



ENVIRONMENTAL STATEMENT

VOLUME 2

**APPENDIX 9.9 – INVERTEBRATE HABITAT
ASSESSMENT AND HAIRSTREAK BUTTERFLY
SURVEY REPORT**



Great Wolf Resorts

INVERTEBRATE HABITAT ASSESSMENT AND HAIRSTREAK BUTTERFLY SURVEY

Bicester Golf Course



Great Wolf Resorts

INVERTEBRATE HABITAT ASSESSMENT AND HAIRSTREAK BUTTERFLY SURVEY

Bicester Golf Course

TYPE OF DOCUMENT (VERSION) CONFIDENTIAL

**PROJECT NO. 70042711
OUR REF. NO. 70042711-000**

DATE: MAY 2018

WSP
Mountbatten House
Basing View
Basingstoke, Hampshire
RG21 4HJ
Phone: +44 1256 318 800
Fax: +44 1256 318 700
WSP.com



QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Final Issue			
Date	April 2018			
Prepared by	Luke Roberts			
Signature				
Checked by	Seán McGrogan			
Signature				
Authorised by	Adrian Hutchings			
Signature				
Project number	70042711			
Report number	70042711-002			
File reference				



CONTENTS

1	EXECUTIVE SUMMARY	1
2	INTRODUCTION	2
2.1	PROJECT BACKGROUND	2
2.2	ECOLOGICAL BACKGROUND	2
2.3	SCOPE OF REPORT	2
2.4	RELEVANT LEGISLATION AND POLICY	2
3	METHODS	4
3.1	DESK STUDY	4
3.2	INVERTEBRATE HABITAT ASSESSMENT	4
3.3	HAIRSTREAK BUTTERFLY SURVEY	4
3.4	WEATHER CONDITIONS	5
3.5	LIMITATIONS	5
4	RESULTS AND INTERPRETATION	6
4.1	DESK STUDY	6
4.2	INVERTEBRATE HABITAT ASSESSMENT	7
5	RECOMMENDATIONS	10
6	REFERENCES	12
7	FIGURES	13

TABLES

Table 1 - Butterfly records within 2.5km of the Site.	6
---	---

FIGURES

Figure 1 – Invertebrate assessment and hairstreak survey areas and results

13

APPENDICES

Appendix A

Appendix B

1

EXECUTIVE SUMMARY



1 EXECUTIVE SUMMARY

- 1.1.1. WSP UK Ltd was instructed by Great Wolf Resorts to undertake an invertebrate habitat assessment and hairstreak butterfly survey on the land at Bicester Health Club and Spa off the A4095, hereafter referred to as the 'Development Site' or 'the Site'.
- 1.1.2. The report covers the Site's potential to support important invertebrate assemblages. The scheme is referred to hereafter as the 'Proposed Development'.
- 1.1.3. The Development Site comprises nine of the existing 18 hole golf course which forms part of the wider site also occupied by the Bicester Hotel Golf and Spa. The Proposed Development is understood to include:
 - the creation of a 500 bed all-inclusive resort hotel, with an indoor pool and leisure complex, targeted at families; and
 - access to be taken from A4095, which runs along the northern boundary of the Site.
- 1.1.4. Habitat within the existing Bicester Golf Course and along its associated boundaries was the focus of an invertebrate habitat assessment and hairstreak butterfly survey.
- 1.1.5. A desk study completed for the Proposed Development returned records of five species of butterfly listed as Species of Principal Importance (SPI) under Section 41 of the 2006 NERC Act.
- 1.1.6. There are six parcels of habitat within the Site which have been identified as having the potential to be important to terrestrial invertebrates. Habitats in the south-west of the Site have the potential to be an Open Mosaic Habitat, a priority habitat under Section 41 of the NERC Act.
- 1.1.7. All ponds on Site have the potential to support important assemblages of aquatic invertebrates and therefore be priority ponds under Section 41 of the NERC Act.
- 1.1.8. Brown hairstreak butterfly, a Species of Principal Importance under Section 41 of the NERC Act, has been confirmed as being present on Site, with eggs being found in suckering blackthorn along the northern boundary of the Site.
- 1.1.9. Black and white-letter hairstreak butterfly eggs were not recorded during the hairstreak survey.
- 1.1.10. Recommendations for further survey and preliminary avoidance and mitigation measures are provided within this report. Recommended further survey includes:
 - terrestrial invertebrate surveys; and
 - aquatic invertebrate surveys.
- 1.1.11. Preliminary avoidance and mitigation measures include the following.
 - Avoidance and retention of habitats of ecological value.

2 INTRODUCTION

2.1 PROJECT BACKGROUND

- 2.1.1. Great Wolf Resorts are planning the redevelopment of land to the north-west of the Bicester Golf Hotel and Spa off the A4095 ('the Development Site' or 'the Site') and as such has appointed WSP to undertake an invertebrate habitat assessment and hairstreak butterfly survey to understand the Site's potential to support important invertebrate assemblages.
- 2.1.2. The Site comprises nine of the existing 18 hole golf course which forms part of the wider site also occupied by the Bicester Health Club and Spa. This report refers to the wider site for context and study area for the purposes of the pre-application considerations.
- 2.1.3. The redevelopment of land at Bicester Health Club is understood to include:
- the creation of a 500 bed all-inclusive resort hotel, with an indoor pool and leisure complex, targeted at families and golf enthusiasts; and
 - the creation of an access road to be taken from A4095, which runs along the northern boundary of the Site.

This scheme will hereafter be referred to as the 'Proposed Development'.

2.2 ECOLOGICAL BACKGROUND

- 2.2.1. The Site is located within the boundary of the Bicester Golf Course, Bicester, Oxfordshire, OX26 1TH, within the authority of Cherwell District Council (CDC). A 'Survey Area' was defined comprising the golf course and associated buildings. The Survey Area is approximately 52ha in area and located at GR SP551214. The golf course was designed and built in 1973, having previously been arable land (Bicester Hotel 2017 & Google Earth Pro 2018). Habitats within the Survey Area are therefore considered to be around 40 years old, with the likely exception of the boundary features such as hedgerows. Habitats within the Survey Area are predominately woodland, grassland, hedgerow and scrub with intermittent ponds.
- 2.2.2. Land use surrounding the Site is mixed with the village of Chesterton to the east, Bignell Park Farm to the north and predominately arable land to the west and south. The M40 runs along the west boundary of the Site. Land to the east of the Site is currently under development.

2.3 SCOPE OF REPORT

- 2.3.1. The invertebrate habitat assessment and hairstreak survey of the Site comprises the following scope of work.
- Evaluate habitats present on Site for their potential to support important assemblages of invertebrates, both terrestrial and aquatic.
 - Undertake surveys for brown, black and white-letter hairstreak butterfly.
 - Provide recommendations for further survey, where required.

2.4 RELEVANT LEGISLATION AND POLICY

- 2.4.1. The invertebrate habitat assessment and hairstreak butterfly survey have been completed with reference to the following relevant nature conservation legislation, planning policy and the UK Biodiversity Framework from which the protection of sites, habitats and species is derived in England. The context and applicability of each item is explained as appropriate in the relevant sections of the report and additional details are presented in Appendix A.
- The Conservation of Habitats and Species Regulations 2017 (Habitats Regulations).
 - The Wildlife and Countryside Act 1981 (as amended) (WCA).
 - The Natural Environment and Rural Communities (NERC) Act 2006.
 - The UK Post-2010 Biodiversity Framework (2011-2020) (JNCC and DEFRA, 2012).
 - UK Biodiversity Action Plan (UKBAP)¹.

¹ The UK BAP has been replaced by the UK Post-2010 Biodiversity Framework, however, it contains useful information on how to characterise important species assemblages and habitats which is still relevant.



- ODPM Circular 06/2005 Biodiversity and Geological Conservation.

3 METHODS

3.1 DESK STUDY

- 3.1.1. Existing ecological information on the Site and its surrounding area was requested from Thames Valley Records Centre (TVERC) as part of the Preliminary Ecological Appraisal (WSP, 2018), for invertebrates which are legally protected species and species of conservation importance within a 2km radius of the centre of the Site.
- 3.1.2. Butterfly records were also requested from Upper Thames Valley Butterfly Conservation of a 2.5km radius from grid reference SP551214. The data was returned on 12 April 2018.

3.2 INVERTEBRATE HABITAT ASSESSMENT

- 3.2.1. The Site was assessed for its potential to support important invertebrate assemblages by BSG Ecology on 22 March 2018. The assessment involved identifying any habitats with potential to support important invertebrate communities and also any features that might limit the invertebrate value of the Site.
- 3.2.2. In particular, emphasis was placed on the following features (where present).
- Woodland edge and scrub, especially where this had a diverse vegetation structure and species composition.
 - Species-rich grassland, especially that in association with scrub, with a high proportion of plants providing nectar and pollen, and with a varied vegetation structure.
 - Early successional habitat (e.g. cliff faces, quarried areas, eroded banks, periodically disturbed bare or sparsely vegetated ground), especially free-draining ground where there is a high proportion of exposed bare earth.
 - Wetland including watercourses (e.g. ditches, flushes and seepages), standing water or waterbodies (e.g. ponds, lakes and swamp) and associated terrestrial habitat (e.g. wet heath and marshy grassland).

3.3 HAIRSTREAK BUTTERFLY SURVEY

- 3.3.1. The Phase 1 habitat survey, identified a large number of hedgerows containing abundant blackthorn *Prunus spinosa*, which is the larval food plant of brown hairstreak butterfly *Thecla betulae* and black hairstreak butterfly *Satyrrium pruni*. Elm *Ulmus procera* was also recorded on Site, the larval food plant of white-letter hairstreak *Satyrrium w-album* butterfly. All three butterflies are Species of Principal Importance (SPI). A targeted winter egg search survey was conducted as this is considered to be an effective means for identifying the presence of these species.
- 3.3.2. Egg searches for hairstreak were carried out at the Site by BSG Ecology on 21 - 22 March 2018.
- 3.3.3. Brown and black hairstreak species typically lay their eggs on blackthorn bushes, at the base of branches where new growth meets old (Asher et al., 2001). Hedgerows within the Site with the greatest abundance of blackthorn growth were therefore selected and searched for the presence of eggs of both species. Hedgerows subject to survey are indicated in Figure 1. Within each spot check area blackthorn growth was systematically checked for the presence of eggs with the aim of identifying the overall distribution of egg laying sites across the Site.
- 3.3.4. Approximately one minute was spent searching each 1m³ of suitable habitat for a maximum of 20 minutes (i.e. 20m³) in each spot check area. Once hairstreak was found to be present in a hedgerow the search was concluded to allow coverage of other hedgerows.
- 3.3.5. White-letter hairstreak butterflies typically lay their eggs on elm trees, both mature and suckers, around the terminal bud or where new growth joins the previous year's growth on twigs (Asher et al., 2001). Suckering elm, which can be surveyed from the ground, was identified and searched. Given the few specimens on Site, all elm found were searched thoroughly.
- 3.3.6. March is considered to be a suitable time of year to undertake such a survey as the stems on which the eggs are laid are clear of leaves and flowers that would otherwise obscure them from view.



3.4 WEATHER CONDITIONS

- 3.4.1. The weather on 21 March 2018 was dry and predominantly bright with sunny spells and a light breeze. The highest temperature was 10°C. On 22 March 2018 the weather was dry and overcast with a moderate breeze. The maximum temperature was 9°C.

3.5 LIMITATIONS

Late winter/early spring is a suboptimal time for assessing a habitats potential to support important invertebrate assemblages. This is because resources such as the quality and diversity of flora of the Site may not be as evident at this time of year. However, it is considered that the Site was able to be adequately assessed based on vegetative identification of plants that were visible at the time (including dead flower heads for example) and assessment of other resources at the Site.

4 RESULTS AND INTERPRETATION

4.1 DESK STUDY

- 4.1.1. One record of a cinnabar moth *Tyria jacobaeae* was returned by TVERC. The record is from 2004 and 1.3km west of the Site. The cinnabar larval food plant is ragwort *Senecio jacobaea* (UK Moths, 2018), none of which was recorded during the invertebrate surveys of the Site.
- 4.1.2. A total of 31 records of five species of butterfly were returned by TVERC from the 2km data search radius of the Site; grizzled skipper *Pyrgus malvae*, wall *Lasiommata megera*, small heath *Coenonympha pamphilus*, white-letter hairstreak and small blue *Cupido minimus*. All five species are listed as Species of Principal Importance (SPI) under Section 41 of the 2006 NERC Act. Species listed as SPI are of material consideration in the planning process. White-letter hairstreak and small blue are also protected under Schedule 5 of the Wildlife and Countryside Act (WCA) 1981. Although these are historic records (1990-1997) the habitats present mean all have the potential to occur on Site.
- 4.1.3. A total of 486 records of 27 species of butterfly were returned by Upper Thames Butterfly Conservation. The search covered 30 1km squares which overlapped with the 2.5km search radius of the Site. The results of this are displayed in Table 1. Notably, three species of hairstreak were recorded. Of the 30 1km squares, 17 have brown hairstreak recorded with a total of 45 records. Three of these records are from within the Site boundary. In addition, one of the 30 1km squares has white-letter hairstreak and one has purple hairstreak *Favonius quercus*. Common and widespread species were also recorded such as meadow brown *Maniola jurtina* with 31 records, large white *Pieris brassicae* with 43 records and small white *Pieris rapae* with 50 records.

Table 1 - Butterfly records within 2.5km of the Site.

Scientific name	Common name	Total number of records
<i>Gonepteryx rhamni</i>	Brimstone	25
<i>Aricia agestis</i>	Brown Argus	2
<i>Thecla betulae</i>	Brown Hairstreak	45
<i>Colias croceus</i>	Clouded Yellow	1
<i>Polygonia c-album</i>	Comma	21
<i>Polyommatus icarus</i>	Common Blue	19
<i>Thymelicus lineola</i>	Essex Skipper	2
<i>Pyronia tithonus</i>	Gatekeeper	26
<i>Pieris napi</i>	Green-veined White	25
<i>Celastrina argiolus</i>	Holly Blue	16
<i>Ochlodes Sylvanus</i>	Large Skipper	5
<i>Pieris brassicae</i>	Large White	43
<i>Melanargia galathea</i>	Marbled White	13
<i>Maniola jurtina</i>	Meadow Brown	31
<i>Anthocharis cardamines</i>	Orange-tip	19
<i>Vanessa cardui</i>	Painted Lady	17
<i>Aglais io</i>	Peacock	26
<i>Favonius quercus</i>	Purple Hairstreak	1
<i>Vanessa atalanta</i>	Red Admiral	19
<i>Aphantopus hyperantus</i>	Ringlet	22

<i>Lycaena phlaeas</i>	Small Copper	5
<i>Coenonympha pamphilus</i>	Small Heath	1
<i>Thymelicus sylvestris</i>	Small Skipper	8
<i>Aglais urticae</i>	Small Tortoiseshell	28
<i>Pieris rapae</i>	Small White	50
<i>Pararge aegeria</i>	Speckled Wood	15
<i>Satyrrium w-album</i>	White-letter Hairstreak	1
Total		486

4.2 INVERTEBRATE HABITAT ASSESSMENT

TERRESTRIAL ASSESSMENT

The Site in general is dominated by a managed golf course. Amenity grassland is the main habitat type (Photograph 1), with interspersed woodlands of various types (Photograph 2) which forms a habitat which is generally not considered to be important for invertebrate assemblages. However, six parcels of habitat within the Site were identified as being likely important to invertebrates. Figure 1 shows the location of these areas.

AREA 1

- 4.2.1. A low rising, north and south facing bank in the centre of the Site with a mosaic of habitat features (Photograph 3). Scrub, comprising of sporadic young hawthorn *Crataegus monogyna*, ash *Fraxinus excelsior*, *Populus sp.*, rose *Rosa sp.* and blackthorn creates a semi-shady area. The ground flora comprises frequent grasses such as wood avens *Geum urbanum*, red fescue *Festuca rubra*, cocksfoot *Dactylis glomerata*, Yorkshire fog *Holcus lanatus* and false brome *Brachypodium sylvaticum* with interstitial soil exposures. Nectar-rich herbs and ruderal vegetation is frequent which includes: parsnip *Pastinaca sativa*, ground ivy *Glechoma hederacea*, garlic mustard *Alliaria petiolata*, red campion *Silene dioica*, herb Robert *Geranium robertianum*, bristly oxtongue *Helminthotheca echioides*, ox-eye daisy *Leucanthemum vulgare*, hemlock *Conium maculatum*, *Euphorbia sp.*, nettle *Urtica dioica*, spear thistle *Cirsium vulgare* and creeping thistle *Cirsium arvense*. The bank provides shelter to both the north and south. To the west, the bank is connected to an infrequently used rubble car park area (Photograph 4) with sparse vegetation including ribwort plantain *Plantago lanceolata*, ragwort and cow parsley *Anthriscus sylvestris*. This area is likely to be of value to invertebrate owing to the proportion of bare ground (up to 5 % in the summer months), south facing bank and moderately sheltered conditions that are likely to provide habitat for warmth loving (thermophilic) species. The relatively diverse floral and structural diversity is also likely to be an important feature for invertebrates.

AREA 2

- 4.2.2. A small area with localised soil and rubble piles with variable exposure (Photograph 5). Ruderals and short perennials dominate with bristly oxtongue, nettle, ribwort plantain and great willowherb *Epilobium hirsutum* being frequently occurring species. Oxeye daisy, parsnip and white clover *Trifolium repens* occasionally occur and hemlock is locally abundant. A defunct hedge bank runs to the north of the area and a building is to the west; these features create a sheltered area and warm pockets in localised areas. A strip of suckering blackthorn occurs to the south of the hedgerow (Photograph 6). To the north of the hedgerow is a wet ditch. Ephemeral water is also present in front of some of the piles. Some fallen dead wood is present which may be important for associated (saproxylic) species (Photograph 7). There are bare ground exposures across 10-20% of the area. In isolation, this area is fairly small and therefore unlikely to support a diverse and notable invertebrate fauna. However, being connected to Area 1 and Area 3, this is likely to be a complementary and interlinking resource for invertebrates using the Site.

AREA 3

- 4.2.3. This area comprises tall bunds of recently unearthed topsoil and subsoil, of which 5-10 % is exposed (Photograph 8). Exposed rubble is also present on the bunds. Tall ruderal vegetation dominates the bunds with coarse grasses also present. Species include bristly oxtongue, hemlock, teasel *Dipsacus fullonum* and cocksfoot. The bunds surround a recently created lagoon which has bare earth and short perennial vegetation and sparsely vegetated rabbit grazed turf surrounding it (Photograph 9). Plants include black medic *Medicago*

lupulina, ribwort plantain, bristly oxtongue, white clover, oxeye daisy and ragwort. The eastern side of the bund is well sheltered and the bund shelters the banks of lagoon. Whilst rather uniform in structure, this area, which is sheltered with subsoil exposures, is likely to be particularly good for thermophilic species such as burrowing bees and wasps.

AREA 4

- 4.2.4. An area of semi-improved grassland (Photograph 10) which is connected to habitats in the west described in Area 3 (paragraph 4.7). The grassland is tussocky with occasional ant hills and has low to moderate floristic diversity. It is dominated by coarse grasses but there is occasional to locally frequent oxeye daisy, ground ivy, parsnip and *Geranium sp.* Patchy scrub is present throughout the grassland area and comprises blackthorn and bramble *Rubus fruticosus* (Photograph 11). The combination of scrub, tussocky grassland and rubble patches in Area 3 creates a structural patchwork that is contributed to by shorter rabbit grazed lawn areas and mature scrub and trees surrounding Pond 1 (Figure 1). Area 4 is sheltered by a bank of trees to the south. This structural patchwork and presence of sheltered areas may create areas of local humidity and warmth, as well as more stable conditions (associated with scrub edge) for a range of invertebrates.

AREA 5

- 4.2.5. Semi-improved grassland to the north of the clubhouse. This area provides a good patchwork of scrub, ruderal vegetation, short and tussocky grassland. Several Lombardy poplar *Populus nigra* trees are present (Photograph 12). Nectar-rich plant species are in low abundance and diversity however the south-facing bank with exposed earth on the boundary of the Site presents suitable habitat for thermophilous and burrowing invertebrate species.

AREA 6

- 4.2.6. South-facing banks surrounding ponds which are not intensively managed. Recent tree thinning has created exposed soils to a number of ponds. Where such soils are located on moderately species-rich south-facing banks it provides a potentially significant cumulative resource for Hymenoptera. During the assessment bumble bees *Bombus sp.* (including *Bombus lucorum/terrestris*) were frequently seen and in high numbers (exceeding 12) exploring the banks for nesting sites.

AQUATIC ASSESSMENT

- 4.2.7. The Site supports a large amount of standing water, which are predominantly ponds managed within the golf course. Features of these ponds are discussed below.

POND 1

- 4.2.8. An unmanaged pond (Photograph 14) which is mostly shaded by mature grey willow *Salix cinerea* and hawthorn scrub. 10% of the pond is covered with marginal/emergent vegetation including hard rush *Juncus inflexus*, great willowherb, brooklime *Veronica beccabunga*, creeping bent *Agrostis stolonifera* and wild angelica *Angelica sylvestris*. The water is clear but there is evidence of previous algal blooms present. The pond is at least 50cm deep. The pond has the potential to support important assemblages of aquatic invertebrates and therefore be a priority pond under Section 41 of the NERC Act.

MANAGED GOLF COURSE PONDS

- 4.2.9. Ponds within the main golf course are apparently managed and the grassland is managed, although less intensively than the golf course, close to the pond edges (Photograph 15). The ponds are a variety of sizes, ranging from approximately 50m² to 2500m², and depths. Many have 30-50% shading, predominantly by grey willow. Typical plants include branched bur-reed *Sparganium erectum*, hard rush, creeping bent, water mint *Mentha aquatica*, water plantain *Alisma plantago-aquatica*, bulrush *Typha latifolia* and great willowherb. These ponds have the potential to support important assemblages of aquatic invertebrates and therefore be priority ponds under Section 41 of the NERC Act.

HAIRSTREAK SURVEY

BROWN AND BLACK HAIRSTREAK EGG SEARCH

- 4.2.10. Several areas within the Site were identified as having suckering blackthorn present, predominantly along the northern boundary of the Site (Photograph 16). Seven brown hairstreak eggs (with two eggs on one branch in one case) were recorded in hedgerows along the northern boundary (Photograph 17). No brown or black hairstreak eggs were recorded in other hedgerows which were surveyed to the south and west of the Site.



Areas of potentially suitable habitat at the Site that were subject to survey (or which weren't surveyed because eggs were recorded in adjacent areas), and the location of the recorded eggs are indicated in Figure 1.

- 4.2.11. Brown hairstreak eggs were found across most of the surveyed blackthorn hedges. Given this, non-isolated suckering blackthorn present on Site has the potential to support this species.

WHITE-LETTER HAIRSTREAK EGG SEARCH

- 4.2.12. A small number of suckering elm was found in the north-east of the Site, and another two specimens in the south-east. No white-letter hairstreak eggs were recorded from these locations. Areas of potentially suitable habitat at the Site that were subject to survey are indicated in Figure 1.

5 RECOMMENDATIONS

TERRESTRIAL INVERTEBRATES

- 5.1.1. Based on the findings of the invertebrate habitat assessment and the invertebrates recorded from the desk study it is recommended that further surveys are conducted to understand the invertebrate assemblages present in areas to be impacted within Site. As discussed in paragraphs 4.2.1 to 4.2.6 there are six areas which have been identified which could support important invertebrate assemblages, including thermophilic species and those associated with good structural and floral diversity such as phytophagous (plant feeding species) and their predators. These areas include microhabitats such as south-facing banks with shelter, grassland mosaic, soil exposures, rubble patches and nectar rich plants. The areas in the south-west of the Site (Areas 3 and 4) combined have the potential to be classed an open mosaic habitat, a priority habitat listed under Section 41 of the NERC Act.
- 5.1.2. In order to survey for terrestrial invertebrates it is recommended that a suite of survey techniques which target different groups of invertebrates (in particular thermophilic species such as aculeate Hymenoptera, ground dwelling species such as ground and rove beetles, and plant feeders such as various beetles and bugs) are utilised across a minimum of three survey events between May and September:
- Pitfall traps: This involves the use of circular plant pot trays (24cm diameter x 5cm depth), that are sunk into a circular hole that is excavated using a spade, and filled half full with preserving fluid. Pitfall trapping is considered to be an effective method for the sampling of ground dwelling beetles, particularly those belonging to the family *Carabidae* (ground beetles).
 - Pan traps: These comprise yellow plastic trays into which a small amount of water is poured. These traps mimic large yellow flowers and attract flying insects of many groups, which then become trapped in the fluid, for later collection.
 - Sweep netting: Sweep netting involves walking at a steady pace through the vegetation and passing an entomologist's sweep net back and forth through vegetation in a figure of eight motion. This method is particularly suitable for capturing phytophagous (foliage-feeding) families such as *Curculionidae* (weevils), *Chrysomelidae* (leaf or flea beetles), *Nitidulidae* (pollen beetles) and *Cantharidae* (soldier beetles). Sweep netting is also an effective method for collecting many families of bugs.
 - Beating: Beating is a useful technique for extracting beetles from overhanging branches. This method involves placing a beating tray beneath a branch before delivering several sharp blows to the branch, sending any dislodged invertebrates into the beating tray for inspection. This method may uncover a diverse array of beetle families (similar to those found during sweeping).
- 5.1.3. Sampled invertebrates should be identified to species level where possible and analysed using the "Pantheon" database tool being developed by Natural England and the Centre for Ecology and Hydrology (Webb et al., 2018). For each species recognised by Pantheon various attributes relating to associated habitats and resources, assemblage types and habitat fidelity scores are placed against them. Reports can then be generated which can provide an understanding of the invertebrate assemblages on Site.

AQUATIC INVERTEBRATES

- 5.1.4. All ponds on Site have the potential to be priority ponds under Section 41 of the NERC Act. It is therefore recommended that ponds which are within the area to be impacted by the Proposed Development are surveyed once between June and August. Habitat, water quality, plant and macroinvertebrate data should be collected and analysed using the Predictive SYstem for Multimetrics (PSYM) tool developed by Pond Action (2002) in order to assess the biological quality of each of the ponds. Ponds attaining an Index of Biological Integrity over 75% are classified as Priority Ponds in accordance with the PSYM guidance (Fairclough & Nicolet, 2008).

HAIRSTREAK BUTTERFLIES

- 5.1.5. As discussed in the results, the presence of brown hairstreak eggs was recorded along much of the northern boundary of the Site. Black hairstreak eggs were not recorded, however this species tends to lay higher on blackthorn, over 1.5m from the ground, and on mature trees (Asher et al. 2001), so this was not unexpected. Habitats present on Site are suitable for this species and it has the potential to occur on Site (although no records were returned from the desk study).



- 5.1.6. White-letter hairstreak was not recorded in the survey, however little elm was available for direct survey. The desk study returned records of this species within 2.5km of the Site and therefore as some suitable habitat is present on Site this species has the potential to occur on Site. If present it is likely that this species is largely limited to the margins of the site.
- 5.1.7. It is recommended that mitigation measures are put in place for hairstreak species. Blackthorn and elm should be retained within the Site where possible. Removed sections of hedgerow should be replaced elsewhere (incorporated into planting designs) and ideally within proximity of existing plants of blackthorn and elm to provide continued habitat for species of principal importance.

6 REFERENCES

PROJECT REFERENCES

- 6.1.1. WSP (2018) Bicester Golf Course Preliminary Ecological Appraisal.

TECHNICAL REFERENCES

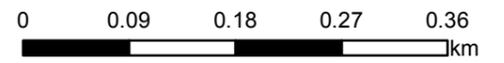
- 6.1.2. Asher, J., Warren, M., Fox, R., Harding, P., Jeffcote, G. and Jeffcote, S. (2001) The Millennium Atlas of Butterflies in Britain and Ireland. Oxford University Press, Oxford.
- 6.1.3. Bicester Hotel (2017). Available at <http://www.bicesterhotelgolfandspa.com/golf/> [Accessed April 2018].
- 6.1.4. Fairclough, J. and Nicolet, P. (2008) Best Practice for the Identification and the Assessment of UK BAP Priority Ponds. In Practice.
- 6.1.5. Google Earth Pro (2018). Google Earth Pro version 7.3.1. Google Inc.
- 6.1.6. HMSO (1981). Wildlife and Countryside Act (as amended by the Countryside and Rights of Way Act 2000). HMSO, Norwich.
- 6.1.7. HMSO (2005). Biodiversity and Geological Conservation – Statutory Obligations and Their Impact Within the Planning System. Office of the Deputy Prime Minister (ODPM) Circular 06/2005 HMSO, Norwich.
- 6.1.8. HMSO (2006) Natural Environment and Rural Communities Act. HMSO, Norwich.
- 6.1.9. HMSO (2010). The Conservation of Habitats and Species Regulations 2010 as amended (the Habitat Regulations)
- 6.1.10. JNCC and DEFRA (2012) UK Post 2010 Biodiversity Framework. Available online: <http://jncc.defra.gov.uk/page-6189> [Accessed April 2018].
- 6.1.11. Pond Action (2002) A guide to monitoring the ecological quality of ponds and canals using PSYM. Pond Action, Oxford.
- 6.1.12. UK Moths (2018). The Cinnabar *Tyria jacobaeae* - UKMoths. [online] Available at: <https://www.ukmoths.org.uk/species/tyria-jacobaeae/>
- 6.1.13. Webb, J., Heaver, D., Lott, D., Dean, H.J., van Breda, J., Curson, J., Harvey, M., Gurney, M., Roy, D.B., van Breda, A., Drake, M., Alexander, K.N.A. and Foster, G. (2018). Pantheon - database version 3.7.4 [online] Available at: <http://www.brc.ac.uk/pantheon/>

7 FIGURES

Figure 1 – Invertebrate assessment and hairstreak survey areas and results



- Key**
- Site boundary
 - 1 Areas of terrestrial invertebrate interest
 - + Brown hairstreak eggs found
 - P1 Unmanaged pond with aquatic invertebrate interest
 - Blackthorn not surveyed for brown and black hairstreak as found in adjacent areas
 - Blackthorn searched for brown and black hairstreak eggs
 - Blackthorn searched for brown and black hairstreak eggs
 - Elm searched for white-letter hairstreak eggs
 - Managed ponds with aquatic invertebrate interest



Client:	DP9
Project:	Bicester
Title	Invertebrate habitat assessment and hairstreak survey areas and results

Drawing No: Figure 1	Date: April 2018	Scale: 6,000 @ A3	Drawn: SC	Checked: LR	Approved: AH
----------------------	------------------	-------------------	-----------	-------------	--------------

Appendix A

RELEVANT LEGISLATION AND

PLANNING POLICY



SUMMARIES OF RELEVANT POLICY, LEGISLATION AND OTHER INSTRUMENTS

This section briefly summarises the legislation, policy and related issues that are relevant to the main text of the report. The following text does not constitute legal or planning advice.

GOVERNMENT CIRCULAR ODPM 06/2005 BIODIVERSITY AND GEOLOGICAL CONSERVATION

Paragraph 98 of Government Circular 06/2005 advises that “the presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. Local authorities should consult Natural England before granting planning permission. They should consider attaching appropriate planning conditions or entering into planning obligations under which the developer would take steps to secure the long-term protection of the species. They should also advise developers that they must comply with any statutory species’ protection provisions affecting the site concerned...”

Paragraph 99 of Government Circular 06/2005² advises that “it is essential that the presence or otherwise of protected species, and the extent that they may be affected by the proposed development, is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making the decision. The need to ensure ecological surveys are carried out should therefore only be left to coverage under planning conditions in exceptional circumstances, with the result that the surveys are carried out after planning permission has been granted”.

STANDING ADVICE (GOV.UK)

The GOV.UK website provides information regarding protected species and sites in relation to development proposals: ‘Local planning authorities should take advice from Natural England or the Environment Agency about planning applications for developments that may affect protected species.’ GOV.UK advises that ‘some species have standing advice which you can use to help with planning decisions. For others you should contact Natural England or the Environment Agency for an individual response.’

The standing advice (originally from Natural England and now held and updated on GOV.UK³) provides advice to planners on deciding if there is a ‘reasonable likelihood’ of protected species being present. It also provides advice on survey and mitigation requirements.

When determining an application for development that is covered by standing advice, in accordance with guidance in Government Circular 06/2005, Local planning authorities are required to take the standing advice into account. In paragraph 82 of the aforementioned Circular, it is stated that: ‘The standing advice will be a material consideration in the determination of the planning application in the same way as any advice received from a statutory consultee...it is up to the planning authority to decide the weight to be attached to the standing advice, in the same way as it would decide the weight to be attached to a response from a statutory consultee.’

PROTECTED SPECIES - WILDLIFE AND COUNTRYSIDE ACT 1981

Protected animals are listed on Schedule 5 of the Wildlife and Countryside Act, (all EPS are also protected under the 1981 Act). In summary, this legislation makes it an offence to intentionally or recklessly:

Kill, injure or take any wild animal listed on Schedule 5

Damage, destroy or obstruct access to any structure or place which such an animal uses for shelter or protection or to disturb such an animal when it is occupying a structure or place for that purpose.

All nesting birds are protected under the Wildlife and Countryside Act 1981 which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use or being built, or

² HMSO (2005). Biodiversity and Geological Conservation – Statutory Obligations and Their Impact Within the Planning System. Office of the Deputy Prime Minister (ODPM) Circular 06/2005 HMSO, Norwich.

³ <https://www.gov.uk/protected-species-and-sites-how-to-review-planning-proposals#standing-advice-for-protected-species>



take or destroy its eggs. In addition, it is an offence to disturb any wild bird listed on Schedule 1 of the act whilst it is building a nest or is in, on, or near a nest containing eggs or young, or whilst lekking; or to disturb the dependent young of any wild bird listed on Schedule 1.

NATURAL ENVIRONMENT AND RURAL COMMUNITIES (NERC) ACT 2006 – HABITATS AND SPECIES OF PRINCIPAL IMPORTANCE

The Natural Environment and Rural Communities (NERC) Act came into force on 1st October 2006. Sections 41 (S41) of the Act require the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England, as required by the Act. In accordance with the Act the Secretary of State keeps this list under review and will publish a revised list if necessary, in consultation with Natural England.

The S41 list is used to guide decision-makers such as public bodies, including local authorities and utilities companies, in implementing their duty under Section 40 of the NERC Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions, including development control and planning. This is commonly referred to as the 'Biodiversity Duty.'

Guidance for public authorities on implementing the Biodiversity Duty⁴ has been published by Defra. One of the key messages in this document is that 'conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them.' In England the administration of the planning system and licensing schemes are highlighted as having a 'profound influence on biodiversity conservation.' Local authorities are required to take measures to "promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species. The guidance states that 'the duty aims to raise the profile and visibility of biodiversity, clarify existing commitments with regard to biodiversity, and to make it a natural and integral part of policy and decision making.'

In 2007, the UK Biodiversity Action Plan (BAP) Partnership published an updated list of priority UK species and habitats covering terrestrial, freshwater and marine biodiversity to focus conservation action for rarer species and habitats in the UK. The UK Post-2010 Biodiversity Framework⁵, which covers the period from 2011 to 2020, now succeeds the UK BAP. The UK priority list contained 1150 species and 65 habitats requiring special protection and has been used as a reference to draw up the lists of species and habitats of principal importance in England.

In England, there are 56 habitats of principal importance and 943 species of principal importance on the S41 list. These are all the habitats and species found in England that were identified as requiring action in the UK BAP and which continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.

EUROPEAN PROTECTED SPECIES (ANIMALS)

The Conservation of Habitats and Species Regulations 2017 consolidates various amendments that have been made to the 2010 and original (1994) Regulations which transposed the EC Habitats Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Council Directive 92/43/EEC) into national law.

"European protected species" (EPS) of animal are those which are shown on Schedule 2 of the Conservation of Habitats and Species Regulations 2010 (as amended). They are subject to the provisions of Regulation 43 of those Regulations. All EPS are also protected under the Wildlife and Countryside Act 1981 (as amended). Taken together, these pieces of legislation make it an offence to:

Intentionally or deliberately capture, injure or kill any wild animal included amongst these species

Possess or control any live or dead specimens or any part of, or anything derived from a these species
deliberately disturb wild animals of any such species

⁴ Defra, 2007. *Guidance for Public Authorities on Implementing The Biodiversity Duty*. (<http://www.defra.gov.uk/publications/files/pb12585-pa-guid-english-070516.pdf>)

⁵ JNCC and Defra (on behalf of the Four Countries' Biodiversity Group). 2012. *UK Post-2010 Biodiversity Framework*. July 2012. (<http://jncc.defra.gov.uk/page-6189>)

deliberately take or destroy the eggs of such an animal, or intentionally, deliberately or recklessly damage or destroy a breeding site or resting place of such an animal, or obstruct access to such a place

For the purposes of paragraph (c), disturbance of animals includes in particular any disturbance which is likely—

to impair their ability—

to survive, to breed or reproduce, or to rear or nurture their young, or

in the case of animals of a hibernating or migratory species, to hibernate or migrate; or

to affect significantly the local distribution or abundance of the species to which they belong.

Although the law provides strict protection to these species, it also allows this protection to be set aside (derogated) through the issuing of licences. The licences in England are currently determined by Natural England (NE) for development works. In accordance with the requirements of the Regulations (2010), a licence can only be issued where the following requirements are satisfied:

The proposal is necessary 'to preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment'

'There is no satisfactory alternative'

The proposals 'will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

Appendix B

PHOTOGRAPHS



Table 2 - Photographs

Site feature	Photograph
<p>Photograph 1: Amenity grassland typical of that across the golf course</p>	
<p>Photograph 2: Wooded habitat on Site with limited invertebrate interest</p>	
<p>Photograph 3: Area 1; bank next to car park</p>	

Photograph 4: Area 1; rubble car park area



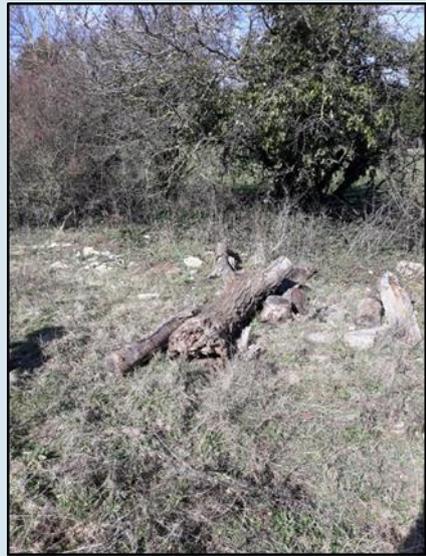
Photograph 5: Area 2; Soil and rubble piles



Photograph 6: Area 2; Blackthorn strip



Photograph 7: Area 2; Dead wood



Photograph 8: Area 3; Tall bunds with exposed soil.



Photograph 9: Area 3; Lagoon and sparsely vegetated area



Photograph 10: Area 4; Semi-improved grassland



Photograph 11: Area 4; Patchy scrub



Photograph 12: Area 5



Photograph 13: Area 6; South-facing bank next to ponds



Photograph 14: Pond 1



Photograph 15: Example of a managed pond



Photograph 16: Blackthorn along northern boundary where brown hairstreak eggs were found



Photograph 17: Brown hairstreak eggs found on Site





Mountbatten House
Basing View
Basingstoke, Hampshire
RG21 4HJ

wsp.com