Epsom Golf Course Management Plan:

Incorporating Botanical & Invertebrate Surveys

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Contents

1.0 Introduction 4
2.0 Site Description 5
3.0 Phase 1 Survey 6
4.0 Conclusions 16
5.0 Invertebrate Survey 19
8.0 Management Recommendations 37
9.0 Botanical Species List 44
8.0 Invertebrate Species List 49
9.0 References 57
10.0 Photographs 60
Figure 1 Botanical Target Notes 62
Figure 2 Management Suggestions 63
Appendix 1 64

Photograph Title Page: Round-headed Rampion

1.0 Introduction

1.1 Surrey Wildlife Trust (SWT) Consultancy was commissioned by Epsom & Ewell Borough Council to update the 2003 Epsom & Walton Downs Habitat Management Plan, concentrating on the Epsom Golf Course section. This survey report incorporates a suite of ecological surveys designed to provide a detailed picture of the ecology of the site, namely a botanical survey (Phase II) and terrestrial invertebrate survey.

1.2 The site boundary was defined by the following maps:

- Habitat Management Plan Epsom & Walton Downs (2003)
- MapInfo Ordenance Survey map (ask AK)

1.3 The following survey reports pertinent to the site were used:

- Habitat Management Plan Epsom & Walton Downs (2003)
- Epsom Golf Course Site of Nature Conservation Importance (SNCI) Survey 1998
- Epsom Racecourse Management Plan update (2008)

1.4 This management plan provides:

- An overview of the ecological habitats, botanical species and invertebrate species present on the site
- Details on notable invertebrate species
- Recommendations for habitat management

1.5 The site was surveyed for habitats and plant species by Isobel Girvan BSc (Hons) MIEEM, Principal Ecologist as SWT Consultancy on four separate occasions. The first was a spring date, 6th May 2010, suitable for woodland recording. The rest were summer dates to best record the grassland and scrub areas and make notes on appropriate habitat management ideas on 30th June, 28th July and 12th August 2010. Eileen Taylor and Peter Wakeman (Surrey Botanical Society) were invited to record on the 30th June and took detailed information on the surviving Juniper bushes for Surrey Rare Plant Register. Nick Owen from Lower Mole Countryside Management Project (LMCMP) and Mark Harvey the Greenskeeper Manager met Isobel Girvan on the 28th July to discuss in detail the overall management of the site and also specifically the bunker area. Gail Jeffcoate (Butterfly Conservation) and Conor Morrow (LMCMP) also visited the site in autumn 2010 to discuss butterfly management for the site, their findings are incorporated into the management recommendations section.

1.6 The ecologists recommendations are based on the existing ecology, determined from the site visit dates. The report is provided for the sole use of the named client and is confidential.

2.0 Site Description

2.1 Epsom Golf Course is located on the dipslope of the North Downs just south of Epsom town on the southern boundary of the Borough of Epsom and Ewell in Surrey. The central grid reference is TQ 222589, and covers approximately 56 hectares (see Figure 1).

2.2 The site is set in a relatively rural location with Epsom Racecourse to the south and west, open fields to the west and north west and residential housing to the east. There is one Right of Way that goes through the site from the south east corner of the site towards Burgh Heath Road. All of the public rights of way information can be seen via the Surrey County Council Interactive map (see References for address). There are several other local paths that criss cross the site.

2.3 The geological map relevant for this area is Sheet 286 Reigate printed in 1978. The entire area is Upper Chalk. The 1983 Soil Survey of England and Wales '*Soils of England and Wales Sheet 6 – South East England soil map*' describes the resulting soil type as a brown redzina called Andover 1. This is a shallow well drained calcareous silty soil over chalk and found on slopes.

2.4 There are no statutory designations on the site.

2.5 The site is included on the Surrey Biodiversity Opportunity Areas (BOA) map. These are areas identified on the South East England Biodiversity Forum website depicting the regional priority areas of opportunity for restoration and creation of Biodiversity Action Plan (BAP) habitats. Therefore the management work detailed in this report could be seen to provide a landscape link within the overall BOA network.

2.6 Epsom Golf Course was selected as a non-statutory Site of Nature Conservation Importance (SNCI) during the Epsom & Ewell District Council SNCI project in 1998, using the 1993 SNCI criteria and assessed by a panel of experts on the Sites of Nature Conservation Importance Liaison Group (SNCLG). This is a countywide project, linking with similar projects in other counties. Such projects provide an overview of the type and area of wide variety of semi-natural habitats. The reason for its selection is cited as '*..for its areas of unimproved calcareous grassland. Rare and valuable in both County and National terms'*. A copy of the SNCI survey report is available from SWT. The selection of SNCIs in no way diminishes the importance of other areas of semi-natural habitat in Surrey and it is recognised that all semi-natural habitat is important for wildlife. The assessment for SNCIs is a continuous process and new sites are identified as scientific knowledge of sites becomes available.

3.0 Phase 1 Survey

3.1 Methodology

Phase 1 survey is a standardised system for classifying and mapping semi-natural vegetation and wildlife habitats in Great Britain. Vegetation is mapped in terms of standard habitat types as defined in the JNCC Handbook for Phase 1 Habitat Survey (1990). This has been extended to include detailed target notes to describe particular habitats, features or species of note (also known as a Phase II survey). A combination of walk-over habitat information and aerial photographs were used to map the habitats.

During the field survey the entire site was covered, with the exception of stands of impenetrable woodland and associated underscrub.

The surveys were completed within the optimal time frame for conducting habitat surveys (ie. between April and September), when most plants are in flower or the vegetative parts are evident and, mostly, readily identifiable. A single one-off survey is insufficient to record all the plants present in any given site and, for example, any strictly vernal species will have been missed. Therefore the May site visits concentrated survey effort on the woodland, whilst the June, July and August visits concentrated on the rest of the site including semi-improved and unimproved neutral and chalk grassland with associated scrub.

The last visit at the end of August was principally used to record where Round Headed Rampion occurs; this is an uncommon plant in Surrey, qualifying as Nationally Scarce (Surrey Rare Plant Register 2010 draft).

Abundance is based on the DAFOR scale and refers to the specific section of the site. The overall abundance across the site is provided in the Species List (section 6.0). DAFOR ratings for certain species, notably annual, can change throughout the year.

The DAFOR scale uses the following key:-
(**L**ocally) **D**ominant; **A**bundant; **F**requent; **O**ccasional; **R**are

Nomenclature follows Stace (1999) for vascular plants.

Descriptions of each habitat found on the site are provided below, the approximate locations of which are identified on the attached map (Figure 1). Species are referred to in the text using common.

The full list of vascular plants with common and scientific names and abundance recorded at the site visit are provided in section 6.0.

It was possible to record the overwhelming majority of species seen to specific and, where relevant, to sub-specific level. However, no sub-species of Dog Rose, Bramble or Dandelion have been separated.

3.2 Habitat Descriptions

Semi-natural broad-leaved woodland (BW)
These target note numbers are circled in green on Figure 1

Northern Woodland Section

1 This is a broadly triangular shaped piece of woodland covering the majority of the central area in this northern section of the golf course. It comprises a very dense canopy, often with little growing in the woodland floor apart from occasional Ivy and some Ash saplings. The tall canopy contains frequent Sycamore, Pedunculate Oak and Ash with occasional Wild Cherry, Silver Birch and rare Norway Maple, Horse Chestnut and Yew. Where there are gaps and old open paths that have become decidedly overgrown there is an added scrub mosaic diversity with abundant Hawthorn, frequent Elder, Clematis, Holly, Hazel, occasional Wild Privet and Dog-rose. In amongst this are patches of grassland with frequent False-oat grass, Timothy, Common Nettle, Bramble, Herb Bennet, Creeping Thistle, Agrimony, Common Knapweed, Upright Hedge Parsley and Ground-elder. Occasionally there are glimpses of small areas of a more diverse chalk grassland with Salad Burnet and Quaking grass.

2 This small western corner of woodland is divided from the main part of the woodland in this section by a wide fairway. It comprises tall dense and even-aged trees such as frequent Ash, Pedunculate Oak, Turkey Oak, Common Lime, Wild Cherry, Silver Birch and a scrub layer of Hawthorn and Dogwood. Ivy is frequent as a climber. The scrub edge is also accompanied by frequent Bramble and occasional Gorse. As well as a mix of tall vegetation along the rough including abundant Red Fescue, Rose-bay Willowherb, Creeping Thistle, Common Knapweed, occasional Bladder Campion, Upright Hedge Parsley, Dropwort, Salad Burnet, Common Toadflax, Common Bird's-foot Trefoil, Ground-ivy and locally abundant Ground-elder and locally frequent Wild Parsnip. Tansy and Hedge Woundwort are rare.

3 This is a line of mature trees such as Ash, Pedunculate Oak, Sycamore, Horse-chestnut and some shrubs, along the western boundary.

4 A small area of woodland on the corner of Burgh Heath Road and Longdown Lane South with frequent Sycamore, occasional Pedunculate Oak. Hawthorn and Dogwood shrubs are frequent. Ivy is common. Under this and around the edges are abundant Red Fescue, occasional Timothy with Common Knapweed, Salad Burnet, Field Scabious and Red Clover.

5 This is a small group of trees, mainly Pedunculate Oak and Sycamore.

6 This is a thin straggly line of Beech trees, some Silver Birch and very old Hawthorn. The Hawthorn, unusually, has the uncommon Mistletoe on it and should therefore be preferentially kept on the course.

7 Along the edgeof Longdown Lane South there is a thin section of woodland/scrub mosaic comprising of abundant Sycamore, Hawthorn, Dogwood, occasional Wild Cherry and rare Apple. Ivy is locally frequent, as is Bramble. On the edges is a tall vegetation habitat with frequent Cow Parsley, Cleavers, Common Nettle and occasional Germander Speedwell, Ground-ivy, Lords & Ladies and Ground-elder. Opposite Bunbury Way there is a small 2m x 4m patch of Early Goldenrod. This is not the invasive species, but looks very similar.

8 The secondary woodland to the east of Longdown Lane South is dense with abundant Sycamore and Pedunculate Oak, often with locally dominant Blackthorn and Bramble scrub on the edges to the rough and fairway.

Middle Woodland Section

9 Along the north west boundary there is an overgrown line of trees and scrub, dominated in places by Hawthorn and Dogwood along with frequent Wild Privet, Holly and locally dominant Blackthorn. Trees include occasional Sycamore, Ash and rare Common Lime, Beech, Apple and Turkey Oak.

Southern Woodland Section

10 The main body of this secondary broad-leaved woodland comprises abundant Pedunculate Oak with Sycamore in the dense canopy (see Photograph 1). There is also a sub-canopy of younger Sycamore and Wild Cherry along with a shrub layer of abundant Hawthorn, frequent Elder, rare Dog-rose and locally frequent Holly in the central section of the woodland. Hazel is locally abundant towards the northern corner, along with locally abundant Blackthorn and Snowberry on the northern edge. There is a dense section of Blackthorn scrub on the southern edge of the woodland and Hawthorn scrub along the eastern edge.

Bramble dominates the central woodland area with abundant Ivy, frequent Hawthorn saplings and Herb Robert. Bluebell is rare. On the edges and paths Hogweed is frequent with occasional Ground-ivy, Dandelion, White Dead-nettle, Rough Meadow-grass, Ribwort Plantain, Common Nettle and Herb Robert.

The field layer contains a scattering of common woodland species such as Bluebell, Common Nettle, Bramble, Cow Parsley, Sycamore saplings, Herb Bennet, Cleavers and Wood Dock, particularly on the more open areas and edges. Dog's Mercury is locally frequent towards the northern tip and eastern side of the woodland. Spanish Bluebell and the hybrid is present along the northern tip, along with Michaelmas Daisy,

both of which are invasive species. Three-nerved Sandwort is present in small quantities on the southern end of the tee.
The woodland along the southern edge seems to have been more disturbed and is a more open, with less shrub structure. The field layer contains abundant Bramble, frequent Ground-ivy, Cow Parsley, Ivy, Cleavers, White Dead-nettle, Hawthorn saplings. Herb Robert, Creeping Thistle, Lords and Ladies are occasional and Common Mouse-ear is rare. A Viola sp is locally frequent. There are small patches of Bonfire-moss, close to the toilet blocks and road.

Along the southern edge where there is a very open canopy the field layer tends towards a more conventional grassland sward with Yorkshire-fog as well as occasional Daisy, Germander Speedwell, Greater Plantain, White Clover, Cow Parsley, Dandelion, Common Nettle, Creeping Buttercup, Common Mouse-ear, Bluebell and White Dead-nettle.

There is a scattering of Hawthorn trees leading from the main body of the woodland and running east towards the roundabout.

On the northern edge of this area, by Grandstand Road, is a scattered line of trees such as Pedunculate Oak, Hawthorn, Silver Birch and Rowan.

11 A thin section of woodland abutting the Old London Road. The main trees in the canopy are Pedunculate Oak and Ash with frequent Silver Birch. There is also an old large Scots Pine and a large dead tree stump by the gated barrier. Under this is occasional Hawthorn and Elder with some Bramble and Ivy.

Scrub/chalk grassland/tall vegetation mosaic section
These target note notes are marked on Figure 1 in orange with an underscore under the number

.

Northern scrub/grassland section

12 There is a tee on the eastern edge of the main body of woodland, and there is a dense area of scrub around the tee edge. The scrub includes abundant Hawthorn, Silver Birch and Dogwood merging into Ash woodland with rare Wayfaring tree and Clematis.

On the edge of the tee here is rough chalk vegetation comprising grasses such as abundant Red Fescue, Yorkshire-fog and frequent Soft Brome with rare Quaking grass. Herbs include Common Knapweed. Agrimony, Red Clover, Common Restharrow, Common Bird's-foot, Yarrow, Kidney Vetch, Field Scabious, Black Medick, Dropwort, Dwarf Thistle, Creeping Cinquefoil and Glaucous Sedge.

13 This area has been managed in the past as open chalk grassland and scrub mosaic. However it is now very scrubbed over with frequent Dogwood, Hawthorn, Silver Birch, Bramble and occasional Wild Privet, young Ash with rare Sycamore. Holly is locally

frequent on the north west edge and Dog Rose becomes locally abundant further north in this area.

The remnant chalk grassland is very overgrown and shaded although Red Fescue and Quaking grass are still locally frequent along with herbs such as Common Knapweed, Common Rockrose, Common Bird's-foot Trefoil, Bladder Campion, Salad Burnet and rare Rough Hawkbit and Common Spotted Orchid.

Middle scrub/grassland section

14 This is the main core of scrub in the middle section of the golf course, with maturing abundant Hawthorn scrub, locally dominant in placed as is Dogwood, occasional Elder, with rare Dog Rose and Wild Privet (see Photograph 2). Gorse is rare on the edges. Bramble and Ivy are locally abundant. On the edges there is abundant Tor grass, with occasional Creeping Cinquefoil, Wild Parsnip, Perforate St John's-wort, False Wood-brome, Creeping Thistle and Hedge Woundwort. Away from edges and into the central core are frequent Pedunculate Oak and Ash, with occasional Sycamore.

15 The overgrown tree boundary edge has already been described in the woodland section under target note number 9. And intergrated into this is a scrub/grassland mosaic with frequent Hawthorn, occasional Dog rose, Gorse, Wild Privet and Blackthorn are locally frequent and Hazel, Elder and Apple are rare. Under this Bramble is frequent as is Clematis as a climber.

On the edges the tall grassland comprises abundant False-oat grass, occasional Rough Meadow-grass, Cock's-foot, Yorkshire-fog, Timothy, Upright Brome with common herbs such as Cleavers, Hogweed, Herb Bennett, Creeping Thistle, Herb Robert, Common Knapweed, Rosebay Willowherb, Wild Carrot, Common Nettle, and rare Salad Burnet, Wild Basil, Lucerne, Black Medick, Perforate St John's-wort, Bladder Campion, Goat's Beard, Small Scabious and Wild Mignonette. Ground-elder and Wild Parsnip are locally abundant. Kidney Vetch and Wild Marjoram are present in locally abundant patches. Along the track there is shorter vegetation such as Silverweed, Common Restharrow, Yarrow, Common Bird's-foot and Common Vetch (see Photogaph 3).

16 This Hawthorn scrub area has been managed in the past by the Lower Mole Countryside project. A number of scrapes have been successfully created to enhance habitat for the germination of Kidney Vetch. In amongst the scrapes with the Kidney Vetch is abundant Tor grass, frequent Salad Burnet, Fairy Flax, Common Bird's-foot Trefoil, and rare Quaking grass and Wild Marjoram. In the taller vegetation grasses are similar to those mentioned in 15 with frequent False-oat grass, Upright Brome, Red Fescue, and occasional Timothy. Herbs include occasional Salad Burnet, Common Knapweed, Greater Knapweed, Ribwort Plantain, Yarrow, Silverweed, Common Restharrow, Mugwort, Small Scabious and Black Medick.

17 Predominantly Hawthorn scrub running along the edge of Burgh Heath Road.

18 Linear length of scrub between two fairways with abundant Hawthorn, and more rarely Yew, Holly, North Maple, Wild Cherry, Wayfaring and Blackthorn on the edge. On the southern edge at a grid reference of TQ2230 5895 are two Juniper bushes, (there is also another male Juniper plant at grid reference TQ22265914). Towards the south of this area by Grandstand Road small Elder trees are occasional with abundant Sycamore, Dog Rose, Dogwood and rare Wild Privet. On the edges are locally abundant patches of Tor grass, dotted with Ivy, Bramble and Creeping Cinquefoil. It is on this southern edge, where the scrub has in the past been cut back to produce a shallow bay of sheltered scrub and tall grass.

Southern scrub/grassland section

19 Scrub to the north east of the woodland in this area, leading up towards the Buckle's Gap roundabout. Hawthorn and Dogwood are abundant with occasional Ash, Pedunclate Oak, Beech, Aspen, Grey Poplar, Rowan and Silver Birch trees. Bramble is also an important component and Wild Cherry is rare. The edges contain rough tall grassland. There is generally a high percentage of grasses such as occasional Tall Fescue, Perennial Rye-grass, Cock's-foot, Timothy, Tor grass, Red Fescue, Rough Meadow-grass. Herbs that are present are frequent to occasional such as Common Knapweed, Common Bird's-foot Trefoil, Wild Carrot, Kidney Vetch, Red Bartsia, Red Clover, Dove's-foot Crane's-bill, Burnet Saxifrage, Agimony, Dwarf Thistle, Ladies Bedstraw, Common Ragwort, Small Scabious, Salad Burnet, Wild Basil and Glaucous Sedge. There is locally dominant stand of Wild Radish on the northern edge of this area.

20 Along the eastern boundary edge with the residential housing is a linear line of scrub with frequent Hawthorn, Firethorn, Bramble, Elder and rare Yew.

Roughs & chalk grassland
These target notes are marked on Figure 1 in yellow with a line above the number

Northern grassland section

21 This is the site of an old bunker dating from World War 2. It has in the past been successfully managed by the Lower Mole Countryside Project. However, with the lack of on-going management (and lack of funding/labour), the open chalk grassland and scrub has become very overgrown; only a very small area of remnant chalk grassland remains (see Photograph 4). Hawthorn has overgrown the path from the fairway into the bunker and it is easily missed. Also encroaching is Silver Birch, young Ash, Wayfaring tree and Wild Privet. Bramble is abundant. However where it is still open enough for some chalk grassland it does give an idea of how diverse it could be with some appropriate management. Taller vegetation includes occasional Red Fescue,

Common Ragwort, Common Knapweed, Dropwort, Wild Mignonette and Greater Knapweed. Shorter vegetation includes rare Common Restharrow, Salad Burnet, Kidney Vetch, Small Scabious, Perforate St John's-wort, Red Clover, Common Bird's-foot Trefoil, Quaking grass, Fairy Flax, Common Rockrose, Squinancywort, Glaucous Sedge, Yellow-wort, Round Headed Rampion, Burnet Saxifrage, Eyebright, Common Spotted Orchid, Chalk Milkwort and Dwarf Thistle. Canadian Goldenrod is also present in low quantities.

22 This wide rough is on a slight bank east of the bunker area and denoted by a fine population of Round-headed Rampion (30+) as well as occasional Small Scabious, Burnet Saxifrage, Salad Burnet, Common Bird's-foot Trefoil, Red Clover, Common Knapweed, Glaucous Sedge, rare Harebell, Common Rockrose and Dwarf Thistle.

23 A long wide area of rough running north/south down the eastern side of this area. The calcareous influence of the underlying soil is still evident, as it is over most of this northern section of the golf course. Red Fescue grass is the most common with rare Quaking grass. Herbs include frequent Common Knapweed, Common Bird's-foot Trefoil, Ladies Bedstraw and Wild Carrot with rare Harebell, Small Scabious and Dwarf Thistle.

24 This rough is below the woodland (target note 1) and by the 16th green. The taller vegetation is represented by frequent Cow Parsley, Hogweed, Common Nettle, Bramble and occasional Upright Hedge Parsley. The shorter grassland is represented by occasional Salad Burnet, Yellow Rockrose, Small Scabious, Red Clover and rare Round-headed Rampion, Fairy Flax, Burnet Saxifrage, Dwarf Thistle, Squinanywort and Kidney Vetch.

25 This area of coarse grassland is not as diverse with frequent False-oat grass, Cock's-foot and Rough Meadow grass and some Common Knapweed.

26 On the scrub/woodland edge there is a rough area of grassland with a diverse range of herbs such as frequent Ladies Bedstraw, Perforate St John's-wort, Common Knapweed, Yarrow, Agrimony, Creeing Thislte, White Clover, Red Clover, Mouse-ear Hawkweed, Oxeye Daisy, occasional Wild Carrot, Dwarf Thistle, Wild Mignonette, Ribwort Plantain, Red Bartsia and rare Harebell.

Middle grassland section

27 The grassland around the car park area here predominantly contains common grassland species and is less diverse than other rough areas. This will be because of the nutrient enrichment from visitors and dogs. However there are some chalk grassland species that are present in small quantities. Perennial Rye-grass is co-dominant with Red Fescue, frequent Cock's-foot and occasional Timothy. Herbs include frequent Yarrow, White Clover, occasional Wild Mignonettle, Common Bird's-foot Trefoil, Common Knapweed and locally frequently Small Scabious.

28 The grassland becomes more diverse and interesting further away from the car park edge to the west where occasional Upright Brome and Soft Brome join Red Fescue (see Photograph 5). Dropwort is frequent along with occasional Wild Parsnip, Greater Knapweed and locally abundant Ladies Bedstraw and Red Clover. On the bund by Grandstand Road edge it is slightly longer with similar species to mentioned above as well as Common Ragwort, Creeping Thistle, Wild Carrot, Mouse-ear Hawkweed, Wild Mignonette, Leucerne, Greater Knapweed, Small Scabious. Common Restharrow and Kidney Vetch were rare.

29 This area is tucked behind a tee and the grassland here is left longer, it is not as diverse as other areas, but does have a good potential for invertebrates, particularly because there is a small amount of Hawthorn scrub here as well. The grasses here include abundant Yorkshire-fog, frequent False-oat grass, Soft Brome, Cock's-foot and occasional Rough Meadow-grass. There is a distinct lack range of herbs here except for occasional Common Knapweed, Ladies Bedstraw, Broad-leaved Dock and Perforate St Johns's-wort.

30 An old bund with track spoil from many years ago. The resulting vegetation is typical of this type of habait with frequent False-oat grass, Cock's-foot grasses and Hedge Mustard, Creeping Thistle, Black Horehound and occasional Wall Lettuce, Dandelion, Groundsel, Curled Dock, Bladder Campion, Common Nettle and Yarrow.

31 Northern fairway rough similar to species described in 15 but less diverse (see Photograph 6). False-oat grass is abundant with Red Fescue. Both Greater and Common Knapweeds are present with occasional Dropwort, Dandelion, Common Bird's-foot Trefoil, Kidney Vetch, Small Scabious and rare Common Restharrow.

32 An area of tall chalk grassland rough found in the north corner of this section and along Burgh Heath Road. Red Fescue and Soft Brome are frequent with occasional Timothy, Yorkshire-fog, Upright Brome, Tor grass and Quaking grass. The herbaceous cover is variable with frequent Red Clover and Salad Burnet and occasional Common Knapweed, Red Bartsia, Kidney Vetch, Perforate St John's-wort, Wild Carrot, Ladies Bedstraw, Wild Mignonette, Glaucous Sedge and Common Ragwort. Small Scabious and Fairy Flax are rare. Yellow Toadflax is locally frequent. Sycamore and Pedunculate Oak saplings are frequent.

The 3m wide rough towards Buckle's Gap is well managed with two cuts a year and the result is a diverse grassland with a good population of the Round-headed Rampion. In addition there is occasional/rareLadies Bedstraw, Common Knapweed, Wild Parsnip, Yarrow, Harebell, Burnet Saxifrage, Sainfoin, Dwarf Thistle, Fairy Flax, Eyebright, Quaking grass, Small Scabious and Kidney Vetch. Bee Orchid has also been recorded here recently.

33 The grassland here is coarser tending to more neutral either as a result of slightly different soils or long term improvement from nutrient enrichment. In amongst the tall Upright Brome, Yorkshire-fog, Timothy, Tor grass and False-oat grass are Creeping Thistle, Common Ragwort, Common Knapweed, White Clover, Upright Hedge Parsley, Wild Carrot, Common Bird's-foot Trefoil, Wild Parsnip and Greater Knapweed. This leads towards Buckle's Gap corner where in addition there are occasional Ladies Bedstraw, Yarrow, Ribwort Plantain, Salad Burnet, Wild Mignonette and Small Scabious.

34 Rough grassland area next to a fairway similar to 32 described above, although no Round-headed Rampion here and there are some scattered Pedunculate Oaks and old Hawthorns.

Southern grassland section

35 This is not a very wide boundary to the road that is cut regularly though the summer. It contains some Hawthorn/Bramble scrub as well as tall vegetation and remnant calcareous grassland, although this is not particularly diverse. There is frequent False-oat grass, Rough Meadow grass and rare Meadow Foxtail with occasional Common Ragwort, Common Knapweed, Ribwort Plantain, Perforate St John's-wort, Wild Carrot, Quaking grass, Ladies Bedstraw, Salad Burnet, Field Wood-rushSmall Scabious and Kidney Vetch.

36 A rough area of grassland with frequent Yorkshire-fog and Rough Meadow-grasses. Herbs include occasional Common Mouse-ear, Ground-ivy, Dandelion, Rough Hawkbit, Ribwort Plantain, White Dead-nettle and Yarrow.

37 In this rough grassland are common grasses with rare Common Restharrow, Common Knapweed, Common Bird's-foot Trefoil and Dropwort (see Photograph 7).

38 Grassland rough predominantly with Red Fescue as well as occasional Common Bent, Timothy and Perennial Rye grass with Common Knapweed, Ladies Bedstraw and rare Harebell, Burnet Saxifrage, Wild Mignonette, Small Scabious, Greater Knapweed and Dwarf Thistle.

39 There is an old bank by the toilet block here with a range of ruderal vegetation such as occasional Germander Speedwell, Wall Speedwell, Grey Speedwell, Yarrow, Dandelion, Common Knapweed, Common Mallow, Wild Mignonette and Field Bindweed.

40 An area of species poor improved grassland with Perennial Rye grass, Common Bent grass and Soft Brome and only a few common herbs present such as Dandelion, Ribwort Plantain, White Clover, Yarrow and Creeping Thistle.

41 A small area of dry soil by the barrier next to Old London Road with an extensive patch of Rue-leaved Saxifrage. Associated species include Yarrow, White Clover, Ribwort Plantain and Scurvey-grass.

4.0 Conclusions

4.1 Habitat Evaluation

For the ease of recording and three broad habitat types have been used during the field survey and are listed in Table 1 along with UK Biodiversity Action Plan (BAP) Broad Habitat types; Priority BAP habitats; and the relevant Surrey HAP classification that they relate to.

UK Biodiversity Action Plan (UK BAP) Priority Habitats are also Habitats of Principle Importance under The Natural Environment and Rural Communities Act 2006 Section 41 (NERC S41). There are currently 56 such habitats included on the S41 list. The S41 list is intended to provide guidance to decision-makers, e.g. those representing public bodies and local/regional authorities, in implementing their duty under Section 40 of the NERC Act to '…*have regard to the conservation of biodiversity in England when carrying out their normal functions*'.

Table 1 – Habitats recorded, their relationship to BAP habitats

Habitat (Phase 1 code)	Broad Habitat classification	UK Priority BAP Habitats	Surrey HAP classification
Semi-natural broad-leaved woodland	Lowland mixed deciduous woodland	Lowland mixed deciduous woodland*	Woodland
Unimproved chalk grassland/scrub	Calcareous grassland	Lowland calcareous grassland	Chalk grassland

***** This includes most of the semi-natural woodland in the South and East of England and includes blocks that are often less than 20 hectares.

4.2 Total plants recorded

The following table lists the total number of vascular plant species found at Epsom Golf Course in 2010. The total of 185 vascular plants represents a high number of species. More species would be found with further survey effort, especially at different times of the year.

4.3 Non-native species

Of the 185, only 10 are introduced, non-native and in some cases invasive, the rest are native species in Britain (Preston *et al* 2002). All of the non-native species were assigned 'rare' in abundance. Turkey Oak is proving to be invasive and whilst the number of larger trees is small, there are areas with lots of seedlings. The rest are at the moment not proving to be greatly invasive, although they should be monitored and ideally managed towards eradication. Particularly Canadian Goldenrod, Butterfly-bush and Michaelmas Daisy.

- Butterfly-bush
- Turkey Oak

- Apple
- Michaelmas Daisy
- Snowberry
- Cotoneaster
- Spanish Bluebell
- Russian Vine
- Firethorn
- Goat's-rue

4.4 BAP Priority Species

UK BAP Priority Species are also Species of Principle Importance (SPI) under NERC S41. There are currently 943 such species (covering all taxonomic groups) included on the S41 list. The S41 list is intended to provide guidance to decision-makers, e.g. those representing public bodies and local/regional authorities, in implementing their duty under Section 40 of the NERC Act to '…*have regard to the conservation of biodiversity in England when carrying out their normal functions*'.

- Juniper – Three bushes grow on the site (target note 18).

4.7 Surrey Rare Species recorded in 2010

These are species which are listed in the Surrey Rare Plant Register (updated October 2010). According to this list, one species is considered Nationally Threatened, one is Nationally Scarce, two are Surrey Scarce species (those found between 4-10 sites in Surrey) and one has an Undecided status.

- Sainfoin – Nationally Threatened
- Round-headed Rampion – Nationally Scarce
- Juniper – Surrey Scarce
- Rue-leaved Saxifrage – Surrey Scarce
- Small Toadflax – Surrey Undecided

4.8 Surrey Rare Species recorded prior to 2010

The following species have been recorded on the site in the past, but were not seen during the 2010 survey.

- Chalk Eyebright – A UK BAP priority species, with an undecided Surrey status. It is uncommon in Surrey.

- Early Gentian – As well as being a UK BAP priority species, it is considered a Surrey Rare species.

4.9 Additional species of note

- Kidney Vetch – uncommon in Surrey, and the only food plant for the uncommon BAP butterfly priority species Small Blue (see Photograph 8).
- Mistletoe – uncommon and unusually found in Hawthorn over the course.

5.0 Invertebrate Survey

6.0 Summary

- Three visits were made to the Epsom Golf Course on 06.v., 10.vi. & 28.vii.2010.

- A total of 256 species were recorded of which a total of 10 species have Red Data Book or Nationally Scarce status (4% of all species recorded), whilst a further 30 species are regarded as nationally Local (12% of all species recorded). In total 40 species (16% of the species recorded) are of conservation significance (i.e. RDB, Nationally Scarce, Local).

- The main assemblage types present were identified by ISIS (2008) as associates of:
    - Broad Assemblage Types (BATs)
        - Unshaded early successional mosaic.
        - Open grassland & scrub mosaic.
        - Arboreal canopy.
        - Wood decay.
    - Specific or Resource-based Assemblage Types (SATs / RATs)
        - Rich flower resource **Favourable (by SSSI standards)**.
        - Scrub edge.
        - Bark & sapwood decay.

5.2. Method

7.0 Survey design

- Three visits were made to the Epsom Golf Course on 06.v., 10.vi. & 28.vii.2010.
- A general walk over survey was undertaken on each visit (see map) and the sampling techniques described in section 2.3. were employed in each chosen sampling area.
- Sampling areas were chosen to represent the range of semi-natural habitats present on the site and the main areas are summarised in Table 1.
-

Table 1. Main sampling areas at Epsom Golf Course, 2010

Grid Reference	**Habitat description**	**Notes**
TQ220587 – TQ221589	▪ Grassland / scrub	NE from Grandstand Road parking area, linear route along rough with scrub edge.
TQ221588	▪ Grassland / scrub	Roughs.
TQ221589	▪ Grassland / scrub ▪ Woodland	End of linear route, flower-rich short turf and scrub in sheltered glade. Large, dead Hawthorn in a small copse at TQ221590.
TQ221591	▪ Grassland / scrub ▪ Bare chalk ▪ Hedgerow	Chalk scrapes and ruderal areas of spoil. Flower-rich grassland (Small Blue area). Scrubby wooded edges Hedgerow adj. road.
TQ222589	▪ Scrub	Juniper area. Mixed scrub.
TQ221586	▪ Woodland	Deciduous woodland & scrub edge
TQ222586	▪ Woodland	Deciduous woodland & scrub edge
TQ2258	▪ None	General observations

5.2.2. Taxonomic coverage

The tables given in Drake *et al*. (2007a) were consulted to target the invertebrate groups most appropriate to analyzing the invertebrate assemblages of the sampled habitat, which was predominately field layer (predominately open calcareous grassland) and scrub / woodland edge. Therefore, sampling focused upon the major groups of reviewed British invertebrates associated with these habitats: Coleoptera (beetles), Hemiptera (true bugs and leaf-hoppers), Lepidoptera (Butterflies & Moths), Diptera (flies), Hymenoptera (Bees, Wasps & Ants) and Arachnida (spiders), but other groups are also included.

5.2.3. Sampling techniques

A range of sampling techniques, based on those given in Drake *et al*. (2007a), were used during the visits and are detailed in Table 2. On average 1 hour was spent using each technique per visit.

Table 2. Survey techniques employed at Epsom Golf Course, 2010.

Technique	Target Groups	Target Habitats
Sweep-netting ('sweeping') of vegetation with a calico-bag sweep-net.	Especially Flies (Diptera), True Bugs (Hemiptera), Beetles (Coleoptera) & Spiders (Arachnida).	Heathland / scrub and grassland, with particular focus upon potential foodplants.
Spot-netting using a fine mesh net.	Especially Bees and Wasps (Hymenopetra), Hoverflies (Diptera: Syrphidae).	Floral and nesting resources.
Hand searching ('grubbing')	A range of ground-dwelling and arboreal invertebrates including Beetles (Coleoptera), True Bugs (especially Heteroptera) and Ants (Hymenoptera).	All habitats. Open bare ground, looking under plants at ground level, amongst tussocks, turning over logs, stones etc amongst foliage and under bark.
Beating foliage over an entomological beating-tray.	Especially True Bugs (Hemiptera), Beetles (Coleoptera) & Spiders (Arachnida).	Lower branches of trees, dead branches, shrubs and coarse vegetation.

Once secured in a clear tube the individuals were either identified in the field and subsequently released or dispatched in an ethyl acetate killing jar for later microscopic examination in the lab. Voucher specimens of notable species have been retained where critical examination is required to confirm identification.

5.2.4. Historic records

Epsom Golf Course is a well-known site for the Small Blue Butterfly *Cupido minimus* (Fuessly, 1775). The adult of this species was not recorded during the survey (poor weather conditions on visit coinciding with main flight period) but another individuals survey work for the eggs and larvae of this species on the host plant was evident and these areas were not disturbed.

A full data search was not undertaken as it falls outside of the remit of this survey.

5.2.5. Rarity status

Rarity statuses follow those given in the ISIS (2008) system and the relevant published national species status reviews (e.g. Hyman & Parsons, 1992 – see references).

The system for allocating rarity status was devised by the then Nature Conservancy Council (now the Joint Nature Conservation Committee). This system is gradually being superceded

by that of the International Union for the Conservation of Nature (IUCN). However, comprehensive coverage is currently unavailable for all invertebrate taxa and therefore the statuses given in the relevant Red Data Books and their subsequent reviews are used here. Definitions of rarity status categories are given in section 5.7.1.

5.2.6. Constraints

The survey was structured to cover invertebrate activity throughout the most active months of the season and proposed survey dates wereplanned into the diary early on in the year. Invertebrate activity is reduced for the majority of species when the weather is poor and the surveyor endeavoured to visit the site during favourable weather conditions. However, sub-optimal weather conditions prevailed on two out of three visits.

5.3. Results

5.3.1. Species richness and rarity for Epsom Golf Course, 2009

A total of 256 species were recorded of which total of 10 species have Red Data Book or Nationally Scarce status (4% of all species recorded) whilst a further 30 species are regarded as nationally Local (12% of all species recorded). In total 40 species (16% of the species recorded) are of conservation significance (i.e. RDB, Nationally Scarce, Local).

Table 3. Species summary table for Epsom Golf Course, 2010

Order	Total number of species recorded	Rare or Notable species	Nationally Local species	UK BAP /SPI species
Orthoptera & allies (Grasshoppers, Bushcrickets, Earwigs etc)	6	1	0	0
Psocoptera (Bark Lice)	6	0	1	0
Hemiptera (True Bugs, Hoppers, etc)	39	2	3	0
Lepidoptera (Moths & Butterflies)	29	1	0	0
Diptera (2-winged Flies)	41	1	9	0
Hymenoptera (Ants, Bees, Wasps & Sawflies)	32	2	3	0
Coleoptera (Beetles)	61	2	12	0
Arachnida (Spiders, Mites & Harvestmen)	32	1	1	0
Isopoda, Diplopoda etc (Woodlice, Millipedes etc)	5	0	1	0
Mollusca (Snails & Slugs)	5	0	0	0
Total	**256**	**10**	**30**	**0**

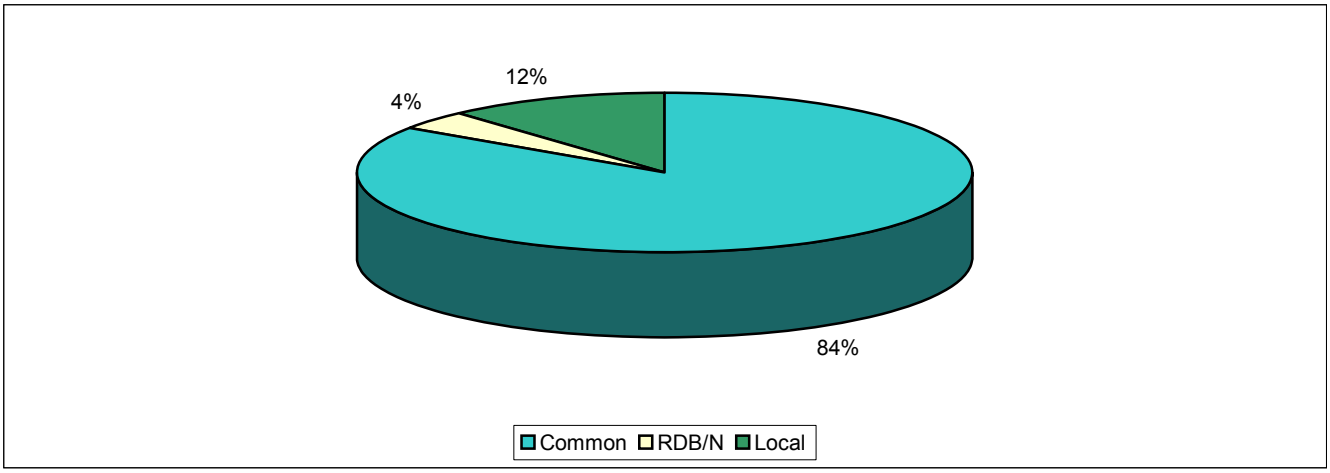

Figure 1. Overall percentages (%) of Red Data Book/Notable, Local and Common species recorded at at Epsom Golf Course, 2010.

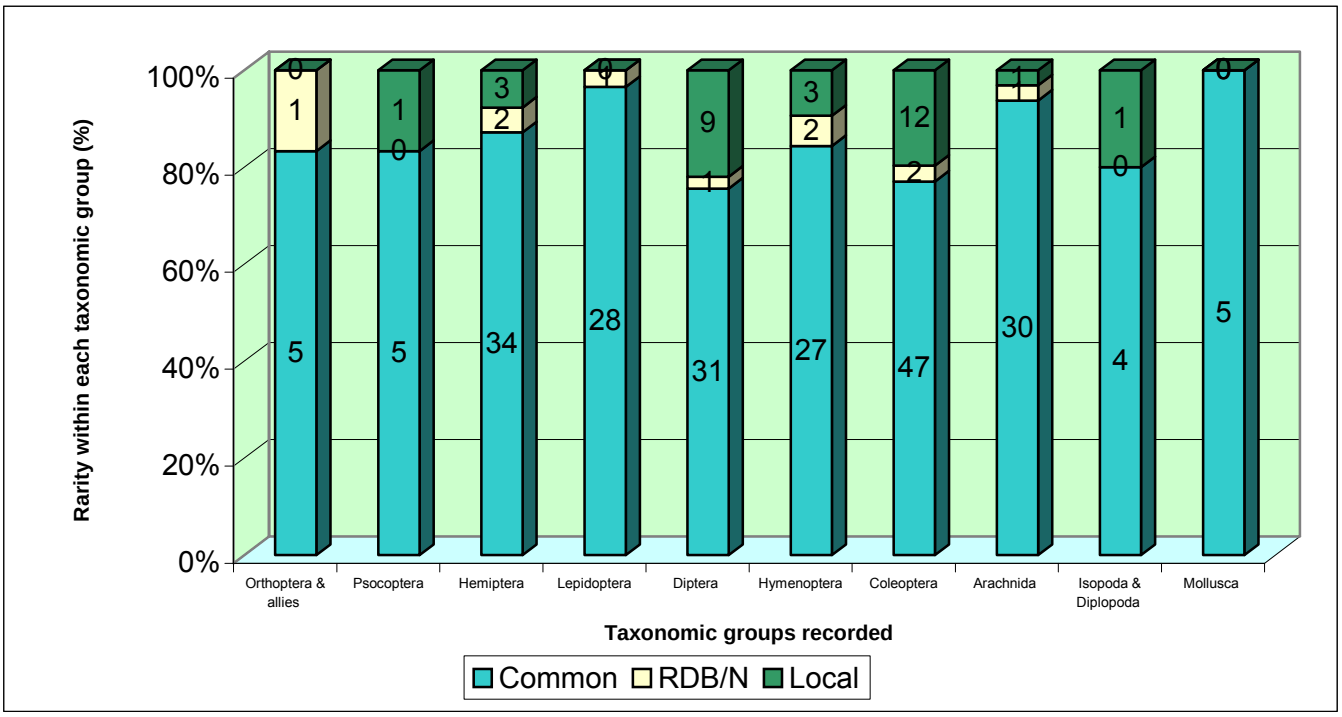

Figure 2. Percentages (%) of Red Data Book/Notable, Local and Common species recorded for each taxonomic grouping, including actual number of species recorded within each rarity category (columns), at Epsom Golf Course, 2010.

5.3.2. Rare & Nationally Scarce species

Species are listed in capitals by taxonomic ORDER. The text in brackets refers to the Family group. The text in *italics* is the scientific name of the species. The following name and date refers to the author who originally described the species. A common name is given where applicable.

The species statuses given in the Red Data Book (Shirt, 1987) and subsequent reviews (see References) are presented in **bold** type. These statuses may no longer be applicable for some species in the light of progressed knowledge of a species ecology or distribution and this is commented upon within the text to ensure a true reflection of conservation importance. A local context is also provided where it is possible to do so, based upon county checklists, atlases and the authors own experiences. UK BAP / SPI statuses are also presented in **bold** type.

5.3.2.1. ORTHOPTERA

(Tettigoniidae) *Metrioptera roeselii* (Hagenbach, 1822) [=*Roseseliana roeselii* Hagenbach] Roesel's Bush-cricket.

Status: **Nationally Scarce B (Nb).** Until the 1940's this bush-cricket was only known in England from either side of the Thames estuary and up the east coast to the Humber (Baldock, 1999). This species range has increased dramatically since this time with records from Yorkshire, Lancashire and southern Ireland. First recorded in Surrey in 1944 (Menzies & Airy Shaw, 1947) and now widespread throughout the county in suitable habitats. **Notable status in need of revision.**

Habitat and ecology: Rough grasslands with tall, rank, herbaceous vegetation, such as common ragwort and thistles etc. Water meadows and the like are also used. Eggs are laid in plant stems with nymphs emerging in late May/early June. Omnivorous but largely vegetarian, feeding on grasses (Marshall & Haes, 1988). Baldock (1999) suggests that roads such as the M25 have benefited this species by creating linear corridors of south facing grassy slopes. *M.roeselii* was fairly common in rank vegetation throughout the site. Where adults could not be seen the distinctive high-pitched, continuous male song was audible.

Management and conservation:

- Control of excessive scrub to maintain open structure of site.
- Retention of areas of long, rank vegetation to be considered in any future mowing / grazing regime.

5.3.2.2. HEMIPTERA

(Auchenorrhyncha: Cicadellidae) *Athysanus argentarius* Metcalf, 1955 a hopper bug.

Nationally Scarce B (Nb). Historically considered scarce and confined to coastal sites in the south-east of England. Recently established at inland sites across parts of southern and central England (http://www.britishbugs.org.uk – accessed November 2010). Local in Surrey

and probably increasing, though known from the Epsom & Ewell area, where it was recorded by the surveyor in the adjacent hectad of TQ26 during 2009.

Habitat and ecology: Phytophagous. Associated with a variety of grasses in open situations. The cause of range expansion is not yet fully understood but is thought to be climate related. Swept from grasses in roughs at TQ221589 on 28.vii.

Management and conservation:
- Control of excessive scrub to maintain open structure of site.
- Retention of areas of rough grassland vegetation.

(Miridae) *Lygus pratensis* (Linnaeus, 1758) A Mirid Bug

Status: **Red Data Book 3 [Rare] (RDB3)**. Once a rarity in the British Isles; confined largely to open areas within ancient woodland and records from heathland in the south (Kirby, 1992; www.britishbugs.org.uk – Accessed November 2010). This species appears to be rapidly increasing its range and is apparently fairly widespread in Surrey. The RDB3 status is likely to be down-graded in any forthcoming review. The true distribution is not yet fully understood due to confusion with similar species. In my experience *L.pratensis* is amongst the most commonly encountered *Lygus* spp. Of open flower-rich habitats in Surrey. **RDB status in need of revision.**

Habitat and ecology: Phytophagous. This species is now increasingly common on a range of plants, esp. Asteraceae (Composite or Daisy family) in open areas, inc. downland and heathland, and woodland rides. Frequent across the site where herbaceous vegetation dominates.

Management and conservation:
- Control of excessive scrub to maintain open structure of site.

5.3.2.3. LEPIDOPTERA

(Gelechiidae) *Recurvaria leucatella* (Clerck, 1759) a micro moth.

Nationally Scarce B (Nb). Widely scattered in England and North Wales (http://ukmoths.org.uk/ - accessed November 2010). Widespread and locally common in Surrey (Palmer *et al*., 2010).

Habitat and ecology: Phytophagous. A species of woodland edge, hedgerows and orchards etc. Larvae feed between spun leaves of Hawthorn *Crataegus* spp. Or Apple *Malus* spp. (and potentially other Rosaceous species). Adults on wing during June and July. Beaten from Hawthorns at woodland edge (TQ222586) on 28.vii.

Management and conservation:
- Maintain shrubby woodland edges.

- Maintain hedgerows, scattered scrub across site.

5.3.2.4. DIPTERA

(Syrphidae) *Cheilosia soror* (Zetterstedt, 1843) a hoverfly.

Status and distribution: **Nationally Scarce (N).** Southern restricted. Local in Surrey (Morris, 1998).

Habitat and ecology: Calcareous habitats and clay woodlands (Morris, 1998). Adults are associated with umbelliferous flowers. Larvae have been reportedly bred from truffles but the biology remains otherwise unknown (Stubbs & Falk, 2002). Swept from TQ221589 on 28.vii.

Management and conservation:

- Maintain a mosaic of open grassland and woodland rides / edges supporting umbelliferous flowers.

5.3.2.5. HYMENOPTERA

(Apidae: Andreninae) *Andrena minutuloides* Perkins, R.C.L., 1914. A Solitary Bee.

Status: **Nationally Scarce A (Na).** Southern restricted and generally rare. Locally common in Surrey, esp. along the North Downs (Baldock, 2008).

Habitat and ecology: Largely restricted to calcareous grasslands where it is found ground nesting in short turf or areas of bare ground. Double brooded. Fairly common across the site in open, flower-rich areas.

Management and conservation:

- Control of excessive scrub to maintain open structure of site.
- Maintain existing and create new open, bare patches – e.g. chalk scrapes – for nesting.

(Apidae: Megachilinae) *Osmia vailabi* (Schrank, 1781) Two Coloured Mason Bee

Status and distribution: **Nationally Scarce B (Nb)**. Southern restricted (Edwards [ed.], 1998). Locally common in Surrey (Baldock, 2008).

Habitat and ecology: The range is closely correlated with chalk and limestone soils (Edwards [ed.], 1998) and in Surrey it is almost completely restricted to the North Downs area (Baldock, 2008). One of the earliest solitary species to appear in spring (e.g. April) and on the wing until July. Visits a range of flower-resources. Nesting in empty snail shells of medium to large size, such as *Cepaea* spp., *Helix* spp. And *Monacha cantiana*. Several nest cells are constructed inside the shell with a leaf-based mastic and the closing plug from chalk / soil particles, sealed

with leaf mastic. Once sealed the female covers the shell with organic fragments, such as grass stems or leaf fragments, possibly as camouflage from would-be predators and parasites. Nesting aggregations may be found in grassland, scrub or open woodland. Several females observed foraging on Ground Ivy *Glechoma hederaceae* etc in sheltered scrubby glade area at TQ221589 on 06.v.

Management and conservation:

- Maintain areas of flower-rich grassland / scrub mosaic for foraging and nesting.
- Maintain open structured woodlands for nesting.
- Maintain hedgerows for nesting.

5.3.2.6. COLEOPTERA

(Coccinelidae) *Nephus quadrimaculatus* (Herbst, 1783) 4-spot Ivy Ladybird.

Status: **Red Data Book 2 [RDB2] (Vulnerable)**. Very localised, mainly in southeast England (http://data.nbn.org.uk/interactive/map – accessed November 2010) Majerus (1995) does not map this species. Local in Surrey (Denton, 2005), probably increasing range (Hawkins, 2000).

Habitat and ecology: Predatory. Associated with Ivy *Hedera helix* on walls and tree trunks. Known to predate the coccid *Phenacoccus aceris* in continental Europe, though this particular species of mealybug is not known to occur on Ivy (Hawkins, 2000).

Management and conservation:

- Retain Ivy on tree trunks.

(Scraptiidae) *Anaspis thoracica* (Linnaeus, 1758) a beetle.

Status: **Nationally Scarce B (Nb).** Widely scattered in Britiain and Ireland but infrequently found in numbers (Levey, 2009). Scarce in Surrey (Denton, 2005; Tenebrionoidea Recording Scheme dataset 2010).

Habitat and ecology: Saproxylic. Larvae have been reared from the dead-wood of a wide range of broadleaved trees (Levey, 2009). Adults from May to September, peaking in June/July. Adults do frequent hedgerow blossom (as in other common related species) but are perhaps more readily collected by beating tree foliage. Severa males (genitalia determination) beaten from foliage at TQ221586 on 10.vi.

Management and conservation:

- Retention of mature and semi-mature trees, woodland and hedgerows with evidence of decay in a range of situations.
- Fallen tree limbs etc should be left *in situ* where it is safe and practical to do so.
- Maintain sheltered scrub eco-tone into woodland and spring-flowering hedgerows.

5.3.2.7. ARACHNIDA

(Thomisidae: Philidrominae) *Philodromus albidus* Kulczynski, 1911 a crab spider.

Status and distribution: **Nationally Scarce B (Nb).** Southern restricted and may be numerous where found (Harvey *et al*. (eds.), 2002). Probably locally common in Surrey.

- *Habitat and ecology:* Arboreal. Associated with broad-leaved and / or mixed woodland edges where adults can be found on the lower branches of trees and scrub, including hedges. A single female beaten from English Oak Q*uercus robur* at woodland edge (TQ222586) on 28.vii.

Management and conservation:

- Retain areas of semi-open woodland with open rides and glades to increase edge habitat.
- Maintain continuity of linear shrub features such as hedgerows. 3.2.7. Other species of interest.

5.3.2.8 Other species of interest.

(Psocoptera: Psocidae) *Psococerastis gibbosa* (Sulzer, 1776) a barklouse. **Local.** Uncommon but widely scattered in Britain. The largest British psocid species. On branches of various deciduous and coniferous trees, where the species grazes micro-flora and/or general organic detritus. Beaten from English Oak *Quercus robur* in woodland at TQ222586 on 28.vii.

(Diptera: Tachinidae) *Oswaldia muscaria* (Fallén, 1810) a parasitic fly. **Local.** Scattered records from southern England and Wales (http://tachinidae.org.uk/site/get-map – accessed November 2010) and generally uncommon. The Surrey status is unclear. A parasite of various larger moth larvae. Swept from scrubby vegetation at TQ221589 on 10.vi. Provisional identification of a single adult voucher specimen. This has been sent to a specialist in the group for verification.

(Coleoptera: Apionidae) *Taeniapion urticarium* (Herbst, 1784) a weevil. **Local**. Southern restricted, rather localized but may be common where found (Morris, 1990). Rare in Surrey (Denton, 2005). Associated with Nettles *Urtica* spp., where the larvae feed in the stems and nodes. Swept from Common Nettle *Urtica dioica* at TQ221586 on 10.vi.

(Arachnida: Dysderidae) *Dysdera erythrina* (Walckenaer, 1802) Woodlouse Spider. **Local**. Very localised in Surrey, with only a handful of historic records, the most recent record being at Box Hill in 1989. A mainly southern species associated with old, undisturbed habitats. A predator of woodlice at ground level, usually under stones, logs etc. Male and Female located under flints on or near scrapes in the vicinity of TQ221591 on 06.v.

5.3.3. Assemblage composition

5.3.3.1. Invertebrate Species-habitat Information System (ISIS 2008)

Species assemblage information has been compiled using the ISIS 2008 (Invertebrate Species-habitat Information System; Webb & Lott, 2006) computer programme developed by Natural England. ISIS applications are detailed in Drake *et al*. (2007a), with further developments discussed by Lott (2008) due to be implemented by 2010, superceding the ISIS 2007 system.

Lott (2008) describes the essence of ISIS as a database that can be used to recognise invertebrate assemblage types in species lists and evaluate their value for nature conservation. In broad laymans terms ISIS has been described as the equivalent to an 'invertebrate National Vegetation Classification'. An explanation of the ISIS (2008) system based on Drake *et al*. (2007a) and Lott (2008) and adapted from the summaries given in Drake *et al*. (2007b) and Lott (2008) is presented below:

- Interprets species lists via recognition and conservation quality scoring of assemblage types present.
- Developed for Common Standards Monitoring (CSM) on Sites of Special Scientific Interest (SSSI) but other applications are possible at a range of geographic scales.
- Two levels of assemblage type are recognised (BAT & SAT) with a recently introduced (ISIS, 2008) third resource based category which sits outside of the hierarchy of ISIS (2007) :
    - 11 Broad Assemblage Types (BATs) characterised by more widespread species.
    - 17 Specific Assemblage types (SATs) characterised by stenotopic species of intrinsic nature conservation value.
    - A further 8 assemblage types dependant upon important habitat resources or environmental gradients. I have provisionally called these largely Resource-based Assemblage Types (RATs). RATs are habitat specific and are therefore shown as SATs in the results section of ISIS (2008).

- Scores generated for BATs:
    - Representation score – measures relative importance of the BAT represented in the species list on a scale of 1 – 100. On a small scale (e.g. a management unit within a site) this can provide a crude measure of ecological change. On a larger scale it is merely representative of the habitats sampled. Using the visibility threshold options can refine this score to show only assemblages of significance.
    - Rarity score – the mean of all the individual species rarity scores present in the assemblage. Rarity scores are based upon conservation status and / or distribution at a 10km sq resolution, similar to Species Quality Index scoring systems.
    - BAT species richness – A count of species coded to BAT.

- Scores generated for SATs:
    - Weighted species score – Equal to the number of species coded to a SAT, though species of particularly high fidelity may be weighted. Required for CSM □vailabili condition assessment (SSSI's only).
    - No. spp. – A count of species coded to SAT.
    - % of national species pool – No. spp. Divided by species index for SAT.
    - Related BAT rarity score – Rarity score of the parent BAT.

5.3.3.2. Assemblage composition results for Epsom Golf Course, 2010

The Broad Assemblage Types (BATs) present are identified using ISIS (2008) in Table 4. Four assemblages are noted at a threshold of >5 qualifying species, 10 species below the advised minimum threshold for SSSI's (Drake *et al*., 2007a). Stenotopic species (i.e. those able to adapt to a very narrow range of environmental specifications) were also assessed (Table 5) with three Specific Assemblage Types (SATs) identified. In total 256 species were inputted into the ISIS (2008) programme for assessment. Of these, a total of 212 species (83%) qualified for assessment.

Table 4. Qualifying Broad Assemblage Types present Epsom Golf Course, 2010

BAT code	BAT name	Representation (1-100)	Rarity score	Condition	BAT species richness	IEC
F2	grassland & scrub matrix	40	125		85	
A1	arboreal canopy	20	151		42	
F1	unshaded early successional mosaic	12	138		26	
A2	wood decay	6	158		13	0
Visibility threshold (total no. spp. Used to calculate rarity score)					5	

Four BAT's were identified, falling into two categories:

- 2 x Field layer assemblages (F1 & F2) totalling 111 spp. And represented by open grassland & scrub mosaic habitats (F2 = 85 spp.). [Reference should also be made to the related SAT's (F001 & F002, see Table 5 below)], and unshaded early successional mosaic (F1 = 26 spp.). These assemblages best describe those invertebrates recorded in the scrubby edges and unmown grasslands (roughs) of the course and the areas of regenerating bare chalk scrapes respectively.
- 2 x Arboreal assemblages (A1 & A2) totalling 55 spp. Were largely represented by plant-feeding (phytophagous) and predatory species of woodland and scrub (A1 = 42 spp.). Dead wood (saproxylic) specialists in the wood decay BAT (A2 = 13 spp.) form a lesser component, largely due to a lack of apparent dead wood resources and limited sampling techniques used for this habitat during the survey.

Table 5. Qualifying Specific and Resource-based Assemblage Types present Epsom Golf Course, 2010

SAT code	SAT name	No. spp.	Condition	Percentage of national species pool	Related BAT rarity score
F002	rich flower resource	15	fav	6	
F001	scrub edge	9		5	
A212	bark & sapwood decay	6		1	158
Visibility threshold (total no. spp. Used to calculate rarity score)				5	

Three SAT's were identified. Two of these 'specific' assemblage types, i.e. scrub edge and rich flower resource, should be considered as 'resource-based' assemblage types (RAT's).

- Rich flower resource (F002) included 15 spp. This is a field layer RAT and reflects the importance of herb-rich areas for pollinators, in particular the aculeate Hymenoptera. The default threshold for SSSI's is 15 associated species for favourable condition (Lott, 2008). **Favourable (by SSSI standards).**
- Scrub edge (F001) included 9 spp. This field layer associated RAT reflects the importance of scattered scrub in open habitats and scrub edge, such as scrubby woodland edges etc. The suggested species threshold for SSSI's is 11 associated species for favourable condition (Lott, 2008).
- Bark & sapwood decay (A212) included 6 spp. This is an arboreal canopy SAT identifying species entirely associated with dead and dying trees. This group is currently under review (Lott, 2008) and the default for an SSSI would be taken as 15 species. Other methods of ranking this group are perhaps more robust but require a greater threshold of species (Coleoptera only).

5.4. Discussion – Entomological assessment and management recommendations

5.4.1. General assessment

Poor weather conditions made sampling more difficult and reduced the activity of highly-mobile 'fair-weather' invertebrates, such as Butterflies, Bees, Wasps and Hoverflies. These groups are well reviewed with regards to their national status and undoubtedly more species characteristic of calcareous habitats await discovery at the site. However, the species recorded clearly show that the non-amenity/sports areas of the Golf Course support locally important assemblages of invertebrates, notably the rich flower resource – largely associated with the roughs and regenerating bare chalk scrapes – was found to be in favourable condition by SSSI standards, despite the site not being designated as such.

In general the mosaic of habitats, ranging from bare chalk and flower-rich grassland through to mixed scrub and sheltered woodland edges/glades, provides a useful balance of habitat resources for invertebrates. Specific management requirements for individual species of conservation importance are dealt with in section5. 3.2.

5.4.2. Calcareous grassland

Calcareous grassland on thin soil is one of the richest habitats for invertebrates (Kirby, 2001). Thin, dry soil stresses plants, causing them to put more effort into flowering and thus increasing the foraging resources available. Calcareous grasslands provide a rich flower resource for foraging invertebrates requiring access to sources of pollen and nectar. A diversity of native forbs is also essential for phytophagous, or plant-eating, species, e.g. leaf beetles (external feeders) and leaf-mining larvae (internal feeders) and provides opportunities for parasite/host interaction.

Analysis of the results for 'rich flower resource' generated by ISIS (2008) show that with 15 qualifying species, Epsom Golf Course was found to be in favourable condition by SSSI standards for this resource.

In many cases vegetation structure is as important (or more important) than vegetative species composition. In order to support the greatest possible range of invertebrate species grasslands should provide a mosaic of successional stages and vegetation structures (Kirby, 2001); including bare-ground, short turf, tussocks and scrub. Intimate mosaics can provide for many requirements in a small area. The interface and connectivity of these habitats at Epsom Golf Course is generally good given the primary function of the site as a sporting facility.

Herb rich grassland should be maintained with attention to the management of excessive scrub, which will eventually shade out the area to the detriment of the existing plant and invertebrate communities. It should be noted that existing areas with moderate densities of native scrub and rough, tussocky grasses etc are beneficial to invertebrates and should be maintained under a rotational management system (see section 4.6.).

5.4.3. Short turf

Short, open-structured turf on calcareous soil is a valuable feature that supports a characteristic fauna that is easily displaced through neglect (Kirby, 2001; Fry & Londsdale [eds], 1991). Though a varied structure is optimal, maintaining areas of short turf should be a management priority. Rotationally stripping areas of vegetation back to bare mineral soil and allowing natural regeneration to occur can achieve this.

5.4.4. Bare ground in grassland

Open, unshaded areas of bare ground, particularly those with a southerly aspect, are an important and often undervalued resource as bare ground warms up quickly in sunshine, thus providing:

- Valuable basking areas.
- Nesting areas for burrowing and ground-nesting invertebrates.
- Suitable foraging areas for visual predators.

The continuation of bare ground habitat creation through localised or piece-meal disturbance/turf stripping in open areas is therefore a priority. Piece-meal disturbance is also beneficial to many calcicolus plant species (see above).

5.4.5. Tussocky grassland

In general, moderately tall grassland supports a greater range of invertebrates than short turf (Kirby, 2001) though these species are often less specialised. At Epsom Golf Course the BAT 'grassland & scrub matrix' proved to be the most species-rich (85 associated species), though few of these species can be regarded as highly specialised.

Taller grassland offers opportunities for both endophagous species, which develop in stems (inc. dead-stems) and seed-pods etc (e.g. Tephritid flies in Knapweed heads), and species dependant on the actual structure, e.g. burnet moths, many spiders etc. Grass tussocks themselves provide a differing micro-climate from that of their surroundings; offering sheltered and comparatively humid conditions which harbour a characteristic community of invertebrates and suitable conditions for over-wintering. Overall management should aim to provide a mosaic of grassland structures that interface with each other. At the time of survey the connectivity and interface with other habitats (e.g. scrub, bare ground etc) was found to be adequate.

5.4.6. Grassland scrub

Calcareous grassland supports a greater diversity of scrub species than other grassland types (Kirby, 2001), which in turn support a wealth of invertebrates. Areas of calcicolous scrub represent the next stage in succession to woodland from areas of rank, tussocky grassland and should be rotationally managed to prevent succession of large areas of the site to shaded scrubby woodland. Periodic scalloping and glading of existing blocks of grassland scrub/scrub-edge would provided a continuity of sheltered micro-climates and habitat niches whilst arresting scrub succession on a long-term basis.The soft-interface, where tussocky grassland meets scrub / hedgerow habitat, is to be encouraged.

5.4.7. Woodland, scrub-edge and hegerows

As previously mentioned, calcareous habitats support a wealth of shrub species, many of which blossom and fruit heavily, providing important seasonal resources for invertebrates. Scrub-edge habitat also provides a soft eco-tone or interface habitat between open grassland and closed canopy woodland. Hedgerows and linear scrub features can aid connectivity between woodland habitats for less mobile species. These features, where they exist on the site, should be managed to ensure a continuity of habitat.

The areas of woodland across the site require little management to maintain the *status quo*, although a programme of occasional coppicing, glading and/or widening of rides to allow more light in would be beneficial.

Dead-wood should be retained in all situations, standing or fallen, where it is safe to do so. It should also be noted that fallen trees and branches are of greater benefit to invertebrates when left entire *in-situ*, as opposed to being tidied up into neat piles. Where larger trees are present within the woodland these should be gradually freed of competition using a technique widely known as 'haloing', whereby the encroaching vegetation is progressively thinned out, allowing more light and air to penetrate and encouraging robust open growth habits. It is stressed that this should be a gradual process over the course of several years at least.

5.5 Acknowledgements

Many thanks to Mr Graham Collins for confirmations or determinations of Lepidoptera; Peter Harvey and Jonty Denton for useful discussion on the Surrey status of Dysdera erythrina and Epsom Golf Club for supporting this survey work.

5.7.1. Status categories for uncommon species.

Criteria for allocation of Red Data Book (nationally rare) and Nationally Scarce (notable) statuses are varied and complex. I have followed the British Red Data Book for insects (Shirt, 1987) with reference to the subsequent JNCC reviews, which also include notable species. The Red Data Book and its subsequent reviews are already in need of updating and I have made reference to this in the text for individual species where it is applicable as many species have had range expansions or contractions in recent years.

- **Red Data Book category 1. RDB1 – Endangered**. Occurring only as a single population or otherwise in danger of extinction.

- **Red Data Book category 2. RDB2 – Vulnerable**. Likely to move into the RDB1 Endangered category if causal factors continue, species declining in their range, species in vulnerable habitats.

- **Red Data Book category 3. RDB3 – Rare**. Species estimated to occur in 15 or fewer of the 10km squares in the national Ordnance Survey grid since 1970. Localised within a restricted geographical area or thinly scattered over a more extensive range.

- **Red Data Book category I. RDBI – Indeterminate**. Taxa considered Endangered, Vulnerable or Rare, but where there is not enough information to assign to category (RDB1 – 3).

- **Red Data Book category K. RDBK – Insufficiently known**. Taxa suspected, but not definitely known due to lack of information, to be Endangered, Vulnerable or Rare.

- **Provisional Red Data Book (X). pRDB(X).** The prefix 'p' before any RDB category implies a provisional grading.

- **Nationally Scarce (Notable) category A – NA**. Very local species, thought to occur in 16 to 30 of the 10km squares of the national Ordnance Survey grid since 1970, or within 7 or fewer Vice-counties for less well recorded groups.

- **Nationally Scarce (Notable) category B – NB**. Very local species, thought to occur in 31 to 100 of the 10km squares of the national Ordnance Survey grid since 1970, or between 8 and 20 Vice-counties for less well recorded groups.

- **Nationally Scarce (Notable).** Very local species, thought to occur in 16 to 100 of the 10km squares of the national Ordnance Survey grid since 1970, or between 1 and 20 Vice-counties for less well recorded groups. Sub-division into categories NA and NB has not been attempted due to lack of data.

- **Local**. Species that are restricted in distribution either geographically or by habitat. Also used for species that are widespread but infrequently encountered, e.g. encountered in no more than 300 10km squares of the national Ordnance Survey grid since 1970.

- **Unknown**. Usually indicates a lack of available data for difficult taxa but may also imply recent taxonomic confusion.

8.0 Management Recommendations

The following lettered sections are marked on Figure 2

Woodland/scrub areas

A It is recommended here to open out the tee by preferentially clearing the Sycamore trees, occasional Pedunculate Oaks as well. The majority of the Hawthorns should be left to create a scrub edge. In the long term this will require sequential clearing to chalk grassland and then re-establishment allowed through seeding in order to maintain the scrub edge. The majority of the Dogwood should be cleared (ie cut down to the ground) and then left to regrow as a low level scrub layer.

B Another major project would be to take out all scrub down through the fairway from Buckle's Gap corner north towards the clubhouse. This would help to produce a wide vista with views towards London, whilst also helping to encourage a more diverse chalk grassland fairway rough.

C The woodland edge on this side should be pushed back to produce a better scrub edge. This will also have the added advantage of widening the grassland and producing better views. In addition the existing Hawthorn scrub should be cut back and continue to do so every 4/6 years to to produce a variety of scrub ages.

D The woodland along the edges and to the north should be pushed back to encourage more of the rough chalk grassland and scrub edge. Do so in wavy bays, whilst using the remaining woodland along the road edge as a boundary habitat and shelter for the grassland.

E In general there is better structure on edges than the central component, where Pedunculate Oaks are thin and straggly and struggling for light and space thus casting too much shade and subduing the shrub and field layers. Therefore in the main, non-intervention is recommended, and management efforts should continue to focus on the edge and ride habitat. Winter work has already concentrated efforts into pushing some of the woodland around the tees to make wider fairways, but also eventually create a scrub edge. The existing main path through the centre of the southern woodland section should be widened to approximately 10m to 15m wide by gently scalloping the edges. This will allow more light onto the woodland floor, and in turn help diversify the woodland structure. The edges will then gradually scrub over, again producing a valuable woodland habitat. This as with all of the woodland management work will need to be done over the long term with continued funding and labour.

F If funding were made available, then thought should go to creating a west/east running ride through the middle of the woodland. The direction of rides are very important as a south facing linear pathway will receive more light than other directions and will

produce a more varied habitat. The rest of the woodland require a programme of thinning or group felling as as to fester future timber value alongside the diversification of the stands by natural regeneration in the group fells. Then the future small scale harvesting of oak butts will allow the sale of firewood, a rapidly growing market. It is possible that some of the trees are of sufficient size and value which could realise some income and offset costs of contractors or fund other management work. Also the patch-coppicing of oaks on the woodland edge will help diversify the age structure of the woodland whilst still providing shelter. This could be carried out by a coppice worker.

G The interplanting of the thin line of Hawthorn and other trees along the edge of Grandstand Road and running towards the Grandstand roundabout, with more Hawthorn.

H Remove the non-native Snowberry, Spanish Bluebell and Michaelmas Daisy found on the northern edge of the southern woodland section. This can be done by pulling, although the Michaelmas Daisy may also need some herbicide spraying to get it off the site completely.

I Here are a couple of over mature and dying trees beside the Old London Road which are particularly useful for local invertebrate activity and therefore should be left.

Scrub/grassland areas

J As a matter of priority the scrub should be heavily cleared back in this area to create a 10-15m wide circular area around the former bunker. Then a circular edge of scrub can be allowed to grow back, whilst the rest of the bunker is left open. This should be managed then on an annual basis to keep up with the manaintance and monitored. The scrub at the back of the bunker should also be pushed back into the woodland and a 2m to 3m wide ride created down the very overgrown path towards the 18th tee. This project will then connect with the work proposed on the northern side of the woodland where some further scrub and woodland clearance would also help to encourage back the former species rich chalk grassland. This would also help to support to expansion of the Kidney Vetch into a larger population with the aim of the re-establishment of a metapopulation of Small Blue butterfly in this area. They would be able to take advantage of a range of aspects and shelter in a small area not otherwise present elsewhere on the course and therefore would be of value for the future conservation of this BAP species.

This may be done with the Lower Mole Countryside Management Project, with the proviso that subsequent management must be budgeted into the ongoing annual management on the golf course. This area must be annually cleared back to ensure that it does not become overgrown again. In a couple of years time scrapes should be created to produce bare ground habitat for the Kidney Vetch as well as other species that require this type of habitat. The spoil should be deposited into the woodland.

The Canadian Goldenrod in the bunker area is of concern. Whilst there is very little there, it makes it an ideal time to get rid of it by pulling. Inevitably there will be a lot of seed in the soil bank and therefore it should be monitored on an annual basis, pulling frequently as soon as it comes up and regularly during the summer as and when is possible.

K This rough area does not appear to have the clippings taken off (or at least they were left on at the time of the site visit) and is producing a thatch, which in turn will lead to a decrease in diversity. Therefore, as will all the grassland areas, the arisings should be taken off the site. Alternatively it might be possibly to set the mower to a very fine cut, this would stop the thatch, although this method still adds unwanted nutrients back into the soil and therefore is not the ideal approach. Scarifying could also be employed to great effect, to gently open up some bare ground.

L The Juniper bushes have been monitored this year by Eileen Taylor and Peter Wakeham from Surrey Botanical Society for the Juniper Rare Plant survey. They are all males and in need of some low key management. The ones at TQ2230 5895 requires the removal of a lower branch from an overhanging Sycamore to allow the Juniper a little more room and light. In addition there is a Norway Maple sapling that should be removed before it too gets too big. The Cotoneaster is this area should also be removed as it is a non-native species and will start to spread.

M Continue to cut back the Dogwood scrub to produce scalloped edges.

N In this area there are two paths parallel to the boundary edge, that create two ride habitats. The one closest to the boundary is used more frequently by dog walkers and therefore naturally kept open. It is therefore suggested that this one be maintained as a wide ride by cutting the grass once a year with the arisings taken off. An alternative low maintenance option would be to only cut once every three years. In addition the scrub edges will need to be cut back periodically to ensure a variety of age ranges and so it doesn't encroach. The second less used path, should be less obviously or intensively managed. This will create a slightly different habitat type that is less well used by walkers. This can be achieved by cutting back 3-5m shallow bays of scrub on alternate sides of the path every 5 years. The associated grassland should be cut back at the same time.

O Go in behind present (2008) scrapes and create new ones, preferentially over any concentrations of Tor grass. This will ensure the expansion of the highly valuable Small Blue food plant, Kidney Vetch

P This patch of Michaelmas Daisy should be eradicated. This can be done by covering with a staked down taurpaulin. Also in this area is a small, but dense patch of Early Goldendrod, this should be monitored and if it continues to spread, then it should be pulled.

Q If general maintainence were to be persued here, then it would be in the form of non-intervention for the woodland, then encouragement of a dense scrub around the outside, with wide and deep bays along the edge of shorter, younger scrub/tall vegetation and rough chalk grassland. However, the following approach has been suggested by Nick Owen (LMCMP) and should be regarded as the better more proactive approach that will increase the overall species rich chalk BAP grassland. Substantial areas of the scrub and woodland (up to 70%) should be cleared and restored to chalk grassland.

R On the road side the scrub should be management by clearing bays away and perhaps scarifying the ground. In addition Gail Jeffcoate (Butterfly Conservation) and Conor Morrow (LMCMP) visited the golf course in autumn 2010 and put forward the following suggestion. There is a need for a row of scrapes next to Burgh Heath Road, along the edge of mature Hawthorn scrub (on the side away from the track and road, facing the open fairway betweetn TQ2189058850 and TQ2203058950. The resulting spoil could be used to create some banks behind the scrapes.

S The rough here is generally cut in the spring then again in late August with the bars set to a 2/3cm height. This seems to be a successful regime and the Round-headed Rampion are thriving in good numbers. As will all roughs, it is important to remove all arisings.

T Punch through the scrub edges to produce tongues of open grassland that will readily scrub over, to then be reopened in 8-10 years time.

U Leave as longer grassland, cut some areas annually and leave a wide margin around the Hawthorn scrub. Preferentially cut the Pedunculate and Turkey Oak in this area between the Grandstand roundabout and the seventh tee. Replace with locally sourced junipers available from LMCMP.

Management Recommendations Summary Table
Use in conjunction with Figure 2

Key – Lower Mole Countryside Management Project – LMCMP
Greenskeeper Team – GR. Team
Prioity – 1 – High
- **2 – Recommended**
- **3 – Desirable**
- **R/M – Review/Monitor**

Area (Target Note)	Description of Work	Who	Timescale	Financial Year 11	12	13	14	15
A	**Tree/scrub clearance** • Preferentially clear Sycamore to open up tee. • Hawthorns to be left to create scrub edge and future management should incorporate sectional coppicing. • Dogwood to be cut back down to ground level, left to regrow to create low level scrub.	Tree contractors/GR Team	Winter task (Nov – Feb)	1				
B	**Scrub clearance** • Take out 70% scrub down through the fairway from Buckle's Gap corner towards the Clubhouse.	GR Team/LMCMP	Winter task (Nov – Feb)	1				
C	**Woodland/scrub clearance** • Push back the woodland by 10m to 15m in 20m to 30m long scallops. • Cut back existing Hawthorn scrub in sections to produce variety of ages. • Re cut scallops and scrub after 5 years.	GR Team	Winter task (Nov – Feb)		1			
D	**Woodland/scrub clearance** • Cut back woodland, whilst leaving wide strip adjacent to road edge. • Cut back 30% of exisiting scrub to create age variety. • Some trees to be ring barked, crown taken off and left, 'haloed'. • Other dead wood to be left in situ. • Leave 8-12 log piles in variety of conditions, shaded, sunny, under scrub or woodland.	GR Team	Winter task (Nov – Feb)		2			
E & F	**Woodland Ride** • Use coppice worker to thin though woodland or group fell in sections to take advantage of potential future timber firewood, whilst diversifying woodland and creating better age structure. • Some trees to be ring barked, crown taken off and left, 'haloed'. • Other dead wood to be left in situ. • Leave 8-12 log piles in variety of conditions, shaded, sunny, under scrub or woodland. • Consider creating a linking ride running east/west from the main path towards the Grandstand roundabout.	GR Team	Winter task (Nov – Feb)		3			
~~**G**~~	~~**Scrub enhancement**~~ ~~• Interplant Hawthorn and other trees with Hawthorn whips.~~	~~GR Team~~ **Deleted August 2012 after July meeting with Epsom (IG).**	~~Winter task (Nov – Feb)~~			~~3~~		
H	**Non-native removal** • Remove non-native Snowberry, Spanish Bluebell and Michaelmas Daisy from northern woodland edge. • To be pulled in preference, spraying is a last option for the Michaelmas Daisy.	GR Team	Winter task (Nov – Feb)	1				
I	**Mature trees** • Non-intervention for mature trees in this area, monitor. Unless health and safety issues. **Added August 2012 after July meeting with Epsom (IG).**	GR Team	Annual task	M	M	M	M	M
J	**Bunker** • Clear scrub by 20m to 30m in the bunker and around the edges. • Include scrub clearance around the top of the bunker. • Also clear a 3m to 4m wide ride towards the 18th fairway. • Scrub then should be checked and cleared on an annual basis. • Create 6 to 10 hand scrapes (75cm by 75cm), down to bare chalk & some soil. • Use nearby woodland to pile spoil, take off site. • Remove Canadian Goldenrod and monitor or regrowth.	GR Team Contractors (ask LMCMP)	Winter task (Nov – Feb) – scrub/scrapes Summer task ((May – July) – Canadian Goldenrod removal.	1				

Area (Target Note)	Description of Work	Who	Timescale	Financial Year 11	12	13	14	15
General grassland, including K	**Mowing** • All clippings to be taken off site and composted. • Cut to height of 10-12cm with wavy margin. • Relax mowing where possible for widest roughs. • Set mowers to highest bar possible. • Avoid use of artifical fertilisers. • Purchase and use forage harvester & baler. **Tor grass** • Cut twice a year in Spring (May) and Autumn (September) strimmed to 7cm. • Arisings to be taken off. • Use brushcutters or scythes. • Monitor & consider herbide application.	GR Team	Mowing – Later summer (ie late Aug – early Oct) on annual basis Strimming Tor grass – in Spring (May) and again in Autumn (Sep) on annual basis	1 2	1 1	1 2	1 1	1 2
L	**Juniper** • TQ2230 5895 needs the removal of a lower Sycamore branch and removal of a Norway Maple sapling. • Possible further planting of female Junipers from LMCMP stock (local provenance) • Cotoneaster in this area should also be removed.	GR Team/LMCMP	Winter task (Nov – Feb)	1				
M	**Scrub clearance** • Continue to clear away Dogwood scrub on fairway edges	GR Team	Winter task (Nov – Feb)	1	1	1	1	1
N	**Path clearance** • Path closest to boundary edge requires wide scrub clearance with annual (or every three year) grass path cutting. • Arisings to be taken off site. • The second, less well used path, to have 3m to 5m shallow bays of cut back scrub along the edge on alternate sides. The grassy path should be cut annually with the arisings taken off.	GR Team	Winter task (Nov – Feb)				1	
O	**Scrapes** • Go in behind 2008 scrapes and create new ones, preferentially over existing Tor grass. • Create 6 to 10 hand scrapes (75cm by 75cm) & excavator scrapes (1m by 2m), down to bare chalk & some soil. • Prioritise areas where there is Tor grass. • Use nearby woodland to pile spoil, take off site, or create south facing bunds. • Monitor hand & excavator scrapes.	Hand scrapes – LMCMP volunteers. Machinery scrapes – LMCMP in conjunction with GR Team. Review – vegetation colonisation using LMCMP or ecologist contractor.	Hand scrapes – Winter task, yearly, avoid May – July. Machinery scrapes – ideally every 2-3 years, but dependent on the viability of machinery. Review during summer years in 5 years.	1				
P	**Invasive species** • Removal of Michaelmas Daisy either by cutting/spraying or staking down a tarpaulin over the area. • Monitor and review.	GR Team	Winter task (Nov – Feb)	1				
Q	**Scrub** • Major cutting back of scrub and woodland from pathway and edges by up to 70% to recreate large area of species rich chalk grassland. • There is potential to sell the resulting woodland for firewood. • Some trees to be ring barked, crown taken off and left, 'haloed'. • Other dead wood to be left in situ. • Leave 8-12 log piles in variety of conditions, shaded or sunny in the under scrub.	Major scrub management, tree haloing & scrub/woodland edge scallops – using contractors under supervision of LMCMP & GR Team	Winter task (Nov – Feb) gradual work, up to 30% cut back every two years, then review two years after.				1	
R	**Scrub/scrapes** • Clear bays of scrub from road side. • Scarify the bare ground. • Create a row of scrapes on the fairway side of the scrub between TQ2189058850 and TQ2203058950. Use spoil to create south facing banks behind scrapes.	GR Team	Winter task (Nov – Feb)		1			
S	**Rough** • Continue with the current regime of cutting in Spring and then again in late August with the bars set to 2/3cm height. • Remove arisings.	GR Team	Winter task (Nov – Feb)	1	1	1	1	1
T	**Scrub** • ~~Punch~~ Break up scrub intermittently to produce tongues of scrub on a 6 to 8 year rotation. . **Deleted/added August 2012 after July meeting with Epsom (IG).**	GR Team	Winter task (Nov – Feb)			2		
U	**Scrub/grassland**	GR Team	Winter task (Nov – Feb)	2	2	2	2	2

Area (Target Note)	Description of Work	Who	Timescale	Financial Year 11	12	13	14	15
	• Leave grassland long and uncut as a wide margin around the Hawthorn scrub. • Preferentially cut Penduculate Oak and Turkey Oak between the Grandstand roundabout ~~and seventh tee and plant up with local Juniper from LMCMP~~. Juniper to be planted on roundabout nearest to Golf Club. . **Deleted/added August 2012 after July meeting with Epsom (IG).**							
General – Fixed point photography	**Surveys & Monitoring** • Fixed points established in key habitat areas. Also continue photo monitoring of areas before and after conservation management. LMcmP have already established a programme on Juniper Hill.	R Team & LMCMP	Annual task	1	1	1	1	1

9.0 Botanical Species List

Species list recorded during Summer 2010 (Girvan I)

Scientific name	Common name	Abundance
Acer platanoides	Norway Maple	R
Achillea millefolium	Yarrow	F
Aegopodium podagraria	Ground-elder	LF
Aesculus hippocastanum	Horse-chestnut	R
Agrimonia eupatoria	Agrimony	LF
Agrostis capillaris	Common Bent	F
Agrostis stolonifera	Creeping Bent	O
Alliaria petiolata	Garlic Mustard	R
Alopecurus pratensis	Meadow Foxtail	R
Anisantha sterilis	Barren Brome	R
Anthriscus sylvestris	Cow Parsley	F
Anthyllis vulneraria	Kidney Vetch	LF
Arrhenatherum elatius	False Oat-grass	F
Arum maculatum	Lords-and-ladies	R
Asperula cynanchica	Squinancywort	R
Aster sp.	A michaelmas-daisy	R
Ballota nigra	Black Horehound	R
Bellis perennis	Daisy	R
Betula pendula	Silver Birch	F
Brachypodium pinnatum	Tor-grass	LA
Brachypodium sylvaticum	False-brome	LF
Briza media	Quaking-grass	LF
Bromopsis erecta	Upright Brome	LF
Bromus hordeaceus	Soft-brome	R
Bryonia dioica	White Bryony	R
Buddleja davidii	Butterfly-bush	R
Calystegia sepium	Hedge Bindweed	R
Campanula rotundifolia	Harebell	R
Carex flacca	Glaucous Sedge	LF
Carex pendula	Pendulous Sedge	R
Centaurea nigra	Common Knapweed	F
Centaurea scabiosa	Greater Knapweed	O
Cerastium fontanum	Common Mouse-ear	R
Chaenorhinum minus	Small Toadflax	R
Chamerion angustifolium	Rosebay Willowherb	R
Chenopodium album agg.	Fat Hen	R
Cirsium acaule	Dwarf Thistle	LF
Cirsium arvense	Creeping Thistle	LF
Clematis vitalba	Traveller's Joy	LF

Scientific name	Common name	Abundance
Clinopodium vulgare	Wild Basil	R
Cochlearia danica	Danish Scurvygrass	R
Convolvulus arvensis	Field Bindweed	R
Cornus sanguinea	Dogwood	F
Corylus avellana	Hazel	R
Cotoneaster sp.	A cotoneaster	R
Crataegus monogyna	Hawthorn	A
Dactylis glomerata	Cock's-foot	F
Dactylorhiza fuchsii	Common Spotted-orchid	R
Daucus carota ssp. Carota	Wild Carrot	F
Digitalis purpurea	Foxglove	R
Epilobium parviflorum	Hoary Willowherb	R
Erophila verna sensu Stace	Common Whitlowgrass	R
Euphrasia officinalis agg.	Eyebright	R
Fagus sylvatica	Beech	R
Fallopia baldschuanica	Russian Vine	R
Fallopia convolvulus	Black Bindweed	R
Festuca arundinacea	Tall Fescue	R
Festuca gigantea	Giant Fescue	R
Festuca ovina agg.	Sheep's Fescue [agg.]	LF
Festuca pratensis	Meadow Fescue	R
Festuca pratensis x Lolium perenne	A grass	R
Festuca rubra agg.	Red Fescue	A
Filipendula vulgaris	Dropwort	LF
Fraxinus excelsior	Ash	R
Galega officinalis	Goat's-rue	R
Galium aparine	Cleavers	F
Galium verum	Lady's Bedstraw	R
Geranium molle	Dove's-foot Crane's-bill	R
Geranium robertianum	Herb-robert	O
Geum urbanum	Herb Bennet	R
Hedera helix	Ivy	F
Helianthemum nummularium	Common Rock-rose	R
Heracleum sphondylium	Hogweed	O
Holcus lanatus	Yorkshire-fog	F
Hordeum murinum	Wall Barley	R
Hyacinthoides hispanica	Spanish Bluebell	R
Hyacinthoides non-scripta	Bluebell	R
Hypericum hirsutum	Hairy St. John's-wort	O
Hypericum perforatum	Perforate St. John's-wort	F
Ilex aquifolium	Holly	LF
Juniperus communis	Juniper	R
Lamium album	White Dead-nettle	O

Scientific name	Common name	Abundance
Lapsana communis	Nipplewort	R
Lathyrus nissolia	Grass Vetchling	LF
Lathyrus pratensis	Meadow Vetchling	R
Leontodon hispidus	Rough Hawkbit	R
Lepidium campestre	Field Pepperwort	R
Leucanthemum vulgare	Oxeye Daisy	LF
Ligustrum vulgare	Wild Privet	LA
Linaria purpurea	Purple Toadflax	R
Linaria vulgaris	Common Toadflax	R
Linum catharticum	Fairy Flax	R
Lolium perenne	Perennial Rye-grass	F
Lotus corniculatus	Common Bird's-foot-trefoil	F
Luzula campestris	Field Wood-rush	R
Malus domestica	Apple	R
Malva sylvestris	Common Mallow	R
Matricaria discoidea	Pineapple Weed	R
Medicago lupulina	Black Medick	R
Medicago sativa ssp. Sativa	Lucerne	R
Mercurialis perennis	Dog's Mercury	R
Moehringia trinervia	Three-nerved Sandwort	R
Mycelis muralis	Wall Lettuce	R
Odontites vernus	Red Bartsia	LF
Onobrychis viciifolia	Sainfoin	R
Ononis repens	Common Restharrow	R
Origanum vulgare	Wild Marjoram	R
Pastinaca sativa ssp. Sativav	Wild Parsnip	LA
Phelum retense sens.str	Timothy	F
Phleum bertolonii	Smaller Cat's-tail	R
Phyteuma orbiculare	Round-headed Rampion	R
Picris echioides	Bristly Oxtongue	R
Pilosella officinarum	Mouse-ear-hawkweed	R
Pinus sylvestris	Scots Pine	R
Plantago lanceolata	Ribwort Plantain	R
Plantago major	Greater Plantain	R
Poa annua	Annual Meadow-grass	R
Poa pratensis	Smooth Meadow-grass	F
Polygala calcarea	Chalk Milkwort	R
Polygonum aviculare	Knotgrass	R
Populus alba x tremula	Grey Poplar	R
Populus tremula	Aspen	R
Potentilla anserina	Silverweed	R
Potentilla reptans	Creeping Cinquefoil	R
Primula veris	Cowslip	LF
Prunus avium	Wild Cherry	R

Scientific name	Common name	Abundance
Prunus domestica ssp. Domestic	Plum	R
Prunus spinosa	Blackthorn	LA
Pyracantha sp.	Firethorn sp.	R
Quercus cerris	Turkey Oak	R
Quercus ilex	Evergreen Oak	R
Quercus robur	Pedunculate Oak	F
Ranunculus acris	Meadow Buttercup	R
Ranunculus ficaria	Lesser Celandine	R
Ranunculus repens	Creeping Buttercup	O
Reseda lutea	Wild Mignonette	LF
Rosa canina agg.	Dog Rose	LF
Rubus fruticosus agg.	Bramble	F
Rumex obtusifolius	Broad-leaved Dock	R
Rumex sanguineus	Wood Dock	R
Sagina apetala ssp. Apetala	Annual Pearlwort	R
Sambucus nigra	Elder	F
Sanguisorba minor ssp. Minor	Salad Burnet	F
Saxifraga tridactylites	Rue-leaved Saxifrage	R
Scabiosa columbaria	Small Scabious	LF
Senecio jacobaea	Common Ragwort	O
Senecio vulgaris	Groundsel	R
Silene dioica	Red Campion	R
Silene vulgaris ssp. Vulgaris	Bladder Campion	R
Sisymbrium officinale	Hedge Mustard	R
Solanum dulcamara	Bittersweet	R
Solidago canadensis	Canadian Goldenrod	R
Solidago gigantea	Early Goldenrod	R
Sorbus aria agg.	Whitebeam	R
Sorbus aucuparia	Rowan	O
Spergula arvensis	Corn Spurrey	R
Stachys sylvatica	Hedge Woundwort	R
Stellaria media	Common Chickweed	R
Symphoricarpos albus	Snowberry	R
Tanacetum vulgare	Tansy	R
Taraxacum officinale agg.	Dandelion	F
Taxus baccata	Yew	R
Thymus polytrichus	Wild Thyme	R
Tilia cordata x platyphyllos	Lime	R
Torilis japonica	Upright Hedge-parsley	LA
Tragopogon pratensis	Goat's-beard	R
Trifolium pratense	Red Clover	O
Trifolium repens	White Clover	LF
Tussilago farfara	Colt's-foot	R
Ulex europaeus	Gorse	R

Scientific name	Common name	Abundance
Urtica dioica	Common Nettle	F
Veronica arvensis	Wall Speedwell	R
Veronica chamaedrys	Germander Speedwell	O
Veronica filiformis	Slender Speedwell	R
Veronica polita	Grey Field-speedwell	R
Viburnum lantana	Wayfaring-tree	R
Vicia cracca	Tufted Vetch	R
Vicia sativa	Common Vetch	R
Vicia sepium	Bush Vetch	R
Viola sp.	A violet	R
Viscum album	Mistletoe	R

8.0 Invertebrate Species List

Species list for Epsom Golf Course invertebrate survey2010, detailing statuses and assemblage affiliations as defined by ISIS (2008). RDB and Nationally Scarce species are shown in bold type.

Order	Family/Sub-family	Taxon	Vernacular	Status	Rarity	BAT	SAT	Comment
Orthoptera	Acrididae	*Omocestus viridulus*	Common Green Grasshopper	Common	1	F2	0	Roughs
Orthoptera	Acrididae	*Chorthippus brunneus*	Common Field Grasshopper	Common	1	F2	0	Roughs
Orthoptera	Acrididae	*Chorthippus parallelus*	Meadow Grasshopper	Common	1	F2	0	Roughs
Orthoptera	Meconematidae	*Meconema thalassinum*	Oak Bush Cricket	Common	1	A1	0	On Oak
Orthoptera	**Tettigoniidae**	***Metrioptera roeselii***	**Roesel's Bush Cricket**	**Nb**	**4**	**F2**	**0**	**Roughs**
Dermaptera	Forficulidae	*Forficula auricularia*	Common Earwig	Common	1	0	0	Fairly common on a variety of shrubs across site.
Psocoptera	Elipsocidae	*Elipsocus pumilis*	a bark louse	Common	-	-	-	Woodland
Psocoptera	Elipsocidae	*Elipsocus sp.*	a bark louse	Unknown	-	-	-	Indeterminate males.
Psocoptera	Mesopsocidae	*Mesopsocus immunis*	a bark louse	Common	-	-	-	Woodland. Gen. det.
Psocoptera	Psocidae	*Psococerastis gibbosa*	a bark louse	Local	-	-	-	Woodland. On Oak.
Psocoptera	Psocidae	*Loensia fasciata*	a bark louse	Common	-	-	-	Woodland
Psocoptera	Stenopsocidae	*Graphopsocus cruciatus*	a bark louse	Common	-	-	-	Woodland
Auchenorrhyncha	Cercopidae	*Philaenus spumarius*	a hopper	Common	1	0	0	Roughs
Auchenorrhyncha	Cercopidae	*Neophilaenus lineatus*	a hopper	Common	1	F2	0	Roughs
Auchenorrhyncha	Cicadellidae	*Iassus lanio*	a hopper	Common	1	A1	0	Woodland
Auchenorrhyncha	Cicadellidae	*Aphrodes makarovi*	a hopper	Common	1	F2	0	Roughs
Auchenorrhyncha	Cicadellidae	*Euscelis incisus*	a hopper	Common	1	F2	0	Male gen.det. using B&N 2004
Auchenorrhyncha	**Cicadellidae**	***Athysanus argentarius***	**a hopper**	**Nb**	**2**	**F2**	**0**	**Roughs**
Auchenorrhyncha	Cicadellidae	*Mocydia crocea*	a hopper	Common	1	F2	0	
Auchenorrhyncha	Cicadellidae	*Eupteryx urticae*	a hopper	Common	1	F2	0	Woodland edge
Auchenorrhyncha	Delphacidae	*Eurybregma nigrolineata*	a hopper	Local	2	0	0	Local. Gen.det. Voucher lost during setting.
Heteroptera	Acanthosomatidae	*Acanthosoma haemorrhoidale*	Hawthorn Shieldbug	Common	1	A1	0	On Hawthorn
Heteroptera	Anthocoridae	*Acompocoris alpinus*	a predatory bug	Common	1	A1	0	
Heteroptera	Anthocoridae	*Anthocoris confusus*	a predatory bug	Common	1	A1	0	On Oaks
Heteroptera	Anthocoridae	*Anthocoris nemoralis*	a predatory bug	Common	1	A1	0	
Heteroptera	Coreidae	*Coreus marginatus*	a leatherbug	Common	1	F2	0	Nr. scrapes on Brambles
Heteroptera	Coreidae	*Coriomerus denticulatus*	a leatherbug	Common	1	F1	0	On seed heads of Trifolium
Heteroptera	Cydnidae	*Sehirus bicolor*	a shieldbug	Common	1	F2	0	Beaten from Lamium album.
Heteroptera	Lygaeidae	*Cymus melanocephalus*	a ground bug	Common	1	F2	0	
Heteroptera	Miridae	*Adelphocoris lineolatus*	a plant bug	Common	1	F2	0	
Heteroptera	Miridae	*Calocoris stysi*	a plant bug	Common	1	F2	0	

Order	Family/Sub-family	Taxon	Vernacular	Status	Rarity	BAT	SAT	Comment
Heteroptera	Miridae	*Calocoris striatellus*	a plant bug	Common	1	A1	0	Woodland
Heteroptera	Miridae	*Capsus ater*	a plant bug	Common	1	F2	0	Roughs
Heteroptera	Miridae	*Liocoris tripustulatus*	a plant bug	Common	1	F2	0	Nettles
Heteroptera	**Miridae**	***Lygus pratensis***	**a plant bug**	**RDB3**	**8**	**F2**	**0**	**Roughs**
Heteroptera	Miridae	*Miris striatus*	a plant bug	Common	1	A1	0	Woodland
Heteroptera	Miridae	*Phytocoris ulmi*	a plant bug	Common	1	A1	0	On Hawthorn
Heteroptera	Miridae	*Phytocoris varipes*	a plant bug	Common	1	F2	0	
Heteroptera	Miridae	*Stenodema calcarata*	a plant bug	Common	1	F2	0	Roughs
Heteroptera	Miridae	*Stenodema laevigata*	a plant bug	Common	1	F2	0	Roughs
Heteroptera	Miridae	*Cyllecoris histrionius*	a plant bug	Common	1	A1	0	On Oaks
Heteroptera	Miridae	*Heterotoma planicornis*	a plant bug	Common	1	F2	0	Nettles
Heteroptera	Miridae	*Pilophorus perplexus*	a plant bug	Local	2	A1	0	On Oak
Heteroptera	Miridae	*Harpocera thoracica*	a plant bug	Common	1	A1	0	Final instar nymphs on Quercus robur.
Heteroptera	Miridae	*Oncotylus viridiflavus*	a plant bug	Local	2	F2	F211	On C.nigra.
Heteroptera	Miridae	*Plagiognathus arbustorum*	a plant bug	Common	1	F2	0	
Heteroptera	Miridae	*Plagiognathus chrysanthemi*	a plant bug	Common	1	F1	0	
Heteroptera	Miridae	*Psallus perrisi*	a plant bug	Common	1	A1	0	On Oaks. Gen. det.
Heteroptera	Miridae	*Psallus varians*	a plant bug	Common	1	A1	0	On Oak. Gen. det.
Heteroptera	Pentatomidae	*Dolycoris baccarum*	a shieldbug	Common	1	F2	0	
Heteroptera	Pentatomidae	*Pentatoma rufipes*	a shieldbug	Common	1	A1	0	On Oak and Hawthorn
Lepidoptera	Arctiidae	*Phragmatobia fuliginosa*	Ruby Tiger	Common	1	0	0	Pupae on underside of Burdock leaf. Adult emerged 30/07/2010.
Lepidoptera	Blastobasidae	*Blastobasis adustella*	a micro-moth	Naturalised	-	-	-	
Lepidoptera	**Gelechiidae**	***Recurvaria leucatella***	**a micro-moth**	**Nb**	**-**	**-**	**-**	
Lepidoptera	Gelechiidae	*Teleiodes luculella*	a micro-moth	Common	-	-	-	On Oak.
Lepidoptera	Geometridae	*Colotois pennaria*	Feathered Thorn	Common	1	A1	0	Late instar on Malus. Larvae identified using Porter (1997) & http://www.ukleps.org
Lepidoptera	Heliozelidae	*Heliozela sericiella*	a micro-moth	Common	-	-	-	
Lepidoptera	Incurvariidae	*Nematopogon schwarziellus*	a micro-moth	Common	-	-	-	Woodland edge.
Lepidoptera	Incurvariidae	*Nemophora degeerella*	a micro-moth	Common	-	-	-	Woodland
Lepidoptera	Lycaenidae	*Lycaena phlaeas*	Small Copper	Common	1	F2	0	Roughs
Lepidoptera	Nepticulidae	*Stigmella aurella*	a micro-moth	Common	-	-	-	On Bramble Rubus fruticosus agg in roughs and scrubby edges of site. Old larval leaf mines on previous years leaves.
Lepidoptera	Noctuidae	*Noctua janthe*	Lssr Broad-bordered Yellow Underwing	Common	1	0	0	Last instar on Juniper / Hawthorn. Larvae identified using Porter (1997) & http://www.ukleps.org
Lepidoptera	Noctuidae	*Mesoligia furuncula*	Cloaked Minor	Common	1	F2	0	TQ220587 (bank by car park)

Order	Family/Sub-family	Taxon	Vernacular	Status	Rarity	BAT	SAT	Comment
Lepidoptera	Notodontidae	*Phalera bucephala*	Buff-tip	Common	1	A1	0	On Oak
Lepidoptera	Nymphalidae	*Vanessa atalanta*	Red Admiral	Migrant	0	0	0	Roughs
Lepidoptera	Nymphalidae	*Inachis io*	Peacock	Common	1	F2	0	Roughs
Lepidoptera	Nymphalidae	*Polygonia c-album*	Comma	Common	1	F2	0	Woodland edges
Lepidoptera	Oecophoridae	*Endrosis sarcitrella*	a micro-moth	Common	-	-	-	Beating Moribund oak and Hawthorn branches / logs etc. Gen. det.
Lepidoptera	Pieridae	*Gonepteryx rhamni*	Brimstone	Common	1	A1	0	Fairly common across site.
Lepidoptera	Pieridae	*Pieris brassicae*	Large White	Common	1	0	0	Roughs
Lepidoptera	Pieridae	*Pieris rapae*	Small White	Common	1	0	0	Roughs
Lepidoptera	Pieridae	*Anthocharis cardamines*	Orange-tip	Common	1	F2	0	Roughs
Lepidoptera	Psychidae	*Luffia ferchaultella*	a micro-moth	Common	-	-	-	On Oak in wooded area.
Lepidoptera	Psychidae	*Psyche casta*	a micro-moth	Common	-	-	-	Scrub
Lepidoptera	Pyralidae	*Chrysoteuchia culmella*	Garden Grass-veneer	Common	-	-	-	Widespread across site.
Lepidoptera	Satyridae	*Pararge aegeria*	Speckled Wood	Common	1	F2	F212	Wooded and scrubby areas.
Lepidoptera	Satyridae	*Pyronia tithonus*	Gatekeeper	Common	1	F2	F212	Widespread across site.
Lepidoptera	Satyridae	*Maniola jurtina*	Meadow Brown	Common	1	F2	0	Widespread across site
Lepidoptera	Tortricidae	*Ptycholoma lecheana*	a micro-moth	Unknown	-	-	-	Emerged 11/06/2010. Pupae in silk-folded oak leaf. Conf. G.A.Collins
Lepidoptera	Zygaenidae	*Zygaena filipendulae*	Six-spot Burnet	Common	1	F2	0	Roughs
Diptera	Agromyzidae	*Phytomyza fulgens*	a fly	Common	-	-	-	Leaf mines on Clematis vitalba
Diptera	Agromyzidae	*Phytomyza ilicis*	a fly	Common	-	-	-	Common where Holly occurs in wooded parts of site.
Diptera	Asilidae	*Leptarthrus brevirostris*	a robber fly	Local	2	F2	0	Roughs
Diptera	Asilidae	*Dioctria linearis*	a robber fly	Local	2	F2	F212	Roughs
Diptera	Bibionidae	*Bibio anglicus*	a fly	Local	2	0	0	Widespread across site in open areas.
Diptera	Bibionidae	*Bibio johannis*	a fly	Common	1	F2	0	Widespread across site in open areas.
Diptera	Bibionidae	*Bibio longipes*	a fly	Unknown	-	-	-	Widespread across site in open areas. =Bibio lepidus Loew, 1871
Diptera	Bibionidae	*Bibio marci*	a fly	Common	1	F2	0	Abundant across site in all open and semi-open situations.
Diptera	Cecidomyiidae	*Schizomyia galiorum*	a fly	Unknown	-	-	-	On Galium verum
Diptera	Cecidomyiidae	*Hartigiola annulipes*	a fly	Common	-	-	-	Galls on Beech
Diptera	Conopidae	*Sicus ferrugineus*	a parasitic fly	Local?	2	F1	0	On various flowers
Diptera	Dolichopodidae	*Dolichopus ungulatus*	a fly	Common	1	W2	0	
Diptera	Dolichopodidae	*Hercostomus chetifer*	a fly	Local	2	W1	0	
Diptera	Dolichopodidae	*Sciapus longulus*	a fly	Local	2	W2	0	Tentative identification of female using Fonseca (1978)
Diptera	Empididae	*Empis tessellata*	a fly	Common	1	0	0	On Apple blossom.

Order	Family/Sub-family	Taxon	Vernacular	Status	Rarity	BAT	SAT	Comment
Diptera	Fanniidae	*Fannia lustrator*	a fly	Unknown	1	F3	0	
Diptera	Lauxaniidae	*Minettia tabidiventris*	a fly	Unknown	0	F3	0	Gen. det. using Merz 2004 review.
Diptera	Limoniidae	*Limonia phragmitidis*	a crane fly	Common	1	F3	0	
Diptera	Lonchopteridae	*Lonchoptera lutea*	a fly	Common	1	0	0	Gen. det.
Diptera	Opomyzidae	*Opomyza germinationis*	a fly	Common	1	F2	0	Frequent in grassy areas.
Diptera	Stratiomyidae	*Pachygaster atra*	a soldier fly	Common	1	F3	0	Occasional at wooded edges.
Diptera	Stratiomyidae	*Chloromyia formosa*	a soldier fly	Common	1	F2	0	
Diptera	Syrphidae	*Melanostoma mellinum*	a hoverfly	Common	1	0	0	
Diptera	Syrphidae	*Melanostoma scalare*	a hoverfly	Common	1	0	0	
Diptera	Syrphidae	*Platycheirus albimanus*	a hoverfly	Common	1	0	0	
Diptera	Syrphidae	*Epistrophe eligans*	a hoverfly	Common	1	A1	0	Frequent across site.
Diptera	Syrphidae	*Episyrphus balteatus*	a hoverfly	Migrant	1	0	0	Widespread across site.
Diptera	Syrphidae	*Eupeodes corollae*	a hoverfly	Common	1	F1	0	
Diptera	Syrphidae	*Scaeva pyrastri*	a hoverfly	Migrant	1	F1	0	
Diptera	Syrphidae	*Sphaerophoria scripta*	a hoverfly	Common	1	F1	0	Common at flowers.
Diptera	Syrphidae	*Syrphus ribesii*	a hoverfly	Common	1	0	0	Sweeping area of flowering Taraxacum officinale agg.
Diptera	**Syrphidae**	***Cheilosia soror***	**a hoverfly**	**N**	**4**	**F2**	**F212**	
Diptera	Syrphidae	*Myathropa florea*	a hoverfly	Common	1	A2	A211	Woodland
Diptera	Tachinidae	*Prosena siberita*	a parasitic fly	Unknown	-	-	-	
Diptera	Tachinidae	*Eriothrix rufomaculata*	a parasitic fly	Common	-	-	-	Roughs
Diptera	Tachinidae	*Oswaldia muscaria*	a parasitic fly	Local	-	-	-	Tentative identification using Belshaw 1993 and Raper 2009.
Diptera	Tachinidae	*Nowickia ferox*	a parasitic fly	Local?	-	-	-	Roughs
Diptera	Tachinidae	*Tachina fera*	a parasitic fly	Common	-	-	-	On first Hawthorn blossoms.
Diptera	Tephritidae	*Urophora jaceana*	a picture-wing fly	Common	1	F2	0	On C.nigra
Diptera	Tephritidae	*Urophora quadrifasciata*	a picture-wing fly	Local	2	F2	0	Local. Numerous males and females swept from C.nigra.
Diptera	Tipulidae	*Nephrotoma appendiculata*	a crane fly	Common	1	F2	0	
Hymenoptera	Andreninae	*Andrena bicolor*	a solitary bee	Common	1	F1	0	Locally common on site on roughs.
Hymenoptera	Andreninae	*Andrena minutula*	a solitary bee	Common	1	F1	0	
Hymenoptera	**Andreninae**	***Andrena minutuloides***	**a solitary bee**	**Na**	**2**	**F1**	**0**	
Hymenoptera	Andreninae	*Andrena scotica*	a solitary bee	Common	1	F1	0	
Hymenoptera	Apidae:Anthophorinae	*Nomada leucophthalma*	a nomad bee	Local	2	F1	0	
Hymenoptera	Apidae:Anthophorinae	*Nomada ruficornis*	a nomad bee	Common	1	F1	0	
Hymenoptera	Apidae:Apinae	*Apis mellifera*	Honey Bee	Common	1	0	0	On Apple
Hymenoptera	Apidae:Apinae	*Bombus lapidarius*	a bumblebee	Common	1	F1	0	
Hymenoptera	Apidae:Apinae	*Bombus pascuorum*	a bumblebee	Common	1	F2	0	Frequent across site.

Order	Family/Sub-family	Taxon	Vernacular	Status	Rarity	BAT	SAT	Comment
Hymenoptera	Apidae:Apinae	*Bombus pratorum*	a bumblebee	Common	1	0	0	male gen det
Hymenoptera	Apidae:Apinae	*Bombus terrestris*	a bumblebee	Common	1	F1	0	Queen prospecting for nest? In roughs.
Hymenoptera	Apidae:Halictinae	*Halictus tumulorum*	a mining bee	Common	1	F1	0	
Hymenoptera	Apidae:Halictinae	*Lasioglossum calceatum*	Slender Mining Bee	Common	1	F1	0	
Hymenoptera	Apidae:Megachilinae	*Megachile ligniseca*	a leaf-cutter bee	Local	2	A2	A212	
Hymenoptera	**Apidae:Megachilinae**	***Osmia bicolor***	**a solitary bee**	**Nb**	**2**	**F1**	**0**	**Near scrapes**
Hymenoptera	Parasitica:Cynipidae	*Diplolepis rosae*	Rose bedeguar causer	Common	-	-	-	Galls on Dog Rose in roughs and hedgerows.
Hymenoptera	Parasitica:Cynipidae	*Neuroterus numismalis f. sexual*	Blister-gall causer	Common	-	-	-	Galls on Oak
Hymenoptera	Parasitica:Cynipidae	*Andricus aries f. agamic*	Ramshorn gall causer	Naturalised	-	-	-	Galls on Oak scrub
Hymenoptera	Parasitica:Cynipidae	*Andricus fecundator f. agamic*	Artichoke gall causer	Common	-	-	-	Galls on Oak
Hymenoptera	Parasitica:Cynipidae	*Andricus inflator f. sexual*	Twig gall causer	Common	-	-	-	Galls on Oak
Hymenoptera	Parasitica:Cynipidae	*Andricus kollari f. agamic*	Marble gall	Naturalised	-	-	-	Galls on Oak
Hymenoptera	Parasitica:Cynipidae	*Andricus lignicola f. agamic*	Cola-nut causer	Naturalised	-	-	-	Galls on Oak scrub
Hymenoptera	Parasitica:Cynipidae	*Andricus quercuscalicis f. agamic*	Knopper gall causer	Naturalised	-	-	-	Galls on Oak
Hymenoptera	Parasitica:Cynipidae	*Biorhiza pallida f. sexual*	Oak-apple causer	Common	-	-	-	Galls on Oak
Hymenoptera	Parasitica:Ichneumonidae	*Amblyteles armatorius*	an ichneumon	Common	-	-	-	Open areas
Hymenoptera	Symphyta:Tenthredinidae	*Athalia rosae*	a sawfly	Common	-	-	-	
Hymenoptera	Symphyta:Tenthredinidae	*Empria liturata*	a sawfly	Common	-	-	-	Associated with Geum and Fragaria.
Hymenoptera	Symphyta:Tenthredinidae	*Priophorus pallipes*	a sawfly	Common	-	-	-	On Hawthorn
Hymenoptera	Formicidae	*Lasius niger*	an ant	Common	1	F1	0	
Hymenoptera	Formicidae	*Myrmica ruginodis*	an ant	Common	1	F3	0	
Hymenoptera	Formicidae	*Myrmica scabrinodis*	an ant	Common	1	F2	0	
Hymenoptera	Tiphiidae	*Tiphia femorata*	a solitary wasp	Local	2	F1	0	On various Umbellifer flowers.
Coleoptera	Anobiidae	*Ochina ptinoides*	a beetle	Local	2	A2	A212	On dead Ivy stems
Coleoptera	Anobiidae	*Anobium punctatum*	a beetle	Common	1	A2	A212	In dead wood.
Coleoptera	Apionidae	*Taeniapion urticarium*	a weevil	Local	2	F1	0	On Nettles
Coleoptera	Apionidae	*Exapion ulicis*	a weevil	Common	1	F2	0	On Gorse
Coleoptera	Apionidae	*Protapion assimile*	a weevil	Common	1	F2	0	Roughs
Coleoptera	Apionidae	*Protapion trifolii*	a weevil	Common	1	F2	0	Roughs
Coleoptera	Apionidae	*Holotrichapion ononis*	a weevil	Local	2	F1	F112	Very localised in Surrey, on Restharrow.
Coleoptera	Apionidae	*Eutrichapion ervi*	a weevil	Common	1	F2	0	On vetches in rough
Coleoptera	Byturidae	*Byturus ochraceus*	a beetle	Local	2	F2	0	On Hawthorn
Coleoptera	Cantharidae	*Cantharis decipiens*	a soldier beetle	Common	1	F2	0	
Coleoptera	Cantharidae	*Cantharis rustica*	a soldier beetle	Common	1	F2	0	
Coleoptera	Cantharidae	*Rhagonycha limbata*	a soldier beetle	Common	1	F2	0	
Coleoptera	Cantharidae	*Rhagonycha fulva*	a soldier beetle	Common	1	0	0	Widespread across site.
Coleoptera	Cantharidae	*Rhagonycha lignosa*	a soldier beetle	Common	1	A1	0	
Coleoptera	Carabidae	*Bembidion lampros*	a ground beetle	Common	1	F1	0	Running on bare chalk scrapes

Order	Family/Sub-family	Taxon	Vernacular	Status	Rarity	BAT	SAT	Comment
Coleoptera	Carabidae	*Dromius quadrimaculatus*	a ground beetle	Common	1	A2	0	On Oak / Ivy
Coleoptera	Chrysomelidae	*Oulema melanopus*	a leaf beetle	Common	1	F2	0	Gen. det. Roughs.
Coleoptera	Chrysomelidae	*Cassida rubiginosa*	a leaf beetle	Common	1	F2	0	
Coleoptera	Chrysomelidae	*Lochmaea crataegi*	a leaf beetle	Common	1	A1	0	Occasional across site on Hawthorn bushes.
Coleoptera	Chrysomelidae	*Sermylassa halensis*	a leaf beetle	Local	2	F2	0	On Galium verum
Coleoptera	Chrysomelidae	*Phyllotreta nigripes*	a leaf beetle	Common	1	F2	0	
Coleoptera	Chrysomelidae	*Phyllotreta nodicornis*	a leaf beetle	Local	2	F1	0	On Reseda lutea growing on scrapes
Coleoptera	Chrysomelidae	*Aphthona nonstriata*	a leaf beetle	Local	2	W3	0	Not the usual habitat - a wetland species associated with Iris.
Coleoptera	Chrysomelidae	*Longitarsus luridus*	a leaf beetle	Common	1	F2	0	
Coleoptera	Chrysomelidae	*Cryptocephalus hypochaeridis*	a leaf beetle	Local	2	F1	F112	On yellow composite flowers
Coleoptera	Coccinellidae	*Rhyzobius chrysomeloides*	a ladybird	Unknown	0	A1	0	Scrub and wooded edges
Coleoptera	**Coccinellidae**	***Nephus quadrimaculatus***	**Ivy Ladybird**	**RDB2**	**16**	**A1**	**0**	**On Ivy**
Coleoptera	Coccinellidae	*Exochomus quadripustulatus*	Pine Ladybird	Common	1	A1	0	On Oak
Coleoptera	Coccinellidae	*Halyzia sedecimguttata*	Orange Ladybird	Common	2	A1	0	Occasional on shrubs and low branches across site.
Coleoptera	Coccinellidae	*Psyllobora vigintiduopunctata*	22-spot Ladybird	Common	1	F2	0	
Coleoptera	Coccinellidae	*Harmonia axyridis*	Harlequin Ladybird	Naturalised	-	-	-	On Hawthorn scrub.
Coleoptera	Coccinellidae	*Coccinella septempunctata*	7-spot Ladybird	Common	1	0	0	Widespread across site.
Coleoptera	Curculionidae	*Phyllobius roboretanus*	a weevil	Common	1	F2	0	
Coleoptera	Curculionidae	*Phyllobius pyri*	a weevil	Common	1	A1	0	Abundant across site on low shrubs etc.
Coleoptera	Curculionidae	*Polydrusus cervinus*	a weevil	Common	1	A1	0	
Coleoptera	Curculionidae	*Barypeithes pellucidus*	a weevil	Common	1	F2	0	
Coleoptera	Curculionidae	*Sitona lineatus*	a weevil	Common	1	F2	0	Roughs
Coleoptera	Curculionidae	*Sitona sulcifrons*	a weevil	Common	1	F2	0	
Coleoptera	Curculionidae	*Euophryum confine*	a weevil	Naturalised	0	A2	0	Dead wood
Coleoptera	Curculionidae	*Acalles misellus*	a weevil	Local	2	A2	A212	Along hedgerow/wood edge.
Coleoptera	Curculionidae	*Trichosirocalus troglodytes*	a weevil	Common	1	F2	0	On Plantago lanceolata. Gen. det. female (inconclusive). T.thalhammeri not known in Surrey.
Coleoptera	Curculionidae	*Nedyus quadrimaculatus*	a weevil	Common	1	F2	0	On Nettles
Coleoptera	Curculionidae	*Archarius pyrrhoceras*	a weevil	Local	2	A1	0	On Oak
Coleoptera	Curculionidae	*Mecinus pyraster*	a weevil	Common	1	F2	0	On Plantago and / or Linaria vulgaris.
Coleoptera	Curculionidae	*Gymnetron pascuorum*	a weevil	Common	1	F2	0	On Plantago lanceolata
Coleoptera	Elateridae	*Athous haemorrhoidalis*	a click beetle	Common	1	F2	0	Roughs
Coleoptera	Elateridae	*Agriotes sputator*	a click beetle	Common	1	F2	0	
Coleoptera	Kateretidae	*Brachypterus glaber*	a beetle	Common	1	F2	0	On Nettles
Coleoptera	Kateretidae	*Brachypterus urticae*	a beetle	Common	1	F2	0	On Nettles
Coleoptera	Nitidulidae	*Meligethes aeneus*	a beetle	Common	-	-	-	On Lamium album flowers.

Order	Family/Sub-family	Taxon	Vernacular	Status	Rarity	BAT	SAT	Comment
Coleoptera	Oedemeridae	*Oedemera lurida*	a beetle	Common	2	0	0	Roughs
Coleoptera	Rhynchitidae	*Neocoenorrhinus aequatus*	a weevil	Common	1	A1	0	Common across site on Hawthorn bushes.
Coleoptera	Scarabaeidae	*Phyllopertha horticola*	Bracken Chafer	Common	1	F2	0	Roughs
Coleoptera	Scraptiidae	*Anaspis fasciata*	a beetle	Common	1	A2	A212	On Hawthorn
Coleoptera	Scraptiidae	*Anaspis maculata*	a beetle	Common	1	A2	A212	On Hawthorn
Coleoptera	**Scraptiidae**	***Anaspis thoracica***	**a beetle**	**Na**	**4**	**A2**	**A211**	**Male gen. det.**
Coleoptera	Silphidae	*Silpha laevigata*	a beetle	Local	2	F1	0	Roughs
Coleoptera	Staphylinidae	*Drusilla canaliculata*	a rove beetle	Common	1	0	0	Roughs
Coleoptera	Staphylinidae	*Stenus flavipes*	a rove beetle	Common	1	0	0	Not the usual habitat.
Coleoptera	Staphylinidae	*Xantholinus linearis*	a rove beetle	Common	1	F2	0	
Coleoptera	Tenebrionidae	*Gonodera luperus*	a beetle	Local	2	A2	0	On Juniper.
Julida	Julidae	*Tachypodoiulus niger*	White-legged Snake-millipede	Common	1	0	0	Dead wood
Isopoda	Armadillidiidae	*Armadillidium vulgare*	Common pill woodlouse	Common	1	0	0	Common across site.
Isopoda	Oniscidae	*Oniscus asellus*	Common shiny woodlouse	Common	1	0	0	
Isopoda	Platyarthridae	*Platyarthrus hoffmannseggi*	Ant woodlouse	Local	1	F2	0	In nest of Myrmica sp. in roughs.
Isopoda	Porcellionidae	*Porcellio scaber*	Common rough woodlouse	Common	1	0	0	On dead Hawthorn.
Arachnida	Acari	*Aceria cephaloneus*	a mite	Common	-	-	-	On Acer pseudoplatanus
Arachnida	Amaurobiidae	*Amaurobius fenestralis*	a spider	Common	1	A2	0	Under loose bark of Hawthorn.
Arachnida	Anyphaenidae	*Anyphaena accentuata*	a spider	Common	1	A1	0	Roughs
Arachnida	Araneidae	*Araneus diadematus*	a spider	Common	1	0	0	Roughs
Arachnida	Araneidae	*Nuctenea umbratica*	a spider	Common	1	A2	0	Under bark in woodland
Arachnida	Araneidae	*Araniella cucurbitina*	a spider	Common	1	A1	0	On foliage
Arachnida	Araneidae	*Zygiella atrica*	a spider	Common	1	A1	0	
Arachnida	Araneidae	*Mangora acalypha*	a spider	Common	1	F2	0	Roughs
Arachnida	Clubionidae	*Clubiona comta*	a spider	Common	1	A1	0	
Arachnida	Clubionidae	*Clubiona brevipes*	a spider	Common	1	A1	0	
Arachnida	Dictynidae	*Dictyna arundinacea*	a spider	Common	1	F2	0	Roughs
Arachnida	Dysderidae	*Dysdera erythrina*	a spider	Common	1	F2	0	Under stones near scrapes
Arachnida	Linyphiidae	*Labulla thoracica*	a spider	Common	1	F3	0	
Arachnida	Linyphiidae	*Linyphia triangularis*	a spider	Common	1	0	0	
Arachnida	Linyphiidae	*Neriene peltata*	a spider	Common	1	A1	0	
Arachnida	Linyphiidae	*Microlinyphia pusilla*	a spider	Common	1	F2	0	
Arachnida	Philodromidae	*Philodromus cespitum*	a spider	Common	1	A1	0	
Arachnida	**Philodromidae**	***Philodromus albidus***	**a spider**	**Nb**	**4**	**A1**	**0**	
Arachnida	Pisauridae	*Pisaura mirabilis*	a spider	Common	1	F2	0	Roughs
Arachnida	Salticidae	*Heliophanus flavipes*	a spider	Common	1	F2	0	On scrapes
Arachnida	Tetragnathidae	*Tetragnatha montana*	a spider	Common	2	W3	0	Roughs
Arachnida	Tetragnathidae	*Metellina mengei*	a spider	Common	1	0	0	Roughs

Order	Family/Sub-family	Taxon	Vernacular	Status	Rarity	BAT	SAT	Comment
Arachnida	Theridiidae	*Anelosimus vittatus*	a spider	Common	1	A1	0	
Arachnida	Theridiidae	*Theridion sisyphium*	a spider	Common	1	F2	0	Scrub
Arachnida	Theridiidae	*Theridion varians*	a spider	Common	1	A1	0	
Arachnida	Theridiidae	*Theridion mystaceum*	a spider	Common	1	A1	0	Scrub
Arachnida	Theridiidae	*Paidiscura pallens*	a spider	Common	1	A1	0	Oaks in woodland
Arachnida	Theridiidae	*Enoplognatha latimana*	a spider	Local	2	F2	0	Roughs
Arachnida	Thomisidae	*Misumena vatia*	a spider	Common	1	F2	0	One yellow female swept from area of Dandelions. One paler yellow female on low scrub with Diptera prey.
Arachnida	Thomisidae	*Xysticus cristatus*	a spider	Common	1	0	0	Roughs
Arachnida	Opiliones:Leiobunidae	*Leiobunum rotundum*	a harvestman	Common	1	A1	0	Roughs
Arachnida	Opiliones:Phalangiidae	*Mitopus morio*	a harvestman	Common	1	0	0	Roughs
Mollusca	Cochlicopidae	*Cochlicopa lubricella*	a snail	Common	1	F1	0	
Mollusca	Discidae	*Discus rotundatus*	Rounded Snail	Common	1	0	0	Woodland
Mollusca	Helicidae	*Monacha cantiana*	Kentish Snail	Common	1	F2	0	Roughs
Mollusca	Helicidae	*Helix aspersa*	Garden Snail	Common	1	0	0	Roughs
Mollusca	Zonitidae	*Aegopinella nitidula*	Smooth Glass Snail	Common	1	0	0	Roughs

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10.0 Photographs

Photograph 1 – TN10

Photograph 2 – TN14

Photograph 3 – TN15

Photograph 4 – TN 21

Photograph 5 – TN28

Photograph 6 – TN31

Photograph 7 – TN37

Photograph 8 – Horseshoe Vetch

Figure 1 Botanical Target Notes

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Figure 1
Epsom Golf Course
Survey Results

SURREY wildlife TRUST

Figure 2 Management Suggestions

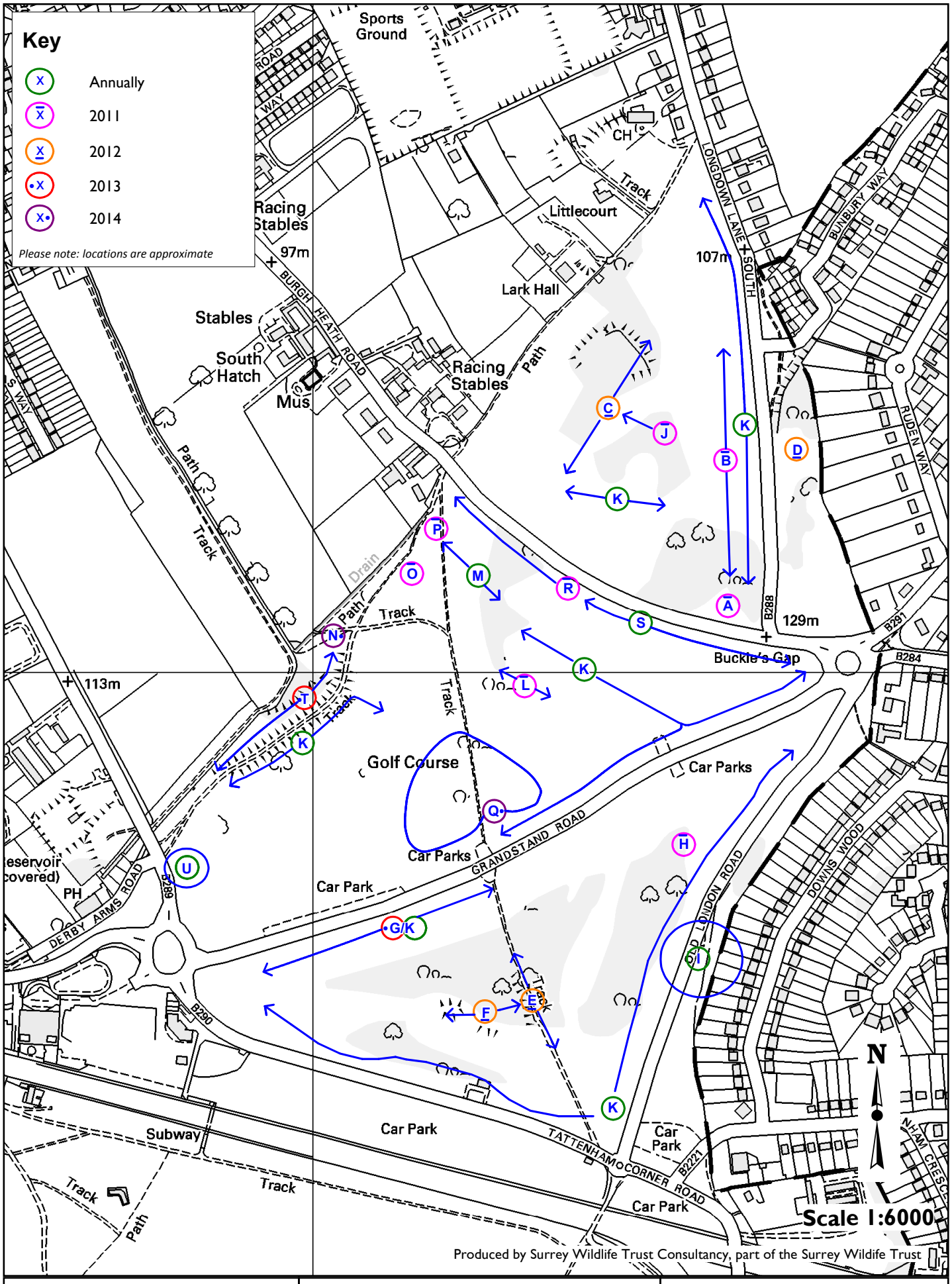

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Figure 2
Epsom Golf Course
Management Recommendations

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Appendix 1

Species Action Plan for the Small Blue Butterfly (Cupido minimus) and its food plant the Kidney Vetch (*Anthyllis vulneraria*) in Surrey

Prepared by Gail Jeffcoate, Butterfly Conservation.

1. INTRODUCTION

The Small Blue has undergone a severe decline in Surrey since 1980. A number of local extinctions have occurred and the remaining populations are vulnerable. This Species Action Plan sets out current knowledge of its status and requirements and the measures that need to be taken to halt the decline and enable the few remaining populations to survive and increase. The Small Blue requires chalk grassland in the early stages of succession and is entirely dependent on a single larval foodplant, Kidney Vetch (Anthyllis vulneraria). Implementation of this Action Plan will benefit both species.

This Action Plan has been prepared for the following reasons: · There has been a recent rapid decline of the Small Blue in the county. · There is good knowledge of the status and requirements of the species. · The conservation measures needed are small scale, easy to implement and likely to produce favourable results rapidly. · A commitment to regular (though small-scale) conservation work at locations where the species survives is urgently needed. · The conservation actions required for the Small Blue in Surrey are not covered by any other existing Habitat Action Plan or Species Action Plan.

The broad objectives of this Plan are to: · Halt the decline of the Small Blue in Surrey by ensuring that sites with surviving populations are managed with the long-term maintenance of the species as a key objective. · Raise awareness among landowners and site managers of the status and habitat requirements of the species. · Encourage management close to remaining populations that will provide suitable habitat for the Small Blue and enable it to occupy larger areas than is currently the case.

2. CURRENT STATUS

2.1 Legal status

The Small Blue is listed on Schedule 5 of the 1981 Wildlife and Countryside Act (for sale only). (It s a criminal offence to sell, offer or expose for sale, or possess or transport for the purposes of sale, whether alive or dead, any wild specimen and parts or derivatives of them; or for anyone to publish or cause to be published any advertisement indicating or suggesting that they buy or sell such things, without a license).

2.2 Conservation status

UK BAP status: Species of Conservation Concern. Butterfly Conservation Priority (national): Medium. BC Regional Action Plan for South-east England (Surrey, Sussex & Kent) Priority: High.

2.3 National status
The species occurs very locally in Britain and Ireland. It has undergone a severe decline since 1950, and is now extinct throughout most of the northern half of England and Wales, and almost absent from Northern Ireland and southern Scotland, where remaining colonies are often small and vulnerable. Its main stronghold is the chalk and limestone grassland of southern England, where colonies are most numerous in Wiltshire, Dorset and Gloucestershire, but here too declines have resulted in numerous extinctions and many surviving populations are very small.

2.4 Surrey status
At the start of the twentieth century the Small Blue was described as 'Common in many places on the chalk, in chalk pits and on hill slopes' in Surrey (VCH, 1902). Losses occurred when building development took place (especially on the edges of London), when chalk grassland was improved for agricultural purposes, and when successional change resulted in the loss of chalk grassland to scrub and secondary woodland. By 1980 populations survived in about 20 locations (Collins, 1995).
A survey of all these locations was carried out in 1995 (Jeffcoate, 1997). It was found that several extinctions had occurred and that most surviving populations were extremely small. The decline was noted in the Habitat Action Plan for Chalk Grassland in Surrey (1999). By 2002, as many as half the populations recorded after 1980 were thought to be extinct, although the butterfly may remain undetected at very low levels and extinction can be hard to confirm. Recording of butterflies on the North Downs in Surrey has been thorough in recent years, and it is likely that few, if any, populations remain unrecorded, except possibly on private land in the east of the county. Almost all populations of the Small Blue in Surrey are on land owned by conservation organisations or managed with wildlife conservation as an objective, including SSSIs. This has not prevented the current decline. As the sites are owned and/or managed by over a dozen organisations, liaising and organising conservation for the Small Blue is complicated.
This Action Plan covers the administrative county of Surrey, where in 2003 nine or ten populations were thought to remain. The exact number is difficult to ascertain because extinction may be hard to confirm. This figure assumes that the half-dozen small patches of suitable habitat in the Epsom Downs area, including Walton Downs and Epsom Golf Course, support a single population. The Small Blue occurs in two neighbouring London Boroughs, Croydon (3 or 4 sites) and Sutton (2 or 3 sites), where populations are close to those in Surrey, especially in the Banstead/Cheam/Sutton area. The butterfly also occurs at West Kent Golf Course, 3km east of the Surrey/Kent boundary. These locations are included in the distribution map and list of sites at the end of this Action Plan and it is important that they are taken into account when planning conservation measures for the species in Surrey.

3. CURRENT KNOWLEDGE

3.1 ECOLOGY

3.1.1. Habitat

In the ideal situation the larval foodplant, Kidney Vetch (which is also the nectar source most favoured by the Small Blue) grows abundantly in a short to medium, sparse sward, with plenty of bare ground present. Taller grass and some scrub are also necessary to provide shelter and perching/roosting places. Old chalk pits and quarries are often ideal. Golf courses may also provide suitable habitat. In Surrey the butterfly is confined to the chalk soils of the North Downs, but in other parts of Britain and Ireland it can be found on disused railway lines with limestone ballast, road cuttings and coastal grassland and dunes.
At most Surrey sites where the Small Blue survives, the vegetation has passed beyond the early successional stage required. Sward is too dense with no, or insufficient, bare ground present, especially in wet summers when vegetation growth is vigorous. In some places scrub is shading out the ground vegetation. Numbers are declining and management is urgently needed.

3.1.2. Larval foodplant
The sole larval foodplant is Kidney Vetch (Anthyllis vulneraria), which is a scarce and declining plant. In Surrey it grows only on the chalk soils of the North Downs, where in most of its surviving locations it occurs in very small amounts, often covering only a few square metres. Kidney Vetch is a short-lived perennial that is a poor competitor. It is one of the first plants to be lost in the course of succession and bare chalk soil must be available if it is to continue to establish seedlings regularly. The absence of non-flowering seedlings is an indication that the population is in decline, and searching for seedlings is an important aspect of monitoring both foodplant and butterfly. Most seeds fall to the ground and germinate among existing plants, though occasionally seeds are dispersed further by being carried in the fur of animals. Currently the only known populations of Kidney Vetch in Surrey that do not support the Small Blue are the few surviving plants at locations where the butterfly has already become extinct.

3.1.3. Life cycle and behaviour
The smallest British butterfly, the Small Blue may easily be overlooked due to its small size, dusky colouring, short flight period, and the fact that most populations are very small. Adult Small Blues begin to emerge in mid-May and are on the wing throughout June. In a few places where populations are larger there may be a partial second brood in late July and August. In Surrey this occurs at Howell Hill and Banstead Downs. Eggs are laid singly in the flowerheads of Kidney Vetch and hatch after about a week. Occasionally additional eggs are laid on a flowerhead, by different females, but if this happens cannibalism occurs and only one larva reaches maturity. Larvae burrow into the flowers, where they feed on developing seeds. When fully-grown in mid-late July, they can be found among the brown seedpods before descending to the ground, where they overwinter among vegetation and debris. Pupation takes place without further feeding in late April and May, also at ground level. Males perch in groups on shrubs or tall grasses in sheltered spots, flying out to intercept females. When mated, females spend much time among flowers of Kidney Vetch, laying eggs. Kidney Vetch is also the main nectar source, though other yellow legumes such as Bird's-foot Trefoil are occasionally used. Both sexes roost in long grass, scrub bushes and taller herbs, which are also used for shelter in bad weather.

3.1.4 Colony structure and mobility

The Small Blue lives in discrete colonies. Suitable breeding habitat is usually available only in a very small area, and as a result many populations contain few individuals. In the past, areas meeting the habitat requirements of the butterfly were more extensive. Fluctuations in the number of flowers of Kidney Vetch produced each year result in fluctuations in butterfly numbers. Kidney Vetch is scarce and declining at almost all locations in Surrey where the butterfly occurs, and increasing the number of flowers is the aim of conservation effort for both species, to reduce the likelihood of extinction in years when fewer flowers are produced. Most colonies are small, but where conditions are favourable (at sites with much bare ground, sparse vegetation and shelter) large populations of both Kidney Vetch and Small Blue may occur, as at Howell Hill in Surrey.

The butterfly is sedentary. Most flights cover distances of only a few metres. Flights longer than 40m are exceptional, though dispersal of individuals from occupied patches of habitat may occur occasionally when the flight period coincides with a long spell of hot weather. Because most remaining populations in Surrey are small and scattered, dispersing individuals are very unlikely to reach suitable habitat.

Kidney Vetch flowers must be available every year or the butterfly population becomes extinct. Such extinctions have always occurred occasionally, and in the past would have been balanced by colonisations as new patches of habitat became available. Now, however, new habitat is rarely available and colonisations are far outweighed by extinctions. Nationally and locally, this has resulted in surviving populations becoming increasingly isolated, reducing the chance of colonisation even further. Colonisation of new habitat has taken place locally in recent years, in Sutton and at a disused claypit at Holmwood, where Kidney Vetch was present in a wildflower seed mix sown in the 1980s. Here the populations of both plant and butterfly were very small, and the Holmwood population, the only one known in Surrey away from the chalk grassland of the North Downs, became extinct in the late 1990s when Kidney Vetch died out.

In Surrey, the largest population of Small Blue occurs at Howell Hill (Surrey Wildlife Trust reserve at Cheam), where it is possible to see more than 50 adults during a 30 minute visit at the peak of the flight period. Even here, however, vigorous growth of vegetation, especially invasive scrub species such as Cotoneaster and Dogwood, is reducing the amount of suitable habitat. At all Surrey sites, strong growth of vegetation, encouraged by recent wet summers, has resulted in a decline in the amount of Kidney Vetch, and management is urgently required.

3.2 MANAGEMENT

The aim of conservation management for the Small Blue is to provide a strong population of flowering Kidney Vetch, and to ensure its persistence from year to year, by regular creation of bare ground and maintenance of sparse sward. For this reason, ground disturbance is the most important management activity at most sites. Provision of a varied vegetation structure, including scrub, to give shelter, is also important. If the right conditions are created, rapid increases in numbers of both plant and butterfly may follow, ensuring that local extinction is less likely. Because of the early successional nature of the habitat required, management must be carried out regularly, not as a one-off operation, to provide a continuous supply of

suitable vegetation. A commitment to regular (though small-scale) conservation work at locations where the Small Blue survives in Surrey is urgently needed
Three kinds of management may be required to provide suitable habitat. Not all may be appropriate at any individual site:

3.2.1. Ground disturbance
Ground disturbance is the most important form of management for Kidney Vetch and Small Blue at most of the sites where they survive. It is the way in which much suitable habitat was created by man, unintentionally, in the past, for instance at quarries and pits, path, road and rail cuttings, and golf courses. The aim is to enable seedlings of Kidney Vetch to establish on a regular basis, and increase both the number of plants and the area supporting them, and is achieved by removal of turf and soil to create patches of bare chalk. Disturbance may result in growth of seedlings, from a seedbank already present in the soil, before the next flowering of nearby plants, while seeds produced after the disturbance are provided with a suitable substrate for growth.
It is important that disturbance is carried out regularly. As most Surrey populations are currently very small, small-scale disturbance using hand tools such as mattocks may be most appropriate. This has been tried at several local sites and at most of them seedlings of Kidney Vetch appeared within a few months. Material removed during the process should be discarded away from existing vetch plants. At sites with larger areas of Kidney Vetch, disturbance by mechanical means, such as bulldozers, might be considered but must be targeted and carried out with care.

3.2.2. Scrub management
Special care is needed to keep areas where Kidney Vetch grows free of scrub, and young woody plants should be removed from among Kidney Vetch plants as soon as possible. Some should be retained nearby, however, to provide shelter and roosting areas. Bare ground created by removal of scrub is not a suitable medium for Kidney Vetch growth, as it contains more nutrients than bare ground created by disturbance in grassy areas, and is soon covered with coarser vegetation. Scrub should be kept under regular review and removed as necessary. Summer cutting, especially of Dogwood and Privet, is more successful than winter cutting.

3.2.3. Grazing
Many of the strongest populations of Small Blue occur on man-made habitats, such as quarries, which have no history of grazing. This is true of most Surrey sites that support the species. The restoration of grazing to chalk grassland may not benefit the Small Blue in the same way that it does many other invertebrates. In some cases it may be damaging; hence the need for this Species Action Plan. Little is known about the effects of grazing on populations of Kidney Vetch and Small Blue, and more information is needed.
Removal of vegetation by grazing slows the progress of succession, which in theory should be beneficial for both Kidney Vetch and Small Blue. More specific effects, however, especially of sheep grazing, may be damaging. Sheep will selectively eat flowers and developing buds of Kidney Vetch and should never be present at a Small Blue site after February. Also, Kidney Vetch is vulnerable to damage by trampling. For these reasons grazing should be carried out

between October and January, and carefully monitored. Sheep grazing also leads to a denser sward, less suitable for establishment of Kidney Vetch seedlings. It has been carried out in recent years at five Small Blue sites in Surrey and three in neighbouring London Boroughs. At most of these it has been sporadic and it is not possible to draw conclusions about the results, as the effects of weather and successional change have been far greater. At Banstead Downs, Kidney Vetch is more widely distributed than at other local sites, and grazing has not been carried out over the whole area at once. In some years there are large numbers of Kidney Vetch flowers, suggesting that long-term sheep grazing has been beneficial. A quantitative study of the effects of grazing here would be very valuable. Sheep grazing began at Howell Hill in late 2002. It is vital that the effects are monitored and that the regime is modified if necessary, for instance by excluding animals from vulnerable areas and/or grazing less frequently.
Cattle grazing, which results in a more uneven vegetation structure and bare ground in the form of hoofprints, may be more beneficial to Kidney Vetch and Small Blue than sheep grazing. It has only been carried out at one Surrey site, Newlands Corner. Here it appeared to benefit both Kidney Vetch and Horseshoe Vetch in the short term, but was discontinued before long-term effects could be seen.

4. FACTORS CAUSING DECLINE

4.1 Historical

· Loss of unimproved chalk grassland through agricultural intensification and building development.
· Loss of suitable habitat through successional change.

4.2 Current and future

· Loss of suitable habitat through successional change.
· The extremely small size of many surviving populations, making them more vulnerable to extinction.
· Increasing fragmentation and isolation of sites capable of supporting the species.
· Fluctuation in the number of flowers produced by Kidney Vetch, making extinction more likely in some years.
· Low dispersal ability of both butterfly and foodplant.
· Difficulty of maintaining a network of suitably managed habitat at sites under different ownership. Around twenty sites in Surrey currently supporting, or that have recently supported, populations of the Small Blue, are owned and/or managed by at least a dozen different organisations.
· Population levels are affected by grazing pressure and may fall rapidly if numbers of grazing stock and/or rabbits are too high. Rabbit numbers fluctuate and are hard to control.

5. CURRENT ACTION

· As many as possible of the surviving populations in Surrey are visited each year. Numbers of adults are recorded, searches for eggs made in flowerheads of the foodplant, and checks made on amounts of Kidney Vetch, especially young seedlings.
· Standard butterfly transects are currently carried out at the two Surrey sites with the strongest populations (Howell Hill and Banstead Downs). Transects are also carried out at several other sites where the butterfly is present, but numbers are so low that this is not the best way of monitoring.
· Owners and managers of all sites where the butterfly survives have been made aware of its presence and conservation importance. Copies of the national Species Action Plan and the 1997 report on the status of the butterfly in Surrey have been made available.
· Site visits with owners and managers have been made at several sites to advise on appropriate management for the species. · Scrub management and a small amount of ground disturbance have been carried out at some sites. Sheep grazing has been set up by Surrey Wildlife Trust at Howell Hill, starting in 2002. There is also sheep grazing on part of Banstead Downs.
· In September 2002 a presentation entitled 'Implementing Action Plans for Cupido minimus (Small Blue butterfly) in Surrey' was given at Butterfly Conservation's 4th International Symposium at Lancaster University, highlighting the decline of the species at local and national level and raising awareness of the need for research and conservation action.

6. PROPOSED ACTIONS

Action code	Action	Organisation
1 Policy and legislation		
Action SBA01	Include habitat requirements of the Small Blue when drawing up or revising management prescriptions in appropriate Site Management Statements, Countryside Stewardship agreements, management plans and other relevant documents.	EN, DEFRA, landowners and site managers
2 Site safeguard and acquisition		
Action SBA02	Oppose any development proposals threatening Small Blue populations.	SWT, LAs, BC
3 Land management		
Action SBA03	Establish management regimes, where populations survive, that will halt the current decline of Small Blue and its larval foodplant Kidney Vetch and ensure the continuation of such regimes in the future.	All Landowners and site managers, EN, BC
Action SBA04	Target suitable management on grassland close to existing populations to encourage the spread of the Small Blue and its larval foodplant Kidney Vetch.	BC, Landowners and site managers

4 Advisory		
Action SBA05	Advise site owners and managers and those responsible for administering agri-environment schemes on practical habitat management for the Small Blue and how to integrate this with other management priorities.	BC, EN
Action SBA06	Advise on habitat restoration techniques on formerly occupied and potential sites.	BC, EN
5 Future research, survey and monitoring		
Action SBA07	Continue existing monitoring by standard butterfly transects and collate results.	BC, landowners/site managers
Action SBA08	Confirm continued presence and population level of both butterfly and larval foodplant at all sites by at least one annual visit. Search for and count eggs of the Small Blue and assess numbers of flowers and non-flowering seedlings of Kidney Vetch.	BC, landowners/site managers
Action SBA09	Encourage the development of standardised monitoring techniques at national level.	BC
Action SBA10	Train site managers and/or volunteers in survey and monitoring techniques.	BC
Action SBA11	Support and contribute to research on appropriate management regimes and ecology carried out as part of the national Species Action Plan.	BC
6 Communication and publicity		
Action SBA12	Publicise this Action Plan, the status of the Small Blue and measures needed to conserve it.	Surrey BAP Steering Group, BC
7 Review		
Action SBA14	Review this Action Plan at intervals of 5 years and update when necessary.	Surrey BAP Steering Group, BC

Key to Abbreviations: BC=Butterfly Conservation; BAP=Biodiversity Action Plan; DEFRA=Department of the Environment, Farming and Rural Affairs; EN=English Nature; LAs=Local Authorities; SWT=Surrey Wildlife Trust.

7. Related Action Plans

National Species Action Plan for the Small Blue (2000). Butterfly Conservation. Chalk Grassland Habitat Action Plan (1999). Surrey Biodiversity Partnership. Butterfly Conservation Regional Action Plan for South-east England (2000). Butterfly Conservation. Chalk Grassland HAP – London Biodiversity Partnership no date

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APPENDIX 1

SMALL BLUE SITES IN SURREY:

Details of sites where the Small Blue has been recorded since 1995, listed from west to east. Status: maximum number seen during a single visit 2000-2003.

Pewley Down TQ008489 Guildford Borough (8)

This was one of county's strongest populations. It is declining steadily as coarse grass, including Tor-grass, and scrub increasingly dominate the slope. Bare ground is now virtually absent. Past management involved mowing. More sympathetic management began in 2003 but dense vegetation is a huge problem. Carefully timed cattle grazing would reduce the Tor-grass and benefit many species, including Small Blue and Kidney Vetch. Without action soon, both are likely to become extinct here.

Merrow Downs TQ019499 Guildford Borough (15)

There is a large amount of Kidney Vetch growing in an atypical situation among long grass on flat ground without scrub shelter. Large amounts of Yellow Rattle appear to be reducing grass density sufficiently to allow Kidney Vetch to persist. More observations are needed.

Merrow Golf Course TQ028499 (2)

A small and declining population, with scattered plants of Kidney Vetch, some of which may be mown during the flowering period.

Newlands Corner TQ040490 Surrey Wildlife Trust (0) Probably extinct
Kidney Vetch grows in open grassland with no shelter. No adult Small Blues have ever been recorded here, but in the 1990s it was possible to find eggs in low numbers. None have been found since 2000. Cattle grazing in late 1990s showed signs of improving vegetation structure, but this has been lost in recent mowing.

Sheepleas TQ089523 Surrey Wildlife Trust (0) Probably extinct
Amounts of Kidney Vetch declined rapidly as vegetation became dense during the wet summers of 2000-2. By 2002 Kidney Vetch had virtually disappeared, with only 3 or 4 plants found and no eggs of Small Blue. The butterfly has been seen in two gardens in Horsley where Kidney Vetch has been encouraged in recent years, but none were seen in 2003. There is a small possibility that the butterfly survives on undiscovered Kidney Vetch in the area but it seems more likely that the population here has died out.

North Holmwood TQ172471 Mole Valley District Council (0) Extinct
Kidney Vetch was introduced when a seed mix was used in this old clay pit in the 1980s. Small Blue were found in 1996, but it is not known how long they were here before this, or how they reached the site. Both butterfly and foodplant disappeared in 1999 after the Kidney Vetch flowerheads were removed, possibly by rabbits.

Box Hill TQ176518 National Trust (2)
Amounts of Kidney Vetch and numbers of Small Blue declined dramatically during the early 1990s. For several years no adult Small Blues were seen, and presence was confirmed only by searching flowers for eggs. From 1996 to 2002 none were found and the butterfly was presumed extinct. In 2002 two adults were seen and a few eggs found. Eggs were also found in 2003. It is not known if the butterfly survived undetected, if an unauthorised release took place, or if it colonised the site naturally (minimum distance 2km).

Headley Warren TQ195539 Privately owned (5)
Kidney Vetch occurs in a very small area in an increasingly closed and dense sward, though rabbit scrapes create a small amount of disturbance. Very small-scale ground disturbance is being tried here. Numbers of Kidney Vetch flowers have remained surprisingly stable but both plant and butterfly are vulnerable.

Epsom Downs Area TQ25 Various owners and managers (6)
There are a few small patches of Kidney Vetch at Epsom Downs Golf Course, Epsom Racecourse and Walton Downs. These are remnants of a population that was once much more widespread. A huge amount of Kidney Vetch, supporting the largest population of Small Blue in Surrey apart from Howell Hill, was destroyed in the 1980s when Epsom Downs station was replaced by housing. The remaining populations are declining, at the golf course due to scrubbing over, otherwise due to grass and herbs becoming denser and coarser. There is increasing interest in conserving wildlife, and the Small Blue in particular, here, and it is hoped that ground disturbance and other measures will be implemented before further losses occur. There is scope here for a large increase in the population.

Howell Hill TQ238619 Surrey Wildlife Trust (100+)
This small site holds the largest population of Kidney Vetch and Small Blue in Surrey. Kidney Vetch is widespread except in the central area where rich soil supports dense grass and scrub. In the bunker area there is a high proportion of bare ground. Birch, Cotoneaster and Dogwood have grown vigorously here recently and require regular management, with summer cutting being the best way to achieve reduction. In the 'meadow' area the vetch grows in a grassy sward still sparse enough to allow seedlings to establish. Regular mowing and raking of this area have recently been replaced by sheep grazing (Oct –Dec), which needs monitoring to ensure that the sheep do not trample or graze out the Kidney Vetch. Since mowing stopped abundant young Hawthorn has required removal by other means. Invasive Golden Rod and Michaelmas Daisy are also a threat. Ground disturbance would be beneficial and is likely to become vital in coming years.

Banstead Station TQ247605 Reigate and Banstead Borough Council (2)
A small patch of Kidney vetch by the roadside opposite Banstead station supports a few Small Blues. Vegetation is becoming dense and scrubby.

Banstead Downs TQ256615 Banstead Conservators (30+)
The area covered by Kidney Vetch here is large enough to fence part of it and graze (with sheep) on rotation, so that some remains ungrazed each year. This appears to have been successful, with large numbers of flowers appearing in some seasons. Good numbers of young plants continue to establish, even though the sward is dense and tall in places. Vetch has become less widespread over the years, however, and will continue to do so without increased measures to conserve the population.

Long Hill, Woldingham TQ365568 Tandridge Borough Council Extinct
The Small Blue was first seen at this small, isolated site in 1994, when there was a large amount of Kidney Vetch growing along the edge of a sunken path with much exposed chalk. Vegetation growth in subsequent years led to a rapid decline and the butterfly has not been seen since the late 1990s. In 2002 only a single plant of non-flowering Kidney Vetch was found.

Small Blue sites in the London Borough of Sutton: A small population at Cuddington Park Meadow lies between Banstead Downs and Howell Hill, a few hundred metres from each and immediately adjacent to the county boundary. Two other populations occur in the urban area of Sutton, one in a nature reserve, the other in a school nature garden. Both are very small and vulnerable. All three are managed by Local Authority staff, who carry out ground disturbance and scrub clearance especially for the Kidney Vetch and Small Blue.

Small Blue sites in the London Borough of Croydon: A very small population occurs at Dollypers Hill, managed by Surrey Wildlife Trust. A larger population at Riddlesdown Quarry is managed by the Corporation of London. Scrub clearance is carried out, and the bunker has been grazed by sheep. The effects of this are being monitored, but it is currently unclear if grazing has led to a reduction in amounts of Kidney Vetch. At Hutchinsons Bank, a London Wildlife Trust reserve, numbers of Small Blue suddenly declined dramatically in 2002.

Successional change is rendering the site unsuitable for Kidney Vetch. In 2003 there were reports of Small Blue on a golf course nearby.

Small Blue in west Kent: There is a population of Small Blue at West Kent Golf Course, near Downe, where a number of adults are recorded each year. This is about 3km east of the Surrey Kent border. Other populations occur much further east in Kent.