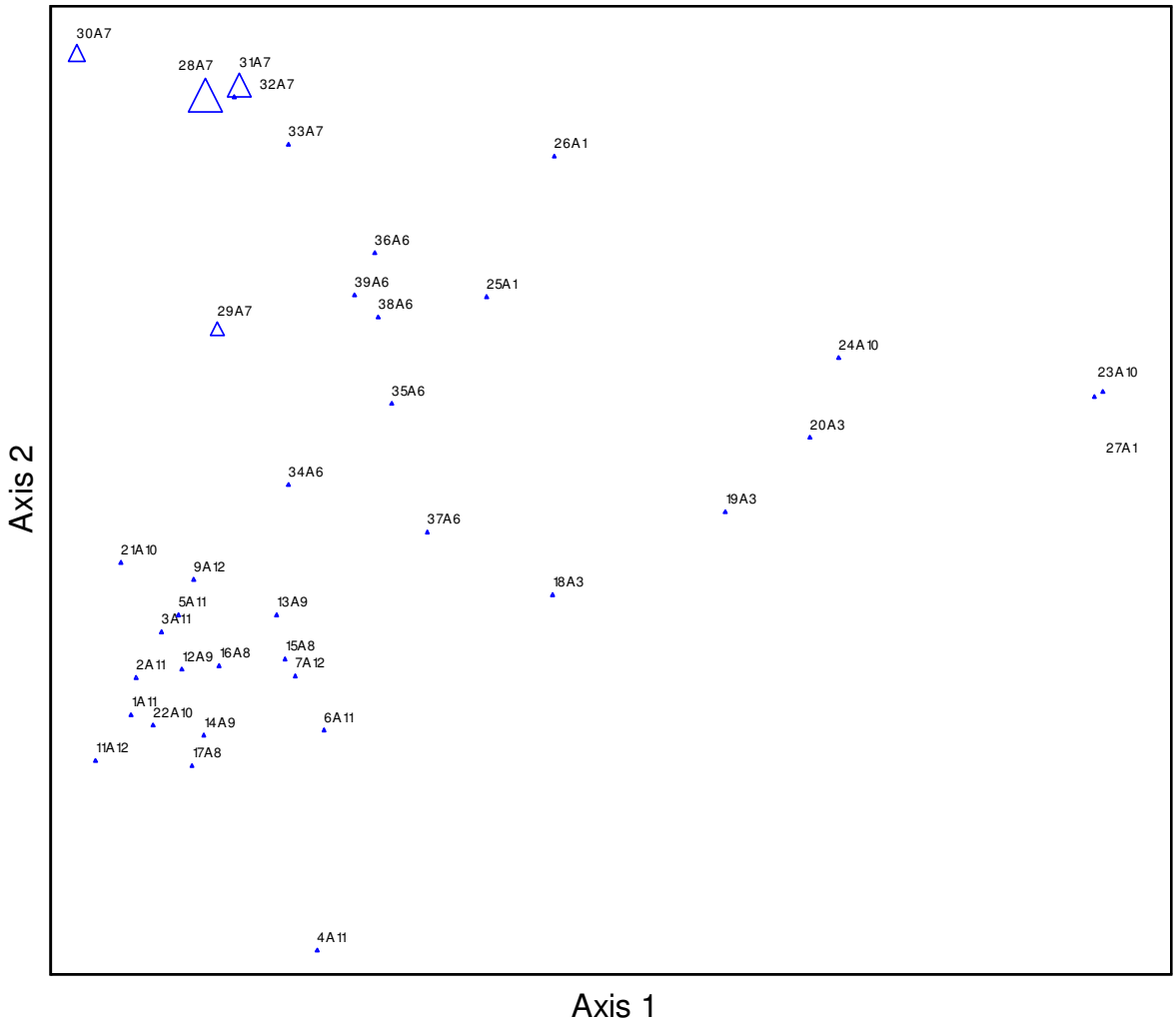


Figure 17 Devil's bit scabious S*uccisa pratensis* scattergram

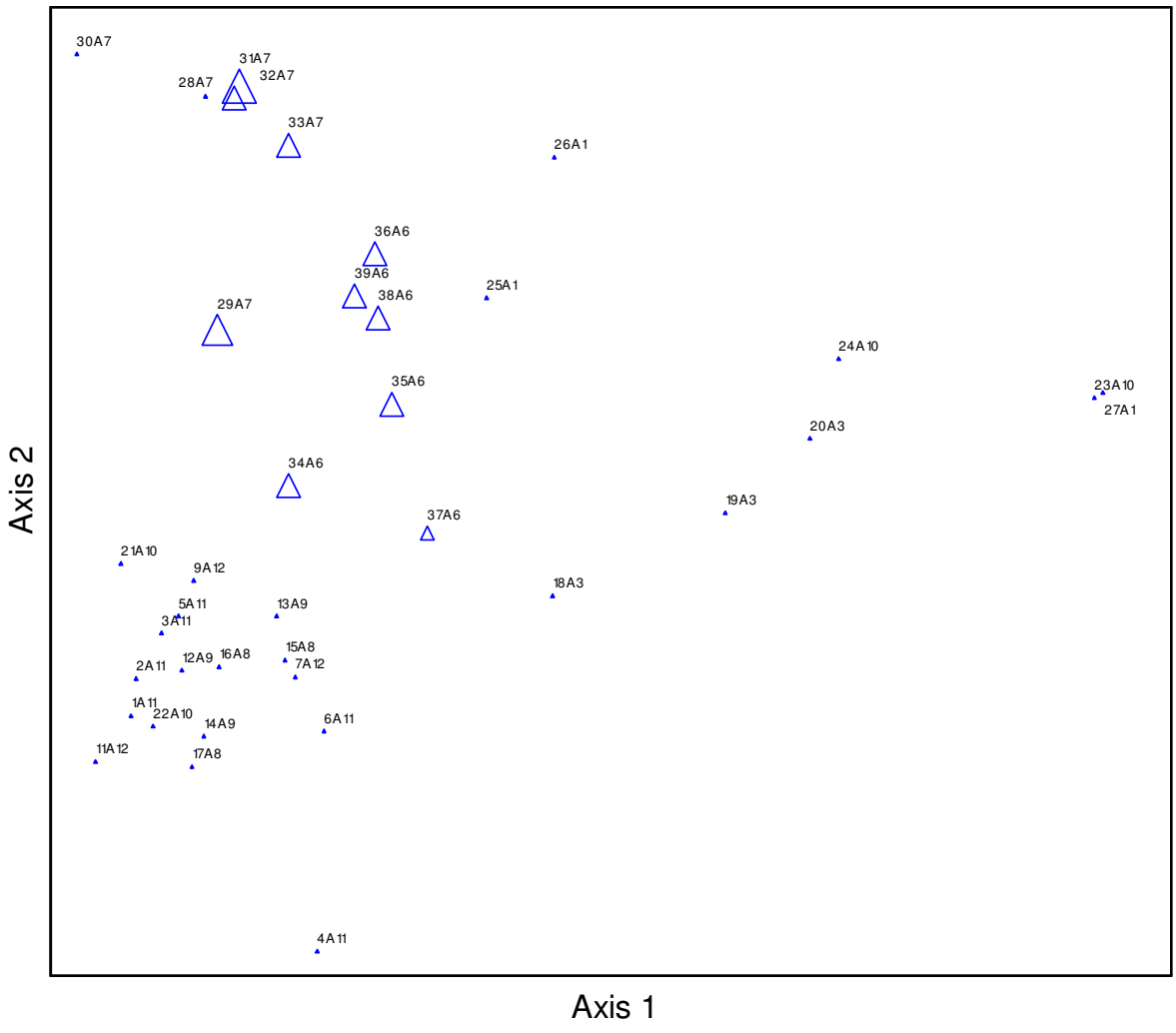


Figure 18 Common bent *Agrostis capillaris* scattergram

Common bent (*Agrostis capillaris*) another acid indicator, shows a more wide distribution, being predominantly abundant in Fields 6 and 7 (Fig. 18). There is also a trend in the size of the triangles, with smaller triangles towards the bottom end of the scatter and larger ones towards the top, showing a cline present. This is reflecting the transitional nature of this site, with one habitat type grading into another. This type of more acidic grassland has a very limited distribution on site but is in the LBAP and fits in with the description of the more acidic end of the Lowland Meadow habitat rather than acid grassland *per se* (TVERC, 2009).

Not all of the acid indicators are shown here due to limitations on space.

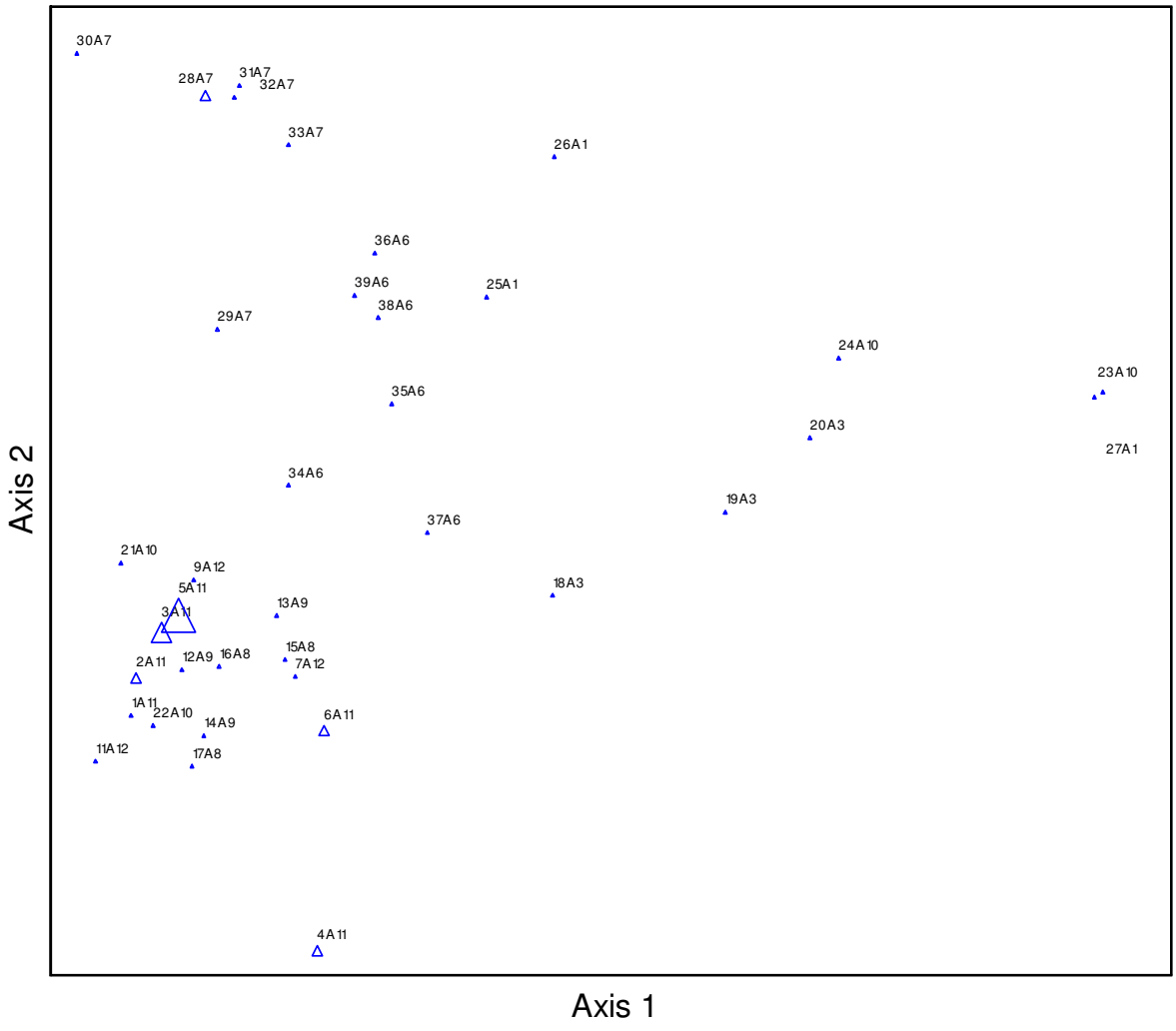


Figure 19 Great Burnet *Sanguisorba officinalis* scattergram

By contrast, great burnet (*Sanguisorba officinalis*), a hay meadow species, is to be found in the lower left hand of the quadrant in the quadrats taken in Field 11 (Fig. 19). This is an indicator of hay meadow and is a characteristic species of the MG4 NVC community type. It is quite widespread throughout the site however when considering the DAFOR lists (Table 1). It was found in Fields 2, 4, 6, 7, 8, 11 and 12. Fields 2 and 4 are not in the LBAP.

Another neutral grassland indicator, meadow foxtail (*Alopecurus pratensis*), is to be found in the same part of the quadrant but in a greater number of fields: F3, F8, F9, F10, F11 and F12 (Fig. 20). This is also a hay meadow indicator and one of the characteristic species of MG4 also.

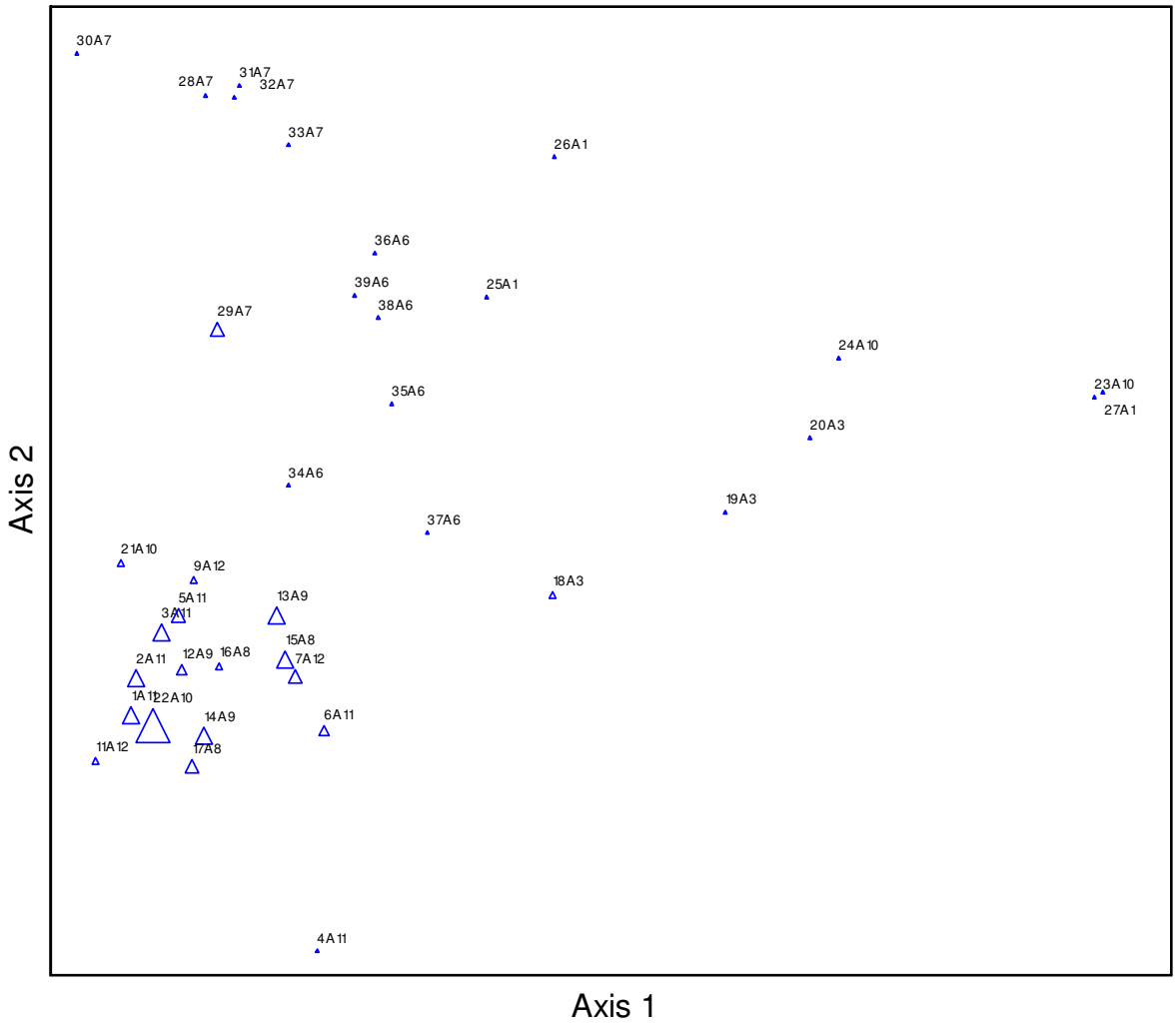


Figure 20 Meadow foxtail *Alopecurus pratensis* scattergram

In general, the scattergram shows the relationship between the plant communities on site, giving us three clearly different community types in the spread. These are the wet grassland type to the far right of the quadrant, the hay meadow species to the bottom left of the quadrant, and the more acidic grazing grasslands in the top left quadrant. There are trends in the scatter from drier to wetter grassland types, from left to right on Axis 1, and from neutral to more acidic grasslands from bottom to top on the left side of the quadrant relating to Axis 2. This approach shows the underlying ecological drivers on the site, determining the plant community types in a realistic way. There are other neutral hay meadow indicators predominantly in this quadrant but have been left out due to space limitations.

3.3.2 Twinspan

Two-way Indicator Species Analysis (Twinspan) was carried out within PCORD. The analysis was carried out on the same data set used for Decorana. Twinspan allows for a splitting of the data into two groups at each level, based on similarity within the quadrats. The end groups were then used to enter into MAVIS for comparison with NVC community

types (Fig. 21). As Twinspan is an artificial system, the divisions are not always as clear cut as they are shown. Provision for false positives and false negatives are given within the output of the program. It is a useful way for clustering the quadrats for further objective analysis within MAVIS. Eigenvalues are given within each division, showing how reliable the results are. These are dimensionless values between 0 and 1. The closer to 1, the more reliable the division is in terms of the data presented. A cut-off in the levels is chosen subjectively, based on the eigenvalues and the number of quadrats in the groups. The latter can be specified in the analysis. This was limited to greater than or equal to 5, as this is standard for NVC quadrat comparisons.

The results of the Twinspan analysis are presented in Fig. 21. The first division separates the 37 original quadrats into two groups, containing 32 quadrats and 5 quadrats respectively. The eigenvalue for this split is 0.49, which is considered to be acceptable. The five quadrat group is defined by the indicator species of soft rush (*Juncus effusus*). This corresponds to a marshy grassland type.

The remaining 32 quadrats are further divided into two groups – one with 12 quadrats and one with 20 quadrats. The 12 quadrat group are defined by the indicator species common bent (*Agrostis capillaris*). The eigenvalue is again 4.9. This reflects a somewhat acid grassland type. A further and final division of this group separates out a part of Field 7 (3 quadrats) where devil's bit scabious (*Succisa pratensis*) is an indicator species.

The 20 quadrats are divided into 1 quadrat and 19 quadrats. The eigenvalue is 0.52. The one quadrat relates to Quadrat 26 in Field 1, which doesn't fit well into any group. The remaining 16 quadrats are divided into two groups; one of three quadrats and one of 13 quadrats. The latter group is identified by the species indicator false oat-grass (*Arrhenatherum elatius*). This group contains neutral grassland species found in Fields 8, 9 and 11.

3.3.3 Comment

The Twinspan groupings reflect well the quadrat scatter diagram for Decorana (Fig. 15). It splits off the marshy grassland first with soft rush as an indicator species. The next split gives us the acid grassland group with common bent as the indicator species. This was further divided to give us the devil's bit scabious group within it. The last group outlined was the false-oat grass group which defined the hay meadow type. These correlations with the Decorana quadrat scatter are not surprising, but the extra bit of useful information is the eigenvalue, which can give one confidence in the results. All the eigenvalues were acceptable in the analysis. Secondly it will 'discard' some of the quadrats which do not fit easily into the groupings, allowing one to concentrate on the quadrats which are more likely to be useful for analysis in the NVC.

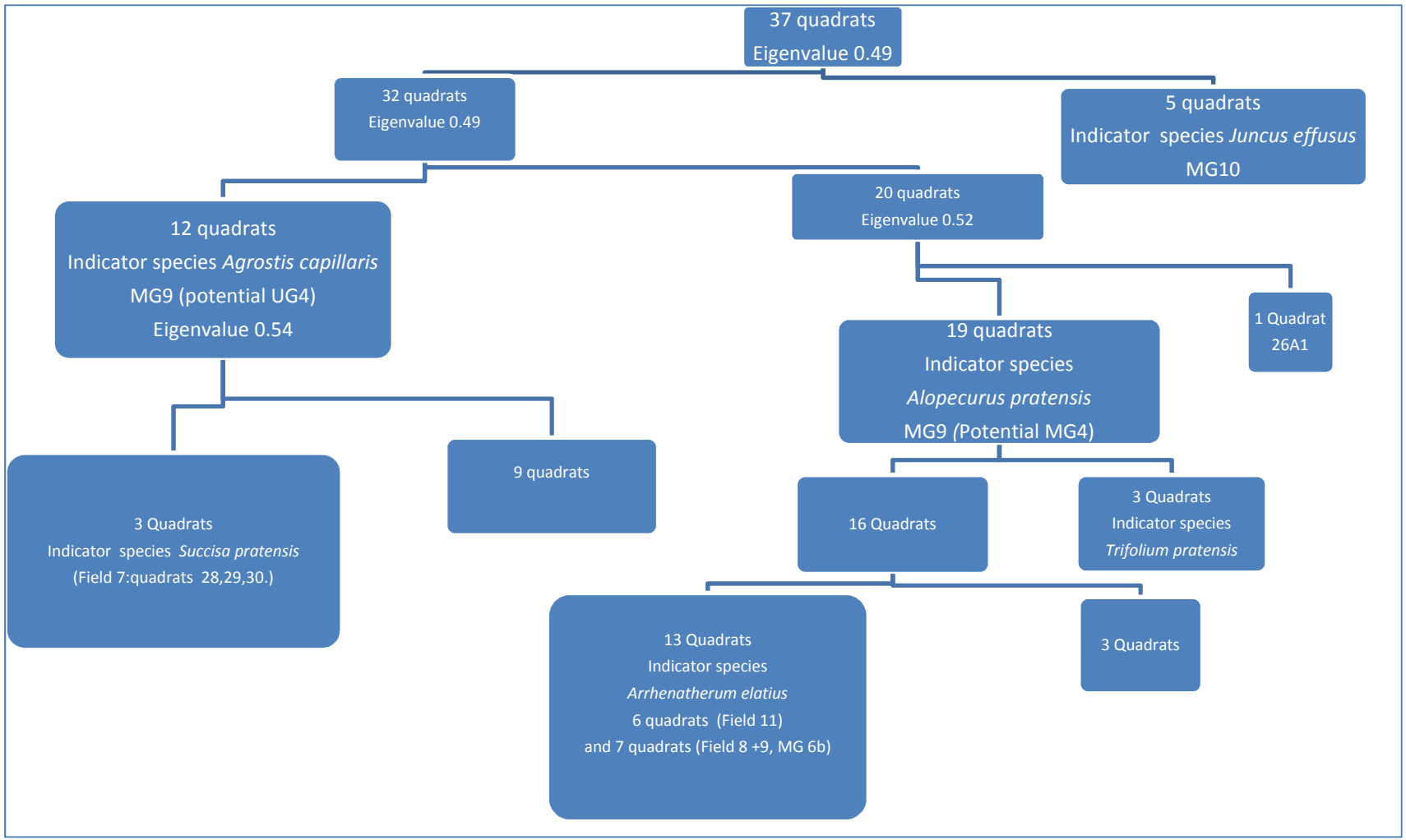


Figure 21 Twinspan groups based on quadrats analysed in PCORD. Indicator species are shown for each level of division.

3.4 MAVIS

The Twinspan groups of quadrats (Fig. 21) were then entered into MAVIS for comparison with NVC. As the Twinspan dichotomous groups are somewhat artificial and may not reflect accurately real vegetation communities in the field, a flexible approach was taken. The smallest similar quadrat groups were entered first into MAVIS and then the groups were merged to see if this improved the match with NVC communities in MAVIS. Results are shown in Table 3.

Table 3 NVC classes of Fields 1-12, determined by MAVIS.

Sites	NVC class(es)	Percentage similarity	Level of precision with NVC	NVC name
Fields 1, 3 and 10 (wet grassland)	MG10 MG10a	50.99 49.94	Poor	MG10= *Holcus lanatus – Juncus effusus* rush-pasture.
Field 6 only	MG9 MG9b MG9a	59.23 54.44 53.16	Poor -Fair	MG9 = *Holcus lanatus – Deschampsia cespitosa* grassland
Field 7 only	MG9 MG9b MG9a U4b	48.64 47.48 44.81 42.79	Very poor - poor	MG9 = *Holcus lanatus – Deschampsia cespitosa* grassland U4 = *Festuca ovina – Agrostis capillaris - Galium saxatile* grassland U4b *Holcus- Trifolium* sub-community
Fields 6 and 7 together	MG9b MG9	53.31 51.97	Poor	MG9 = *Holcus lanatus – Deschampsia cespitosa* grassland MG9b *Arrhenatherum elatius* sub-community
Fields 8 and 9 only	MG6b MG6	53.76 53.22	Poor	MG6 *Lolium perenne – Cynosurus cristatus* grassland. MG6b *Alopecurus pratensis* variant.
Fields 8, 9, 10, 11 and 12	MG9b MG1c MG9 MG4	57.02 55.67 54.29 44.10	Poor	MG9 = *Holcus lanatus – Deschampsia cespitosa* grassland MG9b = *Arrhenatherum elatius sub-*community. MG4 = *Alopecurus pratensis-Sanguisorba officinalis* grassland
Field 12 only	S28	40.63	Very poor	S28 = *Phalaris arundinacea* tall-herb fen

3.4.1 Comment

The reliability of percentage similarity with NVC communities outputted by MAVIS has been graded (Morris & Therivel, 2009). Similarity is from 0-100%, from which similarity ranges are graded 0-49% = very poor, 50-59% = poor, 60-69% = fair, 70-79% = good and 80-100% =

very good. All values >60% are generally acceptable. Similarities <60% may reflect an unusual variant which has not been identified by NVC, as it is not totally comprehensive.

From Table 3, it can be seen that none of the NVC plant communities identified by the analyses used in this report (Twinspan and MAVIS) are 'good'.

Starting with the marshy grassland quadrats at the top of the Table, five quadrats were grouped by Twinspan (Fig. 21) from three fields F1, F10 and F3. The percentage similarity to MG10 (*Holcus lanatus – Juncus effusus* rush-pasture) came out at 51%, which is considered to be 'poor'.

The rest of the quadrats as a whole group fell into MG9 (*Holcus lanatus – Deschampsia cespitosa* grassland) with varying percentages of similarity (see the ordination diagram Fig. 15 and Table 3). However, when the quadrats were analysed by Field number, better % similarities were sometimes achieved. For instance, Fields 6 and 7 were analysed together as reflected by the 12-quadrat group in Twinspan (Fig. 21). They produced a similarity with MG9b (*Arrhenatherum elatius* sub-community) of 53.31% which is 'poor'.

When the fields were split up for separate analysis, all six quadrats in Field 6 came out nearly 'fair' for MG9 at 59.23% (Table 3). Field 6 is included in the LBAP. In contrast, when quadrats in Field 7 were analysed together, the % similarity to MG9 was 'very poor – poor'. However, it did show a slight affinity to U4b (42.79%), which is an acid grassland community (*Festuca ovina – Agrostis capillaris - Galium saxatile* grassland). This is due to the presence of more acid indicator species such as common bent, tormentil, sheep's fescue and devil's bit scabious. Field 7 is also in the LBAP.

The six quadrats taken in the hay meadows Fields 8 and 9 were analysed together in MAVIS and came out close to MG6b (59.23%; 'poor'), which is a more improved grassland type - MG6 *Lolium perenne – Cynosurus cristatus* grassland with the MG6b *Alopecurus pratensis* variant coming out closest. These fields are not in the LBAP.

However, when these two Fields were analysed together with Fields 11 and 12 (as shown by the grouping in the quadrat ordination scattergram (Fig. 15), and the 13-quadrat group in Twinspan (Fig. 21), the comparison yielded a higher similarity with MG9 of 57.02%, which is better than that achieved alone for fields 8 and 9 with MG6b. This suggests that these four fields (two LBAP and two not LBAP) are quite closely related in terms of species composition, despite their very different appearance and management on site.

Finally, the two quadrats in Field 12 which represented swamp vegetation reached a 'poor' similarity (40.63%) with S28 (*Phalaris arundinacea* tall-herb fen). This is due to too few quadrats taken in this community type. These were left out of the main ordination analysis as they are not strictly grasslands but fen.

3.5 NVC communities in Gavray Drive

The NVC communities as described by MAVIS can now be superimposed on the Decorana scatter shown earlier (Fig. 15). This allows for comparison of the NVC communities with the quadrat scatter in 2D space (Fig. 22).

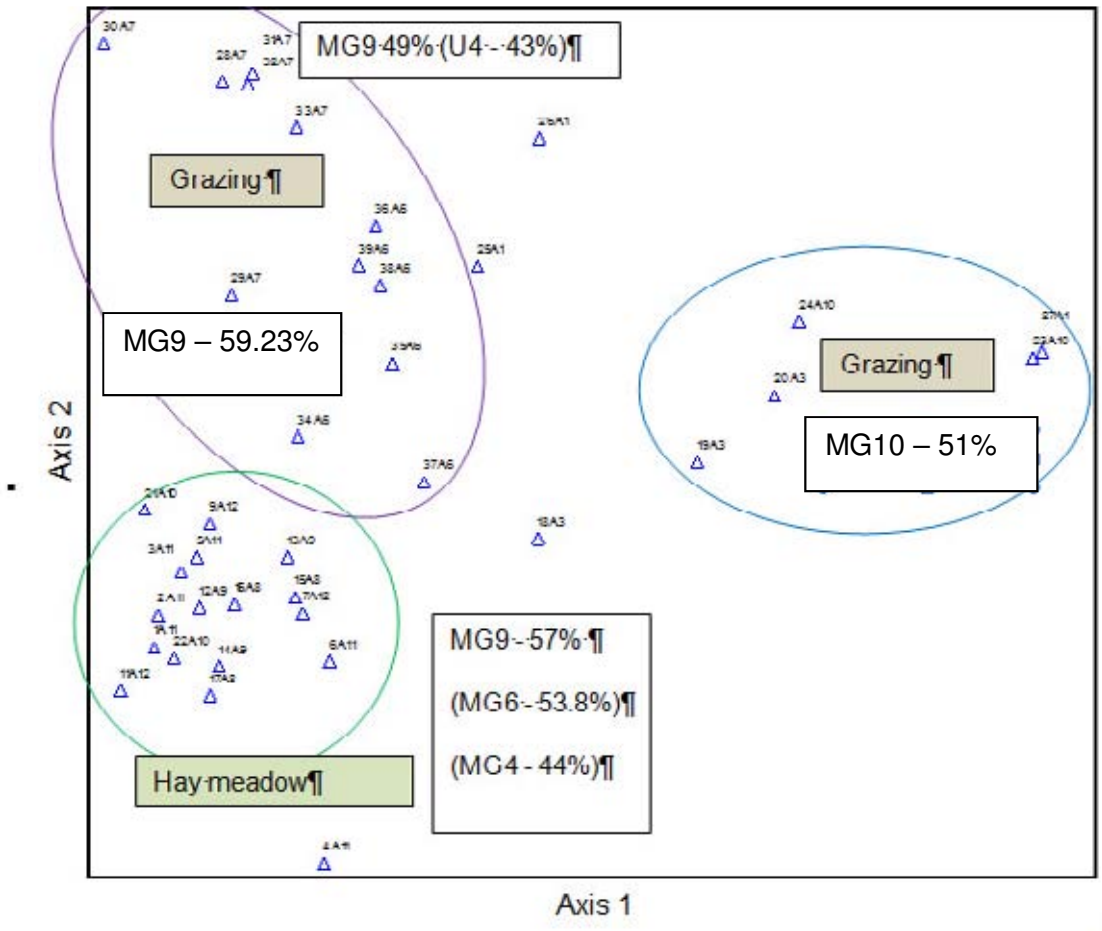


Figure 22 Superimposition of NVC communities on the quadrat scattergram.

This shows the spread of the NVC communities within the scatter. MG10 clearly separates from the rest of the scatter, emphasising the wet nature of those quadrats in Fields 1, 3 and 10. All the other quadrats are positioned on the other side of Axis 1 but have spread out considerably. All the ordination clusters come out predominantly MG9, but when analysed more closely, using Twinspan and MAVIS, more differences emerge, with elements of MG6 and MG4 being seen in the Hay Meadow group, and an acid component towards the top of the quadrant, showing a weak similarity with U4.

3.6 Field by field NVC analysis

This section aims to describe the individual fields in terms of their size, species diversity, NVC classification and LBAP status. Table 4 shows the comparison of total area of each field, the relative areas of NVC grassland communities within each field, species diversity and LBAP status. Most of the NVC areas are approximate. This is because the fields were generally very mixed in terms of vegetation structure due to scrub encroachment, and heterogeneous vegetation cover. This was due to succession occurring within the unmanaged grasslands, including those of the LBAP. The exception to this was Fields 3, 8 and 9, which are regularly managed and easy to define in terms of area and NVC coverage.

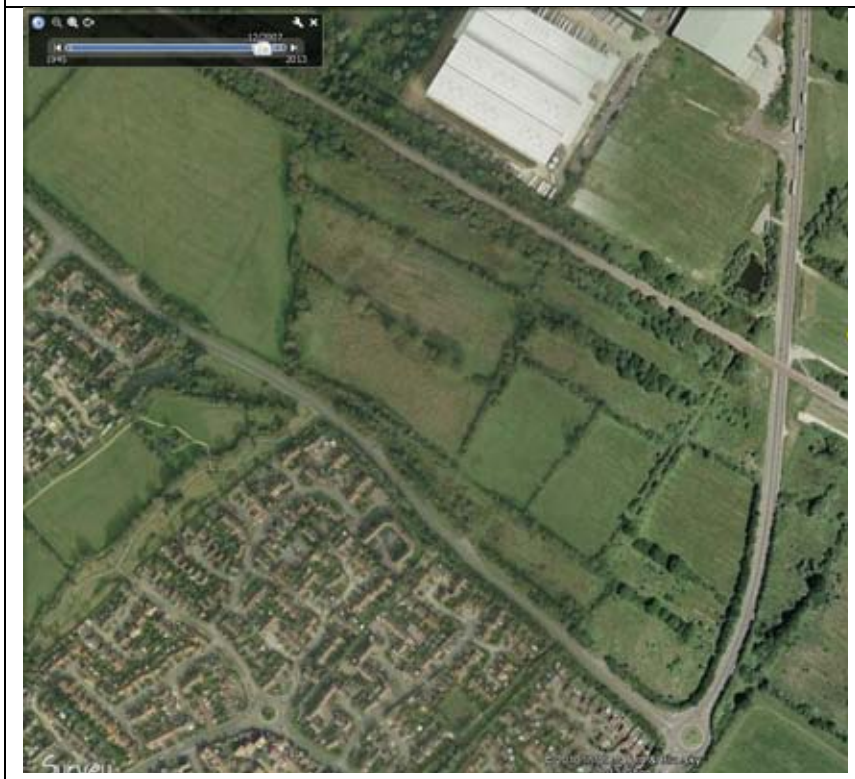
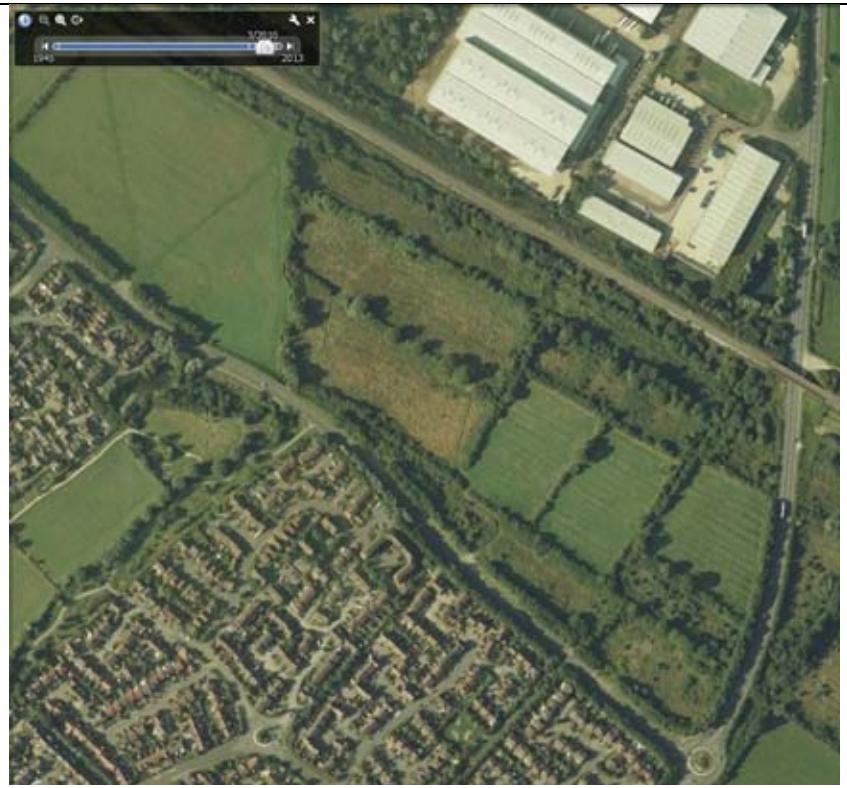
Table 4. Overview of Fields 1-12 in terms of NVC, species diversity, area and existing LBAP status (Coloured rows show weak associations with UK BAP Priority habitats).

Field number	Total area (ha)	NVC community present	% NVC similarity	Approx. total area of NVC (ha)	LBAP	Species number
1	0.69	MG10	50.99%	0.26	No	45
2	0.38	None identified (DAFOR only)			No	42
3	1.02	MG 10	50.99%	0.15	No	27
		MG6b	53.22%	0.87	No	
4	0.42	None identified (DAFOR only)		None	No	52
5	0.49	None identified (DAFOR only)		None	Yes	50
6	0.78	MG9	59.23%	0.78	Yes	45
7	0.61	MG9	48.64%	0.56	Yes	48
		(U4b)	42.79%	0.56		
8	1.18	MG9	57.02%	1.04	No	24
		(MG6b)	(53.76%)	1.04		
9	1.05	MG9	57.02%	1.05	No	28
		(MG6b)	(53.76%)	1.05		
10	1.09	MG10	50.90%	0.12	Yes	39
		MG9b	57.02%	0.45		
11	1.34	MG10	50.90%	0.17	Yes	38
		MG9b	57.02%	0.58		
		(MG4)	(44.10%)	0.58		
12	1.74	MG9b	50.90%	1.02	Yes	33
		S28	57.02%	0.26		
		(MG4)	(44.10%)	1.02		

Change in vegetation structure has occurred over a relatively short timescale at Gavray Drive. Table 5 shows a range of images from Google Earth from 1945-2009. These images show that scrub encroachment was not really a problem until after 2006, and that the fields had a relatively open structure up to that. The most recent image of the site on Google earth is 2009 and this shows that scrub invasion has advanced dramatically since 2006. This can only be worse in 2013 when this survey was conducted.

Table 5 Change in vegetation structure on Gavray Drive between 1945 and 2009 (Google Earth).

1945	2004
	
2006	2009

3.6.1 Field map of NVC communities

The NVC map for Gavray Drive is found in Fig. 23. These NVC location maps are not to be taken as definitive or accurate. They give a general sense of where the NVC is located as far as was possible from the field visit. This is because the nature of the unmanaged fields 1, 2, 4, 5, 6, 7, 10, 11 and 12. Most of them had scrub encroachment, sometimes severely, and the grassland vegetation was highly mixed due to transition through to rank vegetation and scrub.

Because of the ridge and furrow structure of the fields, it was difficult to assign NVC easily spatially as the ridges and furrows interdigitated throughout. This resulted in NVC 'mixtures' within fields. It was difficult to find areas for quadrats suitable for NVC analysis in most fields and in some it was not possible at all i.e. fields 2, 4 and 5. This was due to lack of homogeneity, size and quality within the grasslands.

Despite best efforts, the quadrats taken did not match NVC community types very well, despite having at least six quadrats to test for an individual NVC category. All matches ranged from 'very poor' to nearly 'fair' (Table 3).

Figure 23 Approximate area of NVC classes applied to Gavray Drive vegetation. NVC classes in brackets relate to relevant classes with lower percentage similarity.

3.7 UK BAP priority habitats and species

There is one UK BAP priority habitat relevant to this study; Lowland Meadow. In terms of National Vegetation Classification (NVC) plant communities, the Lowland Meadow BAP primarily embraces each type of *Cynosurus cristatus* - *Centaurea nigra* grassland (MG5), *Alopecurus pratensis* - *Sanguisorba officinalis* floodplain meadow (MG4) and *Cynosurus cristatus* - *Caltha palustris* flood-pasture (MG8). The category is not restricted to grasslands cut for hay, but also takes into account unimproved neutral pastures where livestock grazing is the main land use (Maddock A. , 2008).

In relation to the site surveyed, Fields 8, 9, 11 and 12 taken together, had a low similarity to MG4 of 44.10% (Table 3). This is a 'very poor' similarity to MG4, but does suggest some affinity with it and one which may be improved with correct management.

Only the Lowland Meadow UK BAP has been cited at Gavray Drive, although many of the species and habitats found there are representative of Floodplain Grazing Marsh. The latter has no NVC classification associated with it as it is representative of a landscape type than a plant community type.

No UK BAP priority plant species (http://jncc.defra.gov.uk/page-5171) were found at Gavray Drive.

3.8 Oxfordshire LBAP

The Oxfordshire LBAP habitats are managed by the Oxfordshire Nature Conservation Forum (http://www.oncf.org.uk/biodiversity/biodiversity.html). The LBAP specifically covers Lowland Meadows and Floodplain Grazing Marsh which is relevant to this study.

The relationship of the LBAP with UK Priority BAP habitats is shown in the Table 4 below, taken directly from the LBAP document. From this Table, it is clear that much of the site at Gavray drive resembles the Floodplain Grazing Marsh community, expressing affinity with MG9, MG10 and MG6, the predominant NVC communities identified by MAVIS.

However, under the Lowland Meadow categories, the site as a whole most closely resembles the Wet Grassland sub-group with MG9 and MG10 present, noted as found in a number of sites outside Floodplain Grazing Marsh *sensu stricto.*

So, while not meeting exactly the UK BAP Priority habitat of Lowland Meadow due to the poor affinity in this study to MG4 (the only Lowland Meadow NVC community type recognised, somewhat poorly, on this site), it is still classed within the Oxford LBAP as Lowland Meadow with the inclusion of Wet Grassland and, to a lesser extent, as Seasonally Flooded Neutral Grassland (Table 6).

Table 6 The relationship between UK BAP Priority habitats and LBAP habitats in Oxfordshire (Source; Oxford LBAP).

UK BAP Priority habitat	Specific habitat	Definition
Coastal and Floodplain Grazing Marsh	-	Mosaic of grassland and wetland bounded by managed ditches. The grassland can range from wet grassland (NVC communities MG9 and MG10), inundation grasslands such as NVC community MG13, to improved grassland (NVC community MG6) and may include lowland meadow grassland types.
Lowland meadows	Seasonally flooded neutral grassland	Unimproved or semi-improved hay meadows or pasture in the floodplain. NVC communities MG4 and MG8.
	Dry neutral grassland	Unimproved or semi-improved hay meadows or pasture within and outside the floodplain that tend not to be flooded in the winter. NVC community MG5
	Rough grassland	NVC community MG1. Grassland dominated by false oat grass, which occurs anywhere where management is relaxed or sporadic. It is the principal community on road verges.
	Wet grassland	Wet grassland (NVC communities MG9 and MG10) is found in a number of sites outside grazing marsh

3.9 Local Wildlife Site status

Fields 11, 12, 5, 6, and 7 of the Gavray Drive site are identified as a Local Wildlife Site (LWS) for Lowland Meadow. Lowland meadow is distinguished from lowland dry acid grassland by the absence of acid indicator species such as sheep's sorrel (*Rumex acetosella*), tormentil, and heath bedstraw (*Galium saxatile*). However, the criteria for selection of Wildlife Sites (TVERC, 2009) states that care should be taken in North Oxfordshire with the more acidic lowland meadow habitat, specifically the U4 acid grassland community, which includes bitter vetch, betony, tormentil, pignut (*Conopodium majus*) and devil's bit scabious. This bears out well with this study as there is a weak correlation with U4 in Field 7, where devil's bit scabious is to be found in association with other acid indicators such as common bent, tormentil, sheep's fescue and betony.

Gavray Drive is contained within the Ray Conservation Target Area (Fig. 24). The Target Area is concentrating on management, restoration and creation of Lowland Meadow (with a focus on MG4 hay meadows) and Floodplain Grazing Marsh (with a focus on breeding

waders). Local Wildlife Sites (LWS) have no statutory protection. However, LWS may support habitats and species of national significance, or they may be of more local importance. They are recognised for their local, regional and national wildlife value and for public enjoyment and scientific research. In Oxfordshire there are 363 Local Wildlife Sites covering 2% of the County. There are 993.7ha in total of Lowland Meadow in Oxfordshire (TVERC, 2009).

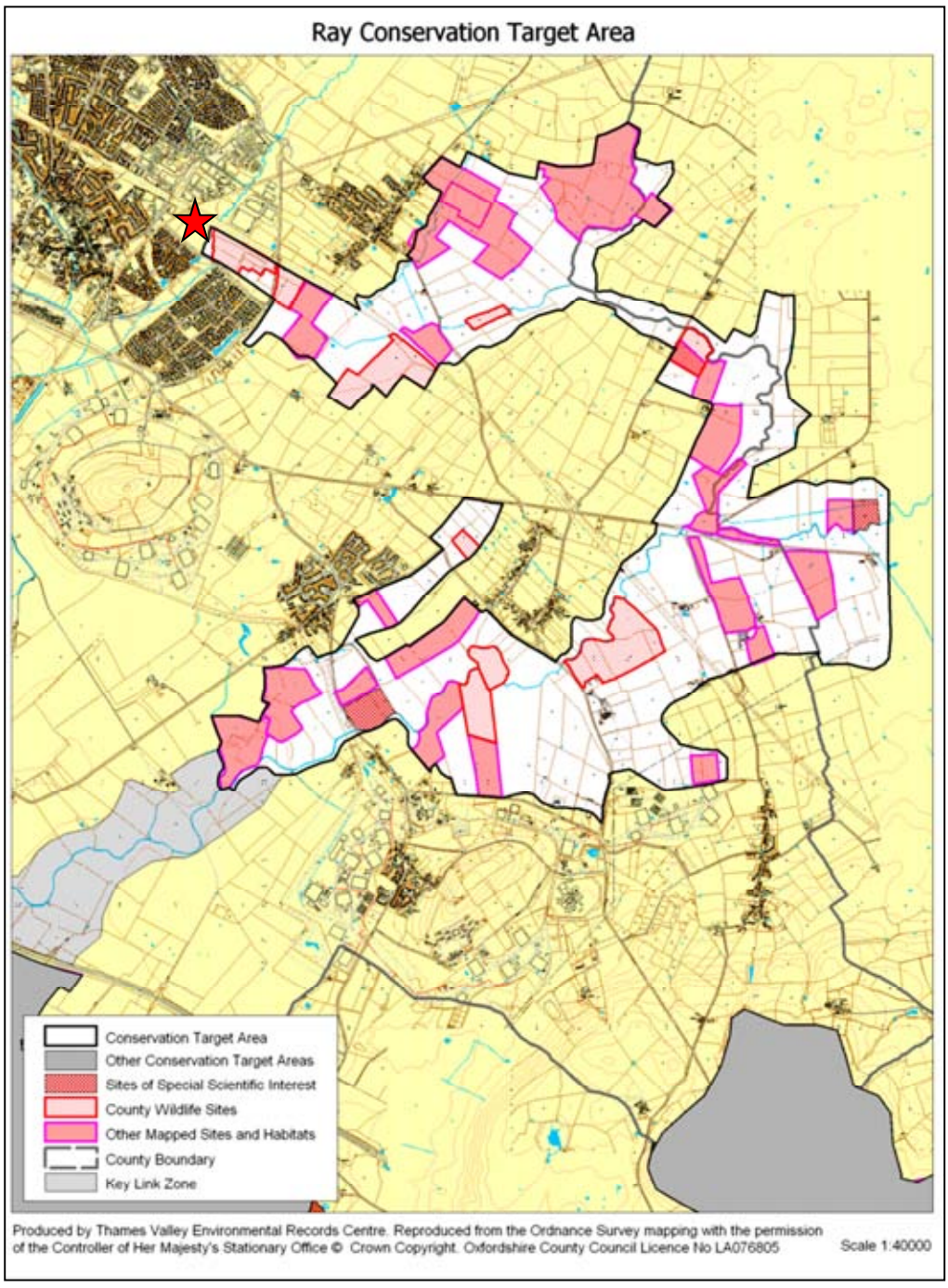


Figure 24 The Ray Conservation Target Area. Gavray Drive is situated at the extreme North West corner (red star).

3.9.1 *Wildlife Site criteria*

The Wildlife Site criteria follow broadly the 'Ratcliffe approach'. This is set out in Fig. 25 below (taken directly from the Wildlife Criteria document from TVERC), with threshold scores shown at the bottom of the Figure.

Criterion	Evidence from surveys	Does the site qualify under this criterion?
Core Criteria		
1. Naturalness (habitats)	Presence of UKBAP priority habitats	Qualifies under either core criteria 1 or 2 AND
2. Rare or exceptional features (principally for species)	Presence of substantial population or assemblage of species as defined by the species criteria. See the specific information for what would be considered under this criterion in the Species section.	
3. Size or extent of features (habitat or population)	Does the site hold a substantial amount (≥ 3%) of the county resource of the habitat (or habitat mosaics) or species which it is being put forward for? OR is it a large site supporting a range of habitat types? AND Is the site ecologically viable? Are the minimum viable ecological units for the habitat(s) or the lifecycle requirements of the species present? NB. If the resource is less than the smallest viable unit for the BAP habitat it has been selected for, the site will not meet this criterion	EITHER one or both of criteria 3 or 4
4. Diversity (numbers of species or habitats)	Follow species guidelines and consider in context of the number of habitats the site supports.	
5. Connectivity within the landscape	Presence of green links or in close proximity to other areas of semi-natural habitat. Part of wider area used by meta-population of a species	OR two or more of contextual criteria 5-9
6. Fragility	Sensitive species populations or habitats prone to loss from external influences such as climate change or land management change (does not include at risk from new development).	
7. Recorded history and cultural associations	Historic use of the site known and important to local community. Part of regular survey/monitoring programme	
8. Value for appreciation of nature	Good access/greatly increase the aesthetic of the area	
9. Value for learning	Current use by schools, local groups or proximity to education centres and access	
Does the site qualify for LWS selection?	**YES/NO (qualifies by having: one of 1 OR 2 & at least one of 3 OR 4 alternatively one of 1 OR 2 & two or more contextual criteria)**	

Figure 25 The Ratcliffe criteria used to aid selection of LWS designation in Oxford County (TVERC, 2009).

In terms of this study of grasslands alone, it is only possible to comment on numbers 1-5 with some certainty (Table 7). On the basis of these, in relation to the grasslands only, it still qualifies for LWS selection. This is for containing LBAP and UK BAP Lowland Meadow habitat, on its size (> 0.25ha for Lowland Meadow), general diversity and its connectivity to the wider landscape (Ray Conservation Target area).

Table 7 LWS criteria for selection in relation to the grasslands of Gavray Drive.

Criterion	Evidence from surveys	Does the site qualify under this criterion?
1. Naturalness (habitats)	Contains Lowland Meadow (LBAP), encompassing wet meadow (MG9 and MG10). There is a weak association with MG4 (UK BAP).	Satisfies habitat definition 4.3
2. Rare or exceptional features	No UK priority BAP plant species. Contains 18 out of 54 lowland meadow species specified by TVERC.	X
3. Size or extent	The extent of the Lowland Meadow *sensu lato* is roughly 4.4ha	✓
4. Diversity	Diverse flora (154 grassland species, covering dry meadow and wet grassland).	✓
5. Connectivity with the landscape	Is contained within the Ray Conservation Target Area, designed to increase and connect The Lowland Meadow and Grazing Marsh BAP habitat.	✓
Does the site qualify for LWS selection?	Yes, qualifies under 1, 3 and 4.	

3.9.2 Comment

In relation to the grassland habitats on this site, some comments may be made with regard to these criteria. Naturalness relates to the relative influence of man on the habitats present. Overall, sites that have one or more of the UK BAP Priority Habitats of good quality should be selected under this criterion. In addition, sites with good quality, non-UK BAP Priority habitats in a more built environment setting can be selected under this criterion. This last comment is relevant to Gavray Drive, as the site sits within the largely built-up area of Bicester.

Larger sites will be looked on more favourably as they are usually richer in wildlife than smaller ones and are likely to accommodate more habitat- and species diversity. Such sites may be necessary to support sustainable populations of some species which require a minimum foraging area or territory, or which operate successfully only within a metapopulation (e.g. great crested newts). Gavray Drive is a relatively large site (15.6ha). Connectivity with semi-natural habitat in the surrounding landscape is already addressed with the inclusion of Gavray Drive in the Ray Conservation Target Area (Fig. 24). Use of the site as a wildlife resource by the community is also an important factor. This site has a public right of way going through it and is used regularly by walkers.

3.10 Habitat hectares approach

A field by field analysis was requested for LWS and LBAP status. To do this objectively, a method called the Habitat Hectares approach was used. This is an Australian method for assessing the quality, condition or status of stands of native vegetation (Parkes, Newell, & and Cheal, 2003) using a scoring system. This method is an objective assessment of vegetation quality which is both reliable and repeatable. This is defined as the degree to which the current vegetation differs from a benchmark representing the characteristics of a mature and undisturbed stand of the same vegetation community.

The benchmark in UK terms is the NVC classification. The Habitat Hectares method attempts to assess the evidence of the long term viability of the stand. It does this by looking at particular perennials present. Other factors which contribute to the score are whether the area is disturbed or not e.g. the presence of weeds and the encroachment of scrub. The approach also deals with patch size which is incorporated into the other scores, as larger patches would have a better prognosis for survival. Multiplying the 'habitat score' by the area of the stand offers a quality-quantity measure that is termed a 'habitat hectare'.

For this site, six habitat measures were chosen to represent the quality of the habitats present:

- the presence of weeds and shrubs in the grassland areas (scored negatively),
- a recognisable NVC grassland community(ies) or sub-community(ies) present,
- the species diversity of each field,
- the presence or absence of characteristic species such as devil's bit scabious and great burnet in each field, as these two species were indicative of the persistence of good quality lowland grassland, and characteristic of U4 and MG4 grassland respectively.

A final category was created which gave a negative marking for whether the field experienced 'edge effects', where the majority of the field edge was adjacent to a road and suffered as a result from disturbance and/or increased neglect.

The presence of scrub and weed species, and species diversity was reduced to scales ranging from 1-3. Grassland NVC communities, if present, were added together for each field.

The final measure was to multiply this total 'habitat' score by the size of the individual field. This was calculated from Google earth, and the 'habitat hectare' result is achieved (Table 8). A bar chart of the results is shown in Fig. 26.

Table 8 Scores for calculating the 'habitat hectares' for each field at Gavray Drive

Field no.	1	2	3	4	5	6	7	8	9	10	11	12
Weeds and Shrubs	-2	-3	-1	-3	-3	-2	-1	-1	-1	-2	-2	-1
NVC	1	0	2	0	0	1	1	1	1	1	2	2
Diversity	3	3	1	3	3	3	3	1	1	2	2	2
Succisa	0	0	0	1	1	0	1	0	0	0	0	0
Sanguisorba	0	1	0	1	1	1	1	0	0	0	1	1
Edge effects	0	0	0	-1	-1	-1	0	0	0	-1	0	0
Total score	2	1	2	1	1	2	5	1	1	1	3	3
Hectares	0.69	0.38	1.02	0.42	0.49	0.78	0.61	1.18	1.05	1.09	1.34	1.74
Habitat hectares	1.38	0.38	2.04	0.42	0.49	1.56	3.05	1.18	1.05	1.09	4.02	5.22

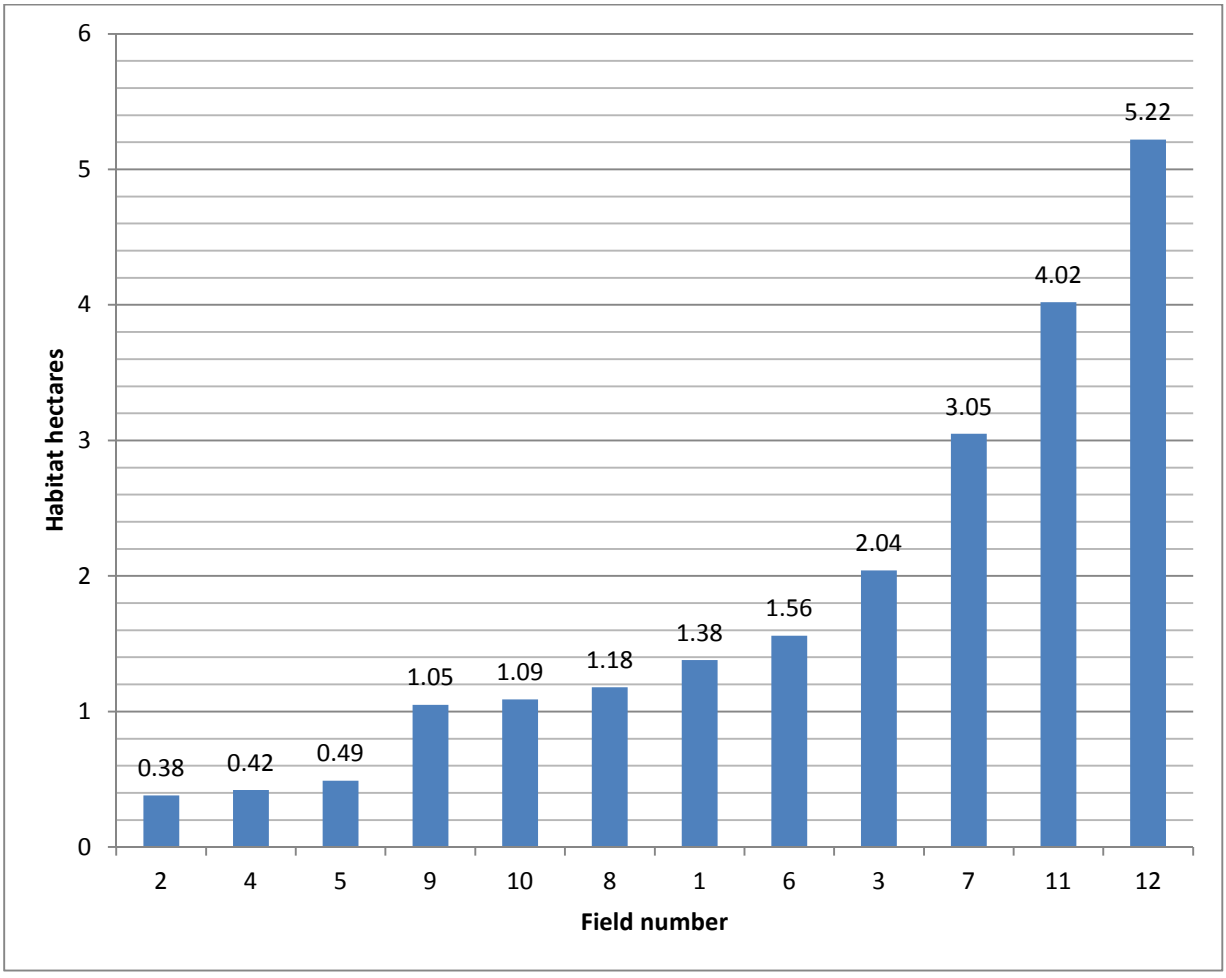


Figure 26 The 'habitat hectares' for each field surveyed in Gavray Drive.

Fields 2, 4 and 5 yielded the smallest scores as these were small fields, had scrubbed up most severely, and also did not contain sufficient area of grassland to survey for NVC. Fields

8, 9 and 10 follow as the next lowest scoring. These did have NVC communities present, but were relatively species-poor. Field 10 was very disturbed also. The remainder of the Fields 1, 6, 3, 7, 11 and 12, habitat hectares start to rise steeply in the bar chart, with Fields 7, 11, and 12 showing the best scores (Fig. 26).

Fields 1 and 3 are not currently recognised as LBAP within the site, although they both contain the wet grassland community MG10. Field 3 has a mixture of wet grassland in the furrows, and dry hay meadow on the ridges. This is more akin to the UK BAP Priority Habitat, Floodplain Grazing Marsh, which is also an LBAP. Using the Habitat Hectares approach, a revised LWS field selection based on LBAP criteria for Lowland Grassland is shown in Table 9.

Table 9 A revised LWS selection based on the Habitat hectares approach.

Field number	1	2	3	4	5	6	7	8	9	10	11	12
LWS	Yes	No	Yes	No	No	Yes	Yes	No	No	No	Yes	Yes

3.11 Overall comments

This study was commissioned to assess the botanical status of grassland within the Oxford LBAP at Gavray Drive, Bicester. The site at Gavray Drive is very varied and consists of three fields being cut for hay, but the remaining nine fields have scrubbed up to a greater or lesser extent over the last ten years. This would have been hay cutting in some fields and grazing in others. Part of the site has been designated as LBAP for the UK Priority habitat Lowland Meadow. At the national level, this would encompass three NVC grassland communities; MG4 Great Burnet – Meadow Foxtail Floodplain Grassland , MG5 Common Knapweed - Crested Dog's-Tail Meadows and MG8 Crested Dog's-Tail - Marsh Marigold Grassland. The only grassland type at Gavray Drive for which it was designated is MG4, described by Rodwell (Rodwell, British Plant Communities Volume 3., 1998) as a lowland grassland characteristic of traditional hay meadows on seasonally flooded land with alluvial soils.

The Local Wildlife Site citation was updated in 2003. No mention was made in this document of the presence of MG4 *per se*, but it was still described as 'Lowland meadows (Hay meadow)'. Many of the species associated with MG4 were mentioned in the citation, but two indicator species; pepper saxifrage (*Silaum silaus*) and sneezewort (*Achillea ptarmica*), located in Field 11, were not recorded in this study. The site was surveyed in 2002 by CPM in relation to a planning proposal for housing. There was a good comprehensive species list for all the fields referred to in this study, but very few quadrats were taken (10 only) in only two fields.

The main aim of this report was to carry out an extensive botanical survey of the grasslands present, using quadrats. To maintain as much objectivity as possible, the data from the

quadrats were entered into several vegetation software analysis packages. Ordination techniques were employed to analyse the vegetation data – this was carried out to identify quadrats and associated species' abundances that were similar in nature, and hence form natural groupings where they were more similar to each other. The next step was to use the output from these ordination techniques to assign NVC classes to the quadrats of similar grouping. This was done using MAVIS, a program which matches quadrats inputted to NVC communities, giving a percentage similarity to original NVC communities in the process.

The ordination techniques showed that the vegetation sampled fell into two main grassland groups; a wetter grassland group and a more dry grassland group. The drier grassland group then differentiated into a neutral grassland group, usually associated with the species composition of hay meadows, and a more acid grassland group more associated with grazing pasture.

When MAVIS was applied to the ordination groups, the wetter grassland group was most closely aligned to MG10 *Holcus lanatus - Juncus effusus* rush pasture. The rest of the quadrats all fell loosely into MG9 *Holcus lanatus - Deschampsia cespitosa* grassland. Further analysis showed that there was a weak association of the neutral hay meadow group with MG4 (44%), and another weak association within the acid grassland group of U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* group (42.79%). The hay meadows (Fields 8, 9, and 3), showed a match with MG6b (MG6 *Lolium perenne – Cynosurus cristatus* grassland, MG6b *Arrhenatherum elatius* sub-community) (53.67%) but was still considered a 'poor' match in NVC analysis.

None of the classifications reached what would be described as a 'good' match to any of the NVC communities using the techniques described here. Despite carefully locating quadrats to fulfill the criteria for effective NVC sampling, poor matches were found everywhere. This probably reflects the transitional state of nearly all the grassland communities encountered in this study.

In terms of the LWS designation, the site does not really conform to the strict UK definition of MG4 Lowland Meadow Priority habitat. There are hints that this NVC community could be restored as there was a weak match through the analysis in MAVIS. Acid grassland has not been confirmed in the County but some fields, notably Field 7, had species present of an acid grassland association. This would fall into an acid variant of Hay Meadow as described within County Wildlife Site Criteria. However, the LWS takes a more loose approach to designating County Level Lowland Meadow and includes wet grassland (MG9 and MG10), and seasonally flooded neutral grassland (MG4 and MG8). The former is very well represented in this site, but does not conform to a UK Priority Habitat type. If the strict definition is adhered to at the UK level, then this site does not qualify in its present condition. If the looser definition is followed as in the Oxfordshire LBAP, then it does qualify – as far as grasslands are concerned.

There is a proviso in the NVC definition for MG4 however which bears recounting here as it is highly relevant. Firstly, very few quadrats have been taken to identify MG4 within the NVC publication itself. Only 22 sites have been identified throughout the UK. This is partly due to the changes in management which has seen the demise of this grassland habitat, even before the NVC was compiled. The description states that this grassland may grade into several other grassland types if neglected, and lack of management will "initiate successions to other grassland types". It can however remain dormant in the soil for years and can recolonise fields from margins or ditch edges. Significantly, if it is not mown – as is the case here- it will grade into stands of *Holcus lanatus – Deschampsia cespitosa* community, namely MG9. As MG9 is the major NVC community type found throughout the site, lack of appropriate management may have caused the demise of MG4 on this site in the short term. Its affinities are somewhat mixed and it appears to straddle MG5 (*Centaurea nigra – Cynosurus cristatus* grassland) and MG1 type communities (*Arrhenatherum elatius* grassland) and even grassy poor fens. This reflects the rather particular combination of treatment factors which maintains MG4 on alluvium in Britain.

In terms of identifying the current value of individual fields for LWS selection, the Habitat Hectares approach was employed. This is an objective method, incorporating important habitat features with the area of the fields in question. This is a somewhat artificial approach as it doesn't take into account the relative proximity of the fields to each other, so at the landscape scale it may be unworkable. However, it did make sense in terms of the actual state of the fields on site today.

3.12 Constraints

In terms of the distribution of NVC communities on site, it was very difficult to assign spatial certainty to their coverage in the individual fields surveyed. The NVC map provided in this study is indicative of the NVC communities present but lacking in the fine detail at the field level. It was very difficult to map the NVC communities accurately in the field as it was not possible to immediately assign NVC communities while surveying. This was partly due to time constraints but also to the fact that the grassland communities are in transition to scrub and thus it was too difficult to map the grassland types accurately. It is tempting to assign NVC communities in the field while surveying, but the subsequent analysis of the quadrats was much more objective and superseded any subjective assignation of NVC in the field.

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5. Appendix 1 Quadrat photographs

Quadrat 1 Field 11	
Quadrat 2 Field 11	
Quadrat 3 Field 11	

Quadrat 4 Field 11	
Quadrat 5 Field 11	
Quadrat 6 Field 11	No photo
Quadrat 7 Field 12	

Quadrat 8 Field 12	
Quadrat 9 Field 12	
Quadrat 10 Field 12	

Quadrat 11 Field 12	
Quadrat 12 Field 9	
Quadrat 13 Field 9	

Quadrat 14 Field 9	
Quadrat 15 Field 8	
Quadrat 16 Field 8	

Quadrat 17 Field 8	
Quadrat 18 Field 3	
Quadrat 19 Field 3	

Quadrat 20 Field 3	
Quadrat 21 Field 10	
Quadrat 22 Field 10	

Quadrat 23 Field 10	
Quadrat 24 Field 10	
Quadrat 25 Field 1	

Quadrat 26 Field 1	
Quadrat 27 Field 1	
Quadrat 28 Field 7 (rabbit grazed)	

Quadrat 29 Field 7	
Quadrat 30 Field 7	
Quadrat 31 Field 7	

Quadrat 32 Field 7	
Quadrat 33 Field 7	
Quadrat 34 Field 6	

Quadrat 35 Field 6	
Quadrat 36 Field 6	
Quadrat 37 Field 6	

Quadrat 38 Field 6	
Quadrat 39 Field 6	

6. Appendix 2 Quadrat data as entered into Decorana

Sp./Field number	1A 11	2A 11	3A 11	4A 11	5A 11	6A 11	7A 12	8A 12	9A 12	10 A12	11 A12	12 A9	13 A9	14 A9	15 A8	16 A8	17 A8	18 A3	19 A3	20 A3	21 A10	22 A10	23 A10	24 A10	25 A1	26 A1	27 A1	28 A7	29 A7	30 A7	31 A7	32 A7	33 A7
Achi mill			1																														
Agro capi																													25		30	20	20
Agro stol																										5		50		20			
Ajug rept																												3		1			
Alop prat	40	40	35		30	20	30		5		10	15	35	35	35	5	25	5	1		5	80							25	3			
Ange sylv		3		2							30																						
Anth odor	5				5		5							15	5	30	10	1		5									2	3			
Arrh elat	35	40	10	3	10						70	30	15		5		5				40	10			5			1					
Arte vulg	1																								2	1							
Call cusp																										25							
Card prat													2				5	1	1	1													
Care acut									5																								
Care hirt									3	1															30			5			5	10	10
Care otru																3	1							10		50							
Care oval									5																								
Care pani																									5								
Cent nigr	1																																
Cera font					1							10		1		1									2								
Cirs arve	1	1	1		2	2	1		1		2	2	2		1		1			5		1						2			1	5
Cirs palu							1																		10	10		5	2				
Dact glom	5		10											1	1		2				5								5				
Desc cesp			2	5		30	5		2	5					25			75	50										5			10	5

Epil cili																															3	1
Epil hirs	1	2							40		10											5			1	5							
Epil mont				40		30		2	5		5												1		1								
Fest ovin																													10	40			
Fest rubr		5	15	3	15	20			5			5	2	10	5	10										3		1	5	5			
Fili ulma			2	80	5			10																									
Gali apar												1										1											
Gali palu								3																					2	1			
Glec hede																														3			
Glyc flui																							90				80						
Glyc maxi								50																									
Hera spho			1		2	5					1																						
Holc lana		6	5		10							5	15	15	10	15					5		2	5	15			5	10	10	50	20	20
Iris pseu																							3		1		10						
Junc arti																															10		
Junc cong																										10							
Junc effu																			60	40			5	10			5						
Lact viro						1																											
Lath prat	5					5											10														1	1	
Leon autu																									1	1							
Lotu corn																												1					
Lotu pedu																				10													
Luzu camp					1											2														5			1
Lych flos									1																								
Phal arun								50	1	100																							
Picr echi																									1								

Poa prat									5					1		1	2				25			1		1		3		5					
Pote anse								1	45																										
Pote erec																													10	10	50	50	10	
Pote rept																	2				5														
Pote ster									1																										
Ranu acri												2	2	40	10	15	20		2		2														
Ranu fica			1										4				5																		
Ranu repe	1						5						10					5	1	5				5	40	15		10	2						
Rhyt squa																														25					
Rubu frut																				5									1						
Rume acet			5	2	10	10	1		10			30	15	10	10		15	5	5									5	2	1					
Rume cris									5																										
Rume sang																									1		2	1							
Sang offi		5	15	5	25	5																							5		1				
Scler puru																															20				
Sola dulc								1																											
Stac beto																													3	3	3	5	30	20	
Stel gram																															1				
Succ prat																													15	5	7	10			
Trif prat																50					20				5										
Trif repe																					5				5										
Urti dioi		2												1						30		5													
Vici crac	1																																		
Vici hirs																									1	1									

7. Appendix 3 – GPS coordinates for all quadrats

Quadrat number	x	y
Q1F11	459622	222297
Q2F11	459616	222271
Q3F11	459682	222236
Q4F11	459670	222262
Q5F11	459715	222249
Q6F11	459761	222210
Q7F12	459663	222383
Q8F12	459707	222369
Q9F12	459716	222369
Q10F12	459698	222343
Q11F12	459625	222403
Q12F9	459847	222205
Q13F9	459835	222205
Q15F8	459961	222180
Q16F8	459954	222154
Q17F8	459946	222126
Q18F3	460046	222099
Q19F3	460031	222107
Q20F3	460029	222083
Q21F10	459775	222136
Q22F10	459825	222074
Q23F10	459908	222024
Q25F1	459984	221953
Q26F1	460003	221921
Q27F1	459915	222027
Q28F7	459927	222241
Q29F7	459903	222263
Q30F7	459878	222267
Q31F7	459973	222215
Q32F7	459970	222220
Q33F7	459986	222214
Q34F6	459667	222439
Q35F6	459694	222421
Q36F6	459684	222440
Q37F6	459751	222398
Q38F6	459783	222377
Q39F6	459817	222367

8. Appendix 4 - Two-way ordered Table from TWINSPAN

```
                 233333333222       12  11111112211222
                 90145672367848912350067123564934781 25
65  Rume san  ------2-2----------------------2---11  11
62  Rubu fru  ---3------1----------------------3---  11
60  Ranu rep  ----34--32-----1------34---3--4-13354  11
47  Lotu ped  ----3-2--------------------------4---  11
40  Junc eff  --------------------------------55343  101
37  Iris pse  ------------------------------1---2-4  101
34  Glyc flu  ----------------------------------5-5  101
15  Care otr  -------------------------1-2--5---4-  101
74  Urti dio  ----------------2---3---1--------5---  100
36  Holc lan  5555455-4344----3343---444--434---23-  011
23  Desc ces  -4335--55-3-32---2---53--5-5----5----  011
20  Cirs arv  -13434-222---12111221212-11------3---  011
68  Sene jac  ---2---2-----------------------------  010111
52  Phle pra  -------3-----------------------------  010111
45  Loli per  -----2--3----------------------------  010111
41  Junc inf  ------5-----------------------------  010111
27  Fest aru  -------55----------------------------  010111
24  Epil cil  -214--42-----------------------------  010111
13  Care dis  ------5-5----------------------------  010111
56  Pote rep  ---4---4-----------------2--3-------  010110
38  Junc art  4-----------------------------------  010110
14  Care hir  3445324443---2----------------5------  010110
 2  Agro cap  555545555-5--------------------------  010110
69  Stac bet  355------222-------------------------  010101
55  Pote ere  554-------44-------------------------  010101
71  Succ pra  4--------433-------------------------  010100
70  Stel gra  -----------1-------------------------  010100
67  Scler pu  -----------5-------------------------  010100
61  Rhyt squ  -----------5-------------------------  010100
46  Lotu cor  ---------1---------------------------  010100
```

33 Glec hed ----------2---------- 010100

32 Gali pal ----------21---------- 010100

28 Fest ovi ----------45---------- 010100

4 Ajug rep ---------2-1---------- 010100

3 Agro sto ---------5-5----------3----- 010100

30 Fili ulm ---35-4-----5----23---------- 01001

25 Epil hir ----4-45-----5412---3---------13----- 01001

48 Luzu cam --1--------3------1---------2-------- 01000

29 Fest rub ---3-5-4313323--3443-5-243--4--2----- 01000

21 Cirs pal ---2--3--32----------1-------44----- 01000

35 Hera sph -------3------1--12--3---------- 00111

22 Dact glo -------4--3----3-4------112--3------- 00111

8 Arrh ela -------551--2-5554454--4-33--53------ 00111

66 Sang off ---------3-13---345--3---------- 00110

43 Lath pra -11----------3-----3----4---------- 00110

6 Ange syl -------2----2-5-2---------- 00110

76 Vici hir ----------11----- 001011

44 Leon aut ----------11----- 001011

39 Junc con ----------4----- 001011

10 Call cus ----------5----- 001011

9 Arte vul ----------1----------21----- 001011

77 Vici sat ----------2------ 001010

73 Trif rep ----------33------ 001010

72 Trif pra ----------553------ 001010

51 Picr ech ----------1------ 001010

17 Care pan ----------3------ 001010

64 Rume cri ----------3---------- 001001

57 Pote ste ----------1---------- 001001

54 Pote ans ----------5---------- 001001

50 Phal aru ----------1---------- 001001

49 Lych flo ----------1---------- 001001

19 Cera fon ----------14----1---1-2------ 001001

16 Care ova ----------3---------- 001001

12 Care acu ----------3---------- 001001

5 Alop pra -----1-2--52-34555545555555333--1---- 001001

78 Fest lol ----------1---------- 001000

75 Vici cra ----------1---------- 001000

59 Ranu fic ----------1-----2--3---------- 001000

42 Lact vir ----------1---------- 001000

31 Gali apa ----------11---------- 001000

18 Cent nig ----------1---------- 001000

1 Achi mil ----------1---------- 001000

63 Rume ace -----132-32124---345-4144443----3---- 0001

53 Poa prat ---------2-3-3----------1-2-15-1---1- 0001

11 Card pra ----------2--31----11--- 0001

7 Anth odo ----------22---3--3---3-43415----3--- 0001

58 Ranu acr ----------2---2545-42--2---- 0000

26 Epil mon ----------533------5--------1---1-- 0000

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Appendix EDP 3
Weather Conditions Recorded During 2013 Reptile Surveys

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Gavray Drive, Bicester – Reptile Surveys Weather Conditions

Date	Visit No.	Start/ Finish time	Cloud cover (%)	Air temp. range (°C)	Refugia temp. range (°C)	Wind speed (Beaufort)	Precipitation (during survey)	Recent weather (last 48 hrs)
05/06/13	1	11:00-14:31	60	16.3-23.0	18.8-27.0	3	-	Hot, sunny and dry
07/06/13	2	11:52-15:31	40	20.2-25.9	26.8-39.0	0-2	-	Hot, sunny and dry
20/06/13	3	17:00-18:33	100	18.3-19.6	18.7-21.4	2	-	Warm and humid
27/06/13	4	11:10-16:10	50	16.6-19.1	17.1-27.1	2	Drizzle and rain after 15:30	Warm and dry
02/07/13	5	13:27-17:15	100	14.5-17.5	17.2-19.7	2	Some light rain	Sunny intervals, hot
12/07/13	6	10:34-12:15	95	17.7-23.8	19.2-25.6	0	-	Hot, sunny and dry (25+)
19/07/13	7	06:15-09:50	<1	13.7-21.6	14.2-28.4	1-2	-	Hot, sunny and dry
24/07/13	8	08:30-13:20	90-30	18.6-28.7	19.4-34.7	1	-	Hot and sunny, thunder and rain
02/08/13	9	10:43-13:00	100-30	19-24	21.1-34.6	1-3	-	Hot and sunny/Rain
08/08/13	10	09:15-11:40	45	19.2-23.6	-	2	-	Dry and sunny, colder at night
19/08/13	11	10:45-15:00	60	17.2-21.9	21.1-27.1	3	-	Sunny spells, breezy and mild
22/08/13	12	10:50-13:40	90	19.2-21.6	22.5-28.7	0-2	-	Hot and sunny
29/08/13	13	10:30-15:00	20	19.3-20.8	-	3	-	Dry and mild
05/09/13	14	09:00-14:00	10	17.9-26.0	18.9-20.1	1	-	Hot and dry
10/09/13	15	09:30-14:30	20-100	13.4-17.4	11.7-20.6	3	-	Rain

16/09/13	16	12:00-16:00	5	14.3-15.3	15.2-27.1	5	-	Heavy rain
20/09/13	17	10:40-15:01	10-70	15.0-17.2	20.4-31.2	2-3	-	-
25/09/13	18	11:05-14:53	100	16.4-18.0	18.7-26.6	0-1	-	-
27/09/13	19	10:10-15:56	5-90	14.3-16.2	19.5-26.6	2-4	-	-
01/10/13	20	10:00-15:00	100	15.6-18.1	17.0-25.1	3-4	-	-

Appendix EDP 4
Terrestrial Invertebrate Survey Colin Plant Associates (UK) BS/2789/13 November 2013

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Commissioned by
EDP
The Environmental Dimension Partnership
Tithe Barn, Barnsley Park Estate,
Barnsley,
Cirencester,
Gloucestershire,
GL7 5EG

GAVRAY DRIVE BICESTER

TERRESTRIAL INVERTEBRATE SURVEY

2013

Report number BS/2789/13
November 2013

Prepared by

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ACKNOWLEDGEMENTS

Colin Plant Associates (UK) are pleased to credit the input of the following personnel:

Field work for this project has been undertaken by

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Identification of samples has been undertaken by many parties, prominent amongst which are

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Edward Milner (Crouch End, London)*
Colin W. Plant
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1 INTRODUCTION AND METHODOLOGY

1.1 Introductory comments and Historical background to the invertebrate survey

1.1.1 During the year 2013, **Colin Plant Associates (UK)** were commissioned by **EDP** to undertake an investigation of terrestrial invertebrates on land to the north of Gavray Drive, Bicester in Oxfordshire.

1.1.2 A similar survey had been commissioned from Colin Plant Associates during the year 2005 by another party. However, data from that survey is now eight years old and whilst many species recorded then might still be present in 2013, overall it is likely that habitat changes will have occurred that render the earlier work "out of date". Indeed, our 2005 survey, whilst identifying that the network of edge habitats were then of high value to the invertebrate community, cautioned this with the suggestion that "… in the longer term some management of the hedge and field mosaic will become necessary in order to prevent the area developing into scrub and woodland".

1.1.3 The present survey was, therefore, designed to provide a comprehensive data set of information gained by active survey during 2013.

1.2 Terrestrial invertebrate sampling methodology

1.2.1 Five site visits were commissioned; in fact to compensate for generally poor weather conditions in 2013 the site was sampled on 6 occasions, on 1st June, 18th June, 14th July, 21st August, 23rd September and 8th October 2013, in order to obtain maximum possible coverage. All visits commenced during satisfactory weather conditions (sunshine, calm and not actively raining), although these conditions did not last for the full duration of the two June visits. On dates when sampling was cut short with the arrival of rain, surveyors returned to the site later the same day to resume surveying.

1.2.3 On most occasions, two persons were involved in each site visit, although in total three different surveyors, with different specialist skills, were involved overall in order to maximise the potential for recording different invertebrate groups.

1.2.4 Within the constraints discussed below, terrestrial invertebrate sampling was undertaken by direct observation and by the following active sampling methods:

- **Sweep-netting.** A stout hand-held net is moved vigorously through vegetation to dislodge resting insects. The technique may be used semi-quantitatively by timing the number of sweeps through vegetation of a similar type and counting selected groups of species.

- **Beating trees and bushes.** A cloth tray, held on a folding frame, is positioned below branches of trees or bushes and these are sharply tapped with a stick to dislodge insects. Black or white trays are used depending upon which group of invertebrates has been targetted for search. Insects are collected from the tray using a pooter – a mouth-operated suction device.

- **Suction Sampling** consists of using a converted leaf blower to collect samples from grass and other longer ground vegetation. The sample is then everted into a net bag and the invertebrates removed with a pooter. The advantage of suction sampling is that it catches species, which do not fly readily or which live in deep vegetation. It is particularly productive for Coleoptera, some Diptera and Arachnida.

1.2.5 We also undertook passive sampling through the use of pitfall traps.

- **Pitfall trapping.** Vending-machine cups or similar are placed in the ground with the rim flush with, or slightly below, the surface. A fluid is added, containing ethylene glycol, sodium chloride and formalin with a little detergent to reduce surface tension. Traps may be covered or uncovered and are typically left in position for a month at a time. Invertebrates simply fall into the traps. This is the single most effective means of recording ground beetles (Carabidae) but is also effective for rove beetles (Staphylinidae), some other beetle groups, spiders and most non-insect soil-dwelling arthropods. Unlike pan traps, pitfall can be left *in* situ for a couple of weeks before they need to be examined.

1.2.6 Traps were established on the second site visit (18th June) and operated throughout the survey period with samples collected during each site visit.

1.2.7 We operated pitfall traps in fields 2, 4, 6, 7 and 12. It should be noted that pitfall trapping was designed, only, to obtain a representative sample of the invertebrate fauna and for this reason we did not establish an extensive network of such traps in every site compartment.

Aquatic Invertebrate Sampling

1.2.8 Sampling of aquatic habitats presented a small challenge. Former ponds were either dry or nearly so during the sampling period such that the aquatic invertebrates normally present would have either migrated away or else entered dormant phases deep in the damp mud. Water was present in some ditches and as flooding on terrestrial fields. These areas were sampled using a pond net, with mesh diameter 0.75mm) as an underwater sweep net, taking care to ensure that as many potentially different habitat types were included (e.g., shaded and exposed, shallow and deep). In the ditches, which were deemed likely to be wet on a semi-permanent basis we also dredged debris to the bank and sifted through this by hand to collect any invertebrates that were visible.

1.2.9 Samples of aquatic invertebrates were preserved in dilute alcohol and retained for laboratory examination.

1.3 Survey constraints

1.3.1 Survey results are likely to have been affected by the distinctly atypical general weather pattern of the entire year and indeed by that of the previous year of 2012 which was, apparently, the wettest on record.

1.3.2 The weather during the first half of the year 2013, January to June, was atypically cold and wet as a consequence of a global change in weather pattern, led by a southwards shift of the Jet Stream in the upper atmosphere. As a direct consequence, numbers of invertebrates appeared to be severely depressed. Several species failed to appear at all. Numerical catches in moth traps, which provide a relatively quantitative comparison of insect numbers, were down in the order of 95% across southern Britain in both May and June and many common species were reported as absent from traps across Britain.

1.3.3 At the start of July, however, the weather switched to become atypically hot and sunny; importantly, the overnight temperatures were also raised. This triggered a resurgence of invertebrate activity. During August the weather pattern returned to near “normal, but there were extensive periods of atypically heavy and persistent rain and these increased again in September and October, both of which saw the return of colder than usual nights. The latter month also saw some exceptional winds.

1.3.4 Although invertebrate numbers in general appear to have recovered from July onwards, there was a knock-on effect with some species remaining apparently absent and others in low number. A great

many species appeared two or even three weeks after their expected season, which meant that in some cases targetted searches at the "correct" time were unproductive. This general effect continued throughout the autumn survey period and is of some relevance interpretation of the species list.

1.3.5 Our overall "tally" of species at Bicester is undoubtedly lower than we had hoped for at the start of the project. Nevertheless, we are of the opinion that it is fully adequate for the purpose of performing an evaluation of current ecological value.

2 RESULTS OF TERRESTRIAL INVERTEBRATE SAMPLING

2.1 Overview

2.1.1 A full list of all recorded invertebrate species is presented as Appendix 1. This combines species recorded in both 2005 and 2013; the year of the latest report (2005 or 2013) is indicated. The total number of species recorded is presented within the summary table below. The greater number of invertebrate species recorded on the site in 2013 is considered to be as a result of the far greater survey effort applied in 2013 compared to 2005.

Parameter	Quantity
species recorded in 2005 survey	331
species recorded in 2013 survey	427
species not seen since 2005	172
Combined list (2005 & 2013)	**599**

2.1.3 A small number of invertebrate species (hairstreak butterflies) found by third parties on the site but not encountered by us (most likely because of the necessary restrictions on the number and timing of our own visits in combination with generally poor weather), are excluded from this initial analysis because the data was not made available to us until after our draft report had been prepared. These additional records are discussed separately, below and are included in the overall site analysis.

2.1.2 The inventory is annotated with formal National Status codes where these are better than "nationally common"; these status codes are explained in Appendix 2.

2.1.3 Finally, the inventory is also annotated with the primary ecological associations of the recorded species, where this information is available and reliable.

2.2 Species of conservation interest recorded

2.2.1 Several categories of invertebrates are of raised significance in an ecological assessment. These categories are explained in Appendix 2 and the corresponding species are now examined in detail in relation to the Gavray Drive site.

Legally Protected Species

2.2.2 No invertebrate species that are afforded direct legal protection under any UK or European legislation were encountered during either survey; none are likely to have been overlooked at this site in spite of the serious constraints imposed by the adverse weather situation.

UK Biodiversity Action Plan (UK BAP) Priority Species/Section 41 Species

2.2.3 UK BAP priority species were those that were identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (UK BAP). The original list of UK BAP priority species was created between 1995 and 1999. In 2007, however, a revised list was produced, following a 2-year review of the priority species and habitats lists. Following the review, the list of

UK BAP priority species increased from less than 600 to 1150. In total, 123 species no longer met the criteria for selection, and were therefore de-listed.

2.2.4 As a result of devolution, and new country-level and international drivers and requirements, much of the work previously carried out by the UK BAP is now focussed at a country-level rather than a UK-level, and the UK BAP has recently (July 2012) been succeeded by the *UK Post-2010 Biodiversity Framework*. The full list of priority invertebrate species can be viewed at *http://jncc.defra.gov.uk/page-5169*.

2.2.5 The UK list of priority species remains an important reference source and has been used to help draw up statutory lists of priorities in England, Scotland, Wales and Northern Ireland. For England and Wales these statutory lists are presented in *The Natural Environment & Rural Communities Act, 2006*: Section 41. *List of Species of Principal Importance for Conservation of Biological Diversity in England* and Section 42: *List of Species of Principal Importance for Conservation of Biological Diversity in Wales*.

2.2.6 Two such Priority Species were recorded in the broader survey, although Marsh Fritillary butterfly (*Euphydryas aurina)* is, without any doubt, absent in 2013. These two taxa are as follows:

The Forester Moth (*Adscita statices*) is a metallic green species about the size of a postage stamp. In spite of the foodplant being various species of docks (*Rumex*) the moth is absent from significant areas of the country. The caterpillar feeds internally, within the rootstock of the dock plant and so is not easily found, but under-recording is thought to play a relatively minor part in the lack of solid black dots (post 1999 reports) in the following distribution map, taken from Hill *et al* (2010):

Map symbols are positioned in the 10-kilometre squares of the Ordnance Survey's national grid system. Post-1999 data are shown as black dots. Open circles indicates sites where it was present but where it has probably become extinct. The overall pattern of decline is visually obvious. We found Forester moths at the Gavray Drive site in both 2005 and 2013, indicating an established and stable population here.

2.2.7 **Marsh Fritillary butterfly *Euphydryas aurinia*** was recorded on the site during 2005; the information is correct and this report writer saw and photographed the larval "nest" on a Devil's-bit Scabious (*Succisa pratensis*) plant in August 2005. However, there is now abundant evidence to support the suggestion that that this was an artificial importation to the site by a member of the public. The species did not establish a breeding population, which is scarcely surprising since, if site conditions were right for it, it would have been present "under its own steam". Awareness of this former record is important; of equal value is our professional opinion that it is quite absent in 2013.

2.2.8 It is of ecological interest that the original list of UK Biodiversity Action Plan Priority Species *of moths* was divided into two sections. In the first, a total of 81 species are afforded the status of UK BAP Priority Species; none of these is recorded in the surveyed area nor is any likely to be present. However, the second section is a list of 69 species that have declined in population strength by a significant amount in the past 25 years. These were defined as "not yet rare" and were flagged as UK BAP species "**for research only**". It is unfortunate that this list has been incorporated into the current priority listing process and that these species are now therefore of statutory interest.

2.2.9 Three such "Research Only" moth species are so far recorded; it is very likely that overnight moth recording at the site would establish the presence of several others. Th recorded species are tabulated below:

Species	English name	Caterpillar feeds on	last seen
Callistege mi	Mother Shipton	coarse grasses, including reeds	2013
Scotopteryx chenopodiata	Shaded Broad-bar	vetches and clovers	2013
Timandra comae	Blood-vein	Polygonaceae	2013

2.2.10 All three of these species are widespread across the whole site, favouring edge habitats made by the transition between hedgerow and grassland where the caterpillar food plants are most frequent and the hedges provide a sheltered micro-climate.

Red Data Book Species

2.2.11 One of the recorded species was listed in the British Red Data Books (Shirt, 1987; Bratton, 1991). Formerly listed in Category 3 (Rare) this is now called "Near Threatened".

The Small Heath Butterfly *Coenonympha pamphilus* is a grassland species that has declined in recent years. It was added to the UK BAP list at the end of 2007 though there are disagreements over the need for this action. In some areas it remains widespread, though it has declined numerically.

At Gavray Drive we recorded it in 2005 but not in 2013. However, we mention it here because we consider that there is a very high likelihood that it remains present and that our failure to find it was a direct consequence of atypical weather during the flight period.

Nationally Scarce Species

2.2.12 A total of 9 species recorded in 2013 species are designated as "Nationally Scarce" (see Appendix 2). A further fifteen Nationally Scarce species recorded in 2005 were not found again in 2013; as with many other species this might be a result of under-recording in the poor weather of 2013 so they are mentioned below for completeness. The site total is, therefore, 24 species.

2.2.13 Four of these species are included in former Nationally Notable Na category (see Appendix 2) and were found in 2013.

Species	English name	Ecological associations
Conocephalus discolor	Long-winged Cone-head	coarse vegetation on the coast, but recently it has colonised inland sites
Longitarsus parvulus	a flea beetle	feeds on many plant species
Rhinocyllus conicus	Thistle Head Weevil	associated with seed heads of thistles
Tachyporus formosus	a rove beetle	amongst moss and litter

2.2.14 A further three in the former Nationally Notable Na category were recorded in 2005 and not 2013, but are specifically mentioned here as they are judged likely to remain present and overlooked as a consequence of the survey constraints stated above:

Species	English name	Ecological associations
Agrilus sinuatus	the Hawthorn Jewel Beetle	larvae tunnel under the bark of old hawthorn branches
Hylaeus cornutus	a yellow-faced bee	nests inside the stems of herbaceous plants, mostly in perennial species
Lasius brunneus	banded tree ant	nests on old oaks and perhaps other trees

2.2.15 Five of the Nationally Scarce species encountered during 2013 were formerly included in the Nationally Notable Nb category (see Appendix 2).

Species	English name	Ecological associations
Meligethes rotundicollis	pollen beetle	Mainly found in the south. The ecology of this beetle is currently unclear
Metrioptera roeselii	Roesel's Bush-cricket	long grassland
Phytoecia cylindrica	a longhorn beetle	larvae feed in stems of Umbelliferae
Stenus oscillator	a rove beetle	amongst moss and litter in marshy places
Thamiocolus viduatus	a weevil	on Stachys palustris in marshy places

2.2.16 A further 9 in the former Nationally Notable Na category were recorded in 2005 and not 2013, but are specifically mentioned here as most, perhaps all, are judged likely to remain present and overlooked as a consequence of the survey constraints stated above:

Species	English name	Ecological associations
Bembidion gilvipes	a ground beetle	marshland and damp riverbanks
Lasioglossum malachurum	a solitary bee	ground nesting species - prefers soils with a clay component
Longitarsus dorsalis	a flea beetle	Ragworts (Senecio species) - a southern species
Lythraria salicariae	loosestrife flea beetle	yellow loosestrife
Oxyna parietina	a picture-winged fly	mugwort - the larvae boring inside the stems
Philonthus fumarius	a rove beetle	ecology unclear - probably a scavenger
Podagrica fuscicornis	a leaf beetle	mallow (Malva species)
Pyrochroa coccineus	the Black=headed Cardinal beetle	larvae feed in dead timber
Sepedophilus pedicularius	a rove beetles	fen and bog habitats

2.2.17 Finally, three Nationally scarce but uncategorised Diptera (former Nationally Notable N category (see Appendix 2) were recorded in 2005 and not refound in 2013.

Species	English name	Ecological associations
Merzomyia westermanni	a picture-winged fly	various ragwort species
Micropeza lateralis	a stilt-legged fly	rough herbage/edge habitats - rarely far from water
Stratiomys potamida	a soldier fly	well-vegetated water-bodies

Nationally Local Species

2.2.18 Thirty of the recorded species in 2013 are listed formally as Nationally Local (see Appendix 2). These are tabulated below with their primary ecological associations:

Species	English name	Ecological associations
Acupalpus dubius	a ground beetle	damp moss, damp litter and similar habitats
Agapanthia villosoviridescens	a longhorn beetle	larvae feed internally in plant stems, including in thistles
Altica oleracea	a leaf beetle	widely polyphagous
Aphthona euphorbiae	a leaf beetle	widely polyphagous
Apolygus lucorum		low plants
Cassida vibex	a tortoise beetle	knapweed, thistles etc
Centrotus cornutus	a plant hopper	oak, aspen and other sapling trees

Species	English name	Ecological associations
Cordylepherus viridis	a malachite beetle	a common grassland species
Coremacera marginata	a snail-killing fly	dry habitats, especially grasslands
Crepidodera plutus	a leaf beetle	Willows, especially Crack Willow - rarely on poplars
Curculio glandium	a weevil	Oak trees - in developing acorns
Dolichopus wahlbergi	a dance fly	larvae require damp habitat
Epitrix pubescens	a leaf beetle	associated with woody nightshade
Hygronoma dimidiata	a rove beetle	amongst moss and litter in marshy places
Hypsosinga pygmaea	a spider	grassland (especially calcareous) and low vegetation
Kelisia guttulifera	a plant hopper	on sedges in dry grassland
Kelisia ribauti	a plant hopper	associated with marshes, especially if base-poor
Magdalis ruficornis	a weevil	rosaceous trees and shrubs. Widespread but in the north confined to old woods
Mordellistena variegata	a tumbling flower beetle	unknown ecology
Oedemera lurida	a beetle	a common grassland species
Paluda flaveola	a plant hopper	tall grassland in moist and usually shaded sites
Pilophorus perplexus	a plant bug	predatory on deciduous trees
Poecilus cupreus	copper ground beetle	open grassy habitats - usually where damp
Rhopalus subrufus	a plant bug	St John's Wort (*Hypericum perforatum*)
Scellus notatus	a dance fly	predatory species in woodland and scrub, the adults predatory
Sepedon sphegea	a snail-killing fly	predatory on water snails
Stenocranus major	a plant hopper	Phalaris arundinacea in marshy places
Stenus cicindeloides	a rove beetle	usually in marshy places
Tetragnatha montana	a spider	trees and bushes
Xanthogramma pedisequum s.str.	a hoverfly	larvae feed in ants nests

2.2.19 Twenty Nationally Local (see Appendix 2) species were last recorded at the site in 2005. These are tabulated below with their primary ecological associations:

Species	English name	Ecological associations
Acidia cognata	a picture-winged fly	Tussilago and Petasites plants - mining the leaves
Arge pagana	a sawfly	host plant associations are currently unclear
Ceratapion carduorum	a seed weevil	Thistles
Ceutorhynchus pyrrhorhynchus	a weevil	Sisymbrium
Conocephalus dorsalis	Short-winged Cone-head	formerly at damp coastal sites it is now found in a variety of inland habitats
Conops quadrifasciatus	a conopid fly	Parasitic on bumble bee *Bombus lucorum* - wherever the host bee is found
Eupeodes latifasciatus	a hoverfly	Damp grassland
Melanargia galathea	Marbled White	tall calcareous grassland
Micropeza corrigiolata	a stilt-legged fly	Larva feeds in root nodules of *Pisum sativum*, *Trifolium pratense* and *Medicago sativa*
Notiophilus palustris	a ground beetle	damp habitats are preferred
Phasia pusilla	a parasitic fly	Parasite of plant bugs in Europe but British hosts unknown.
Physocephala rufipes	a conopid fly	parasitic fly on various species of bee
Sicus ferrugineus	a conopid fly	parasitic fly on bumble bees
Sphenella marginata	a picture-winged fly	on various ragwort species, in late summer and autumn
Taeniapion urticarium	a weevil	nettles - larvae feed inside stem nodes
Tephritis cometa	a picture-winged fly	larvae gall the flowers of creeping thistle
Tetanocera arrogans	a snail-killing fly	predatory on a range of terrestrial and aquatic snails in marshy habitats
Thecophora atra	a conopid fly	a parasite of solitary bees
Toxoneura (Palloptera) muliebris	a picture-winged fly	larva develops under bark
Urophora quadrifasciata	a picture-winged fly	larva galls the flowers of *Centaurea nigra*

Other species of interest

2.2.20 Surveys aimed specifically at looking for selected species of butterflies were undertaken by various third parties during 2011. These butterflies were specifically excluded from our own surveys during 2013; we did not encounter them because we did not select dates that would have been appropriate.

2.2.21 Data from these third party surveys were made available to us after the completion of our own surveys for other invertebrate groups. We have examined the documents provided and we conclude that the data obtained in 2011 are valid, reliable and may be regarded as current (may be treated as if applying to year 2013).

2.2.22 Map 3 presents a summary of the 2011 survey for **White-letter Hairstreak butterfly (*Strymonidia w-album*),** whose caterpillars are restricted to Elm (*Ulmus*) trees. White-letter Hairstreak is listed in Schedule 41 of the NERC Act (2006) as a Species of Principal Importance in England).

2.2.24 Survey was also undertaken for **Brown Hairstreak (*Thecla betulae*)** and **Black Hairstreak (*Satyrium pruni*)**, both of which are also Species of Principal Importance in England. The third party report of this work is appended here as Appendix 3.

2.2.25 The inclusion of these data on butterflies renders this present report fully comprehensive in terms of available invertebrate information. We are not aware of any other invertebrate related data for the Gavray Drive site.

3 RESULTS OF AQUATIC INVERTEBRATE SAMPLING

3.1 Overview

3.1.1 The locations of a watercourse and five ponds at Gavray Drive are presented in Map 2. These are as follows:

W	watercourse (stream) forming eastern boundary of field 13 with smaller fields 6, 12 and 11;
A	east end of field 7;
B	north-east corner of field 8;
C	north edge of field 14;
D	east edge of field 15;
E	southern corner of field 16.

3.1.2 Three of these ponds, C, D and E, lie outside the area of survey indicated to us in Map 1. Ponds A and B are within our survey area but were more or less dry during 2013 and did not generate any aquatic invertebrates during sampling.

3.1.3 During the first two visits we encountered flood water – in ditches surrounding some fields and as accumulations in wheel ruts created by a tractor. These were also sampled, because such temporary habitats are known to be able to support a particular, unique assemblage of water beetles; many of these species will be those displaced from other areas by flooding, by desiccation or other factors and so may have direct bearing on the site's overall ecology.

3.1.4 The stream that crosses the site runs almost completely under the cover of a tree canopy and so is entirely shaded. As a consequence, there is a marked lack of emergent and riparian floral communities. The water is barely a few centimetres deep in most sections and flows rather slowly over a bare gravel substrate. We sampled extensively, but could find relatively few invertebrates.

4 DISCUSSION OF RESULTS

4.1 Introductory comments

4.1.1 The 2013 survey has been remarkably successful at updating records of species from 2005; of the 127 not rediscovered an informal glance at the list suggests that at least half are probably overlooked.

4.1.2 The 2013 survey also added a significant number of new species to the inventory. However, this is not especially surprising as the original survey was undertaken within a rather limited seasonal window. The present assemblage, recorded at Appendix 1, provides a more than adequate representative sample of species upon which to base a reliable assessment of ecological interest. The additional third party data on butterflies makes a significant contribution,

4.2 Terrestrial invertebrates

4.1.3 The site presents a varied mosaic of grassland, woodland, scrub and edge-zone habitats that combine to satisfy the multiple requirements of a wide range of invertebrate species.

4.1.2 Each of these component parts makes a significant contribution to the overall mosaic and with this in mind is unwise, from an ecological standpoint, to attempt to apply too much locality detail. Invertebrates are, as a group, highly mobile. The place where a particular species was found is not necessarily, if ever, the only place that is important for its continued presence; the actual area required will always be much larger

4.1.3 Therefore, whilst botanically-based habitat categorisations may or may not be appropriate, we are unable to attribute specific levels of invertebrate interest to individual parts of the site. It is significantly more appropriate to examine the overall habitat structure of the site and to define habitat types that will make a significant contribution wherever they are found within the boundary. This is the basis of the Invertebrate Species-habitats Information System (ISIS) which is the favoured approach to interpreting invertebrate site data.

4.3 Invertebrate Species-habitats Information System

4.3.1 The Invertebrate Species-habitats Information System (ISIS) is a tool used to undertake common standards monitoring (i.e. monitors the condition of invertebrate assemblages), scores them based on the invertebrate assemblage types present (similar to how the National Vegetation Classification is used to assess plant communities) and evaluates their conservation value *within context*.

4.3.2 The ISIS assemblage types are defined by lists of characteristic species that are generally found together in nature. Broad assemblage types (BATs) are a comprehensive series of assemblage types that are characterised by more widespread species. Specific assemblage types (SATs) are characterised by ecologically restricted or stenotopic species of intrinsic nature conservation value.

4.3.3 We have undertaken the analysis at three levels:

- on the 2005 data alone
- on the 2013 data alone
- on the combined list including the third party butterfly data.

4.3.4 The results of these analyses are presented below. These results ar direct output from the siftware without editing or interpretation:

4.3.5 The **Broad Assemblage Types (BATs)** identified by ISIS are as follows:

2005 data only

BAT name	Representation (1-100)	Rarity score	Condition	BAT species richness
grassland & scrub matrix	15	125		140
unshaded early successional mosaic	4	147		34
arboreal canopy	3	100		23
permanent wet mire	2	163		16

2013 data only (includes butterfly data)

BAT name	Representation (1-100)	Rarity score	Condition	BAT species richness
grassland & scrub matrix	19	118		185
arboreal canopy	5	117		46
permanent wet mire	2	143		23
unshaded early successional mosaic	2	150		22
mineral marsh & open water	2	130		20
wood decay	1			15

2005 & 2013 data combined (includes butterfly data)

BAT name	Representation (1-100)	Rarity score	Condition	BAT species richness
grassland & scrub matrix	22	124		249
arboreal canopy	5	114		57
unshaded early successional mosaic	4	157		44
permanent wet mire	3	159		32
mineral marsh & open water	2	133		21
wood decay	2	144		19

4.3.6 The **Specific Assemblage Types (SATs)** identified by ISIS

2005 data only

SAT name	No. spp.	Condition	Percentage of national species pool	Related BAT rarity score
scrub edge	9		5	
rich flower resource	11		5	
open short sward	6		3	147
litter-rich fluctuating marsh	1		3	
reedfen and pools	3		3	163
moss and tussock fen	1		2	163
seepage	1		2	
heartwood decay	2		1	
dung	1		1	
bark & sapwood decay	4		1	
scrub-heath & moorland	1		0	
bare sand & chalk	1		0	147

2013 data only (includes butterfly data)

SAT name	No. spp.	Condition	Percentage of national species pool	Related BAT rarity score
epiphyte fauna	2		10	
scrub edge	8		4	
rich flower resource	7		3	
litter-rich fluctuating marsh	1		3	130
open short sward	4		2	150
bark & sapwood decay	9		2	
heartwood decay	1		1	

2005 & 2013 data combined (includes butterfly data)

SAT name	No. spp.	Condition	Percentage of national species pool	Related BAT rarity score
epiphyte fauna	2		10	144
scrub edge	13	fav	7	
rich flower resource	14		6	
litter-rich fluctuating marsh	2		5	133
open short sward	9		4	157
reedfen and pools	3		3	159
moss and tussock fen	1		2	159
bark & sapwood decay	11		2	144
seepage	1		2	
heartwood decay	2		1	144
dung	1		1	
Sphagnum bog	1		1	159
saltmarsh and transitional brackish marsh	1		1	
bare sand & chalk	2		0	157
scrub-heath & moorland	1		0	

5 CONCLUSIONS

5.1 It should be borne in mind that the invertebrate ecology has been interpreted using recorded species as a tool and it is this broader ecology, not necessarily any individual species, that has the highest ranking in terms of significance in an overall site assessment. Specific locations for rarer invertebrate species are not presented in this report because they are of no particular significance and may well be different in a different year.

5.2 The identification of BATs and SATs by the software is not a matter of interpretation by any report writer and it is not practical to attribute any particular BAT or SAT to any particular area of the overall site. The identified assemblage types affect the entire site and will inevitably be impacted upon negatively if there is loss or damage to the habitat structure that supports the particular assemblage type.

5.3 For example, the arboreal canopy has been identified as a Broad Assemblage Type at Gavray Drive. This implies, at the "broad" level, that all trees are important. The software does not allow for the mapping of areas of greatest value – indeed it positively prevents such an action.

5.4 At the more detailed level of Specific Assemblage types the same principal applies. At Gavray Drive, the scrub edge has been identified as important – the only assemblage type that achieves "favourable" condition (which means that it is well-managed and does not require intervention to improve it). This means all of the scrub edge habitats, along all of the hedges and other boundaries across the entire or the site and no leeway is given, again deliberately, to allow for grading of the habitat in different areas.

5.5 The flower-rich resource is also flagged. It falls marginally short of "favourable", suggesting that it could be improved slightly, but wherever there are flowers growing these provide an important input to the overall ecological value of the site.

5.6 Although truly aquatic habitats are poor in quality, the ISIS software has drawn attention to "litter-rich fluctuating marsh". This refers to the dried and drying ponds (perhaps including invertebrates from the excluded ponds outside the surveyed area), which present a habitat aprtly described in the SAT designation.

5.7 It is clear from these three analyses that the same four BATs identified in 2005 remain present in 2013. These are

- grassland & scrub matrix
- unshaded early successional mosaic
- arboreal canopy
- permanent wet mire

4.3.7 From this we can conclude that there has been little overall change since 2005. Whilst some adjustments are evident, the grassland and scrub matrix attains poll position in all three analyses.

4.3.8 The additional survey work in 2013 has identified two additional BATs that were not identified in 2013. These are

- mineral marsh & open water
- wood decay

4.3.9 These both might suggest that invertebrates from habitat areas outside the site are moving through the site; certainly the saproxylic (wood decay) resource is low on site. This almost certainly emphasises the high value of the hedgerow network that is continuous across the site (and which is an integral part of the scrub edge habitat identified as in favourable condition).

4.3.10 In conclusion, we advise you as follows:

- that there is a high incumbent invertebrate ecology interest at Gavray Drive;
- This is expressed in the overall biodiversity and in results of assemblage-type analysis as well as in the presence of some key species of high individual nature conservation importance;
- ISIS analysis shows that there is no significant change since 2005 and this in turn suggests a stable and established community structure;
- The interest is evenly spread across the site so that no particular area can be determined as making a greater contribution than any other;
- Loss of or damage to a part of the site will, therefore, likely prove to have a negative impact on invertebrate ecology;
- The high value of the invertebrate interest encountered together with the reliance of individual species upon more than one physical area and in particular the presence of a continuous network of established and well-structured hedgerows suggests that the complete loss of the site, or the loss of a major part of the site, would have a negative impact at the highest level. Given the presence of certain species of raised individual value this negative impact would apply at regional level or higher.

4 REFERENCES USED IN THE CREATION OF THIS REPORT AND ITS APPENDICES

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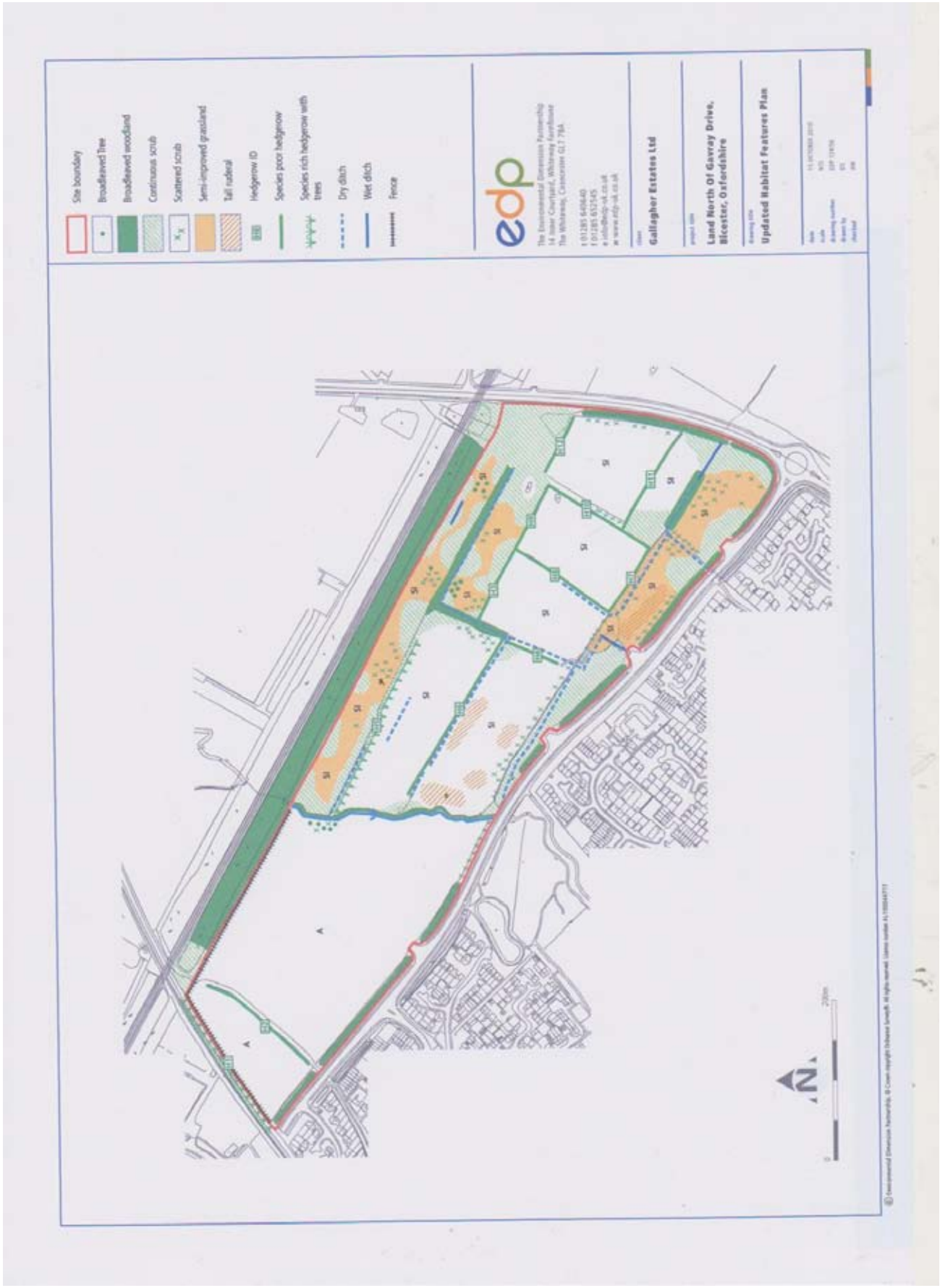
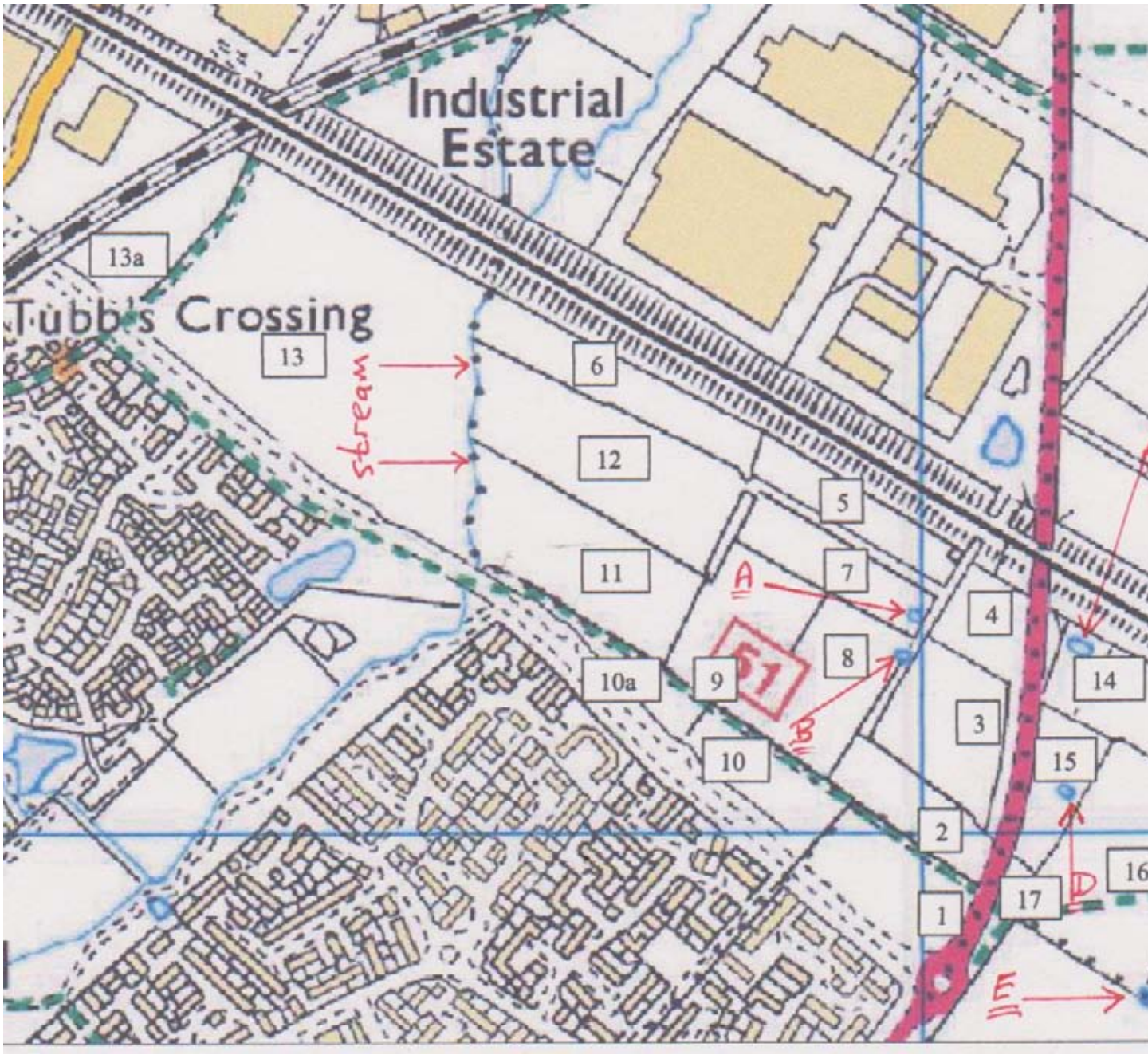
APPENDICES

MAP 1. THE SURVEYED AREA



MAP 2. SURVEY AREA – water bodies (arrowed) & field numbers (boxed)

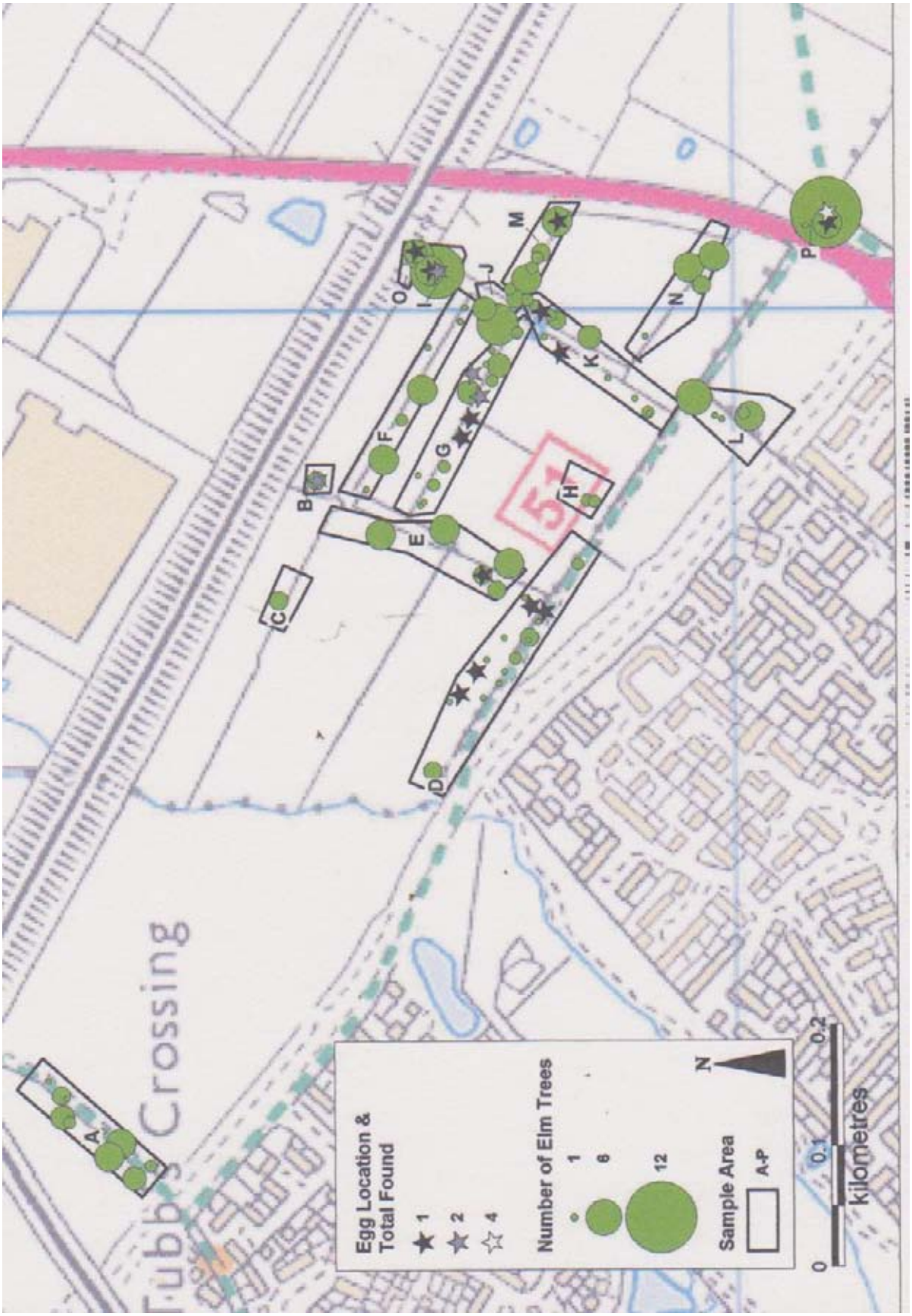


Field numbers shown in this map were applied by another party and adopted by us.

Ponds A to A and a watercourse (stream) are arrowed in red.

Ponds C, D and E fall outside our surveyed area, which is shown in Map 1.

MAP 3. THE SURVEYED AREA – White-letter Hairstreak butterfly results (third party data).



APPENDIX 1: TERRESTRIAL INVERTEBRATE SPECIES RECORDED

National status codes are explained in Appendix 2.

Group / species	English name if available	National status	Ecological associations and comments	Latest report
ARACHNIDA	**SPIDERS**			
Araneidae				
Araneus diadematus	the garden spider		ubiquitous	2013
Araneus quadratus			rough grassland	2013
Araniella opisthographa			trees and bushes	2013
Hypsosinga pygmaea		Local	grassland (especially calcareous) and low vegetation	2013
Clubionidae				
Cheiracanthium erraticum			low plants amongst rough vegetation	2013
Clubiona reclusa			low, scrubby vegetation and rough grassland	2013
Dictynidae				
Dictyna arundinacea			field edges etc amongst dry or dead vegetation	2013
Lycosidae				
Pardosa prativaga			lives on open ground and amongst herbage	2013
Philodromidae				
Philodromus cespitum			herbage and scrub - very occasionally on trees or in houses	2013
Philodromus dispar			wooded habitats, overwintering in leaf litter under hedges etc	2013
Tibellus oblongus			prefers taller herbage, in either wet or dry habitats	2013
Tetragnathidae				
Tetragnatha montana		Local	trees and bushes	2013
Theridiidae				
Enoplognatha ovata			bushes and low plants in more open habitats	2013
Neottiura bimaculata			low vegetation, bushes and low tree branches	2013
Theridion sisyphium			spins a tangle web on bushes, amongst scrub etc	2013
Thomisidae				
Xysticus cristatus			found in most non-shaded situations	2013
COLEOPTERA	**BEETLES**			
Apionidae	**Seed weevils**			
Apion cruentatum			Rumex, especially Rumex acetosella	2013
Apion frumentarium			broad-leaved docks	2005
Ceratapion carduorum		Local	Thistles	2005
Ceratapion gibbirostre			thistles - in the stems	2013
Ceratapion onopordi			thistles, burdocks, knapweeds and other Compositae	2005
Eutrichapion ervi			Lathyrus pratensis, and also on Viccia vetches	2005
Ischneroapion loti			Lotus corniculatus and L. tenuis, the larvae gallingthe seeds	2013
Malvapion malvae			Malvaceae - especially Malva	2005

Group / species	English name if available	National status	Ecological associations and comments	Latest report
			sylvestris	
Oxystoma pomonae			vetches - both Viccia and Lathyrus	2013
Oxystoma sabulatum			Associated with vetches etc	2013
Perapion curtirostre			Rumex, Acetosa and Acetosella species	2013
Perapion hydrolapathi			dock plants - in the stems	2013
Perapion violaceum			dock plants, the larvae mining the stems; widespread and common	2013
Protapion apricans			bird's-foot Trefoil and perhaps other legumes; widespread and common	2013
Protapion assimile			clover, especially red clover; widespread and common	2013
Protapion dichroum			Trifolium - widespread and almost ubiquitous	2005
Protapion fulvipes			various clovers	2013
Protapion trifolii			various clovers; widespread and common	2013
Pseudapion rufirostre			Malva sylvestris and M. neglecta; widespread and common	2013
Taeniapion urticarium		Local	nettles - larvae feed inside stem nodes	2005
Bruchidae				
Bruchus loti			Larvae on seeds of Lotus, Lathyrus & Vicia; adults at various flowers	2013
Bruchus rufimanus	Broad Bean Weevil		larva on Viccia (vetches); adults at flowers	2013
Buprestidae				
Agrilus sinuatus		NS(Na)	larvae tunnel under the bark of old hawthorn branches	2005
Byturidae				
Byturus tomentosus	the raspberry beetle		Brambles and raspberries	2013
Cantharidae	**Soldier beetles**			
Cantharis cryptica			tall vegetation, especially at the woodland/grassland interface	2013
Cantharis decipiens			adults in grassland but larvae associated with woodland	2013
Cantharis lateralis			damp grasslands and wetlands	2005
Cantharis nigra			lowland marsh, rushy pastures, damp hay meadows etc	2013
Cantharis nigricans			poorly known, perhaps likes rank grassland, especially if damp	2005
Cantharis pallida			widespread wetland species	2013
Cantharis pellucida			largely restricted to woodland	2013
Cantharis rustica			lowland grassland - but always in association with scrub	2013
Rhagonycha fulva			tall, rank vegetation in lowland areas	2013
Rhagonycha limbata			dry grasslands	2013
Rhagonycha testacea			wet woodland and scrubby marshes	2013
Carabidae	**Ground beetles**			
Acupalpus dubius		Local	damp moss, damp litter and similar habitats	2013
Agonum (Paranchus) albipes			a wide range of waterside habitats	2005
Amara (Amara) familiaris			Phytophagous species of gardens and other open, dry and sunny habitats	2013
Amara (Amara) similata			phytophagous on ruderal vegetation,	2005

Group / species	English name if available	National status	Ecological associations and comments	Latest report
			especially on waste ground	
Amara (Curtonotus) aulica			dry, well-vegetated sites, the adults climbing stems of Compositae at night to feed on the seed heads	2005
Bembidion aeneum			damp clay soils on the coast and at inland woods and grassland near water	2013
Bembidion assimile				2013
Bembidion biguttatum			usually near water or in damp grassland	2013
Bembidion gilvipes		NS(Nb)	marshland and damp riverbanks	2005
Bembidion guttula			found most habitats that are not excessively dry	2013
Bembidion harpaloides			damp places such as leaf litter or under bark	2005
Bembidion lunulatum			coastal, and in damp inland areas	2013
Bembidion mannerheimi			Damp grasslands and shaded habitats	2013
Clivinia fossor			open, partly vegetated ground, mainly in lowland grasslands	2013
Demetrias atricapillus			amongst leaf litter and in grasslands	2005
Loricera pilicornis			ubiquitous, but especially near water and in damp grassland; feeds on springtails	2013
Nebria (Nebria) brevicollis			ubiquitous late summer and autumn species	2005
Notiophilus biguttatus			most open ground habitats	2013
Notiophilus palustris		Local	damp habitats are preferred	2005
Paradromius linearis			dry tussocky grassland and coastal dunes	2013
Poecilus cupreus	copper ground beetle	Local	open grassy habitats - usually where damp	2013
Pterostichus (Argutor) strenuus			most habitats that are not too dry	2013
Trechus quadristriatus			ubiquitous in most open habitats during autumn	2005
Cerambycidae	**Longhorn beetles**			
Agapanthia villosoviridescens		Local	larvae feed internally in plant stems, including in thistles	2013
Clytus arietis			in dead wood - usually birch or willow, adults at flowers	2013
Grammoptera ruficornis			larvae in twigs and small branches; adults at flowers	2013
Molorchus minor			naturalised species, the larvae under conifer bark and adults at hawthorn flowers	2013
Phytoecia cylindrica		NS(Nb)	larvae feed in stems of Umbelliferae	2013
Tetrops praeustus			feed on a wide variety of deciduous trees and mature bushes	2013
Chrysomelidae	**Leaf beetles**			
Altica lythri			Associated with various willow-herbs (Onagraceae)	2013
Altica oleracea		Local	widely polyphagous	2013
Altica palustris			widespread on many plant species	2013
Aphthona euphorbiae		Local	widely polyphagous	2013
Cassida flaveola				2013
Cassida rubiginosa			various thistles, burdock and other	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
			Asteraceae	
Cassida vibex		Local	knapweed, thistles etc	2013
Chaetocnema confusa				2013
Chaetocnema hortensis			feeds on various grasses	2005
Chrysolina polita	Knotgrass flea-beetle		Lamiaceae - especially species of mint. Often found near water	2013
Crepidodera aurata			willows - rarely on poplars	2013
Crepidodera fulvicornis			Salix species	2013
Crepidodera plutus		Local	Willows, especially Crack Willow - rarely on poplars	2013
Epitrix pubescens		Local	associated with woody nightshade	2013
Galerucella pusilla				2013
Gastrophysa polygoni			Polygonum species	2005
Lochmaea crataegi			Hawthorn - larvae mine the berries. Occasionally on Blackthorn or Rowan	2013
Longitarsus dorsalis		NS(Nb)	Ragworts (Senecio species) - a southern species	2005
Longitarsus luridus			widely polyphagous	2013
Longitarsus parvulus		NS(Na)	feeds on many plant species	2013
Lythraria salicariae	loosestrife flea beetle	NS(Nb)	yellow loosestrife	2005
Neocrepidodera ferruginea			polyphagous	2005
Neocrepidodera transversa			polyphagous	2013
Oulema melanopa			feeds on grasses - very common	2013
Phyllotreta atra			various Brassicaceae	2013
Podagrica fuscicornis		NS(Nb)	mallow (Malva species)	2005
Psylliodes affinis			Solanaceae - especially S. dulcamara (woody nightshade)	2013
Psylliodes dulcamarae			Woody nightshade (Solanum dulcamara)	2013
Psylliodes picina				2013
Sphaeroderma testaceum			mainly on thistles	2013
Coccinellidae	**Ladybirds**			
Adalia bipunctata	2-spot ladybird		predatory on other insects	2013
Adalia decempunctata	10-spot ladybird		predatory on other insects	2013
Anisostica novemdecimpunctata	19-spot ladybird		wetland habitats	2005
Coccidula rufa	Spotless ladybird		reed beds and other marshy places	2013
Coccinella septempunctata	7-spot ladybird		predatory on other insects	2013
Exochomus quadripustulatus	Pine ladybird		aphid predator on both pines and broad-leaved trees	2013
Halyzia sedecimguttata	Orange ladybird		predatory on other insects	2005
Harmonia axyridis	Harlequin ladybird		a recent colonist in Britain	2013
Propylea quattuordecimpunctata	14-spot ladybird		predatory on other insects	2013
Psyllobora vigintiduopunctata	22-spot ladybird		feeds on mildews	2013
Rhyzobius litura			predatory on other insects	2013
Scymnus frontalis			predatory on other insects in grassland and herbaceous vegetation	2005
Subcoccinella vigintiquattuorpunctata	24-spot ladybird		predatory on other insects	2013
Tytthaspis sedecimpunctata	16-spot ladybird		predatory on other insects	2013
Cucujidae				
Psammoecus bipunctatus				2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Curculionidae	**Weevils**			
Anthonomus rubi			flowers of brambles and raspberries	2013
Ceutorhynchus pallidactylus			ecology unclear	2013
Ceutorhynchus pyrrhorhynchus		Local	Sisymbrium	2005
Cionus scrophulariae			Figworts (Scrophularia species)	2005
Cionus tuberculosus			Figworts (Scrophularia species) and Verbascum	2013
Curculio glandium		Local	Oak trees - in developing acorns	2013
Magdalis ruficornis		Local	rosaceous trees and shrubs. Widespread but in the north confined to old woods	2013
Mecinus pascuorum			feeds on flowers of Plantago lanceolata - Ribwort Plantain	2005
Nedyus quadrimaculatus			nettles - feeding on the flowers	2013
Notaris acridulus			Fens, marshes and similar, feeding on or in the stolons of semi-aquatic grasses	2013
Orchestes signifer			larva mines the leaves of oaks	2013
Parathelcus pollinarius			Nettles	2005
Pelonomus quadrituberculatus			various Cruciferae	2013
Phyllobius pomaceus			Nettles	2013
Phyllobius pyri			Larvae develop in the ground an adults feed on a variety of herbage and tree leaves	2013
Phyllobius roboretanus			nettle - feeding on the leaves and flowers	2013
Phyllobius vespertinus			Polyphagous. Was thought rare and restricted to *Artemisia maritima* in saltmarsh, but now more widespread	2013
Phyllobius viridiaeris			typically in hedges and other edge habitats	2013
Rhinocyllus conicus	Thistle Head Weevil	NS(Na)	associated with seed heads of thistles	2013
Rhinoncus pericarpius			knotgrass and docks - mainly in damp places	2013
Rhinoncus perpendicularis			Polygonum amphibium, in wet places - but almost certainly on other species	2013
Sitona cambricus			On Lotus, in ruderal and other habitats	2013
Sitona hispidulus			larvae feed in the root nodules of clover and other legumes	2005
Sitona lineatus			various legumes	2013
Sitona puncticollis			grassland, wasteland, open places etc on light or stony soils	2013
Sitona suturalis			Lathyrus and Viccia in ruderal habitats	2013
Thamiocolus viduatus		NS(Nb)	on Stachys palustris in marshy places	2013
Trichosirocalus troglodytes			Plantains, usually in grassy places	2013
Tychius picirostris			various Leguminosae	2013
Dermestidae				
Anthrenus verbasci	museum beetle		feeds on dead animal and plant matter, including dry carcasses	2013
Elateridae	**Click beetles**			
Agriotes acuminatus			larvae feed on grass roots	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Agriotes lineatus			larvae feed on grass roots, often in damp areas	2013
Agriotes obscurus			larvae feed on grass roots, often in damp areas	2013
Agriotes pallidulus			larvae feed on grass roots	2005
Agriotes sputator			larvae feed on grass roots	2005
Athous haemorrhoidalis			the larva feeds on the roots of grasses	2013
Dalopius marginatus			Damp habitats	2005
Denticollis linearis			larvae feed in decaying wood	2013
Kibunea (Cidnopus) minuta			a species of dry grasslands	2013
Kateretidae				
Brachypterus glaber			Nettles	2013
Brachypterus urticae			Nettles	2013
Latridiidae				
Cartodere bifasciatus			litter, compost, tussocks etc - more or less ubiquitous	2013
Cartodere nodifer			leaf litter, vegetable detritus - more or less ubiquitous	2013
Corticaria impressa			amongst plant litter	2013
Cortinicara gibbosa			amongst plant litter	2013
Malachiidae				
Cordylepherus viridis		Local	a common grassland species	2013
Malachius bipustulatus			grasslands	2013
Mordellidae				
Mordellistena pumilla			larvae in dead wood; adults at hawthorn flowers	2013
Mordellistena variegata		Local	unknown ecology	2013
Nanophyidae				
Nanophyes marmoratus			feeds in developing seeds of Purple Loosestrife	2005
Nitidulidae	**Pollen beetles**			
Meligethes aeneus			various flowers	2013
Meligethes atratus			various flowers, especially of trees and shrubs	2005
Meligethes rotundicollis		NS(Nb)	Mainly found in the south. The ecology of this beetle is currently unclear	2013
Pria dulcamarae			various flowers - especially of woody nightshade	2013
Oedemeridae				
Oedemera lurida		Local	a common grassland species	2013
Oedemera nobilis			a common grassland species	2013
Pselaphidae				
Brachygluta fossulata			usually in grass tussocks, feeding on moulds	2013
Bythinus burrelli			in woodland moss and in grassland tussocks, feeding on moulds	2013
Rybaxis longicornis				2013
Pyrochroidae				
Pyrochroa coccineus		NS(Nb)	larvae feed in dead timber	2005
Pyrochroa serraticornis	Cardinal beetle		Larvae predatory under loose tree bark	2013
Scirtidae				
Microcara testacea				2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Scraptiidae				
Anaspis (Nassipa) rufilabris			larvae feed in oak and other twigs and branches; adults at blossoms	2013
Anaspis fasciata (= humeralis)			larvae in twigs of oak and other trees; adults at hawthorn blossom	2013
Anaspis frontalis			larvae in twigs of oak and other trees; adults at hawthorn blossom	2013
Anaspis maculata			larvae in dead branches and twigs	2013
Silphidae				
Silpha (Phosphuga) atrata			associated with carrion	2013
Staphylinidae	**Rove beetles**			
Aloconota gregaria			plant litter - ubiquitous	2005
Anotylus inustus			leaf litter, carrion, dung and similar	2013
Anotylus rugosus			a detritus-feeding rove beetle	2013
Atheta (Atheta) crassicornis			amongst detritus etc - ecology unclear	2005
Atheta (Mocyta) fungi			a detritus-feeding rove beetle	2013
Atheta (Mycetota) laticollis			a detritus-feeding rove beetle	2005
Hygronoma dimidiata		Local	amongst moss and litter in marshy places	2013
Lathrobium brunnipes			grass tussocks, litter, dung etc	2013
Mycetoporus lepidus			amongst low vegetation and litter	2005
Ocypus olens	Devil's Coach-horse beetle		carrion	2013
Philonthus carbonarius (= varius)			ubiquitous - in moss, litter, carrion, dung etc	2005
Philonthus cognatus			under stones, litter etc, usually in woodland or scrub	2013
Philonthus fumarius		NS(Nb)	ecology unclear - probably a scavenger	2005
Philonthus marginatus			rotting vegetation etc	2013
Sepedophilus nigripennis			grass tussocks, leaf litter, mosses and similar places	2013
Sepedophilus pedicularius		NS(Nb)	fen and bog habitats - mostly in the fenland of Cambridgeshire and Huntingdonshire	2005
Stenus aceris			predatory in both wet and dry habitats	2005
Stenus bifoveolatus				2013
Stenus bimaculatus			mostly found in wetland habitats	2013
Stenus brunnipes			leaf litter, flood debris, tussocks etc	2013
Stenus cicindeloides		Local	usually in marshy places	2013
Stenus clavicornis			disturbed grasslands	2013
Stenus flavipes			found in a wide range of habitats	2013
Stenus fulvicornis			damp habitat, especially grazed grassland with Juncus	2013
Stenus juno			a common species in wet habitats	2013
Stenus oscillator		NS(Nb)	amongst moss and litter in marshy places	2013
Stenus pallipes			in the litter of marshes, fens, swamps etc	2013
Stenus solutus			wet habitats generally	2005
Tachyporus dispar			a detritus-feeding rove beetle	2013
Tachyporus formosus		NS(Na)	amongst moss and litter	2013
Tachyporus hypnorum			leaf litter, grass tussocks and similar micro-habitats	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Tachyporus nitidulus			leaf litter, grass tussocks and similar micro-habitats	2013
Tachyporus obtusus			leaf litter and similar microhabitats	2013
Tachyporus pusillus			detritus feedr	2013
Tachyporus solutus			leaf litter, carrion, dung and similar	2005
Xantholinus longiventris			leaf litter, grass tussocks and similar micro-habitats - very common	2013
DERMAPTERA	**EARWIGS**			
Forficulidae				
Forficula auricularia			generalist species	2013
DIPTERA	**TRUE FLIES**			
Agromyzidae				
Agromyza anthracina			larva makes mines in nettle leaves	2013
Agromyza filipendulae			larva mines the leaves of meadowsweet	2005
Agromyza idaeina			mines in leaves of Filipendula spp.	2005
Agromyza potentillae			mines leaves of Potentilla reptans and other rosaceous plants	2005
Agromyza reptans			larva makes mines in nettle leaves	2005
Agromyza vicifoliae			larva makes mines in leaves of vetches	2005
Amauromyza flavifrons			larva mines leaves of white campion	2005
Amauromyza labiatarum			mines leaves of Lamium album and other labiates	2013
Chromatomyia ramosa			larva mines the leaves of teasels	2005
Liriomyza amoena			mines leaves of elder	2013
Phytomyza chaerophylli			Larva mines in leaves of cow parsley	2005
Phytomyza lappae			mines leaves of Burdock (Arctium species)	2005
Phytomyza ranunculi			larva mines the leaves of Creeping Buttercup	2005
Phytomyza spondylii			mines leaves of Heracleum spondylium	2005
Asilidae	**Robber flies**			
Dioctria atricapilla			predatory -mainly in edge habitats	2005
Dioctria baumhaueri			predatory -mainly in edge habitats	2005
Dioctria rufipes			predatory -mainly in edge habitats	2005
Leptogaster cylindrica			grassland predator	2013
Machimus atricapillus			grassland predator	2005
Bibionidae				
Dilophus febrilis			associated with dung	2013
Calliphoridae	**Blowflies**			
Melanomya nana			larvae parasitise terrestrial woodlice	2013
Conopidae				
Conops quadrifasciatus		Local	Parasitic on bumble bee Bombus lucorum - wherever the host bee is found	2005
Physocephala rufipes		Local	parasitic fly on various species of bee	2005
Sicus ferrugineus		Local	parasitic fly on bumble bees	2005
Thecophora atra		Local	a parasite of solitary bees	2005
Dolichopodidae	**Dance flies**			
Argyra leucocephala			typically around puddles or ponds in woodland	2005
Dolichopus pennatus			larvae require damp places	2005

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Dolichopus wahlbergi		Local	larvae require damp habitat	2013
Poecilobothrus nobilitatus			aquatic larvae	2013
Scellus notatus		Local	predatory species in woodland and scrub, the adults predatory	2013
Sciapus platypterus			predatory in woodland and scrub, the larvae under bark	2005
Empididae	**Assassin flies**			
Empis (Kritempis) livida			predatory on other flies	2013
Hybotidae				
Bicellaria vana			predatory in edge habitats such as hedges etc	2013
Lauxaniidae				
Sapromyza opaca			saprophagous species	2013
Lonchopteridae				
Lonchoptera bifurcata			a more or less ubiquitous species in edge habitats	2005
Lonchoptera lutea			ubiquitous species in edge habitats, saprophagous larvae	2005
Micropezidae	**Stilt-legged flies**			
Micropeza corrigiolata		Local	Larva feeds in root nodules of Pisum sativum, Trifolium pratense and Medicago sativa	2005
Micropeza lateralis		NS(N)	rough herbage/edge habitats - rarely far from water	2005
Neria (=Calobata) cibaria			lush vegetation - especially at water margins	2005
Muscidae				
Helina depuncta				2013
Mesembrina meridiana			larvae in dung, especially cattle dung	2005
Opomyzidae				
Geomyza balachowskyi			larvae feed inside the stems of grasses	2005
Opomyza germinationis			larvae feed inside the stems of grasses	2013
Opomyza petrei			larvae feed inside the stems of grasses	2013
Pallopteridae				
Palloptera quinquemaculata			larvae feed in the stem bases of grasses	2013
Palloptera umbellatarum			larvae feed inside stems of false oat-grass	2005
Toxoneura (Palloptera) muliebris		Local	larva develops under bark	2005
Psilidae				
Loxocera albiseta			eggs are inserted into plants, upon which the larvae feed	2005
Rhagionidae	**Snipe flies**			
Rhagio lineola			woodland and scrub - especially at the edges	2005
Rhagio scolopaceus			woodland edge and other wooded areas - in clearings and at edges	2013
Rhagio tringarius			damp habitats	2013
Scathophagidae				
Scathophaga stercoraria			animal dung	2013
Sciomyzidae	**Snail-killing flies**			
Coremacera marginata		Local	dry habitats, especially grasslands	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Ilione albiseta			predatory on water snails in non-acidic wetland habitats	2005
Limnia unguicornis			predatory on water snails	2013
Pherbellia cinerella			predatory on terrestrial and exposed pulmonate aquatic snails	2005
Sepedon sphegea		Local	predatory on water snails	2013
Tetanocera arrogans		Local	predatory on a range of terrestrial and aquatic snails in marshy habitats	2005
Tetanocera elata			predatory on slugs in a range of habitats	2013
Trypetoptera punctulata			ecology unclear, but found in a range of habitat types	2013
Sepsidae				
Sepsis cynipsea			Larvae feed in animal dung	2005
Sepsis fulgens			the most ubiquitous member of this group, feeding in mammal dung	2013
Sepsis punctum			widespread in various habitats	2005
Sepsis violacea			animal dung	2005
Sphaeroceridae				
Lotophila atra			animal dung	2013
Stratiomyidae	**Soldierflies**			
Beris chalybata			associated with the scrub/grassland interface	2013
Beris vallata			saprophagous larvae	2005
Chloromyia formosa			ubiquitous	2013
Chorisops tibialis			saprophagous larvae	2013
Microchrysa polita			larvae require decomposing organic matter	2013
Pachygaster atra			woodland edge & scrubland species - larvae under dead bark of trees	2013
Pachygaster leachii			woodland edge & scrubland species - larvae under dead bark of trees	2013
Sargus bipunctatus			associated with the scrub/grassland interface	2013
Stratiomys potamida		NS(N)	well-vegetated water-bodies	2005
Syrphidae	**Hoverflies**			
Cheilosia albitarsis s. str.			larvae feed in the roots of Ranunculus repens	2013
Cheilosia bergenstammi			larvae feed in the stems and roots of ragwort on dry chalky or sandy sites or in ruderal areas	2005
Cheilosia impressa			damp woodland and carr	2013
Cheilosia lasiopa (= honesta)			larvae unknown; adults feed at flowers including Anthriscus sylvestris	2013
Cheilosia pagana			larvae are thought to feed in the roots of Anthriscus sylvestris	2005
Cheilosia vernalis			thought to feed in the stems of plants such as Achillea, Matricaria, Tragoponon and Sonchus	2013
Episyrphus balteatus			ubiquitous species, partly immigrant, and a predator of aphids	2013
Eristalis arbustorum			Larvae require damp habitats but adults are more or less ubiquitous	2013
Eristalis lineata (= horticola)			damp habitats, especially margins of ponds and woodland streams	2005

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Eristalis nemorum (= interrupta)			Larvae require damp habitats but adults are more or less ubiquitous	2013
Eristalis pertinax			Larvae require damp habitats but adults are more or less ubiquitous	2013
Eristalis tenax			Larvae require damp habitats but adults are more or less ubiquitous	2013
Eumerus funeralis (= tuberculatus)			larvae feed inside bulbs - especially of bluebells	2005
Eupeodes corollae			Grassland	2013
Eupeodes latifasciatus		Local	Damp grassland	2005
Eupeodes luniger			Grassland	2013
Helophilus pendulus			Larvae require damp habitats but adults are more or less ubiquitous	2013
Melanogaster hirtella			larvae feed in mud amongst roots of emergent vegetation, mainly by running water	2013
Melanostoma mellinum			Grassland	2013
Melanostoma scalare			Grassland	2005
Myathropa florea			larvae are semi-aquatic	2013
Neoascia podagrica			edge-habitat species	2005
Pipizella viduata			Larvae feed on root aphids on Umbelliferae	2013
Platycheirus albimanus			ubiquitous - larvae prey on aphids	2005
Platycheirus angustatus			damp habitats	2013
Platycheirus clypeatus			Damp habitats	2013
Platycheirus manicatus			aphid predator amongst vegetation	2005
Platycheirus scutatus			an edge-habitat species	2013
Rhingia campestris			Cow dung	2005
Scaeva pyrastri			immigrant from overseas - feeds on aphids	2005
Sphaerophoria scripta			Grassland - larvae prey on aphids	2013
Syritta pipiens			larvae in decaying vegetation; adults at flowers	2013
Syrphus ribesii			larvae are aphid predators on trees and bushes	2013
Syrphus vitripennis			larvae are aphid predators on trees and bushes	2013
Volucella bombylans			inquiline in nests of bumble bees	2005
Volucella pellucens			inquiline in nests of social wasps/hornet	2005
Xanthogramma pedisequum s.str.		Local	larvae feed in ants nests	2013
Xylota segnis			Damp, dead wood	2013
Tabanidae				
Chrysops relictus			damp habitats - adult females are blood sucking horseflies	2005
Haematopota pluvialis			damp habitats - adult females are blood sucking horseflies	2005
Tabanus autumnalis			damp habitats - adult females are blood sucking horseflies	2005
Tachinidae				
Eriothrix rufomaculata			larva parasitises moth larvae	2005
Phasia pusilla		Local	Parasite of plant bugs in Europe but British hosts unknown.	2005
Thelaira solivaga			larvae are parasites of caterpillars of the Garden Tiger moth	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Tephritidae	**Picture-winged flies**			
Acidia cognata		Local	Tussilago and Petasites plants - mining the leaves	2005
Euleia heraclei			larvae feed in the seed heads of white-flowering Umbelliferae	2005
Merzomyia westermanni		NS(N)	various ragwort species	2005
Oxyna parietina		NS(Nb)	mugwort - the larvae boring inside the stems	2005
Sphenella marginata		Local	on various ragwort species, in late summer and autumn	2005
Tephritis bardanae			larvae gall the flowers of burdock	2005
Tephritis cometa		Local	larvae gall the flowers of creeping thistle	2005
Tephritis neesi			larvae gall the flowers of Leucanthemum species	2005
Terellia ruficauda			larvae gall the flowers of thistles	2005
Urophora cardui			larvae gall the flowers of thistles	2013
Urophora quadrifasciata		Local	larva galls the flowers of Centaurea nigra	2005
Urophora stylata			larvae form galls on thistle stems	2005
Xyphosia miliaria			larvae gall the flowers of thistles - ubiquitous	2013
Therevidae				
Thereva nobilitata			biology uncertain	2005
Tipulidae				
Tipula oleracea			ubiquitous, larvae feeding on roots of grasses	2013
Tipula paludosa			ubiquitous, larvae feeding on roots of grasses	2013
HETEROPTERA	**PLANT BUGS**			
Acanthosomatidae				
Acanthosoma haemorrhoidale	hawthorn shield bug		hawthorn	2013
Anthocoridae				
Anthocoris confusus			trees and shrubs	2013
Anthocoris nemoralis			trees and shrubs	2013
Anthocoris nemorum			low vegetation	2013
Cardiastethus fasciiventris			Gorse and sometimes other plants	2013
Orius vicina			predatory amongst low growing vegetation	2013
Berytinidae				
Cymus melanocephalus			Juncus (rush) in a wide variety of habitats in the south-east region	2013
Coreidae				
Coreus marginatus			Develops on a variety of Polygonaceae in open habitats	2013
Coriomeris denticulatus			various legumes	2005
Syromastus rhombeus			feeds on Polygonum species in ruderal and other open sites	2005
Lygaeidae				
Drymus sylvaticus			amongst vegetation litter, moss etc in many habitats	2005
Heterogaster urticae			Nettles	2013
Ischnodemus sabuleti			associated with reeds (Phragmites)	2013
Kleidocerys resedae			trees and shrubs generally	2013
Peritrechus geniculatus			ground bug of dry open soils, mainly	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
			southern	
Scolopostethus affinis			usually on nettles	2013
Scolopostethus thomsoni			usually on nettles	2005
Stygnocoris sabulosus			disturbed ground amongst ruderal plants	2013
Microphysidae				
Loricula elegantula			predatory amongst trees and bushes	2005
Miridae				
Adelphocoris lineolatus			leguminous plants	2005
Apolygus lucorum		Local	low plants	2013
Apolygus spinolai			Polyphagous amongst low vegetation	2013
Campyloneura virgula			broad-leaved trees and shrubs	2013
Capsus ater			Grassland	2005
Closterostomus norvegicus			polyphagous	2013
Cyllecoris histrionicus			associated with oak	2013
Deraeocoris flavilinea			predatory amongst trees and bushes	2013
Deraeocoris lutescens			predatory amongst trees and bushes	2013
Deraeocoris ruber			nettles, brambles and similar rough vegetation	2005
Dicyphus epilobii			Epilobium hirsutum	2013
Dryophilocoris flavoquadrimaculatus			associated with oak	2013
Grypocoris stysi			Nettles	2013
Harpocera thoracica			Oaks -solitary and in woods	2005
Heterotoma planicornis			edge habitats - especially in association with nettles	2005
Leptoterna dolabrata			found in a wide range of grassland habitats	2005
Leptoterna ferrugata			grassland species	2005
Liocoris tripustulatus			stinging nettle	2013
Lopus decolor			open grasslands, especially dry calcareous ones but also colonises ruderal sites	2005
Lygocoris pabulinus			Polyphagous amongst low vegetation	2013
Lygus rugulipennis			polyphagous - especially common in ruderal communities	2013
Miris striatus			associated with oak	2005
Notostira elongata			grasslands	2013
Orthops kalmii			on various umbelliferous flowers	2013
Phylus melanocephalus			restricted to oak trees	2013
Phytocoris tiliae			predatory on trunks and branches of deciduous trees	2005
Phytocoris varipes			dry, open grasslands are preferred. Partly vegetarian and partly a predator	2013
Pilophorus perplexus		Local	predatory on deciduous trees	2013
Plagiognathus arbustorum			polyphagous, but usually associated with stinging nettles	2013
Plagiognathus chrysanthemi			polyphagous	2013
Psallus haematodes			sallow trees	2013
Psallus perrisi				2013
Psallus varians			predatory species on oak trees	2013
Rhabdomiris striatellus				2013
Stenodema calcarata			grasslands	2013
Stenodema laevigata			grasslands	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Stenotus binotatus			grasslands	2005
Nabidae				
Himacerus apterus	a damsel bug		a tree-dwelling species	2013
Nabis limbatus	marsh damsel bug		marshy places	2013
Nabis rugosus			common predator amongst long grass and herbs	2013
Pentatomidae				
Aelia acuminata			Thistles	2013
Dolycoris baccarum			polyphagous species of dry habitats	2013
Eysarcoris venutissimus (= fabricii)			probably polyphagous	2013
Palomena prasina			trees and shrubs	2013
Pentatoma rufipes	The Forest Bug		tree-dwelling predator that often flies far from woodland	2005
Picromerus bidens				2013
Podops inuncta	the Turtle Bug		dry places, especially ruderal sites. A markedly southern species	2013
Rhopalidae				
Rhopalus subrufus		Local	St John's Wort (Hypericum perforatum)	2013
Saldidae				
Saldula saltatoria			predatory species of most damp habitats	2013
Scutelleridae				
Eurygaster testudinaria			rushes, sedges and other tall vegetation in damp places	2013
Tingidae				
Physatocheila dumetorum			hawthorn	2013
Tingis ampliata			creeping thistle	2013
Tingis cardui			spear thistle - Cirsium vulgare	2013
HOMOPTERA: AUCHENORHYNCHA	**PLANT HOPPERS**			
Aphrophoridae				
Aphrophora alni			larvae feed under froth on a wide range of trees and shrubs	2013
Neophilaenus lineatus			grasslands	2013
Philaenus spumarius	spittle-bug/Cuckoo-spit bug		larvae feed under froth on a wide range of herbaceous plants	2013
Cercopidae				
Cercopis vulnerata			woodland edge, other edge habitats and damp ditches	2013
Cicadellidae				
Adarrus ocellaris			grassland and rank vegetation	2013
Alebra albostriella			oak	2013
Allygus mixtus			grasses	2013
Anoscopus flavostriatus			grassland	2013
Aphrodes makarovi			on nettles, thistles and other plants in grasslands	2013
Arboridia ribauti			arboreal species, mainly on oaks	2013
Arthaldeus pascuellus			grasses	2013
Balclutha punctata			widespread on grasses etc - overwinters in conifer trees	2013
Cicadella viridis			grasses and rushes in marshy places	2013
Cicadula frontalis			marshy places with tall Carex or Scirpus,inland and coastal	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Cicadula quadrinotata			on Carex (sedges) in wet and dry locations	2013
Edwardsiana crataegi			associated with hawthorns	2013
Eupteryx aurata			low growing plants	2013
Eupteryx urticae			Usually on nettles	2013
Eurhadina pulchella			oaks and sometimes other trees	2013
Euscelis incisus			grasses	2013
Iassus lanio			usually on oak, occasionally on other trees	2013
Idiocerus lituratus			Salix species	2013
Lamprotettix nitidulus				2013
Lindbergina aurovittata			various trees and bushes	2013
Macrosteles sexnotatus			grassland species often associated with clovers	2013
Macrosteles viridigriseus			marshy areas, often at the margins of ponds	2013
Macustus grisescens				2013
Mocydia crocea			grasses	2013
Notus flavipennis			marshy placesd with Carex	2013
Paluda flaveola		Local	tall grassland in mosit and usually shaded sites	2013
Populicerus confusus			various trees and bushes	2013
Psammotettix confinis			grasses, including on post-industrial sites	2013
Streptanus sordidus			grasses in a range of habitats	2013
Zonocyba bifasciata				2013
Zygina angusta			on various trees - overwinters in conifers	2013
Zyginidia scutellaris			grasses	2013
Cixiidae				
Cixius nervosus			most frequent in woodlands	2013
Tachycixius pilosus			grasses	2013
Delphacidae				
Conomelus anceps			Juncus species	2013
Hyledelphax elegantulus			open, dry grassland with Deschampsia cespitosa in the sward	2013
Javesella pellucida			grasses in a range of habitats	2013
Kelisia guttulifera		Local	on sedges in dry grassland	2013
Kelisia ribauti		Local	associated with marshes, espacially if base-poor	2013
Megamelus notula			in marshy places - associated with sedges	2013
Muellerianella fairmairei			damp grasslands	2013
Stenocranus major		Local	Phalaris arundinacea in marshy places	2013
Stenocranus minutus			grasses in a range of habitats	2013
Membracidae				
Centrotus cornutus		Local	oak, aspen and other sapling trees	2013
HOMOPTERA: PSYLLOIDEA	**PLANT LICE**			
Psyllidae				
Cacopsylla peregrina			associated with hawthorns	2013
HOMOPTERA: STENORHYNCHA	**PLANT LICE**			
Triozidae				

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Trioza urticae			stinging nettle	2013
HYMENOPTERA: ACULEATA	**BEES, WASPS AND ANTS**			
Apidae	**Bees**			
Apis mellifera	honey bee		flowers in general	2005
Bombus hypnorum	The Tree Bee		A recent colonist, first seen in 2001 in Dorset, now spreading rapidly	2013
Bombus lapidarius	red-tailed bumble bee		ubiquitous	2005
Bombus lucorum	white-tailed bumble bee		ubiquitous	2013
Bombus pascuorum	common carder bee		ubiquitous	2013
Bombus pratorum	a bumble bee		ubiquitous	2013
Bombus terrestris	buff-tailed bumble bee		ubiquitous	2013
Halictus tumulorum			ground-nesting solitary bee in a range of habitats	2005
Hylaeus communis			nests inside dead stems of bramble, dock etc	2013
Hylaeus cornutus		NS(Na)	nests in stems of herbaceous plants	2005
Lasioglossum calceatum			nests in burrows on steep sandy banks	2013
Lasioglossum malachurum		NS(Nb)	ground nesting species - prefers soils with a clay component	2005
Lasioglossum morio			excavates nest burrows in level ground	2005
Nomada flavoguttata			nest parasite of small-sized Andrena species of bee	2005
Eumenidae	**Solitary wasps**			
Ancistrocerus gazella			nests in broken plant stems and other hollows	2005
Formicidae	**Ants**			
Lasius brunneus	banded tree ant	NS(Na)	nests on old oaks and perhaps other trees	2005
Lasius flavus	yellow ant		grassland. A high nest density indicates long term grassland continuity	2005
Lasius niger	common black ant		generalist species	2013
Myrmica rubra	a red ant		ubiquitous	2013
Myrmica scabrinodis			grassland - preferring shorter, damp turf	2013
Sphecidae	**Digger wasps**			
Pemphredon lugubris			nests in holes in dead wood (trees) and preys on aphids	2005
Trypoxylon attenuatum			preys on spiders. Nests in plant stems, beetle tunnel or other cavities	2005
Vespidae	**social wasps**			
Vespula germanica			ubiquitous	2005
Vespula rufa	the red wasp		usually nesting below ground in a mouse hole or similar	2005
Vespula vulgaris			ubiquitous	2013
HYMENOPTERA: PARASITICA				
Cynipidae	**Gall wasps**			
Andricus quercuscalicis			forms galls in acorns	2013
Neuroterus anthracinus			causes galls on oaks	2013
Neuroterus quercusbaccarum			forms the hairy spangle gall on oak leaves	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Mymaridae	**Parasitic wasps**			
Mymar pulchellum				2013
HYMENOPTERA: SYMPHYTA	**SAWFLIES**			
Argidae				
Arge cyanocrocea			larvae feed on Rubus (bramble, raspberry etc)	2005
Arge gracilicornis			larvae feed on Rubus idaeus	2013
Arge ochropus			larvae feed on wild rose	2005
Arge pagana		Local	host plant associations are currently unclear	2005
Cephidae				
Cephus cultratus			larvae mine the stems of grasses	2013
Cephus pygmaeus			larvae mine the stems of grasses	2005
Tenthredinidae				
Athalia cordata			ubiquitous sawfly species	2013
Athalia rosae			phytophagous species	2013
Empria liturata				2013
Hoplocampa crataegi			larvae mines the flesh of hawthorn berries	2013
Profenusa pygmaea			larva mines the leaves of oak trees	2013
Rhogogaster viridis			larvae on a variety of plant species	2005
Tenthredo arcuata			larvae feed on Trifolium repens leaves	2005
LEPIDOPTERA	**BUTTERFLIES**			
Hesperiidae				
Ochlodes faunus	Large skipper		grassland	2005
Thymelicus sylvestris	Small skipper		grassland	2013
Lycaenidae				
Lycaena phlaeas	Small copper		common sorrel and sheeps sorrel - adults nectar at ragwort	2013
Polyommatus icarus	Common blue		various legumes, especially Bird's-foot Trefoil	2013
Nymphalidae				
Aglais urticae	Small tortoiseshell		larvae feed on Stinging Nettle	2013
Aphantopus hyperantus	Ringlet		woodland edge and clearings, hedges and other edge habitats	2005
Coenonympha pamphilus	Small Heath	NT	grassland	2005
Euphydryas aurinia	Marsh Fritillary	BAP	Succisa pratensis in boggy meadows or chalk grassland	2005
Inachis io	Peacock		nettles	2005
Maniola jurtina	Meadow brown		grassland species	2013
Melanargia galathea	Marbled White	Local	tall calcareous grassland	2005
Pararge aegeria	Speckled wood		grasses in light woodland or scrub	2013
Polygonia c-album	Comma		nettles	2013
Pyronia tithonus	Gatekeeper		larvae feed on coarse grasses	2013
Pieridae				
Gonepteryx rhamni	Brimstone		buckthorn	2005
Pieris brassicae	Large white		various Cruciferae	2013
Pieris napi	Green-veined white		ubiquitous	2013
Pieris rapae	Small white		ubiquitous	2013
LEPIDOPTERA	**MOTHS**			
Choreutidae				
Anthophila fabriciana	Nettle-tap		nettles	2013
Coleophoridae				

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Coleophora paripennella				2013
Elachistidae				
Elachista albifrontella				2013
Gelechiidae				
Helcystogramma rufescens			grasses	2013
Geometridae				
Abraxas grossulariata	Magpie		Ribes species	2013
Camptogramma bilineata	Yellow Shell		herbaceous plants	2013
Epirrhoe alternata	Common Carpet		bedstraws	2013
Scotopteryx chenopodiata	Shaded Broad-bar	BAP(R)	vetches and clovers	2013
Timandra comae	Blood-vein	BAP(R)	Polygonaceae	2013
Xanthorhoe montanata	Silver-ground Carpet		herbaceous plants - especially bedstraws	2013
Glyphipterigidae				
Glyphipterix forsterella				2013
Glyphipterix simpliciella			caterpillar feeds on the seeds of Dactylis and Festuca species of grasses	2013
Gracillariidae				
Phyllonorycter esperella			mines leaves of hornbeam	2013
Phyllonorycter harrisella			mines leaves of oak	2013
Phyllonorycter quercifoliella			mines leaves of oak	2013
Incurvariidae				
Adela fibulella				2013
Lymantriidae				
Orgyia antiqua	Vapourer		deciduous trees and shrubs	2013
Micropterigidae				
Micropterix aruncella			probably on sedges	2013
Nepticulidae				
Ectoedemia subbimaculella			larva mines leaves of oak	2013
Noctuidae				
Callistege mi	Mother Shipton	BAP(R)	coarse grasses, including reeds	2013
Euclidia glyphica	Burnet Companion		Medicago, Trifolium and Lotus corniculatus	2013
Mythimna impura	Smoky Wainscot		grasses	2013
Rivula sericealis	Straw Dot		grasses - especially Brachypodium species	2013
Notodontidae				
Phalera bucephala	Buff-tip		deciduous trees	2013
Pyralidae				
Agriphila tristella			grasses	2013
Tortricidae				
Celypha lacunana			herbaceous plants	2013
Hedya pruniana			Prunus, especially blackthorn	2005
Pseudargyrotoza conwagana			ash and privet in the fruits and seeds	2005
Zygaenidae				
Adscita statices	Forester Moth	BAP	Rumex acetosa	2013
MECOPTERA	**SCORPION FLIES**			
Panorpidae				
Panorpa communis			edge habitats	2013
NEUROPTERA	**LACEWINGS**			
Chrysopidae				
Chrysopa perla			aphid predator amongst herbage	2013
Chrysoperla carnea			aphid predator of trees and bushes	2013

Group / species	English name if available	National status	Ecological associations and comments	Latest report
Cunctochrysa albolineata			predatory on aphids in tree foliage	2005
Dichochrysa prasina			aphid predator on various plant species	2013
Nineta flava			thought to be associated with oak, feeding on aphids on the leaves	2005
Coniopterygidae				
Coniopteryx tineiformis			predatory on aphids in tree foliage	2005
Conwentzia psociformis			arboreal on deciduous trees	2005
Hemerobiidae				
Hemerobius humulinus			trees and bushes, hedges, etc	2013
Hemerobius lutescens			trees and bushes, hedges, etc	2013
Hemerobius micans			oak	2005
Micromus paganus			ubiquitous, but usually in association with wood or scrub	2013
Micromus variegatus			probably a predator of root aphids	2013
Wesmaelius subnebulosus			larvae are aphid predators on trees and bushes	2013
ORTHOPTERA	**GRASSHOPPERS AND CRICKETS**			
Acrididae	**Grasshoppers**			
Chorthippus brunneus	Field grasshopper		grassland	2013
Chorthippus parallelus	Meadow grasshopper		grassland	2013
Omocestus viridulus	Common Green Grasshopper		tall, undisturbed calcareous grassland	2013
Tetrigidae	**Ground hoppers**			
Tetrix undulata	Common Ground-hopper		bare ground habitats, including dunes	2013
Tettigoniidae	**Crickets**			
Conocephalus discolor	Long-winged Cone-head	NS(Na)	coarse vegetation on the coast - recently it has colonised inland sites	2013
Conocephalus dorsalis	Short-winged Cone-head	Local	formerly at damp coastal sites it is now found in a variety of inland habitats	2005
Leptophyes punctatissima	Speckled Bush-cricket		rough herbage and scrub	2013
Meconema thalassinum	Oak Bush-cricket		oak trees, especially when at the woodland edge	2013
Metrioptera roeselii	Roesel's Bush-cricket	NS(Nb)	long grassland	2013
Pholidoptera griseoaptera	Dark Bush-cricket		scrub and edge habitats	2013
PSOCOPTERA	**BARK LICE**			
Stenopsocidae				
Graphopsocus cruciatus			associated with broad-leaved trees	2013

APPENDIX 2: INVERTEBRATE STATUS CODES

Earlier published reviews of scarce and threatened invertebrates employed the Red Data Book criteria used in the British Insect Red Data Book (Shirt 1987) with the addition of the category RDBK (Insufficiently Known) after in 1983. In addition, the status category Nationally Notable (now termed Nationally Scarce) was used from 1991. The original criteria of the International Union for the Conservation of Nature (IUCN – now called the World Conservation Union) for assigning threat status used in these publications had the categories *Endangered, Vulnerable,* and *Rare,* which were defined rather loosely and without quantitative parameters. The application of these categories was largely a matter of subjective judgment, and it was not easy to apply them consistently within a taxonomic group or to make comparisons between groups of different organisms. The deficiencies of the old system were recognised internationally, and in the mid-1980s proposals were made to replace it with a new approach which could be more objectively and consistently applied. In 1989, the lUCN's Species Survival Commission Steering Committee requested that a new set of criteria be developed to provide an objective framework for the classification of species according to their extinction risk. The first, provisional, outline of the new system was published in 1991. This was followed by a series of revisions, and the final version adopted as the global standard by the IUCN Council in December 1994. The guidelines were recommended for use also at the national level. In 1995, the Joint Nature Conservation Committee (JNCC) endorsed their use as the new national standard for Great Britain, and subsequent British Red Data Books have used these revised IUCN criteria. These criteria are used in this present report and are as follows:

EXTINCT (EX) A species is *Extinct* when there is no reasonable doubt that the last individual has died.

EXTINCT IN THE WILD A species is *Extinct* in the wild when it is known to survive only in cultivation, in captivity or as a naturalised population (or populations) well outside the past range.

CRITICALLY ENDANGERED
A species is *Critically Endangered* when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the following criteria:

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 80%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 100 Km^2 or areas of occupancy estimated to be less than 10 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at only a single location.
2. Continuing decline, observed, inferred or projected, in any of the following: a. extent of occurrence b. area of occupancy c. area, extent and/or quality of habitat d. number of locations or sub-populations e. number of mature individuals
3. Extreme fluctuations in extent of occurrence, area of occupancy, number of locations or sub-populations or number of mature individuals.

C. Population estimated to number less than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within 3 years or one generation, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 50 mature individuals) or all individuals are in a single sub-population

D. British population estimated to number less than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild of at least 50% within 10 years or 3 generations, whichever is the longer.

ENDANGERED (Formerly RDB category 1)

A species is Endangered when it is not *Critically Endangered* but is facing a very high risk of extinction in the wild in the near future, as defined by any of the following criteria:

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 50%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 5,000 Km^2 or areas of occupancy estimated to be less than 10 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at no more than five locations.
2. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or sub-populations or the number of mature individuals.

C. Population estimated to number less than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within 5 years or 2 generations, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 250 mature individuals) or all individuals are in a single sub-population

D. British population estimated to number less than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild of at least 20% within 20 years or 5 generations, whichever is the longer..

VULNERABLE (Formerly RDB category 2)

A species is *Vulnerable* when it is not *Critically Endangered or Endangered but* is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the following criteria (A to E):

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 20%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 20,000 Km^2 or areas of occupancy estimated to be less than 20,000 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at no more than ten locations. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or sub-populations or the number of mature individuals.
2. Extreme fluctuations in extent of occurrence, area of occupancy, number of locations or sub-populations or number of mature individuals.

C. Population estimated to number less than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or 3 generations, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 1000 mature individuals) or all individuals are in a single sub-population

D. Population very small or restricted in the form of either of the following:

1. Population estimated to number less than 1,000 mature individuals.
2. Population is characterised by an acute restriction in its area of occupancy (typically less than 100 km) or in the number of locations (typically less than 5). Such a species would thus be prone to the effects of human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming *Critically Endangered* or even *Extinct* in a very short period.

E. Quantitative analysis showing the probability of extinction in the wild of at least 10% within 100 years.

LOWER RISK (Formerly RDB category 3)

A species is Lower Risk when it has been evaluated but does not satisfy the criteria for any of the categories *Critically Endangered, Endangered* or *Vulnerable.* Species included in the Lower Risk category can be separated into three sub-categories:

• **Conservation Dependent** species which are the focus of a continuing species -specific or habitat-specific conservation program targeted towards the species in question, the cessation of which would result in the species qualifying for one of the threatened categories above within a period of five years.

• **Near Threatened** Species which do not qualify for *Lower Risk (Conservation Dependent),* but which are close to qualifying for *Vulnerable.*

• **Least Concern**
Species which do not qualify for *Lower Risk (Conservation Dependent)* or *Lower Risk (Near Threatened).*

DATA DEFICIENT A species is *Data Deficient* when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. A species in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. *Data Deficient* is therefore not a category of threat or Lower Risk.

LOWER RISK (NATIONALLY SCARCE – FORMERLY NATIONALLY NOTABLE)

Species which are not included within the IUCN threat categories and are estimated to occur less than 100 hectads of the Ordnance Survey national grid in Great Britain. It should be noted that Lower Risk (Nationally Scarce) is not a threat category, but rather an estimate of the extent of distribution of these species. Lower Risk species are subdivided as follows:

Na species estimated to occur within the range of 16 to 30 10-kilometre squares of the National Grid System.

Nb species estimated to occur within the range 31 to 100 10-kilometre squares of the National Grid System.

N Diptera (flies) not separated, falling into either category Na or Nb.

NATIONALLY LOCAL (L)

Species which, whilst fairly common, are evidently less widespread than truly common species, but also not qualifying as Nationally Notable having been recorded from over one hundred, but less than three hundred, ten-kilometre squares of the UK National Grid.

ASSOCIATED DEFINITIONS

Extent of occurrence

Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a species, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of species (e.g. large areas of obviously unsuitable habitat) (but see 'area of occupancy'). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

Area of occupancy

Area of occupancy is defined as the area within its 'extent of occurrence' (see definition) which is occupied by a species, excluding cases of vagrancy. The measure reflects the fact that a species will not usually occur throughout the area of its extent of occurrence, which may, for example, contain unsuitable habitats. The area of occupancy is the smallest area essential at any stage to the survival of existing populations of a species *(e.g.* colonial nesting sites, feeding sites for migratory species). The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the species. The criteria include values in km^2, and thus to avoid errors in classification, the area of occupancy should be measured on grid squares (or equivalents) which are sufficiently small.

APPENDIX 3: THIRD PARTY REPORT ON SURVEYS UNDERTAKEN FOR BROWN AND BLACK HAIRSTREAK BUTTERFLIES

********** Report starts **********

Butterfly Conservation
Saving butterflies, moths and their habitats

Upper Thames Branch

A Report on Branch records for

(a) the Brown Hairstreak Butterfly (*Thecla betulae*)
(b) the Black Hairstreak Butterfly (*Satyrium pruni*)

on land to the north of Gavray Drive, Bicester, Oxon.

Prepared by David Redhead (Upper Thames Branch)
(red.admiral@virgin.net)

For The Environmental Dimension Partnership
Date 18th July 2011

Number of pages = 7

BUTTERFLY CONSERVATION
Company limited by guarantee, registered in England (22064688)
Registered Office: Manor yard, East Lulworth, Wareham, Dorset, BH20 5QP
Charity registered in England (254937) and in Scotland (39268)

Land North of Gavray Drive, Bicester, Oxfordshire

1. Brown Hairstreak Records.

1.1 Adult Brown Hairstreak sightings.

Date	Number of recorders	Purpose of visit	Brown Hairstreak seen	Number of other butterfly species recorded
26/08/05	6	Marsh Fritillary larval web	No	10
29/08/05	1	Marsh Fritillary larval web	No	4
01/09/06	4	Brown Hairstreak	No	6
04/09/06	1	Brown Hairstreak	No	1
06/09/07	1	Brown Hairstreak	Yes – 1 female	2
08/08/08	1	Brown Hairstreak	Yes – 1 male	8
18/09/09	1	Brown Hairstreak	No	2
02/08/10	1	Brown Hairstreak	Yes – 1 male	?

Details of 3 adult sightings.

06/09/07 – 1 female nectaring on brambles flowers growing in NW face of hedge EH (Field 12)

08/08/08 – I male flying in ash on north side of Field 7.

02/08/10 – 1 male nectaring on thistle in Field 13.

1.2 Brown Hairstreak egg surveys.

Table 1.1 – Summary of surveys

Date	Eggs found	Search hours	Locations searched	Find Rate (eggs/hour)
Winter 2002/03	0	2	Various parts of SW facing hedges – exact locations not recorded.	0.0
Winter 2003/04	Not searched.			
Winter 2004/05	Not searched.			
Winter 2005/06	16	20	All SW & SE facing hedges east of the Langford Brook. All blackthorn west of the Langford Brook.	0.8
Winter 2006/07	74	17	SW face of hedges MN, NP & RS. NW face of hedges BE, EH & HN. Field 5 accessible hedgerows and scrub.	4.4
Winter 2007/08	33	7	SW face of hedges MN & NP	4.7
Winter 2008/09	No survey*.			
Winter 2009/10	No survey*.			
Winter 2010/11	478	40	All accessible hedges east of the Langford Brook. All blackthorn west of the Langford Brook.	12.0

*During these winters rapid checks were carried out to confirm the continuing use of the site by the Brown Hairstreak for egg laying purposes. The searches were not done on a timed count basis and were terminated when a few eggs had been found.

Table 1.2 – Detailed egg counts by hedgerow (see annotated map for location of hedgerows and fields. Field numbers used are those designated when most of the site was designated as a County Wildlife site in 2002).
Table 1.2a – East of Langford Brook - Fields 1-7

Field	Boundary	Aspect	Eggs found				Estimated blackthorn
			2005/06	2006/07	2007/08	2010/11	
1	RS	SW	3	2	Not searched	16[$]	80%
	SV	W	Inaccessible				?
	UV	NE	Inaccessible				?
	RU	SE	Not searched	Not searched	Not searched	6[$$]	20%
	Scrub		Not searched	Not searched	Not searched	10[$$]	
2	PQ	SW	Inaccessible				?
	QS	W	Inaccessible				?
	RS	NE	1	Not searched	Not searched	6[$$]	20%
	PR	SE	Inaccessible				?
	Scrub		No scrub				
3	KL	SW	1			11[$$]	20%
	LQ	W	No blackthorn				0%
	PQ	NE	Not searched	Not searched	Not searched	0[$$]	20%
	KP	SE	0	Not searched	Not searched	5	20%
	Scrub		No scrub				
4		SW	Inaccessible				?
		W	No hedge				
		NE	Inaccessible				?
		SE	Inaccessible				?
	Scrub		0	Not searched	Not searched	0[$$]	
5	BC	SW	No hedge				
	CF	NW	Inaccessible				?
	EF	NE	2	1	Not searched	2[$$]	20%
	BE	SE	No blackthorn				0%
	Scrub		4	4	Not searched	24[$$]	
6	AB	SW	0	Not searched	Not searched	2	10%
	BE	NW	Not searched	Not searched	Not searched	2	50%
	DE	NE	Not searched	Not searched	Not searched	7	30%
	AD	E	No hedge				
	Scrub		Not searched	Not searched	Not searched	14[$]	
7	EF	SW	2	Not searched	Not searched	43[$]	80%
	FK	NW	Inaccessible				?
	IJK	NE	Inaccessible				?
	EI	SE	0	Not searched	Not searched	0[$]	20%
	Scrub		Not searched	Not searched	Not searched	1[$$]	

Table 1.2b – East of Langford Brook - Fields 8-13

Field	Boundary	Aspect	Eggs found				Estimated blackthorn
			2005/06	2006/07	2007/08	2010/11	
8	JK	SW	0	Not searched	Not searched	9[$]	30%
	KP	NW	Not searched	Not searched	Not searched	1[$$]	30%
	PO	NE	Not searched	Not searched	Not searched	1[$]	10%
	JO	SE	0	Not searched	Not searched	27[$$]	30%
	Scrub		No scrub				
9	IJ	SW	0	Not searched	Not searched	6[$]	30%
	JO	NW	Not searched	Not searched	Not searched	14[$$]	30%
	NO	NE	Not searched	Not searched	Not searched	0[$]	10%
	IN	SE	0	Not searched	Not searched	37[$]	30%
	Scrub		No scrub				
10	NP	SW	0	3	5	91[$]	90%
	PU	NW	Not searched	Not searched	Not searched	0[$$]	20%
	TU	NE	No blackthorn				
		SE	No hedge				
	Scrub		No scrub				
11	GH	SW	3	Not searched	Not searched	37	30%
	HN	NW	Not searched	Not searched	Not searched	8	50%
	MN	NE	Not searched	Not searched	Not searched	9	50%
	GM	E	No hedge				
	Scrub		0	Not searched	Not searched	9	
12	DE	SW	4	Not searched	Not searched	29[$]	40%
	EH	NW	Not searched	Not searched	Not searched	14[$]	50%
	GH	NE	3	Not searched	Not searched	15	30%
	DG	E	0	Not searched	Not searched	1	10%
	Scrub		No scrub				
13	MN	SW	0	30	28	21	90%
		NW	No hedge				
	MT	NE	Inaccessible and probably no blackthorn				0%?
		E	No hedge				
	Scrub		No scrub				

Table 1.2c – West of Langford Brook

Field	Boundary	Aspect	Eggs found				Estimated blackthorn	
			2005/06	2006/07	2007/08	2010/11	2002/03	2010/11
Perimeter								
	WX	SW	0	Not searched		0$	50%	No hedge*
	XA	SW	0	Not searched		0$	10%	No hedge*
	ADGM	NW	No hedge					
	MY	NE	0	Not searched		0$	50%	No hedge*
	YX	NE	0	Not searched		0$	0%	0%
	WX	SE	0	Not searched		0$	0%	0%
Cross hedge								
	XY	W	0	Not searched		0$	10%	10%
	XY	E	0	Not searched		0$	10%	10%
Note: * = hedge cut down to ground during 2010 by Network Rail during fence construction.								

In Tables 2a, 2b & 2c:-

$ = This hedgerow will be affected by the proposed development by either being partially destroyed or directly abutted by the development.

$$ = This hedgerow/scrub will be totally destroyed by the development.

Thus it can be concluded from the 2010/11 survey that the egg carrying capacity of the hedgerows within the proposed development will be reduced by 19% at best and 83% at worst.

Comparing the various surveys shows that the number of eggs laid on most hedges has increased dramatically over the period between the summer of 2005 and the summer of 2010. The possible exception to the rule is the SW face of hedge MN which is one two hedge faces that has been included in every survey. This showed its maximum count in 2006/2007 since when it appears to have deteriorated with the 2010/11 count being 21. This is due to the growth of scrub and trees in field 13 which has resulted in shading of the hedge. The recent footpath clearance has improved this situation. It is actually one of the few hedge faces that should benefit from the proposed development as the area to the south will be totally cleared and occupied by the new newt ponds.

Overall it is anticipated that the proposed development, as it stands, will halve the egg carrying capacity of the existing hedgerows.

1.3 Other relevant Brown Hairstreak egg surveys.

1.3.1 Railway embankment north of Gavray Drive Meadows.

This is inaccessible. The south side of the embankment is mainly trees and non-blackthorn scrub. What little blackthorn there was at the bottom of the embankment was cut down when Network Rail installed their new fence in 2010. There is more blackthorn on the north side of the embankment and in places its extremities are accessible where it has grown beyond the fence. This was searched in the winter of 2005/06 and 2007/08 and no eggs were found. Probably not used because it is north-facing. To the east of Bicester ring road the embankment was totally cleared and there is no blackthorn as far as and beyond where the footpath crosses the railway line.

1.3.2 County Wildlife Site to east of Bicester ring road.

Overall this contains a lower density of blackthorn than the proposed development site and much of it is contained in two large thickets of mature blackthorn. The accessible blackthorn here was surveyed in the winter of 2005/06 and 2 eggs were found in 2 hours of searching.

1.3.3 Bicester Fields.

This is the green space in Langford Village either side of the Langford Brook and immediately to the south of the proposed development site. There is a considerable amount of blackthorn in the northern quarter of the site but very little elsewhere. The blackthorn here has been surveyed twice –
Winter of 2007/08: 0 eggs found in 3 hours of searching.
Winter of 2008/09: 12 eggs found in 10 hours of searching (Find rate = 1.2 eggs/hour.
The site is considered to contain too little blackthorn and too few ash and oak trees to develop into a core site in its own right. The blackthorn in the north of site should be considered as a useful extension to the ideal habitat to be found in the land north of Gavray Drive and to the east of the Langford Brook.

1.3.4 Bicester Airfield.

This site lies 1.5km due north of Gavray Drive Meadows. It contains a very large stand of blackthorn in its southern quarter but no ash or oak trees. Permission was obtained from the MoD to survey the blackthorn in the winter of 2009/10.
Winter of 2009/10: 10 eggs found in 15 hours of searching. Find rate = 0.7 eggs/hour.
This site does not have the potential to develop into a core site for the Brown Hairstreak owing to the lack of ash and oak trees. Its current usage prohibits the planting of ash or oak trees in appropriate areas.

1.3.5 Other locations in and around Bicester.

We are having increasing success in finding eggs in the Bicester area and finding eggs further north and west. In a northerly direction we added Stratton Audley Quarry to the portfolio in the winter of 2009/10. To the west we have been visiting Bure Park in Bicester on an annual basis since the winter of 2006/07. The first eggs were found there in the winter of 2008/09 and further egg finds have occurred in the subsequent two winters. We hope to carry out a more extensive survey of Bure Park in the winter of 2011/12. Eggs have now been found to the NW of Bicester and just into the site for the proposed NW Bicester Ecotown. However, none of these locations rival Gavray Drive Meadows to the east of the Langford Brook in their suitability as a core site for the Brown Hairstreak. None have the density of blackthorn that Gavray Drive Meadows has and many lack the essential ash and oak trees.

2. Black Hairstreak Records.

Date	Number of recorders	Purpose of visit	Black Hairstreak seen	Number of other butterfly species recorded
18/06/05	1	Butterflies & day flying moths	No	4
08/06/06	1	Marsh Fritillary	No	7
10/06/06	1	Marsh Fritillary	No	3
20/06/06	3	White-letter Hairstreak	Yes - 2	8
25/06/06	1	Black Hairstreak	No	8
27/06/06	2	Black Hairstreak	Yes - 3	11
15/06/07	6	Black Hairstreak	Yes - 3	8
15/06/08	5	Black Hairstreak	Yes - 2	1
24/06/08	1	Black Hairstreak	No	6
18/06/09	1	Black Hairstreak	No	8
22/06/10	6	Black Hairstreak	Yes -1	?

03/06/11	1	Black Hairstreak	No	2
10/06/11	1	Black Hairstreak	No	?

Details of Black Hairstreak sightings.

20/06/06 – Both seen nectaring on bramble flowers growing in NW face of hedge EH at east end of Field 12.

27/06/06 – Two seen nectaring on bramble flowers growing in NW face of hedge EH at east end of Field 12. Third flying over blackthorn scrub in Field 1.

15/06/07 – Two flying over blackthorn at very eastern end of hedge GH separating Fields 11 & 12. One nectaring on bramble flowers growing in hedge HN at east end of Field 12.

15/06/08 – One seen nectaring on bramble flowers growing in SW face of hedge EH. One flying in oak tree growing on north side of hedge NP – about third of the way along the hedge.

22/06/10 – One settled on blackthorn comprising SW face of hedge NP – just to west of oak tree where one of sightings made on 15/06/08 (see above).

Summary of locations of Black Hairstreak sightings.

Total number of sightings = 11.

Associated with hedge EH and east end of hedge GH = 8 (73%)

Associated with hedge NP = 2 (18%)

Seen in field 1 = 1 (9%)

Hedge EH will be severely affected by the proposed development with a service road being driven through it and much of it directly abutted by the development. Hedge NP will be abutted by the development on both sides. Nearly all the blackthorn associated with field 1 will be destroyed by the development.

********** **end of third party report** **********

APPENDIX 4: AQUATIC INVERTEBRATE SPECIES RECORDED

National status codes are explained in Appendix 2.

Group / species	National status	Location	
		stream	ditches & wheel ruts
COLEOPTERA			
Dytiscidae			
Agabus bipustulatus		+	+
Agabus paludosus			+
Agabus uliginosus			+
Hydroporus memnonius			+
Hydroporus nigrita			+
Hydroporus palustris		+	+
Hydroporus pubescens		+	+
Hydrophilidae			
Helophorus aequalis			+
Helophorus alternans			+
DIPTERA			
Syrphidae			
Eristalis species larvae		+	
Tipulidae			
Larvae		+	
HETEROPTERA			
Gerridae			
Gerris spp. nymphs		+	
Naucoridae			
Ilyocoris cimicoides			+
Notonectidae			
Notonecta glauca			+

Appendix EDP 5
Ray Conservation Target Area

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Ray CTA (Conservation Target Area)

The alluvial floodplain of the River Ray extending along a number of small tributary streams and including some areas of land between these streams. This area extends into Buckinghamshire. The area extends onto the clay to included known areas of wet grassland and the main areas of ridge and furrow.

Joint Character Area: Thames and Avon Vales

Landscape Types: Alluvial Lowland with some areas of Clay Vale.

Geology: Mainly alluvium along the Ray. Alluvium is also present in narrow bands along the small streams and there are Oxford Clay mudstones away from the streams and river.

Topography. Flat riverside land. **Area of CTA:** 1192 hectares

Biodiversity:

- Lowland Meadow. The key habitat in this area. It is found in a number of SSSIs and Local Wildlife Sites mainly at least partly on the alluvium. North-west of Blackthorn Hill there is a larger group of meadows which are largely on the Oxford Clay. Remnants of this habitat are found elsewhere especially between Bicester and Blackthorn Hill and in some meadows in Buckinghamshire including BBOWT's recent addition to their Upper Ray Meadows Reserve at Leaches Farm.
- Wet Grassland/Floodplain Grazing Marsh. Wet grassland is found in meadows along with lowland meadow habitat with remnants elsewhere. Parts of the BBOWT Upper Ray Reserves have been restored to floodplain grazing marsh.
- Hedgerows. Some rich and well structured hedgerows with brown and black hairstreak.
- Ponds at Leaches Farm BBOWT reserve.
- Other Species: true fox sedge is found in a number of sites in the area.

Access: Largely restricted to bridleways and footpaths. There are a number of BBOWT nature reserves. Dorothy Bolton Meadow & Leaches Meadow currently have no public access, whilst Long Herdon & Grange are accessed via a public footpath. Access routes to a further two BBOWT reserves at Cow Leys and Leaches Farm are by existing public footpaths.

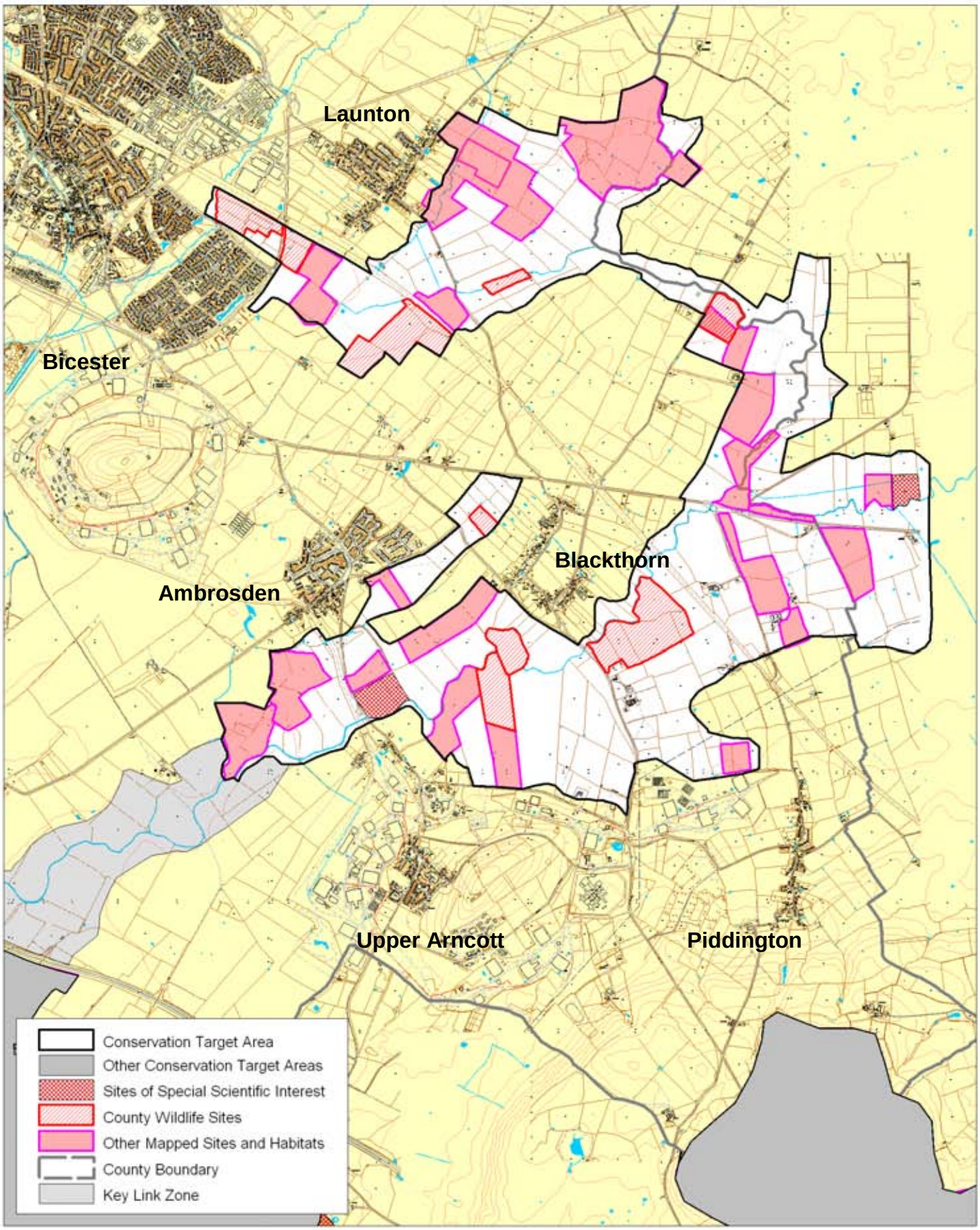
Archaeology: Extensive ridge and furrow.

Oxfordshire Biodiversity Action Plan Targets associated with this CTA:

1. Lowland meadow – management[1], restoration and creation (with a focus on MG4 hay meadows).
2. Floodplain grazing marsh - management, restoration and creation (with a focus on breeding waders).
3. Reedbed – creation.
4. Ponds – creation (particularly of pond complexes).
5. Hedgerows – management (good management of existing hedgerows on short and long-term rotation, which will benefit brown and black hairstreaks and other wildlife).
6. Rivers – management and restoration (resource protection of watercourses to maintain and improve water quality).

[1] "Management" implies both maintaining the quantity, and maintaining and improving the quality of existing BAP habitat and incorporates the following target definitions: "Maintaining extent" and "Achieving Condition".

Ray Conservation Target Area



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Area of BAP habitat present in CTA (from TVERC BAP Habitat GIS layer 5/2010) **and 2015 BAP Habitat Targets for this CTA**

Ray CTA	**Lowland Calcareous Grassland**	**Lowland Dry Acid Grassland**	**Lowland Meadows**	**Coastal and Floodplain Grazing Marsh**	**Eutrophic Standing Waters**	**Lowland Fens**	**Reedbeds**	**Lowland Beech and Yew Woodland**	**Lowland Mixed Deciduous Woodland**	**Wet Woodland**	**Wood - Pasture and Parkland**	**Traditional Orchards**
Area of BAP Habitat in CTA (ha)			105.8	10.6					1.1			
% of CTA area			8.9	0.9					0.1			
% of county resource			9.8	0.2					0.0			
2015 BAP targets (hectares)	**Lowland Calcareous Grassland**	**Lowland Dry Acid Grassland**	**Lowland Meadows**	**Coastal and Floodplain Grazing Marsh**	**Eutrophic Standing Waters – No targets for 2015**	**Lowland Fens**	**Reedbeds**	**Native Woodland**			**Wood - Pasture and Parkland Targets not divided by CTA**	**Traditional Orchards - No targets for 2015**
Maintenance (to be determined)	-	-	-	-	-	-	-	-			-	-
Achieving Condition (to be determined)	-	-	-	-	-	-	-	-			-	-
Restoration			22		-		-				-	-
Creation			5		-	-					-	-

Appendix EDP 6
Gavray Drive Meadows LWS Citation

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Oxfordshire Local Wildlife Site citation

GAVRAY DRIVE MEADOWS

Site Code: 52W01

Grid Reference: SP595226

Area (ha): 15.6

Local Authority: Vale of the Whitehorse

Last Survey Date(s): 2002 (other surveys available from 2005)

Designation Date: 2002

Site Description

These meadows form a mosaic of small damp fields with ponds, divided by thick hedges with old trees. Most of the fields are probably former hay meadows over medieval ridge and furrow field patterns, and have a sward mostly dominated by tufted hair-grass with some meadow foxtail and meadow barley. However, fields 5 and 6 appear to be old pasture, with ragged robin, dropwort, devil's-bit scabious and common spotted orchid. Fields 7, 11 and 12 contain devil's-bit scabious and betony. Great burnet is frequent in fields 7 and 11, and scattered in fields 12, 14 and 16. Sneezewort and pepper saxifrage were only found in field 11. Common marsh bedstraw, bugle, greater bird's-foot trefoil, common knapweed and short-fruited willowherb are occasional throughout the fields. There is a very good range of rushes and sedges across the site, with nine species of sedge: glaucous, common, carnation, brown, hairy, false fox, spiked, slender tufted and oval. Grasses include yellow oat-grass, sweet vernal grass, tall fescue, meadow fescue and red fescue. In the drier areas, slightly acid conditions are indicated by frequent tormentil, lesser stitchwort and sweet vernal grass, especially in fields 5, 6, 14 and 15.

Most of the ponds in the western half of the site are shaded and./or only damp in summer. They have a species-poor vegetation of compact rush, plicate sweet-grass and tufted water-forget-me-not. CPM surveyed the ponds on the west side of the north-south road and reported great crested newt (a priority Biodiversity Action Plan species) in 3 ponds and a channel. Smooth newts were found in all ponds and the channel, and one palmate newt was recorded in field 9. The large water-filled pond in field 14 (on the eastern side of the road) contains greater reedmace, gypsywort, marsh foxtail, tufted water-forget-me-not, sharp-flowered rush and soft rush. The brook running along the western margin of the County Wildlife Site contains reed canary-grass, redshank, water chickweed and greater water plantain.

The hedges across the entire site are mostly tall and thick, and contain hawthorn with bramble, blackthorn and elder, as well as occasional crack willow, field maple, oak, ash, crab apple, English elm, dogwood, holly, wayfaring tree, guelder rose, buckthorn, hop and honeysuckle. They are probably post-medieval, as they dissect the ridge and furrow pattern that

runs through most of the fields. The hedge that separates fields 5 and 6 from fields 7 and 12 is a double hedge, with black bryony, mature oak, ash and crack willow, including one large collapsed crack willow pollard. The hedge that runs along the eastern edge of fields 11 and 12 is also double. These double hedge lines include Midland hawthorn, wood meadow-grass, great hairy brome and three-nerved sandwort; all four are ancient woodland indicator species (characteristic of woodlands more than 400 years old). The gappy hedge line between fields 11 and 12 contains five large mature oaks. The hedges around fields 8 and 9 contain abundant English elm suckers, as well as hawthorn and bramble. The bullace plum (*Prunus domestica* ssp. *insititia*), a rare and declining species in the county, is found in the hedge between fields 8 and 9.

Numerous birds are using the proposed County Wildlife Site, including reed bunting (which was seen flying across the road between fields 14 and 4), willow warbler, garden warbler, blackcap, whitethroat, lesser whitethroat, chiffchaff, bullfinch, linnet, song thrush, yellowhammer, sedge warbler, hobby and kestrel. Common pipistrelle, noctule, *Myotis sp*. and, possibly, serotine bats were recorded foraging over the site (CPM). Butterflies include large skipper, ringlet, common blue, small heath and marbled white. Twenty-six species of ground beetles were found in fields 5, 6, 11 and 12, including the nationally scarce *Bembidion gilvipes*.

UK PRIORITY BAP HABITATS: lowland meadows

UK PRIORITY BAP SPECIES: Reed bunting (3 or 4 singing males), song thrush (2 or 3 singing males), bullfinch, linnet; great crested newt.

RED DATA BOOK SPECIES:

NATIONALLY SCARCE SPECIES: *Bembidion gilvipes* a ground beetle

BIRDS OF CONSERVATION CONCERN:

Red list: Bullfinch, reed bunting, song thrush, yellowhammer, linnet.

Amber list: Dunnock, willow warbler.

TYPICAL SPECIES of LOWLAND MEADOW: Great burnet, greater bird's-foot trefoil, betony, cuckooflower, devil's-bit scabious, sneezewort, pepper saxifrage, brown sedge, carnation sedge, common sedge and meadow barley.

Appendix EDP 7
Gavray Drive Designated Sites Map

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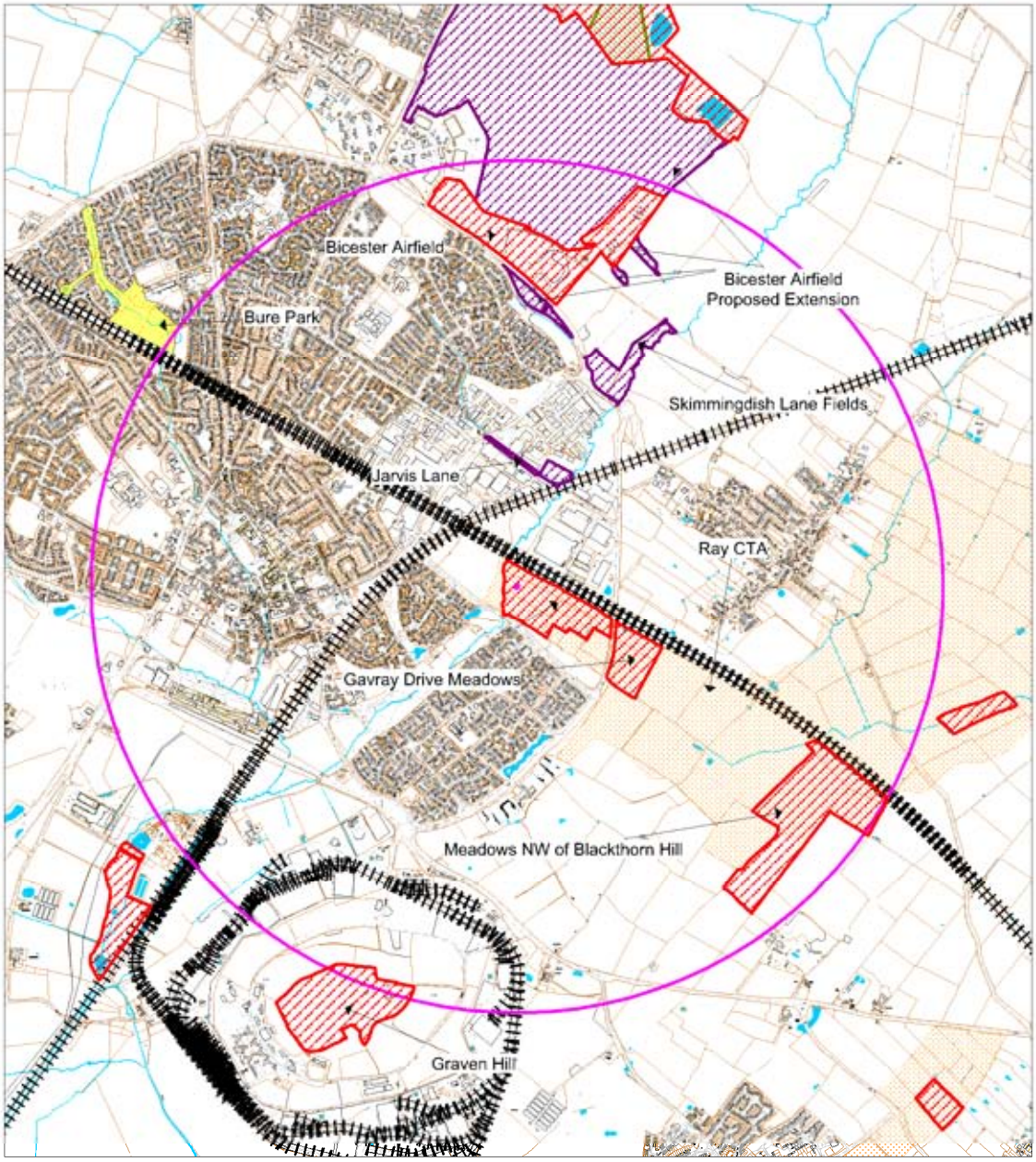
Gavray Drive. Designated Sites



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- Local Nature Reserves
- Local Wildlife Sites
- Proposed Local Wildlife Sites and Extensiond
- Conservation Target Areas
- Search Area

Scale 1:25000

Appendix EDP 8
Tree Bat Roosting Assessment 2013

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Tree no.	Species (age class)	Feature(s) identified from initial inspection from the ground	Bat Roost Potential
T1	Oak (mature)	No features seen from ground, dense ivy covering along main trunk and in canopy	Low
T2	Oak	No features seen from ground	Low
T3	Oak	No features seen from ground	Low
T4	Oak (mature)	Woodpecker hole 5-6 cms diameter, north east side of tree, 6m above ground. No further features seen from ground	Medium
T5	Oak (mature)	No features seen from ground inspect with further aerial survey	Low
T6	Ash (mature)	In field corner with vertical split up trunk on east side and woodpecker hole. Split in trunk appears to lead to a cavity and woodpecker hole below. Rot hole on smaller branch to east, may be less risky to climb.	High
T7	Willow (mature)	In H6 with a cavity in trunk at approx. 1m high and other features may not be visible from ground	Low
T8	Oak (mature)	In H6 with possible hole in trunk on north side at approx. 6m but obscured by rose. Other features may not be visible. Probably not possible to climb without some clearance of rose first.	Low
T9	Oak (mature)	In H6, foliage too dense to fully assess. Would be tricky to climb	Low
T10	Oak (mature)	In H6, dead branch stump in middle of tree at approx. 10m with possible gaps around base. Other features may be present and not visible from ground, climbable	Medium
T11	Oak (mature)	Just north of H6, leaning with dead wood in crown, possible cavity in trunk buttress.	Low
T12	Oak (mature)	Just north of H6 with epicormic growth at base and on trunk. Several dead and snag ended branches with potential cavities. Knot hole on underside at south east limb at approx. 15m	Low
T13	Oak (mature)	Just north of H6. Small rot hole on north side at approx. 10m where a branch bends at almost at a right angle. Bird droppings visible. Other features may be present but not visible from the ground. Climbable.	Low
T14	Willow (mature)	With lots of decay at base and several split and bent over branches. Several cavities and area of decay. Inspect with endoscope	Low
T15	Willow (mature)	With lots of decay at base and several crevices including an upward pointing hole into a thin branch	Medium
T16	Willow (mature)	With very fissured bark and crevices where trunk and branches have split. One branch which is almost horizontal to the ground at approx. 1m high has horizontal splits	Medium
T17	Ash (mature)	In broadleaved woodland strip with large woodpecker hole on west trunk at approx. 13m and possible hole above at approx. 16m. Other features may be present. Possible climbable	Medium
T18	Ash (mature)	Located along southern edge of wooded corridor, approx. 25m along mature oak tree 3m to the east. Feature: Woodpecker hole approx. 7m above ground on north west aspect of the tree, 7-8cms diameter.	Medium
T19	Ash (mature)	Woodpecker hole, 8-9cms diameter, 9m above ground on west side. 2nd woodpecker hole 5-6cms diameter, approx. 1m above on north and north east aspect 3 large woodpecker holes approx. 5, 7 and 10cms diameter respectively at approx. 10m above ground.	High

T20	Ash (semi-mature)	With hole vertically shaped hole where limb has been lost on southern aspect, 8m above ground	Medium – low
T21	Ash (semi-mature)	2 large woodpecker holes on east side 3m above ground, 7-8cms diameter.	Medium
T22	Ash (semi-mature)	Woodpecker hole 6m above ground, north facing, 4-5cms diameter	Medium
T23	Oak (mature)	Visual inspection, significantly hindered by leaf cover. Snag end on east side where limb has been lost with large hole 10-11cms diameter just below snag end, facing east.	Medium
T24		No significant features seen from ground	Low
T25	Ash (semi-mature)	Hole where limb is lost, approx. 7cms diameter on north east aspect	Low
T26	Oak (mature)	Large woodpecker hole on south west side, 6m above ground, approx. 9cms diameter. Hole where limb lost on south side 4m high.	High
T27		No features seen	Low
T28		No features seen	Low
T29		Long vertical crevice on south side ~6m above ground	High

Appendix EDP 9
Breeding Bird Survey Results 2013

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Gavray Drive, Bicester - Breeding Bird Survey Results

Species	Protection/ UK Status*	Regional Status*	On-site Status	Population (determined for species of conservation concern)
Mallard (*Anas platyrhynchos)*	Amber List	Very common resident	Possible breeder	Seen flying to the brook on Visit 1.
Red kite (*Milvus milvus)*	Amber List Schedule 1	Now established resident- from reintroduction started in 1989	Non-breeder	Seen flying over the site just to the east of brook on Visit 2. Also observed over the site during other ecology surveys.
Barn owl (*Tyto alba)*	Amber List Schedule 1	Uncommon breeding resident	Non-breeder	Single sighting of two individuals
Sparrowhawk (*Accipiter gentiles)*	–	Common resident	Possible breeder	Seen flying over the north east corner of the site with prey on Visit 2.
Stock dove (*Columba oenas)*	Amber List	Numerous resident	Possible breeder	Recorded singing on Visit 1 along central hedgerow and foraging in the northern field.
Wood pigeon (*Columba palumbus)*	–	Very numerous resident	Breeder	Widespread throughout the site.
Collard dove *(Streptopelia decaocto)*	–	Very numerous resident	Breeder	Pair seen foraging in Field 13 and birds recorded singing along western boundary. Two to three pairs on site.
Cuckoo (*Cuculus canorus)*	Red List UKBAP	Declining summer visitor	Possible-breeder	On Visit 3 a cuckoo seen in Field 8 and a bird heard singing just off site to the east.
Swift (*Apus apus)*	Amber List	Common but declining summer visitor and passage migrant	Non-breeder	Recorded foraging within the site area but no suitable breeding sites.
Green woodpecker (*Picus viridis)*	Amber List	Fairly common resident	Breeder	Heard on each survey visit, twice along the railway embankment along the northern boundary and a male bird seen along central hedgerow H6 on Visit 3.
Great-spotted woodpecker (*Dendrocopos minor)*	–	Numerous resident	Breeder	Nest site identified in the north eastern section of the site, along southern boundary of Field 5.
Magpie (*Pica pica)*	–	Common and still increasing	Breeder	Fledged chick seen in Field 3 and birds recorded across the site.

Species	Protection/ UK Status*	Regional Status*	On-site Status	Population
Jay (*Garrulus glandarius)*	-	Common in woodlands and extending range	Possible breeder	Single birds seen in the eastern section of the site and in the large field close to the northern railway embankment and along the southern boundary.
Jackdaw (*Corvu monedula)*	–	Numerous resident	Non-breeder	Small number of birds seen flying across the site and foraging in Field 13.
Carrion Crow (*Corvus corone)*	–	Very numerous resident	Breeder	Nest identified in the trees along the brook. Birds observed across the site.
Gold Crest (*Regulus regulus)*	–	Common resident	Possible Breeder	Singing along the southern boundary of the large field on Visit 1.
Blue tit (*Parus caeruleus)*	–	Abundant throughout the county	Breeder	Widespread across the site with two nest sites identified; between five and seven pairs.
Great tit (*Parus major)*	–	Abundant resident	Breeder	Two to eight pairs. Widespread across the site.
Coal tit (*Periparusater)*	–	Locally common reisdent	Possible breeder	Heard singing in the trees along the brook on Visit 1.
Swallow (*Hirundo rustica)*	Amber List	Numerous summer resident	Non-breeder	Recorded foraging widely within the site area but no suitable breeding sites
Long-tailed tit (*Aegithalos caudatus)*	–	Common resident	Breeder	Small group along the eastern side of the brook on Visits 1 with group of birds heard calling in same location on Visit 3. Birds also recorded in Field 1, Field 5. At least 3 pairs across the site.
Chiffchaff (*Phylloscopus collybita)*	–	Common breeding species	Breeder	Six to thirteen pairs widespread in mature hedgerows and trees, largely to the east of the brook and along the boundary with the railway embankment.
Willow warbler (*Phylloscopus trochilus)*	Amber List	Common summer visitor, recent evidence of decline	Breeder	Two to four pairs. Recorded in Fields 1, 2, 4,and 5.
Blackcap (*Sylvia atricapilla)*	–	Commonest breeding *Sylvia* warbler	Breeder	Six to ten pairs across the site. Some concentration of pairs in more wooded areas; along the boundary with the railway, in the wooded strip to the south of Field 5 and along the strips of woodland along the southern boundary of the site.
Lesser Whitethroat (*Sylvia curruca)*	–	Common summer visitor, showing some evidence of recent decline	Breeder	1 pair located in the central area of the site, along the north and eastern boundaries of Field 12.

Species	Protection/ UK Status	Regional Status*	On-site Status	Population
Common Whitethroat (*Sylvia communis)*	Amber List	Common summer visitor	Breeder	Ten to eighteen pairs widespread in hedgerows and scrub across the site. One pair recorded along the western boundary of Field 14 but all other pairs located to the east of the brook.
Wren (*Troglodytes troglodytes)*	–	Common resident	Breeder	Ten to sixteen pairs widespread across the site.
Starling (*Sturnus vulgaris)*	Red List UKBAP	Very common resident	Breeder	Nest site identified in central section of the site in oak tree, part of hedgerow H6. Group of 10 birds seen aerial foraging over the field F13 on Visit 3.
Blackbird (*Turdus merula)*	–	Abundant and ubiquitous resident	Breeder	Three to ten pairs widespread across the site.
Song thrush (*Turdus philomelos)*	Red List UK BAP	Common resident, perhaps declining in suburban areas	Breeder	Five to eight pairs, located along the wooded strips and mature hedgerows to the east of the brook.
Robin (*Erithacus rubecula)*	–	Very common resident	Breeder	Six to fourteen pairs widespread across the site.
Dunnock (*Prunella modularis)*	Amber List UK BAP	Common and widespread resident	Breeder	Seven to fourteen pairs widespread across the hedgerow network and scrub on site, with all pairs except for one recorded to the east of the brook.
House sparrow (*Passer domesticus)*	Red List UK BAP	Abundant resident, showing signs of recent decline	Possible breeder	Colony of approximately seven birds seen foraging amongst bramble scrub in Field X and three birds foraging in the south of the site on Visit 1. Several birds seen foraging in the large field on Visit 3.
Chaffinch (*Fringilla coelebs)*	–	Abundant resident	Breeder	Two to three pairs
Greenfinch (*Chloris chloris)*	–	Common resident	Breeder	One to six pairs, largely along the southern boundary and along the boundary with the railway embankment.
Goldfinch (*Carduelis carduelis)*	–	Common resident	Possible breeder	Goldfinch singing along southern boundary by the brook and several birds observed flying across the site.
Bullfinch (*Pyrrhula pyrrhula)*	Amber List UK BAP	Common resident	Breeder	Heard calling on Visits 2 and 3, along central Hedgerow H6, in the south east area of the site.

* Regional status of species in 2008 as detailed in '*Birds of Oxfordshire 2008*' Oxford Ornithological Society 2012.

Appendix EDP 10
Wintering Bird Survey Results 2013

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Species	Protection/ UK Status*	Regional Status*	Population and distribution
Pheasant (*Phasianus colchicus*)	-	Common	Four birds recorded within F9 on the first visit and one in the same field on the fourth visit.
Moorhen (*Gallinula chloropus*)	-	Widespread and common	Single bird recorded on the second and third visit within F13 adjacent to the stream and P10.
Common buzzard (*Buteo buteo*)	-	Fairly common	One or possible two birds recorded hunting and perching along the sites northern boundary adjacent to the railway.
Red kite (*Milvus milvus)*	Amber List Schedule 1	Now established resident- from reintroduction started in 1989	A single bird recorded foraging over the central section of the site and along the sites northern boundary on the third visit.
Sparrowhawk (*Accipiter gentiles)*	–	Common resident	A single bird recorded hunting along the scrub habitat bounding the north of the site (F5) before flying north.
Woodcock (*Scolopax rusticola*)	Amber List	Winter visitor	A single bird flushed from the same location at the eastern end of F12 on visit 2 and 4.
Black-headed Gull (*Larus ridibundus*)	Amber List	Common visitor	A flock of up to 19 birds recorded around standing water within the arable field (F13) at the western end of the site
Common Gull *(Larus canus*)	Amber List	Frequent winter visitor	A single bird recorded within the arable field on the fourth visit.
Grey Heron (Ardea cinerea)	-	Locally common resident	A single bird recorded flying south west over the arable field (F13) on the first visit.
Wood pigeon (*Columba palumbus)*	–	Very numerous resident	Numerous flocks of up to 40 birds and individuals widely distributed throughout the site.
Collard dove *(Streptopelia decaocto)*	–	Very numerous resident	Recorded on the first and fourth visit along the sites southern boundary.
Stock dove (*Columba oenas*)	Amber List	Numerous resident	Two and four birds recorded on the second and third visit respectively.

Pied wagtail (*Motacilla alba*)	-	Common breeding resident, with autumn inlux of wintering birds	Eight birds recorded foraging around standing water within the arable field (F13) on the first visit and three recorded in the same location on the third visit.
Green woodpecker (*Picus viridis)*	Amber List	Fairly common resident	A single bird recorded flying into H6 on the first visit.
Great-spotted woodpecker (*Dendrocopos minor)*	–	Numerous resident	A single bird recorded on the second, third and fourth visit within mature hedgerow habitat across the site.
Treecreeper (*Certhia familiaris*)		Fairly common resident	A single bird was recorded in H10 within the eastern extent of the site on the second visit.
Magpie (*Pica pica)*	–	Common and still increasing	Recorded widely throughout the site including a peak count of up to 23 birds on the first visit (some of these may have been repeat recordings)
Jay (*Garrulus glandarius)*	-	Common in woodlands and extending range	Between 4 and 6 birds frequently recorded throughout the hedgerow scrub and trees habitat on site.
Jackdaw (*Corvu monedula)*	–	Numerous resident	One bird and two birds recorded within trees along the northern site edge on the third and fourth visits respectively.
Carrion Crow (*Corvus corone)*	–	Very numerous resident	Frequently recorded throughout the site boundary vegetation and foraging within the fields.
Gold Crest (*Regulus regulus)*	–	Common resident	A single bird recorded in the north east corner on the fourth visit.
Blue tit (*Parus caeruleus)*	–	Abundant throughout the county	Large numbers recorded throughout the boundary vegetation across the site with counts of 15- 25 birds per survey across the visits.
Great tit (*Parus major)*	–	Abundant resident	Frequently recorded throughout the boundary vegetation across the site with counts of 7-12 birds per survey across the visits.
Coal tit (*Periparusater)*	–	Locally common reisdent	A single bird recorded within mature trees lying between F1 and F2 in the eastern corner of the site.
Long-tailed tit (*Aegithalos caudatus)*	–	Common resident	Two parties regularly recorded on site in association with the hedgerow and scrub habitat.
Wren (*Troglodytes troglodytes)*	–	Common resident	Widely distributed throughout the site in association with the boundary vegetation with counts of 4-7 birds per survey across the visits.

Starling (*Sturnus vulgaris)*	Red List UKBAP	Very common resident	9 birds recorded foraging within F8 on the third visit, a flock of 20 recorded flying over F13 on the first visit and a single bird recorded flying south over the site on the fourth visit.
Blackbird (*Turdus merula)*	–	Abundant and ubiquitous resident	Widely distributed throughout the site with counts of 14-24 birds per survey across the visits.
Fieldfare *(Turdus pilaris)*	Schedule 1 / Red List	Very common winter visitor and passage migrant	Recorded in low numbers on the first three visits in association with the hedgerows and scrub with a peak count of 7 birds.
Song thrush *(Turdus philomelos)*	Red List	Common resident, perhaps declining in suburban areas	Frequently recorded across the boundary vegetation on site with a peak count of 7 birds on any one survey.
Mistle thrush *(Turdus viscivorus)*	Amber List	Common resident	A single bird recorded on the second and fourth visit within the mature vegetation bounding the stream corridor.
Redwing *(Turdus iliacus)*	Schedule 1 / Red List	Common winter visitor and passage migrant	Small to large flocks frequently recorded throughout the site principally in association with the scrub/hedgerow habitat during the first two visits and the arable habitat on the third and fourth visit. Largest flock recorded approximately 50 birds within the arable field (F13) on the fourth visit and counts of 21-70 birds per survey across the visits.
Robin (*Erithacus rubecula)*	–	Very common resident	Widely distributed throughout the boundary vegetation with counts of 8-17 birds per survey across the visits.
Dunnock (*Prunella modularis)*	Amber List UK BAP	Common and widespread resident	Widely distributed throughout the boundary vegetation with counts of 5-15 birds per survey across the visits.
House sparrow (*Passer domesticus)*	Red List UK BAP	Abundant resident, showing signs of recent decline	Up to four birds recorded on the third and fourth visit along the sites south eastern boundary.
Reed Bunting (*Emberiza schoeniclus*)	Red List UK BAP	Common resident and passage migrant	Three birds (two female and one male) recorded within the scrub habitat adjacent to the stream on the third visit.
Chaffinch (*Fringilla coelebs)*	–	Abundant resident	Widely distributed in low numbers throughout the site in association with the mature tree vegetation. Counts per survey ranged from three to seven birds.
Greenfinch (*Chloris chloris)*	–	Common resident	Two to three birds recorded on the second, third and fourth visit within vegetation along the sites southern boundary.
Goldfinch (*Carduelis carduelis)*	–	Common resident	Widely recorded in low numbers throughout the central and eastern extent of the site associated with the mature trees and hedgerows. Counts per survey ranged from one to seven birds.

Bullfinch (*Pyrrhula pyrrhula)*	Amber List UK BAP	Common resident	Frequently recorded in association with the scrub and hedgerow habitat within the central and western extents of the site with counts per survey ranging from three to thirteen birds.
Linnet (*Carduelis cannabina*)	Red List UK BAP	Common resident, passage migrant and winter visitor	One bird recorded within H5 on the first visit and three birds recorded flying over F9 on the fourth visit.

***Notes**:

UK protection

Those species afforded additional protection under Schedule 1 of the Wildlife and Countryside Act 1981.

UK Conservation Status and Criteria

All data gained from: Eaton MA, Brown AF, Noble DG, Musgrove AJ, Hearn R, Aebischer NJ, Gibbons DW, Evans A and Gregory RD (2009) Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds* 102, pp296-341.

Red list criteria: Globally threatened; Historical population decline in UK during 1800–1995; Severe (at least 50%) decline in UK breeding population over last 25 years, or longer-term period; or Severe (at least 50%) contraction of UK breeding range over last 25 years, or the longer-term period.

Amber list criteria: Species with unfavourable conservation status in Europe (SPEC = Species of European Conservation Concern); Historical population decline during 1800–1995, but recovering; population size has more than doubled over last 25 years; Moderate (25-49%) decline in UK breeding population over last 25 years, or the longer-term period; Moderate (25-49%) contraction of UK breeding range over last 25 years, or the longer-term period; Moderate (25-49%) decline in UK non-breeding population over last 25 years, or the longer-term period; Rare breeder; 1–300 breeding pairs in UK; Rare non-breeders; less than 900 individuals; Localised; at least 50% of UK breeding or non-breeding population in 10 or fewer sites, but not applied to rare breeders or non-breeders; Internationally important; at least 20% of European breeding or non-breeding population in UK (NW European and East Atlantic Flyway populations used for non-breeding wildfowl and waders respectively).

Regional Status
All information gained from: Oxford Ornithological society (2012). *Birds of Oxfordshire 2008*.

Appendix EDP 11
Great Crested Newt Survey Results 2013

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Gavray Drive, Bicester – Great Crested Newt Survey Results

Date	Visit No.	Pond No.	No. Traps	Trap Results	Torch Results	Netting results	Eggs found?	Other pertinent info.
09/05/13	1	1	10	SN: 3 ♂ & 3 ♀ GCN: 1 ♀	SN: 3 ♂ & 1 ♀ 1 ♀ species unidentified	-	10+	-
		2	5	-	-	-	N	-
		4	4	SN: 1 ♂ & 1 ♀	SN: 1 ♀	-	N	-
		5	15	-	-	-	N	Great Diving Beetle, Leeches, Freshwater Shrimp
		6	6	SN: 3 ♂ & 3 ♀	1 Unidentified newt SN: 1 ♀	-	N	-
		7	19	GCN: 1 ♂ & 7 ♀	GCN: 11 ♂ & 17 ♀	-	50+	Great Diving Beetle
		8	5	-	-	-	N	-
		9	25	SN: 1 ♂ GCN: 1 ♂	SN: 1 ♀ GCN: 2 ♂	-	N	Great Diving Beetle, Mallards
		10	14	-	SN: 2 ♀	-	N	Mallards, Moorhen, Carp
		11	12	GCN: 1 ♂ & 1 ♀ SN: 1 ♂	GCN: 2 sex unidentified, 9 ♂ & 3 ♀ 1 unidentified female	-	3	-
13/05/13	2	1	12	GCN: 2 ♂ & 2 ♀	-	-	N	-
		2	7	-	-	-	1-10	-
		4	4	SN: 3 ♀	-	-	N	Great Diving Beetle
		5	11	-	-	-	N	-
		6	3	GCN: 4 ♂ & 1 ♀ SN: 4 ♂	GCN: 2 ♂ & 1 ♀ SN: 3 sex unidentified	-	20+	-
		7	18	GCN: 2 ♂ & 14 ♀	GCN: 6 ♂ & 11 ♀	-	N	-
		8	9	-	-	-	N	-
		9	14	GCN: 1 ♂	GCN: 1 ♂ & 1 ♀	-	N	Mallard
		10	24	-	SN: 1 ♂ & 3 ♀	-	N	-

		11	13	GCN: 2 Juv., 1 ♂ & 4 ♀ SN: 1 ♂	GCN: 3 Juv., 5 ♂ & 9 ♀ SN: 3 ♂	-	10-20	-
16/05/13	3	1	11	GCN: 1 ♂ & 2 ♀ SN: 1 ♀	GCN: 2 Juv.	-	Y	3 Great Diving Beetles
		2	7	-	-	-	N	-
		4	4	-	-	-	N	-
		5	13	-	-	-	N	-
		6	3	-	GCN: 3 ♀ SN: 2 ♀, 1 ♂	-	N	-
		7	19	GCN: 6 ♀	GCN: Juv. 1, 24 ♂ & 25 ♀	-	50+	Moorhen
		8	7	-	-	-	N	-
		9	26	SN: 1 ♀	GCN: 1 ♀	-	N	Mallards, Moorhen, Great Diving Beetle
		10	21	-	-	-	N	-
		11	13	GCN: Juv.1, 2 ♂ & 4 ♀	GCN:3 ♂ & 7 ♀ SN: 3 ♀, 1 ♂ 1 unidentified newt	-	30+	-
20/05/13	4	1	11	GCN:1 ♂ & 1 ♀	GCN: 1 ♂ & 1 ♀ SN: 1 ♀	-	Y	Mallard
		2	7	GCN: 1 ♀	-	-	N	
		4	4	-	SN: 1 ♀	-	N	Great Diving Beetle
		5	18	SN: 2 ♀, 2 ♂	-	-	N	
		6	3	-	-	-	N	
		7	20	GCN: 2 ♂ & 12 ♀	GCN: Juv.1, 34 ♂ & 30 ♀	-	50+	
		8	8	-	-	-	N	
		9	23	GCN:1 ♂ & 1 ♀	-	-	N	Mallard
		10	16	-	-	-	N	Mallards, Moorhen
		11	13	GCN: 2 ♂ & 3 ♀	GCN: Juv.12, 5 ♂ & 5 ♀ SN: 1 ♀	-	10+	Mallard, Mayfly
04/06/13	5	1	11	-	-	-	N	-
		2	9	GCN: Juv.1	-	-	N	-

		4	4	-	-	-	N	-
		5	16	SN: 1 ♂	-	-	N	-
		6	3	-	-	-	N	-
		7	18	GCN: 7 ♂ & 7 ♀ SN: 1 ♂	GCN: 4 ♂ & 18 ♀	-	Y	-
		8	8	-	-	-	N	-
		9	25	-	-	-	N	-
		10	10	-	-	-	N	-
		11	14	GCN: Juv.1 & 5 ♀	GCN: 1 ♀	-	Y	-
06/06/13	6	1	11	SN: 2 ♀, 1 ♂, 1 eft GCN: 1 ♀	-	-	N	Mallard
		2	8	GCN: 2 ♀	-	-	Y	-
		4	4	GCN: 1 ♂	-	-	N	-
		5	14	GCN: 1 ♂	-	-	N	-
		6	3	-	SN: 1 ♀ GCN: Juv.1 1 unidentified newt	-	N	-
		7	18	GCN: 2 ♂ & 4 ♀	GCN: Juv.1, 15 ♂ & 12 ♀	-	Y	-
		8	8	-	-	-	N	-
		9	25	GCN: 1 ♀	GCN: 3 ♂ & 2 ♀	-	N	-
		10	19	-	-	-	N	Signal Crayfish
		11	14	GCN: Juv.1, 1 ♂ & 2 ♀ 1 unidentified newt	GCN: Juv.4, 4 ♂ & 6 ♀ SN: 1 ♀	-	Y	Dragonfly Nymphs

N.B. SN refers to smooth newt (*Lissotriton vulgaris*); GCN refers to great crested newt (*Triturus cristatus*). ♂ symbol used to denote male; ♀ symbol used to denote female.

Appendix EDP 12
Reptile Survey Results 2013

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Gavray Drive, Bicester - Reptile Survey Results

Common lizard *Zootoca vivipara*

Field	Visit No. & Survey Date 2013																				Peak Survey Count per Field	Relative Importance of Field
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
	05-Jun	07-Jun	20-Jun	27-Jun	02-Jul	12-Jul	19-Jul	24-Jul	02-Aug	08-Aug	19-Aug	22-Aug	29-Aug	05-Sep	10-Sep	16-Sep	20-Sep	25-Sep	27-Sep	01-Oct		
F1	9	15	7	0	7	1	0	0	4	5	11	8	5	0	7	3	7	22	5	8	22	High
F2	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	Low
F3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	0	1	0	0	6	Medium
F5	2	0	1	9	1	4	0	0	1	3	6	0	2	0	0	3	0	2	4	1	9	Medium
F6	1	4	3	13	1	0	0	1	0	3	10	4	2	1	2	3	3	1	2	5	13	Medium
F7	25	4	5	0	3	4	2	0	5	4	26	21	8	1	29	32	19	18	8	13	32	High
F8	0	0	0	0	1	1	0	0	0	0	1	0	0	2	1	8	3	7	6	3	8	Medium
F9	0	0	0	0	1	1	0	0	0	1	3	0	2	1	8	7	4	3	4	4	8	Medium
F10	1	1	1	1	3	1	0	0	2	0	4	1	3	0	6	3	2	2	1	2	6	Medium
F11	17	3	13	11	21	9	0	12	19	12	36	22	7	6	5	31	13	18	20	23	36	High
F12	1	1	13	12	12	13	3	3	8	11	32	29	10	3	13	29	25	17	28	44	**44**	High
F15	1	0	0	2	2	1	0	1	0	0	15	3	1	1	0	0	1	0	4	0	15	Medium
Survey Count:	48	28	43	48	53	35	5	17	39	39	**146**	88	40	15	75	125	77	91	82	103		

Not surveyed

Peak survey count (across site)	**146**
Peak survey count (across fields)	**44**

Grass snake *Natrix natrix*

Field	Visit No. & Survey Date 2013																				Peak Survey Count per Field	Relative Importance of Field
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
	05-Jun	07-Jun	20-Jun	27-Jun	02-Jul	12-Jul	19-Jul	24-Jul	02-Aug	08-Aug	19-Aug	22-Aug	29-Aug	05-Sep	10-Sep	16-Sep	20-Sep	25-Sep	27-Sep	01-Oct		
F1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	**1**	Low
F2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Low
F3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Low
F5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	Low
F6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Low
F7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Low
F8	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	Low
F9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Low
F10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Low
F11	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**	Low
F12	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	Low
F15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	Low
Survey Count:	1	0	2	**3**	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0		

Not surveyed

Peak survey count (across site)	**3**
Peak survey count (across fields)	**2**

Appendix EDP 13
Brown and Black Hairstreak Records Received From Butterfly Conservation

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Gavray Drive, Bicester
Brown and Black Hairstreak Records Received from Butterfly Conservation

1. Brown Hairstreak Records.

1.1 Adult Brown Hairstreak sightings.

Date	Number of recorders	Purpose of visit	Brown Hairstreak seen	Number of other butterfly species recorded
26/08/05	6	Marsh Fritillary larval web	No	10
29/08/05	1	Marsh Fritillary larval web	No	4
01/09/06	4	Brown Hairstreak	No	6
04/09/06	1	Brown Hairstreak	No	1
06/09/07	1	Brown Hairstreak	Yes – 1 female	2
08/08/08	1	Brown Hairstreak	Yes – 1 male	8
18/09/09	1	Brown Hairstreak	No	2
02/08/10	1	Brown Hairstreak	Yes – 1 male	?

Details of 3 adult sightings.

06/09/07 – 1 female nectaring on brambles flowers growing in NW face of hedge EH (Field 12)

08/08/08 – I male flying in ash on north side of Field 7.

02/08/10 – 1 male nectaring on thistle in Field 13.

1.2 Brown Hairstreak egg surveys.

Table 1.1 – Summary of surveys

Date	Eggs found	Search hours	Locations searched	Find Rate (eggs/hour)
Winter 2002/03	0	2	Various parts of SW facing hedges – exact locations not recorded.	0.0
Winter 2003/04	Not searched.			
Winter 2004/05	Not searched.			
Winter 2005/06	16	20	All SW & SE facing hedges east of the Langford Brook. All blackthorn west of the Langford Brook.	0.8
Winter 2006/07	74	17	SW face of hedges MN, NP & RS. NW face of hedges BE, EH & HN. Field 5 accessible hedgerows and scrub.	4.4
Winter 2007/08	33	7	SW face of hedges MN & NP	4.7
Winter 2008/09	No survey*.			
Winter 2009/10	No survey*.			
Winter 2010/11	478	40	All accessible hedges east of the Langford Brook. All blackthorn west of the Langford Brook.	12.0

*During these winters rapid checks were carried out to confirm the continuing use of the site by the Brown Hairstreak for egg laying purposes. The searches were not done on a timed count basis and were terminated when a few eggs had been found.

Table 1.2 – Detailed egg counts by hedgerow (see annotated map for location of hedgerows and fields. Field numbers used are those designated when most of the site was designated as a County Wildlife site in 2002).

Table 1.2a – East of Langford Brook - Fields 1-7

Field	Boundary	Aspect	Eggs found				Estimated blackthorn
			2005/06	2006/07	2007/08	2010/11	
1	RS	SW	3	2	Not searched	16[$]	80%
	SV	W	Inaccessible				?
	UV	NE	Inaccessible				?
	RU	SE	Not searched	Not searched	Not searched	6[$$]	20%
	Scrub		Not searched	Not searched	Not searched	10[$$]	

2	PQ	SW	Inaccessible				?
	QS	W	Inaccessible				?
	RS	NE	1	Not searched	Not searched	6[$$]	20%
	PR	SE	Inaccessible				?
	Scrub		No scrub				
3	KL	SW	1			11[$$]	20%
	LQ	W	No blackthorn				0%
	PQ	NE	Not searched	Not searched	Not searched	0[$$]	20%
	KP	SE	0	Not searched	Not searched	5	20%
	Scrub		No scrub				
4		SW	Inaccessible				?
		W	No hedge				
		NE	Inaccessible				?
		SE	Inaccessible				?
	Scrub		0	Not searched	Not searched	0[$$]	
5	BC	SW	No hedge				
	CF	NW	Inaccessible				?
	EF	NE	2	1	Not searched	2[$$]	20%
	BE	SE	No blackthorn				0%
	Scrub		4	4	Not searched	24[$$]	
6	AB	SW	0	Not searched	Not searched	2	10%
	BE	NW	Not searched	Not searched	Not searched	2	50%
	DE	NE	Not searched	Not searched	Not searched	7	30%
	AD	E	No hedge				
	Scrub		Not searched	Not searched	Not searched	14[$]	
7	EF	SW	2	Not searched	Not searched	43[$]	80%
	FK	NW	Inaccessible				?
	IJK	NE	Inaccessible				?
	EI	SE	0	Not searched	Not searched	0[$]	20%
	Scrub		Not searched	Not searched	Not searched	1[$$]	

Table 1.2b – East of Langford Brook - Fields 8-13

Field	Boundary	Aspect	Eggs found				Estimated blackthorn
			2005/06	2006/07	2007/08	2010/11	
8	JK	SW	0	Not searched	Not searched	9[$]	30%
	KP	NW	Not searched	Not searched	Not searched	1[$$]	30%
	PO	NE	Not searched	Not searched	Not searched	1[$]	10%
	JO	SE	0	Not searched	Not searched	27[$$]	30%
	Scrub		No scrub				
9	IJ	SW	0	Not searched	Not searched	6[$]	30%
	JO	NW	Not searched	Not searched	Not searched	14[$$]	30%
	NO	NE	Not searched	Not searched	Not searched	0[$]	10%
	IN	SE	0	Not searched	Not searched	37[$]	30%
	Scrub		No scrub				
10	NP	SW	0	3	5	91[$]	90%
	PU	NW	Not searched	Not searched	Not searched	0[$$]	20%
	TU	NE	No blackthorn				
		SE	No hedge				
	Scrub		No scrub				
11	GH	SW	3	Not searched	Not searched	37	30%
	HN	NW	Not searched	Not searched	Not searched	8	50%
	MN	NE	Not searched	Not searched	Not searched	9	50%
	GM	E	No hedge				
	Scrub		0	Not searched	Not searched	9	
12	DE	SW	4	Not searched	Not searched	29[$]	40%
	EH	NW	Not searched	Not searched	Not searched	14[$]	50%
	GH	NE	3	Not searched	Not searched	15	30%
	DG	E	0	Not searched	Not searched	1	10%

	Scrub		No scrub				
13	MN	SW	0	30	28	21	90%
		NW	No hedge				
	MT	NE	Inaccessible and probably no blackthorn				0%?
		E	No hedge				
	Scrub		No scrub				

Table 1.2c – West of Langford Brook

Field	Boundary	Aspect	Eggs found				Estimated blackthorn	
			2005/06	2006/07	2007/08	2010/11	2002/03	2010/11
Perimeter								
	WX	SW	0	Not searched		0[$]	50%	No
	XA	SW	0	Not searched		0[$]	10%	No
	ADGM	NW	No hedge					
	MY	NE	0	Not searched		0[$]	50%	No
	YX	NE	0	Not searched		0[$]	0%	0%
	WX	SE	0	Not searched		0[$]	0%	0%
Cross hedge								
	XY	W	0	Not searched		0[$]	10%	10%
	XY	E	0	Not searched		0[$]	10%	10%
Note: * = hedge cut down to ground during 2010 by Network Rail during fence construction.								

2. Black Hairstreak Records.

Date	Number of recorders	Purpose of visit	Black Hairstreak seen	Number of other butterfly species recorded
18/06/05	1	Butterflies & day flying moths	No	4
08/06/06	1	Marsh Fritillary	No	7
10/06/06	1	Marsh Fritillary	No	3
20/06/06	3	White-letter Hairstreak	Yes - 2	8
25/06/06	1	Black Hairstreak	No	8
27/06/06	2	Black Hairstreak	Yes - 3	11
15/06/07	6	Black Hairstreak	Yes - 3	8
15/06/08	5	Black Hairstreak	Yes - 2	1
24/06/08	1	Black Hairstreak	No	6
18/06/09	1	Black Hairstreak	No	8
22/06/10	6	Black Hairstreak	Yes -1	?
03/06/11	1	Black Hairstreak	No	2
10/06/11	1	Black Hairstreak	No	?

Details of Black Hairstreak sightings.

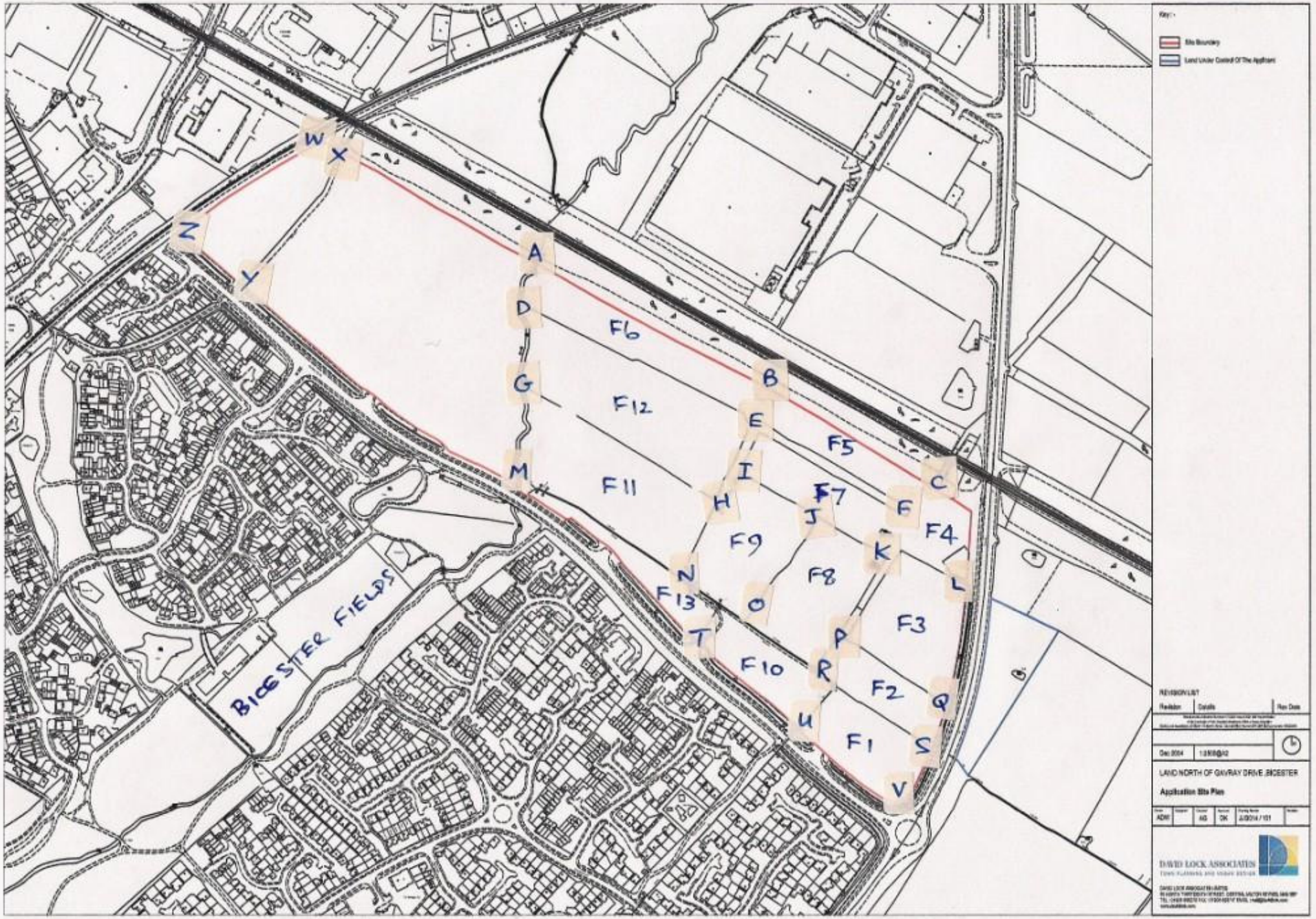
20/06/06 – Both seen nectaring on bramble flowers growing in NW face of hedge EH at east end of Field 12.

27/06/06 – Two seen nectaring on bramble flowers growing in NW face of hedge EH at east end of Field 12. Third flying over blackthorn scrub in Field 1.

15/06/07 – Two flying over blackthorn at very eastern end of hedge GH separating Fields 11 & 12. One nectaring on bramble flowers growing in hedge HN at east end of Field 12.

15/06/08 – One seen nectaring on bramble flowers growing in SW face of hedge EH. One flying in oak tree growing on north side of hedge NP – about third of the way along the hedge.

22/06/10 – One settled on blackthorn comprising SW face of hedge NP – just to west of oak tree where one of sightings made on 15/06/08 (see above).


Key:
Site Boundary
Land Under Control Of The Applicant
W
X
Z
Y
A
D
G
M
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I
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F8
F13
F3
F10
F2
F1
BICESTER FIELDS
REVISION LIST
Revision
Details
Rev Date
Dec 2014
1:2500@A2
LAND NORTH OF GAVRAY DRIVE, BICESTER
Application Site Plan
ADW
AS
DK
A/0014/101
DAVID LOCK ASSOCIATES
TOWN PLANNING AND URBAN DESIGN