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Invertebrate Assessment for a proposed residential development  
at Alsager Avenue, Rushenden, Queenborough,  
Kent ME11 5LA

Client: Snowdene Estates Ltd

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## **1. INTRODUCTION**

### **1.1 Requirement for the survey**

A desk study carried out as part of a Preliminary Ecological Appraisal of land at Alsager Avenue, Rushenden, Queenborough, Kent, commissioned in connection with an outline planning application for a proposed small residential development.

The data search highlighted a number of invertebrate species recorded from the search area with a high conservation status, i.e. Red Data Book or Nationally Scarce and/or NERC Act Section 41 species, some of which may be present on the site, and might therefore be impacted by the proposal (Townsend, 2019). Therefore, one conclusion of the PEA was that an invertebrate assessment should be carried out, with particular focus on bumble-bees with conservation status recorded on the site or nearby.

### **1.2 Purpose of the survey**

The purpose is to carry out a brief survey of this small (1 ha) site to assess its value as invertebrate habitat and the species assemblages present, in the context of the site itself and adjoining habitats. Also, where possible, to outline any measures that could mitigate the effects of the proposal on invertebrates or enhance the site.

### **1.3 Habitats in and around the site**

The site has been described in the PEA (Townsend, 2019). Essentially the habitats are a mosaic of dense scrub, mainly bramble, tall rough neutral grassland with a damp area at one end with Soft Rush.

The site is close to the Medway Estuary, with grass/scrub sea bank, which extends east to more extensive scrub/grassland mosaics, coastal grazing marsh, parkland and residential.

## **2. METHODOLOGY**

### **2.1 Fieldwork**

A single site visit was carried out, on 27<sup>th</sup> October 2022 from 09.00 to 14.00. Invertebrates were sampled by means of a flight-net (for larger, fast-flying insects) and a sweep-net. The latter is swept repeatedly over vegetation and the insects thus trapped collected from within with a pooter. In some cases it was possible to identify species in the field, sometimes without the use of a net. In other cases, specimens were retained and stored in denatured ethanol for identification.

Access was rather limited by the extensive, dense bramble and other vegetation. Particular attention was given to nectar source plants, these mainly comprising Hoary Ragwort and (to a lesser extent) Bristly Ox-tongue. Weather conditions were hot, sunny and dry.

### **2.2 Data analysis**

Once identified, the species list was entered into Pantheon <https://www.brc.ac.uk/pantheon/> on online analytical tool developed by Natural England and the Centre for Ecology & Hydrology to assist invertebrate nature conservation in England.

Species lists can be imported into Pantheon for analysis. Pantheon assigns them to their known habitat associations and national statuses. Note that not all species are covered by Pantheon and that the requirements of some are poorly known.

Additional information was provided by identifiers, and was also obtained from the National Biodiversity Network website <https://nbnatlas.org/>, various other websites specialising in particular taxonomic groups and from JNCC reviews.

### 3. RESULTS

A total of 113 species were recorded. A full, annotated list is provided in appendix II.

Nine species with a conservation status were recorded, including 4 bees (table 1). No species legally protected by the Wildlife and Countryside Act, or other national or international legislation, were recorded.

Table 1. Species with a conservation status recorded.

<b>Taxon group</b>	<b>Vernacular name</b>	<b>Status</b>	<b>Comments</b>
Bombus humilis	Brown-banded Carder Bee	S41	Tall, open, flower-rich grasslands particularly with abundant legumes, but uses a wide variety of flowers. Widely distributed across southern Britain but greatly in decline and now found predominantly on sites on or near the coast, including the Thames Corridor.
Colletes halophilus	Sea-aster Bee	Na S41	Associated with Sea-aster on saltmarshes as the main nectar source, but uses other herbaceous plants also and may breed on drier adjacent areas. South-eastern coasts from Hampshire to the Humber
Stelis breviscula	a cuckoo bee	RDBK	A parasitic species. The host is thought to be the megachiline bee <i>Heriades truncorum</i> , which breeds in dead wood and pithy stems. Formerly had a highly restricted distribution. Adults nectar mainly at ragworts and other Asteraceae. Recently found somewhat more widely, but only in southeast England.
Lasioglossum puncticolle	Ridge-cheeked Furrow Bee	Nb	Breeds in drier coastal sites including at the edge of saltmarsh, also inland. Adults feed at a wide variety of tall herbaceous flowers. Southeast England.
Lygus pratensis	a plant bug	[RDB3]	Greatly increased in recent years, and now a common species awaiting revision; moderate to tall ruderal vegetation.
Eurygaster maura	a tortoise bug	NS	Formerly largely confined to chalk downs, now more widespread in dry grassland and brownfield, but with a restricted distribution, mainly in south-east England.
Olibrus flavicornis	a shining flower beetle	RDB	Only known from southern England and recorded as far north as Suffolk. Relatively widespread in the East Thames Corridor and probably associated with grassland and coastal habitats.
Lasiochaeta pubescens	a grass-fly	NS	Southern, largely coastal
Coenonympha pamphilus	Small Heath Butterfly	NT	Short/medium grassland mosaics containing fine grasses. Widespread but in significant decline.

Table 2. Isis Specific assemblage types (SATs) from Pantheon.

Broad biotope	Habitat	SAT	Species	Status	Species with status
open habitats		rich flower resource	10	1 [RDB K]; 1 [Na]; 1 Section 41 Priority Species; 1 Nb	3
open habitats		scrub edge	4		
open habitats	short sward & bare ground	open short sward	4	1 NT; 1 DD; 1 Section 41 Priority Species; 1 NS	3
open habitats	short sward & bare ground	bare sand & chalk	3		
open habitats		scrub-heath & moorland	2	1 [RDB 3]	1
tree-associated	decaying wood	bark & sapwood decay	1	1 [RDB K]	1

Table 3. Habitat and resources, from Pantheon (note that species recorded may have more than one habitat association, but all associations are listed and that S41 species are not included in "species with status" totals).

Broad biotope	Habitat	Species	Status	Species with status
open habitats	tall sward & scrub	59	1 Section 41 Priority Species - research only; 1 [Notable]; 1 Notable	2
open habitats	short sward & bare ground	18	1 NS; 1 Nb; 1 DD; 1 Section 41 Priority Species; 1 Nt; 1 Notable; 1 [Notable]	5
wetland	peatland	6	1 [Notable]	1
tree-associated	arboreal	4		
coastal	brackish pools & ditches	3	1 Section 41 Priority Species; 1 [Na]	1
wetland	marshland	3	1 [Notable]	1
coastal	saltmarsh	3	1 [Na]; 1 Section 41 Priority Species	1
tree-associated	shaded woodland floor	2		
tree-associated	decaying wood	2	1 [RDB K]	1
coastal	sandy beach	1		

## 4. ANALYSIS

### 4.1 Overview

Invertebrates have seasonal patterns of occurrence, with peaks in May-June/July and again in the autumn for some groups (e.g. Hemipteran bugs and spiders). Therefore, as sampling was only carried out in late August, those recorded in this survey represent a sub-set of those present on the site. However, this can be taken into account when analysing the data, and the samples nevertheless are representative of the communities present. There is no doubt that a considerable number of species could be added by further survey, some with status, but the conclusions regarding communities present are unlikely to change.

### 4.2 Species

The majority of species (59) recorded are associated with tall sward and scrub, which dominate the site. A smaller number (18) are associated with short sward and bare ground and are most closely associated with the higher part of the site where there is bare ground, and along the fringes. Some are associated with both tall and short/bare ground mosaics.

A small number of species are present which are associated with coastal habitats and not all may not be truly associated with the site as breeding habitat. It provides supporting habitat for these species, although in some cases the sea bank is more suitable as it has a more open sward and greater floral diversity.

Similarly, a small number of species are associated with marshy habitats, and there is overlap here with the coastal species. According to Pantheon, a single species, the cuckoo bee *Stelis breviscula*, is associated with decaying wood. However, it is a parasite of another bee, which as well as breeding in dead wood also uses pithy stems. Therefore, it's true association on the site is with tall ruderal vegetation and scrub rather than woodland.

Therefore, all eight species recorded with a valid status are associated with open habitats, namely either tall with shorter grassland mosaics, but at least five wholly or mainly with the former. One species, the bug *Lygus pratensis*, is no longer uncommon enough to merit a status, and is not included in this figure. Table 2 indicates that there are two important resources, namely flower richness grassland (59 associates, 10 in the SAT, 3 with status) and short sward/bare ground mosaics (18 associates, 4 with valid status) No species with status recorded are specifically only with scrub.

### 4.3 Site condition and importance

The site is relatively undisturbed and Google Earth historical imagery indicates that it has probably been in a broadly similar condition since the mid-20<sup>th</sup> century. However, an image from 2003 appears to show a much more varied structure, with clumps of small trees/tall scrub and a network of paths, indicating that the sward was in part much shorter. At present the site is

dominated to a great extent by tall, dense bramble and other scrub to the detriment of floral and overall structural habitat diversity. This is likely to impact on invertebrates. No species associated with this ubiquitous, invasive scrub plant were recorded, but it is an important nectar source in July and will attract insects from the wider area, albeit with a rather limited flowering period.

As described above and in the PEA, there is extensive semi-natural habitat to the west of the site (and to a lesser extent to the north), and many of the species of conservation concern found in this survey are also associated with those habitats, in some cases more so than the site, particularly some of the coastal species.

#### **4.4 KMBRC desk study species**

Very few species with a valid status listed for the area by the KMBRC desk study were recorded, but some were undoubtedly missed either by the timing of the survey or require different techniques to locate (such as pitfall trapping).

The bees *Colletes halophilus* and *Bombus humilis* are listed by KMBRC. *Bombus sylvarum*, of which there are >35 records in the desk study, was not seen. This massively declined species has one of its last two remaining strongholds along the Thames Gateway. It was seen in the area as recently as 2018, although the accuracy of the records is not known. Bumble-bees are more difficult to identify than is sometimes imagined. Most records are from before 2009, with a gap of ten years to 2018 (possibly due to lack of recording). It is particularly associated with legumes, and although it nests at the base of dense vegetation it is particularly associated with sea banks, suggesting that good drainage is important.

There are no recent records of *Bombus muscorum* or *B. ruderarius* but their presence appears to be a possibility. It is unlikely that *Bombus subterraneus* is present as it is extinct in Britain (apart from a reintroduced population at Dungeness).



## **5. CONCLUSIONS AND RECOMMENDATIONS**

The results of the survey indicate that a significant invertebrate assemblage is present associated with open, flower-rich grassland and shorter grassland/bare ground mosaics. This includes species associated with coastal habitats or coastal areas.

The geographical location of the site is influential, in that the extreme southeast England has intrinsically higher diversity than many other parts of Britain due to the warmer climate. However, the recording of eight species with a valid status or highlighted by the NERC Act Section 41 in a short survey, strongly suggests that the assemblage present is significant enough for enhancements of undeveloped land within the site for invertebrates to be appropriate.

In the proposal, land at the north-eastern end and at the south-western extremity of the site would be left undeveloped. The former area would include a pond. Therefore, the opportunity exists to enhance these areas by managing them as semi-natural habitat, i.e. by creating open, relatively short sward grassland, with a mosaic of taller grassland, limited scrub cover and including banking. It should be sown with appropriate, locally sourced seed mix. For maximum benefit, this should include vetches, clovers and trefoils. Seed mixes need not be used throughout, as pioneer species will colonise and these can also provide important resources for invertebrates. Tall trees and scrub should be avoided as these would create shade.

## **REFERENCES**

Townsend, M. (2019) Preliminary Ecological Appraisal for a proposed residential development at Alsager Avenue, Rushenden, Queenborough, Kent ME11 5LA.

Falk, S. (2015) Field Guide to the Bees of Great Britain and Ireland. Bloomsbury, London.

**Appendix I.** List of invertebrate species recorded (note that only specimens identified to species level are included – for some groups e.g. spiders the majority were immatures).

Taxon group	Vernacular name	Status	Comments
<b>Terrestrial Mollusca (snails and slugs)</b>			
<i>Ceruella virgata</i>	Vineyard Snail		Sand-dunes, coastal and calcareous grassland
<i>Cepaea hortensis</i>	White-lipped Snail		
<b>Araneae (spiders)</b>			
<i>Enoplognatha latimana</i>	a cobweb spider		open, dry situations, common in Thames corridor, increasing
<i>Misumena vatia</i>	a crab spider		grassland, scrub edges
<i>Philodromus cespitum</i>	a running crab spider		
<i>Phalangium opilio</i>	a harvestman		
<i>Dictyna latens</i>	a spider		rough grassland, well-established unmanaged ruderal vegetation.
<i>Araneus diadematus</i>	Garden spider		
<i>Argiope bruennichi</i>	Wasp spider		Rough, often dense grassland and similar vegetation
<i>Agelena labyrinthica</i>	Labyrinth spider		
<b>Orthoptera (grasshoppers and crickets)</b>			
<i>Chorthippus parallelus</i>	Meadow Grasshopper		
<i>Chorthippus brunneus</i>	Common Field Grasshopper		
<i>Metrioptera roeselii</i>	Roesel's Bush-cricket		
<b>Aculeate Hymenoptera (bees, wasps and ants)</b>			
<i>Myrmica ruginodis</i>	Common Red Ant		
<i>Lasius alienus</i> agg.	a brown ant		dry grassland
<i>Trypoxylon attenuatum</i>	a solitary wasp		
<i>Trypoxylon clavicerum</i>	a solitary wasp		
<i>Bombus pascuorum</i>	Common Carder Bee		
<i>Bombus humilis</i>	Brown-banded Carder Bee	S41	tall, open, grasslands
<i>Megachile maritima</i>	a leaf-cutter bee		mainly coastal, especially on light, sandy soil
<i>Colletes hederæ</i>	Ivy Bee		
<i>Colletes halophilus</i>	Sea-aster Bee	Na S41	south-eastern coasts from Hampshire to the Humber
<i>Osmia spinulosa</i>	a mason bee		rough grassland
<i>Stelis breviscula</i>	a cuckoo bee	RDBK	only in south-east
<i>Halictus tumulorum</i>	a mining bee		
<i>Lasioglossum punctatissimum</i>	Long-faced furrow Bee		
<i>Lasioglossum puncticolle</i>	Ridge-cheeked Furrow Bee	Nb	southern, scarce, often coastal
<b>Hemiptera (bugs and hoppers)</b>			
<i>Orius laevigatus</i>	a flower-bug		
<i>Neophilaenus lineatus</i>	a froghopper		
<i>Philaenus spumarius</i>	a froghopper		
<i>Aphrodes makarovi</i>	a leafhopper		
<i>Empoasca decipiens</i>	a leafhopper		
<i>Euscelis incisus</i>	a leafhopper		grassland generalist
<i>Macropsis scotti</i>	a leafhopper		habitat mosaics and transitions; on bramble
<i>Mocydia crocea</i>	a leafhopper		
<i>Zyginidia scutellaris</i>	a leafhopper		
<i>Tritomegas sexmaculatus</i>	a shieldbug	?	recent arrival to Britain, spreading in SE; open habitats, transitions, on Black Horehound <i>Ballota nigra</i>
<i>Nysius senecionis</i>	a groundbug		dry open habitats; on Asteraceae
<i>Adelphocoris lineolatus</i>	a plant bug		
<i>Apolygus spinolæ</i>	a plant bug		generalist, esp. tall ruderal vegetation and habitat transitions with bramble
<i>Dicyphus tamaninii</i>	a plant bug	?	recent arrival to Britain, spreading in the south-east; open habitats
<i>Lygus pratensis</i>	a plant bug	RDB3	greatly increased in recent years, and now a common species awaiting revision; moderate to tall ruderal vegetation

Taxon group	Vernacular name	Status	Comments
Notostira elongata	a plant bug		
Orthops kalmii	a plant bug		open habitats and transitions; on umbellifers
Phytocoris varipes	a plant bug		dry grassland
Nabis limbatus	a damsel bug		
Aelia acuminata	a shieldbug		
Dolycoris baccarum	a shieldbug		
Palomena prasina	a shieldbug		habitat transitions and mosaics
Rhopalus subrufus	a plant bug		dry open habitats; on Hypericum and Geranium
Stictopleurus punctatonevrosus	a plant bug		
Eurygaster maura	a tortoise bug	NS	formerly largely confined to chalk downs, now more widespread in dry grassland and brownfield, but with a restricted distribution, mainly in south-east
Coreus marginatus	Dock Bug		
<b>Coleoptera (beetles)</b>			
Olibrus flavicornis	a shining flower beetle	RDB	Probably needs revision to NS: recently found regularly over a wider area in the southeast
Olibrus aeneus	a shining flower beetle		
Psylliodes chrysocephala	Cabbage-stem Flea Beetle		
Tytthaspis sedecimpunctata	a ladybird beetle		
Psyllobora vigintiduopunctata	a ladybird beetle		
Subcoccinella vigintiquatuorpunctata	a ladybird beetle		
Rhyzobius litura	a ladybird beetle		
Meligethes ruficornis	a sap beetle		
Longitarsus parvulus	Flax Flea Beetle		
Longitarsus flavicornis	a flea beetle		on ragworts
Phyllotreta nigripes	Turnip Flea Beetle		
Sitona hispidulus	Clover Beetle		
Crepidodera plutus	a leaf beetle		
Crepidodera aurata	a leaf beetle		on willows
Tychius picirostris	a weevil		
Trichosirocalus troglodytes	a weevil		
<b>Diptera (flies)</b>			
Sphaerophoria scripta	a hover-fly		
Eupeodes luniger	a hover-fly		
Syrirta pipiens	a hover-fly		
Eristalis tenax	a hover-fly		
Eristalis arbustorum	a hover-fly		
Helophilus pendulus	a hover-fly		
Chrysotoxum festivum	a hover-fly		grassland, open scrub
Eumerus ornatus	a hover-fly		woodland rides and edges
Cheilosia latifrons	a hover-fly		open habitats
Trypetoptera punctulata	a snail-killing fly		
Merzomyia westermanni	a tephritid fly		on ragworts, especially Hoary Ragwort
Dolichopus festivus	a long-legged fly		
Dolichopus nubilus	a long-legged fly		coastal
Setisqua malonchaea	Lonchaeidae		
Minettia fasciata	Lauxaniidae		
Tephritis neesii	a tephritid fly		
Campiglossa plantaginis	a picture-winged fly		Coastal, on Sea Aster
Dioxyna bidentis	a picture-winged fly		larva on Tripartite Bur-marigold
Asteia concinna	Asteiidae		
Lasiosina herpini	a grass-fly		
Lasiochaeta pubescens	a grass-fly	NS	southern, largely coastal
Camarota curvipennis	a grass-fly		
Chlorops pumilionis	a grass-fly		

Taxon group	Vernacular name	Status	Comments
Oscinella frit	a grass-fly		
Sarcophaga nigriventris	a flesh fly		
Chamaemyia flavipalpis	Chamaemyiidae		coastal but widespread
Eudorylas obscurus	Pipunculidae		
Hydrotaea parva	Muscidae	pNS	
Conops quadrifasciatus	a conopid fly		
Eriothrix rufomaculata	a tachinid fly		
Phania funesta	a tachinid fly		
<b>Lepidoptera (butterflies and moths)</b>			
<b>Moths</b>			
Cochylis molliculana	a tortricoid moth		
Cochylis hybridella	a tortricoid moth		
Tyria jacobaeae	Cinnabar Moth		
Euclidia mi	Mother Shipton		
<b>Butterflies</b>			
Pieris rapae	Small White		
Lycaena phlaeas	Small Copper		
Aricia agestis	Brown Argus		
Vanessa cardui	Painted Lady		
Pieris brassicae	Large White		
Coenonympha pamphilus	Small Heath	NT,S41	short/medium grassland mosaics
Celastrina argiolus	Holly Blue		
Polygonia c-album	Comma		
Polyommatus icarus	Common Blue		

## **Appendix II. Conservation Status Designations as used in this report, and their summarised definitions (following August 2010 revision)**

### i) Post-1994 IUCN Categories

UK species conservation status designations are based on categories and criteria first produced in the 1980s for the International Union for the Conservation of Nature (now called the World Conservation Union) Red List. This aimed to assess the threat of extinction to species of all taxa. The system was adopted in the Red Data Books (Shirt, 1987, etc.) Owing to recognised deficiencies in the original system, a new set of criteria were produced, in 1991 in the first instance (with subsequent revisions, the most recent in August 2010). Individual countries are permitted to refine the definitions in the Lower Risk categories (Falk and Crossley, 2005) and these are included below. The new criteria were adopted by JNCC in 1995, and are the basis of all reviews of taxon groups in the UK published since that date. The criteria are lengthy and are not included here. The designations can be summarised (where applicable to UK site surveys), as follows in order of greatest threat:

#### THREATENED TAXA:

**Extinct (EX)** A taxon is Extinct when there is no reasonable doubt that the last individual has died.

**Extinct in the wild (EW)** A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalised population well outside the past range.

**Critically Endangered (CR)** A taxon is Critically Endangered when the best available evidence indicates that it is facing an extremely high risk of extinction in the wild.

**Endangered (EN)** (equivalent to Red Data Book 1-RDB1 Endangered). A taxon is Endangered when the best available evidence indicates that it is facing a very high risk of extinction in the wild.

**Vulnerable (VU)** (equivalent to Red Data Book 2 (RDB2 Vulnerable). A taxon is Vulnerable when the best available evidence indicates that it is facing a high risk of extinction in the wild.

#### LOWER RISK TAXA:

Conservation dependant taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.

**Near Threatened (NT)** (roughly equivalent Red Data Book 3 (RDB3 - Rare). A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Endangered or Vulnerable, but is close to qualifying or likely to qualify for a threatened category in the near future. In the UK, this is defined as taxa occurring in 15 or fewer hectads (10 km squares).

**Nationally Scarce (NS)** (UK only, i.e. not based on IUCN criteria) estimated to occur in 16-100 hectads (10km squares).

**Least Concern (LC)** A taxon is Least Concern when it has been evaluated but not does qualify for any of the above.

**Data Deficient (DD)** A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.

**Not evaluated (NA)** A taxon not yet been evaluated against the criteria.

IUCN categories, fully defined along with the criteria upon which they are based, can be found in the most recent revision at

<http://intranet.iucn.org/webfiles/doc/SSC/RedList/RedListGuidelines.pdf>.

ii) Previous system based on UK interpretation of IUCN categories (groups not assessed since 1994)

Where a taxon group has not been reviewed since 1994 and has not therefore been assessed by the new criteria, the designations used in this report refer to the previous system, below. The review process is ongoing, having been taken up by NGOs and several new Red Lists have been produced recently for the UK. In the case of larger moths, this report follows Waring et al (2009), which JNCC acknowledge unofficially 'reviewed' statuses (but did not adopt the new criteria). Where the status is prefixed 'p', this indicates that it is provisional.

Red Data Book 1 (RDB1). Taxa in danger of extinction and whose survival is unlikely if the causal factors continue to operate. These include:

Species only known from a single locality since 1970

Species restricted to habitats which are especially vulnerable

Species showing a rapid and continuous decline in the last 20 years and now estimated to exist in  $\leq 5$  localities.

Red Data Book 2 (RDB2). "Vulnerable". Taxa believed likely to move in to the "Endangered" category in the near future if the causal factors continue to operate. These include:

Species declining throughout their range.

Species in vulnerable habitats.

Species whose populations are low.

Red Data Book 3 (RDB3). "Rare". Taxa with small populations that are not at present endangered or vulnerable but which are at risk. These include:

Species estimated to occur in 15 or fewer localities.

Red Data Book I (RDBI) "Indeterminate". Taxa considered to be Endangered, Vulnerable or Rare, but there is not enough information to say which of the three categories is appropriate.

Red Data Book K (RDBK). Taxa suspected to fall within the RDB categories but which are at present insufficiently known to enable placement.

Nationally Scarce (Notable, N) – estimated to occur in 16-100 10km squares (applied to Diptera only).

Nationally Scarce (Notable A, Na) – estimated to occur in 16-30 10km squares.

Nationally Scarce (Notable B, Nb) – estimated to occur in 31-100 10 km squares.

Local – occurring in 100-300 10km squares, but thinly distributed over the country, or common only within a very restricted area or habitat type. Unless stated otherwise, found over a wide area of Britain. Note that this designation, although no longer officially recognised, is still widely used, including for groups recently reviewed. It has always been poorly defined and arguably somewhat subjective, but in a site-based context, it is useful in providing information on the less ubiquitous species present, i.e. those with definable habitat associations.

Common (C) – occurring in  $>300$  10 km squares. Frequent in a wide range of habitats and widely distributed.

Immigrant (I) – species that are known to migrate to the British Isles, but which do not normally survive the winter. (Note that some resident species are also known to be immigrant).

Unknown (U) – species about which insufficient is known to assign them to one of the above categories.

Naturalised (Nat.) – species that have been artificially introduced and now breed successfully in the wild.

iii) UK Biodiversity Action Plan Priority/NERC Act Species

BAP - species identified in the 2007 review of the UK BAP as priorities for conservation action under the UK Biodiversity Action Plan after assessment against a series of criteria including rarity, decline and threat.

Habitats and species listed in Section 41 of the NERC Act are those identified as requiring action under the former UK Biodiversity Action Plan and are now known as Habitats and Species of Principal Importance (or Priority Species or Section 41 species), under the UK Post-2010 Biodiversity Framework

BAP(R) - a tranche of larger moths, identified after analysis of data from the network of Rothamsted light traps, as common and widespread but declining. They were added to the UK BAP list in 2007 but are not the subject of individual action plans and as such, their inclusion was not intended for use in site assessment. The majority are generalist species, and therefore the BAP(R) category is not considered in this report.