Land at Pen Yr Englyn

A Terrestrial Invertebrate Assessment

Final Report

A report for:
Binnies

07 November 2024

By:
Conops Entomology Ltd

Report Number: 24.39

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Contents

1 Introduction

1.1 Conops Entomology Ltd was commissioned in July 2024 by Binnies to undertake a survey of land at Pen Yr Englyn prior to possible development.

1.2 Pen-Yr-Englyn tip is situated on the eastern side of the Rhondda Fawr Valley. The Scheme Area is located directly north of Pen-Yr-Englyn, situated between the village of Treherbert to the west and the town of Treorchy to the east. The Scheme Area is centred at National Grid reference SS 94822 98025 (nearest postcode CF42 5HA) and covers approximately 0.2 km^2 (20 ha) of land (Figure 1).

1.3 Pen-Yr-Englyn tip was formed as a result of the historical mining waste produced by the Ynysfeio Colliery between 1854 and 1935. Mining spoil was placed on the steep slopes above mine shafts and colliery buildings. The tipping area is above residential properties, and as part of previous remediation works to cap shallow mine entries at the base of the hillside, some spoil was reprofiled to create what is now a plateau at the base of the steep slopes. The current project is to design and implement a drainage solution to reduce the pore water pressure and stabilise the tip.

1.4 The scope of this survey is to undertake an invertebrate assessment of the plateau at the base of the Pen Yr Englyn tip area that may be impacted by proposed development (referred to hereafter as 'the site'). The assessment appraised the key habitats and/or features of the site through the recording of invertebrates. The data are used to assess the value to invertebrates of those habitats or features in order to evaluate the site for its importance as an invertebrate resource. From the collection of data and subsequent assessment and valuation, suitable recommendations could then be put forward in the event that some or all of those features or key habitats may be impacted by a proposed development.

1.5 The plateau (see Figure 1) is located at OS grid reference SS 94706 97910.

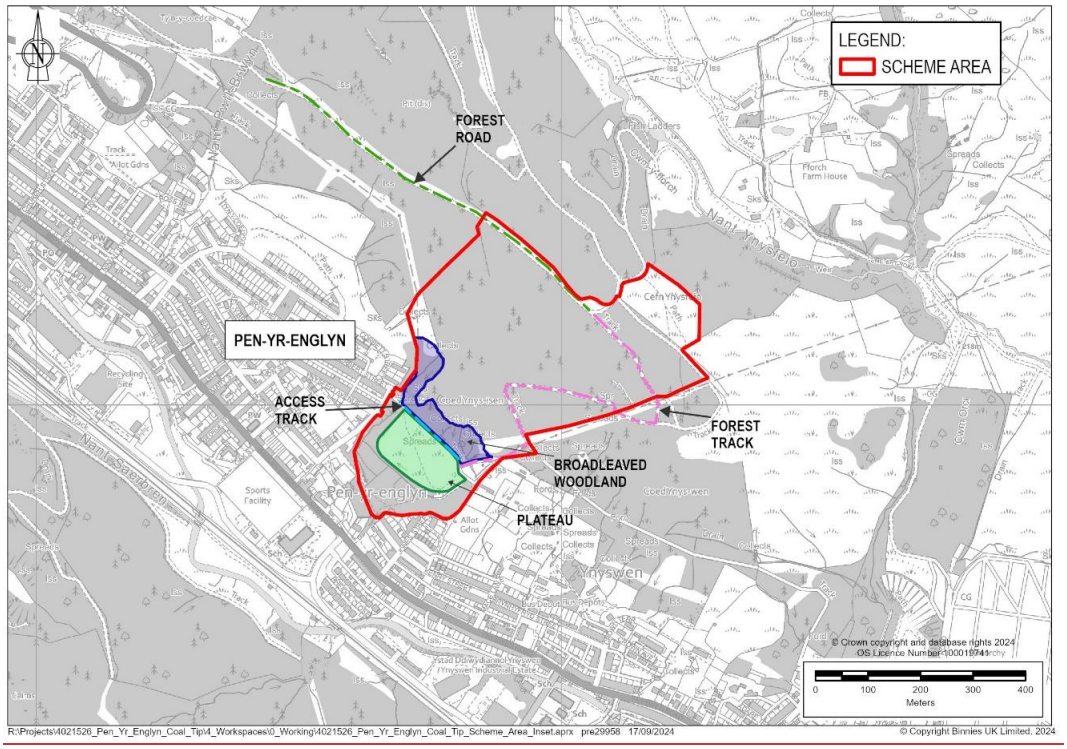

Figure 1 Scheme area and plateau survey site

Methods and timings

1.6 The methods used for the assessment are those recommended in the Natural England guidance document *Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation* (Drake *et al.*, 2007). In some instances, a bespoke method has been created for the site assessment but still retains the overall approach to assessing features and habitats for conservation assessment. The bespoke methods relate to the extent of the free-ranging sampling.

- **Sweep netting**

1.7 This method provides the main proportion of the survey element and is the most efficient method for cataloguing a site's invertebrate resource. Sweep netting involves the use of a long-handled sweep net being swept over vegetation such as stands of grasses or flowers, or along scrub fringes in order to gather invertebrate material.

- **Spot sampling**

1.8 Spot sampling is employed to collect large, conspicuous invertebrates such as bees and wasps from flowering plants, and to supplement the sweep samples. Spot sampling is often the most effective method for recording species from high-fidelity niches.

- **Beating**

1.9 Trees and scrub are beaten to dislodge any invertebrates on the leaves and branches. These are collected from a white sheet, and the contents retained for later examination.

- **Vacuum sampling**

1.10 Suction sampling for ground-running beetles and bugs was undertaken during all visits. Sampling was undertaken on short turf and bare ground areas, and areas with tussocky swards.

Survey timing

1.11 The site was visited on two occasions:

Visit dates
23 July 2024 – sun and cloud, 18–19°C; and
09 August 2024 – sun and cloud, 20°C.

Results analysis

1.12 Tables 1 and 2 provide a breakdown of the site's invertebrate resources and highlight any species of significance recorded during the surveys.

1.13 Tables 3 and 4 have been generated using the Pantheon software package. Pantheon is an analytical tool developed by Natural England and the Centre for Ecology & Hydrology to assist invertebrate nature conservation in England. Although no Welsh equivalent currently exists, this application still works well for sites in Wales. Site data in the form of species lists can be imported into Pantheon, which then analyses the species within the lists, assigning them to habitats and resources. Pantheon also consigns the most up-to-date national status to the species where it is available.

1.14 Pantheon is also capable of other outputs such as Specific Assemblage Types (SATs) (see Table 4).

1.15 A SAT is characterized by stenotopic species (those that can withstand only a narrow range of environmental conditions). SATs are therefore more tightly defined than 'habitats' or 'resources' and sit within a parent habitat or Broad Assemblage Type (BAT). More than one SAT can sit within a parent BAT.

Example:

BAT: **F**2 – grassland and scrub matrix

SAT: **F**211 – herb-rich dense sward

F212 – dense scrub

1.16 The information obtained from Pantheon can then be used to assign quality to sites and their features, assist in management decisions, and facilitate requirement for further surveys, where required and appropriate.

1.17 Pantheon was first made publicly accessible in April 2018 and is the primary analytical tool used by entomologists in site evaluation. For more information on this new resource, see http://www.brc.ac.uk/pantheon/.

1.18 Not all species of importance are expressed in the following tables, as they do not form part of the Pantheon analysis and/or their specific requirements are not yet fully understood.

2 Results summary

2.1 A total of 135 species from the sampled groups were recorded during the surveys.

2.2 A total of three species recorded have a UK status, though it is recognized by many of the national recording schemes that a number of these no longer warrant their current status and that they may need revising. This total does not include research-only moths.

2.3 The full list of species recorded is provided in Appendix II.

Table 1 Species breakdown

Site	Total no. of species recorded	Total no. of species of importance*	Species of importance (%)
Site	135	3	2.2

*Note: some species do not warrant nationally significant status.

Table 2 Species of importance

Scientific name	Vernacular name	National/local status	Habitat preferences and species notes
Coenonympha pamphilus	Small heath butterfly	Vulnerable. Environment Act Wales (Schedule 7 species).	Fine-leaved swards with fescues and bents (*Festuca* spp. and *Agrostis* spp.).
Gorytes laticinctus	A solitary wasp	Red Data Book 3*	Friable soils and structural complexity. No longer warrants a nationally significant status and likely to lose its status in the upcoming review of bees, wasps, and ants.
Norellia spinipes	A fly	Notable	Larvae feed on the daffodil bulbs. Possibly no longer as scare as the status suggests.

*Accepted as being more common than this status suggests; likely to be downgraded.

Table 3 Resource-usage table (taken from Webb *et al.*, 2017)

Broad biotope	Habitat	No. of species	No. of species with conservation status (excluding research-only moths)	Species with conservation status (excluding research-only moths)
open habitats	tall sward & scrub	66	–	–
open habitats	short sward & bare ground	14	2	*Gorytes laticinctus* (RDB3*); *Coenomympha pamphilus* (Sch7; Vu)
tree-associated	shaded woodland floor	11	1	*Norellia spinipes* (N)
tree-associated	decaying wood	10	–	–
wetland	acid & sedge peats	7	–	–
wetland	running water	6	–	–
wetland	marshland	5	–	–
tree-associated	arboreal	5	–	–
tree-associated	wet woodland	3	–	–
wetland	wet woodland	3	–	–

*Accepted as being more common than this status suggests; likely to be downgraded.

Table 4 SAT table (taken from Webb *et al.*, 2017)

Broad biotope	SAT	No. of species	SAT code	No. of species with conservation status (excluding research-only moths)	Conservation status	Reported condition
open habitats	rich flower resource	9	F002	–	–	Unfavourable (9 species, 15 required)
tree-associated	bark & sapwood decay	7	A212	–	–	Unfavourable (7 species, 19 required)
open habitats	scrub edge	4	F001	–	–	Unfavourable (4 species, 11 required)
open habitats	scrub-heath & moorland	3	F003	–	–	Unfavourable (3 species, 9 required)
open habitats	open short sward	3	F112	1	*Coenonympha pamphilus* (Sch7; Vu)	Unfavourable (3 species, 13 required)

3 Discussion

Limitations

3.1 2024 experienced a series of low-pressure systems resulting in poor weather including increased rainfall, cloud cover, and below-normal temperatures. The result has been a widely noted depression of invertebrate abundance. This has led to problems in surveying for species.

3.2 Results therefore are on average lower than expected, and species lists are broadly dominated by common species. It is still possible to reflect fairly the value of a site, though, through the analysis and discussion, and by using the experience of the invertebrate ecologist.

3.3 The site was visited in late summer, at the end of the invertebrate survey season for this area of Wales (April to August/early September), and therefore only a snapshot of the site's fauna could be recorded. No sampling of the spring, early summer, or high summer faunas was undertaken, which would have provided a more rounded view of the site and its importance to invertebrates.

Habitats

3.4 The site is represented by a range of habitats broadly covering three biotopes: 'open habitats', 'tree-associated', and 'wetland'. However, it is the open terrestrial biotope that dominates the site in terms of species associations and physical extent of each habitat. This is supported by the other biotopes, and both the tree-associated and wetland contribute to the overall value of the site and opportunities for invertebrates.

3.5 The habitat that is the most prominent across all areas of the site is the tall sward and scrub habitat, with a strong total of 66 species of association recorded. The resource is dominated by solitary bees and wasps, true bugs such as shield bugs and ground bugs, and also flies, particularly hoverflies and fruitflies.

3.6 The second most speciose habitat on the site is the short sward and bare ground habitat, with 14 species of association, including two species with a nationally significant status, though one of these (*Gorytes laticinctus*) no longer warrants a nationally significant status, although it is still a good indicator of habitat quality.

3.7 The woodland habitats on the site comprise a broad cross-section of features from arboreal canopy to deadwood. Each of these features possesses its own suite of species, helping elevate the site's status for invertebrates. A total of 25 species were recorded from the various woodland features, including a single species of value, but this species is not considered significant and may be downgraded in any upcoming status review.

3.8 The wetland biotope includes 18 species of association. The key wetland habitat within the biotope is the 'acid and sedge peats', which, although not expressed very highly, do include some strong indicators of habitat quality including a small suite of species that are only found on good-quality saturated peat and bog pool sites.

SATs

3.9 The site is moderately large and has a variety of habitats. However, there is a lack of niche variation across the site, as reflected in the SAT analysis, although two are noted as being of potential high value with a further SAT that may be much more valuable than the analysis suggests.

3.10 Appendix III presents a map identifying the broad areas of the site on which the SATs are present.

3.11 The F002 SAT 'rich flower resource' possesses nine species of fidelity (where the threshold for favourable status is 15). This is a strong total for two visits at the end of the invertebrate season and highlights the extensive flowery character of the site, and it is suggested that should further surveys be undertaken, it would attain 'favourable condition'.

3.12 The bark and sapwood decay SAT (A212) is considered to be also relatively strong, despite the limited recording, with seven species of fidelity (where the threshold is 19). Although it is not thought that this SAT would achieve favourable condition with further survey work, it is thought that it would be a strong feature on the site and a high-value asset to deadwood living species (saproxylics). In particular, the resource is dominated by stem-nesting solitary bees and wasps.

3.13 The scrub fringe SAT (F001) is highlighted by the analysis, though with only four species of fidelity (where the threshold is 11), but similarly to other SATs, it is likely to be more robust and important than the analysis suggests. It is thought that at this site, the assemblage of invertebrates associated with this feature is likely to be close to favourable condition, though again possibly not reaching the threshold for favourable condition.

3.14 The scrub-heath and moorland SAT (F003) and open short sward (F112) both feature in the analysis but only by three species each. As with other SATs, they are more important to the site than the analysis suggests and are important attributes to the diversity on the site. In particular, they both contribute to the structure on the site, with the scrub-heath providing a 'bushy' structural interface with the short open turf. This dynamic is an important feature of post-industrial sites.

Species

3.15 The survey of the site recorded 135 species and three species identified by Pantheon as being of value, with one (and possibly *Norellia spinipes*) being more common now than their status suggests, so in time, this number would be revised downwards as further status reviews are completed.

3.16 The important species on the lists are species in a juxtaposition of assemblages from typical mosaic 'brownfield groups' such as solitary bees and wasps to species of peaty sites.

3.17 There is only one genuinely scarce species recorded from the surveys, the small heath butterfly (*Coenonympha pamphilus*). The small heath butterfly is an Environment Act Schedule 7 species that has undergone a 67% distribution decline since 1971. It is reliant on the variable-sward-height grasslands with fine-leaved grasses, such as fescues (*Festuca* spp.) and bents (*Agrostis* spp.). It is present on the open patchy swards of the site but also utilizes the taller swards for roosting and shelter.

3.18 The lists though do include other interesting species of moderate to high fidelity to their specific features. The suite of stem-nesting bees and wasps is typical of brownfield sites with a structural element. They require broken pithy-stemmed plants such as umbellifers or desiccated trees and branches in which to construct a nest. The wetland species associated with the site may be breeding on the site but more likely commuting in from the adjacent moorland. The peat bog-associated hoverfly *Sericomyia silentis* is likely to be breeding on the moorland but using the site to forage for nectar and pollen. Similarly, the golden-ringed dragonfly is thought likely to be breeding on the moorlands but using the site to hunt, as it is a warm and sheltered location, rich with flying insects.

Invertebrates and climate change

3.19 The reduced invertebrate activity of 2024 is an ongoing downward trend in invertebrate abundance that is now widely acknowledged. It is part of a longer-term decline in invertebrate abundance that has been noticed by applied invertebrate ecologists for a number of years. As such, it is important to recognize the fact that invertebrates are under significant pressures from the changing climate. It is not currently known exactly how the change in climate is affecting each group, but flying insects appear to be more strongly influenced by the change in climate, and suffering the most.

3.20 When considering site assessments for invertebrates, it is important also to consider the impact of habitat loss to species in relation to climate change.

3.21 As far as can be understood, losses to complex mosaic sites will increase stress on the local invertebrate populations more than the loss of a site that has few features of potential value. This is because the mosaic sites provide a wide range of opportunities to many invertebrate species, including those that are 'fussy' and require multiple features to fulfil their lifecycles. For instance, the solitary wasp *Gorytes laticinctus* requires friable ground in which to construct a nest but hunts for prey items along scrub fringes. It is these mosaic sites that produce strong lists of species (owing to the habitat complexity) and also robust populations.

3.22 Mosaic sites are likely to be the nuclei out from which species can colonize or re-colonize other sub-optimal sites during opportunistic years of stable weather.

3.23 It is therefore considered likely that if the mosaic of features present on the site are not retained or replicated, the loss of the site or its key features will be felt more greatly by the local populations, since they are not as robust as they should be to be buffered from adverse weather events.

Site assessment summary

3.24 The survey recorded 115 species from the target groups, including three species of importance, but it is considered likely that two of these are no longer nationally significant.

3.25 Owing to the challenging weather conditions of 2024, the list of species is slightly shorter than expected, but there is still a strong cross-section of species that are reflective of the habitats on the site.

3.26 The site was also only visited in late summer, further reducing the pool of species from which to analyse the site and its relative value to invertebrates.

3.27 The overall number of species recorded is slightly lower than expected (see 3.17 and 3.18) but is still a strong cross-section of species highlighting the different features of the site. The lists are dominated by common and local species, but part of these lists includes species with close associations to specific features such as open short swards, saturated peats, and deadwood.

3.28 As the site was visited on only two occasions, some assumptions have to be made about the value of the site and its relative strengths, or weaknesses. The overall character that appears to be the strongest is the brownfield mosaic of open short swards, scrub fringes, and shrub heath habitat. This is complemented by the wet grassland, as it adds a wetland element that increases the diversity potential of the site.

3.29 It is considered likely that should further surveys be undertaken, at other times of the invertebrate season, the site would demonstrate itself to be a valuable invertebrate site with diverse species lists associated with open short swards, rich flower resources, and acid and sedge peats.

3.30 Owing to the comparatively or suspected strong list of species, the site is considered to be of some value (see Site evaluation section), and as such, a number of recommendations are put forward in the Recommendations section to offset any impacts from a proposed development.

3.31 The key with any invertebrate compensation is to create mosaics that include interfaces and strong juxtapositions of habitats and features, as it is these that generate the opportunities for species indicative of brownfield sites, including many of those of value at the site.

Site evaluation

3.32 The site comprises, or is thought to comprise (see Limitations section), a rich invertebrate fauna that comprises both 'brownfield' species and those synonymous with saturated peats, more typical of moorlands.

3.33 As the site supports species from a wide landscape scale, as a hunting resource for moorland dragonflies, or as a pollinator resource for moorland hoverflies, its value is elevated beyond its resident, breeding fauna.

3.34 The valuation of the site takes into consideration the range of species recorded, including the scarce species, the overall assemblages, and the importance of the habitats to the species. It also considers the context of the year's weather, the site, and/or its species in relation to the local area and further afield.

3.35 From considering the above summary information and data collected from the surveys, it is suggested that any impact on the site's key features and species should be considered to be of **District (low) importance**.

3.36 The site is considered to be of District (low) importance and not one of a higher status, owing to the site only possessing a single species that is realistically of nationally significant status. The site is, however, likely to possess more scarce species, but it is not thought likely that a very long list or those of high conservation value (Red Data Book) are present.

4 Recommendations

Important note

4.1 The priority should always be to retain key areas of habitat *in situ*.

4.2 Where this cannot be done, a further replicant habitat **mosaic** should be created. This should be of high quality and managed to retain its desirable character.

4.3 All invertebrate-related mitigation should be undertaken on **low-fertility soils.**

4.4 As the site and its key species are associated with a range of features, a complex mosaic of features is required to support the invertebrates that currently use the site.

4.5 The success of any mitigation for loss of part or all of the site's key features will be dependent on incorporating key features in juxtaposition with one another and creating features that are **abundant**, **extensive**, and **optimal**.

Flowering swards

4.6 As the site is noted for its rich flower resource, particularly the Fabaceae element, it will be important to provide as rich a flowering resource as possible for the site's invertebrates. Flowering areas should be sown/planted with an appropriate mix of flowering plants. This mix should benefit the pollen- and nectar-foraging invertebrates, and therefore include the following:

- common bird's-foot trefoil (*Lotus corniculatus*);
- common knapweed (*Centaurea nigra*);
- bush vetch (*Vicia cracca*);
- tufted vetch (*Vicia sepium*);
- hawkbits (*Leontodon* spp.);
- hawkweeds (*Hieracium* spp.);
- labiates (Lamiaceae);
- ragwort (*Jacobaea vulgaris*);
- meadow vetchling (*Lathyrus pratensis*);
- other trefoils (Fabaceae);
- other vetches (*Vicia* spp.);
- common fleabane (*Pulicaria dysentarica*);
- ox-eye daisy (*Leucanthemum vulgare*);
- yellow rattle (*Rhinanthus minor*);
- tormentil (*Potentilla erecta*);
- red clover (*Trifolium pratense*); and
- woundworts (*Stachys* spp.).

4.7 The flowering swards should have a very high density of flowers. Most standard mixes do not have a high enough proportion of flowering plants that are suitable for invertebrate mitigation, so a bespoke mix or additional ordering of supplementary flower seed or plugs is advised. On-site resources can also be used.

4.8 To complement the flowery swards, creating patches of open bare ground adjacent to them would be of benefit for the short sward and bare ground species.

Open, patchy bare ground

4.9 The presence of an open, flowery sward with patches of bare ground is an important feature on the site.

4.10 To be successful, the mosaic should be exposed to full sun for much of the day, including the key period between 10:00 and 16:00 h, and be created on nutrient-poor subsoils to promote a patchy sward dominated by flowering plants. Some of these substrates should be gravelly, made from partly crushed builders' rubble, chalk, or limestone ballast. A mixture of all three may be beneficial, as it will provide nuance to the composition of the substrate and resulting flora composition. Other areas can comprise compacted, fine, sandy material for ground-nesting bees and wasps.

4.11 Bare ground should comprise approximately 30% of the overall habitat mosaic.

4.12 A mosaic of fine-leaved grasses and a range of flowering plants are required to fulfil the requirements of the open flowery mosaics. It is likely that a 'one stop' commercially sourced seed mixture may not be suitable, but a bespoke mix will be required.

The following plant species should be included as part of the short turf sward:

- common bird's-foot trefoil (*Lotus corniculatus*);
- hawkbits (*Leontodon* spp.);
- tormentil (*Potentilla erecta*);
- other low-growing yellow Asteraceae;
- other trefoils (Fabaceae);
- other vetches (*Vicia* spp.); and
- red clover (*Trifolium pratense*).

Fine-leaved grasses as part of the mosaic should include the following native grass families to benefit small heath butterflies:

- fescues (*Festuca* species); and
- bents (*Agrostis* species).

Scrub fringe

4.13 Scrub is an important interface with open flowery habitats and short turf/bare ground.

4.14 It is also important for deadwood beetles and flies that utilize its spring blossom as adults.

4.15 Scrub, or any trees, should not shade out important areas of flowery areas or bare ground/short turf. Where scrub is needed to produce an interface, it should be positioned on the northern side of the mosaic.

4.16 Where additional scrub planting is required, only use native species. The following species provide a continuity of flowers from early spring to summer:

- apples (*Malus domestica* agg.);
- blackthorn (*Prunus spinosa*);
- cherry plum (*Prunus cerasifera*);
- field maple (*Acer campestre*);
- hawthorn (*Crataegus monogyna*);
- plums (*Prunus domestica* agg.);
- rowan (*Sorbus aucuparia*); and
- willows (*Salix* spp.).

Deadwood

4.17 It is recommended that the woodlands be retained. Where any areas cannot be retained, rework the tree trunks on site as deadwood features. They should be retained in as large a volume as possible (i.e. do not section them up into short 'logs').

4.18 Tree trunks can be placed in semi-shade and full sun to benefit the widest range of invertebrates. The majority should be simply dragged to the edge of a woodland to keep them as intact and whole as possible.

4.19 Some can be inserted into the ground to replicate standing deadwood.

4.20 The key for deadwood resources is 'the larger the better'.

Wetlands and climate change

4.21 Although waterbodies do not feature on the site, they are important to all species, particularly in the event of heatwaves and droughts. Open water is essential and should be included in any compensation plan. This is a key part of climate-change future-proofing to conservation compensation packages. They will also be important to support the wet grassland and increase foraging and potentially breeding locations for the saturated peat-loving flies.

4.22 To get the most out of the open waterbodies, ponds should form part of the overall mosaic of habitats being retained or created. They should be numerous, be in a cluster, and range in size and profile to provide a wide range of opportunities and drawdown zone profiles.

4.23 Broadly, large ponds with significant drawdown zones are of greatest benefit and also retain water during drought events.

4.24 Low-lying wet areas that develop into marshy grassland around the ponds will be of added value, as they will retain humidity during drought events, essential for insects to shelter from the heat.

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6 Appendix

Appendix I: Red Data Book definitions
Appendix II: Survey results
Appendix III: SAT map

Appendix I: Red Data Book definitions

Red Data Book category 1 (RDB 1) – Endangered
Species that are known or believed to occur as only a single population within one 10-km square of the National Grid.

Red Data Book category 2 (RDB 2) – Vulnerable
Species declining throughout their range or in vulnerable habitats.

Red Data Book category 3 (RDB 3) – Rare
Species that are estimated to exist in only 15 or fewer post-1970 10-km squares. This criterion may be relaxed where populations are likely to exist in over 15 10-km squares but occupy small areas of especially vulnerable habitat.

Nationally Notable (Scarce) category A (NS A) – Notable A
Taxa that do not fall within the RDB category but that are nonetheless uncommon in Great Britain and thought to occur in 30 or fewer 10-km squares of the National Grid or, for less well-recorded groups, between eight and 20 vice counties.

Nationally Notable (Scarce) category B (NS B) – Notable B
Taxa that do not fall within the RDB category but that are nonetheless uncommon in Great Britain and thought to occur in 31–100 10-km squares of the National Grid or, for less well-recorded groups, between eight and 20 vice counties.

Nationally Notable (Scarce) (N) – Notable
Species that are estimated to occur within the range of 16–100 10-km squares. The subdividing of this category into Notable A and Notable B has not been attempted for many species in this part of the review.

IUCN categories
EXTINCT (EX)
A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range, have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
CRITICALLY ENDANGERED (CR)
A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
ENDANGERED (EN)
A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.
VULNERABLE (VU)
A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
NEAR THREATENED (NT)
A taxon is Near Threatened when it has been evaluated against the criteria but does not

qualify for Critically Endangered, Endangered, or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
LEAST CONCERN (LC)
A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable, or Near Threatened. Widespread and abundant taxa are included in this category.
DATA DEFICIENT
A taxon is Data Deficient (DD) when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. DD is therefore not a category of threat.

GB Rarity Status categories and criteria
Broadly speaking, the Nationally Rare category is equivalent to the Red Data Book, namely: Endangered (RDB1), Vulnerable (RDB2), Rare (RDB3), Insufficiently Known (RDBK), and Extinct, which will not be used in this report.

The Nationally Scarce category is directly equivalent to the combined Nationally Notable A (Na) and Nationally Notable B (Nb) categories used in the assessment of various taxonomic groups, e.g. by Hyman and Parsons (1992) in assessing the status of beetles, but never used in a published format to assess these three families.

Nationally Rare Native species recorded from 15 or fewer hectads of the Ordnance Survey National Grid in Great Britain since 31 December 1989 and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads. This category includes species that are probably extinct.

Nationally Scarce Native species that are not regarded as Nationally Rare AND have not been recorded from more than 100 hectads of the Ordnance Survey National Grid in Great Britain since 31 December 1989 and where there is reasonable confidence that exhaustive recording would not find them in more than 100 hectads.

England NERC S.41 Biodiversity Lists – England England NERC S.41 Species ‘of principal importance for the purpose of conserving biodiversity’ covered under section 41 (England) of the NERC Act (2006) and therefore need to be taken into consideration by a public body when performing any of its functions with a view to conserving biodiversity. 2008 Natural Environment and Rural Communities Act 2006 – Species of Principal Importance in England (section 41) and Wales (section 42).

Appendix II: Survey results

Only species with a national status have been annotated. All others are common or local species.

Scientific name	Family	Order	National status
Adalia decempunctata	Coccinellidae	Coleoptera	
Adelphocoris lineolatus	Miridae	Hemiptera	
Ancistrocerus gazella	Vespidae	Hymenoptera	
Anomoia purmunda	Tephritidae	Diptera	
Anthidium manicatum	Megachilidae	Hymenoptera	
Anthocoris limbatus	Anthocoridae	Hemiptera	
Anthocoris nemorum	Anthocoridae	Hemiptera	
Anthophora furcata	Apidae	Hymenoptera	
Aphantopus hyperantus	Nymphalidae	Lepidoptera	
Aphrophora alni	Aphrophoridae	Hemiptera	
Araneus diadematus	Araneidae	Araneae	
Araneus quadratus	Araneidae	Araneae	
Autographa gamma	Noctuidae	Lepidoptera	
Bibio pomonae	Bibionidae	Diptera	
Bicellaria vana	Hybotidae	Diptera	
Bombus (Thoracobombus) pascuorum	Apidae	Hymenoptera	
Bombus terrestris	Apidae	Hymenoptera	
Bruchidius varius	Chrysomelidae	Coleoptera	
Calocoris (Calocoris) roseomaculatus	Miridae	Hemiptera	
Cassida rubiginosa	Chrysomelidae	Coleoptera	
Cheilosia bergenstammi	Syrphidae	Diptera	
Chorisops tibialis	Stratiomyidae	Diptera	
Chorthippus brunneus	Acrididae	Orthoptera	
Chrysogaster solstitialis	Syrphidae	Diptera	
Chrysotoxum festivum	Syrphidae	Diptera	
Chrysotus gramineus	Dolichopodidae	Diptera	
Cicadella viridis	Cicadellidae	Hemiptera	

Scientific name	Family	Order	National status
Closterotomus norwegicus	Miridae	Hemiptera	
Coccinella septempunctata	Coccinellidae	Coleoptera	
Coenonympha pamphilus	Nymphalidae	Lepidoptera	Section 41 Priority Species; Vulnerable
Conops quadrifasciatus	Conopidae	Diptera	
Cordulegaster boltonii	Cordulegastridae	Odonata	
Crepidodera fulvicornis	Chrysomelidae	Coleoptera	
Dolichopus griseipennis	Dolichopodidae	Diptera	
Dolichopus ungulatus	Dolichopodidae	Diptera	
Dolycoris baccarum	Pentatomidae	Hemiptera	
Empis livida	Empididae	Diptera	
Empis nuntia	Empididae	Diptera	
Episyrphus balteatus	Syrphidae	Diptera	
Erigone atra	Linyphiidae	Araneae	
Eriothrix rufomaculata	Tachinidae	Diptera	
Eristalis arbustorum	Syrphidae	Diptera	
Eristalis pertinax	Syrphidae	Diptera	
Eumerus funeralis	Syrphidae	Diptera	
Eupeodes luniger	Syrphidae	Diptera	
Eurygaster testudinaria	Scutelleridae	Hemiptera	
Euscelis incisus	Cicadellidae	Hemiptera	
Formica fusca	Formicidae	Hymenoptera	
Gorytes laticinctus	Crabronidae	Hymenoptera	Red Data Book 3*
Helophilus pendulus	Syrphidae	Diptera	
Herina lugubris	Ulidiidae	Diptera	
Himacerus (Aptus) mirmicoides	Nabidae	Hemiptera	
Hylaeus hyalinatus	Colletidae	Hymenoptera	
Hypera nigrirostris	Curculionidae	Coleoptera	
Lasioglossum leucozonium	Halictidae	Hymenoptera	

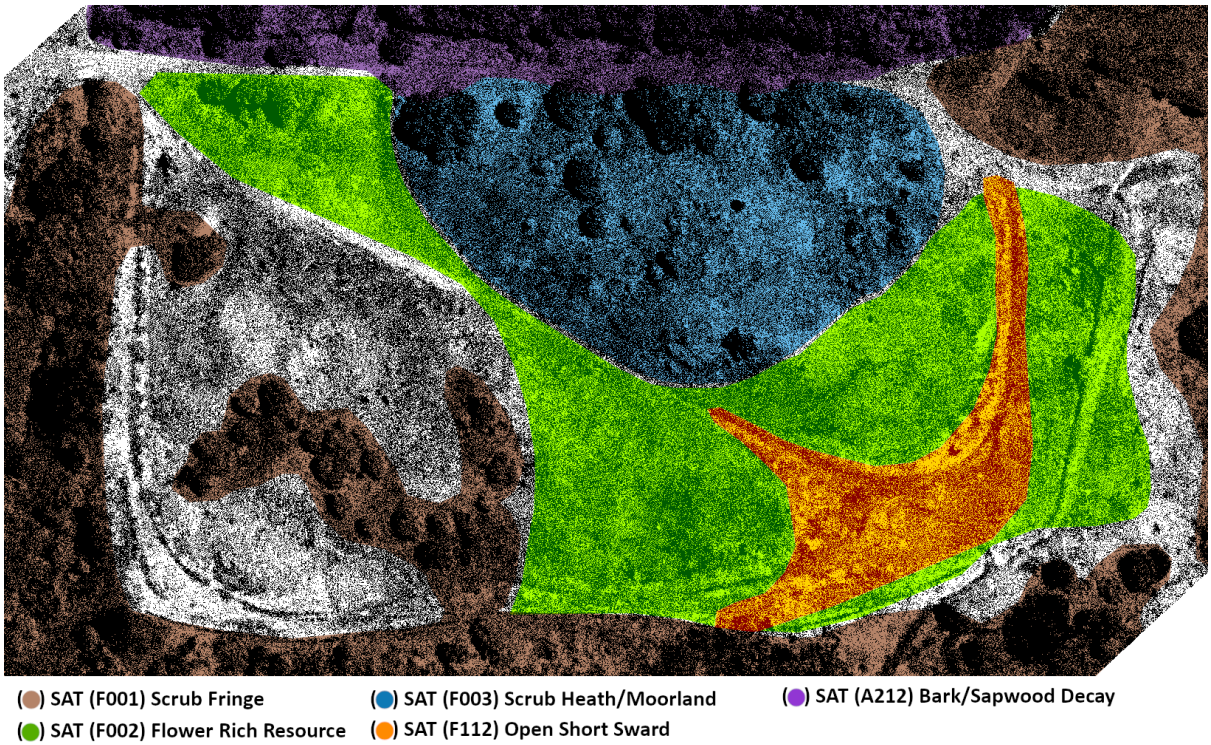
Scientific name	Family	Order	National status
Lasioglossum smeathmanellum	Halictidae	Hymenoptera	
Leptogaster cylindrica	Asilidae	Diptera	
Leptopterna dolabrata	Miridae	Hemiptera	
Leptopterna ferrugata	Miridae	Hemiptera	
Leptura quadrifasciata	Cerambycidae	Coleoptera	
Limnia unguicornis	Sciomyzidae	Diptera	
Linnaemya vulpina	Tachinidae	Diptera	
Lopus decolor	Miridae	Hemiptera	
Maniola jurtina	Nymphalidae	Lepidoptera	
Megachile centuncularis	Megachilidae	Hymenoptera	
Megachile versicolor	Megachilidae	Hymenoptera	
Megachile willughbiella	Megachilidae	Hymenoptera	
Megaloceroea recticornis	Miridae	Hemiptera	
Melangyna umbellatarum	Syrphidae	Diptera	
Melanostoma mellinum	Syrphidae	Diptera	
Melanostoma scalare	Syrphidae	Diptera	
Merodon equestris	Syrphidae	Diptera	
Minettia fasciata	Lauxaniidae	Diptera	
Nabis (Nabicula) flavomarginatus	Nabidae	Hemiptera	
Neocrepidodera transversa	Chrysomelidae	Coleoptera	
Norellia spinipes	Scathophagidae	Diptera	Notable
Ochlodes sylvanus	Hesperiidae	Lepidoptera	
Oedemera lurida	Oedemeridae	Coleoptera	
Oedemera nobilis	Oedemeridae	Coleoptera	
Oncotylus (Oncotylus) viridiflavus	Miridae	Hemiptera	
Orthocephalus coriaceus	Miridae	Hemiptera	
Orthops (Orthops) campestris	Miridae	Hemiptera	

Scientific name	Family	Order	National status
Palomena prasina	Pentatomidae	Hemiptera	
Pararge aegeria	Nymphalidae	Lepidoptera	
Passaloecus singularis	Crabronidae	Hymenoptera	
Philaenus spumarius	Aphrophoridae	Hemiptera	
Phytocoris (Ktenocoris) varipes	Miridae	Hemiptera	
Pieris brassicae	Pieridae	Lepidoptera	
Pieris rapae	Pieridae	Lepidoptera	
Piezodorus lituratus	Pentatomidae	Hemiptera	
Pisaura mirabilis	Pisauridae	Araneae	
Plagiognathus (Plagiognathus) arbustorum	Miridae	Hemiptera	
Plagiognathus (Plagiognathus) chrysanthemi	Miridae	Hemiptera	
Platycheirus clypeatus	Syrphidae	Diptera	
Platycheirus scutatus	Syrphidae	Diptera	
Poecilobothrus nobilitatus	Dolichopodidae	Diptera	
Populicerus confusus	Cicadellidae	Hemiptera	
Propylea quattuordecimpunctata	Coccinellidae	Coleoptera	
Protapion apricans	Apionidae	Coleoptera	
Protapion fulvipes	Apionidae	Coleoptera	
Pseudochorthippus parallelus	Acrididae	Orthoptera	
Pyrausta despicata	Crambidae	Lepidoptera	
Rhagio lineola	Rhagionidae	Diptera	
Rhagio tringarius	Rhagionidae	Diptera	
Rhagonycha fulva	Cantharidae	Coleoptera	
Rhamphomyia variabilis	Empididae	Diptera	
Riponnensia splendens	Syrphidae	Diptera	
Rivellia syngenesiae	Platystomatidae	Diptera	
Sapromyza quadripunctata	Lauxaniidae	Diptera	
Sapromyza	Lauxaniidae	Diptera	

Scientific name	Family	Order	National status
sexpunctata			
Scaeva pyrastri	Syrphidae	Diptera	
Scathophaga stercoraria	Scathophagidae	Diptera	
Sciara hemerobioides	Sciaridae	Diptera	
Sericomyia silentis	Syrphidae	Diptera	
Sicus ferrugineus	Conopidae	Diptera	
Sitona obsoletus	Curculionidae	Coleoptera	
Sitona suturalis	Curculionidae	Coleoptera	
Sphaerophoria philanthus	Syrphidae	Diptera	
Stenodema (Brachystira) calcarata	Miridae	Hemiptera	
Stenodema (Stenodema) laevigata	Miridae	Hemiptera	
Stenotus binotatus	Miridae	Hemiptera	
Syritta pipiens	Syrphidae	Diptera	
Tephritis formosa	Tephritidae	Diptera	
Tephritis leontodontis	Tephritidae	Diptera	
Thymelicus sylvestris	Hesperiidae	Lepidoptera	
Tipula fascipennis	Tipulidae	Diptera	
Tipula fulvipennis	Tipulidae	Diptera	
Tipula maxima	Tipulidae	Diptera	
Tyria jacobaeae	Erebidae	Lepidoptera	
Vespa crabro	Vespidae	Hymenoptera	
Volucella bombylans	Syrphidae	Diptera	
Xylota segnis	Syrphidae	Diptera	
Xysticus cristatus	Thomisidae	Araneae	
Zygaena filipendulae	Zygaenidae	Lepidoptera	
Zygaena lonicerae	Zygaenidae	Lepidoptera	

*Widely accepted as being much more common than this status suggests; likely to be downgraded.

Appendix III: SAT map



Note: The SAT map has been produced highlighting the board areas in which the SATs dominate. This should not be interpreted as definitive as SATs, being tightly defined niches, can occur anywhere on the site where conditions suit. For example, bark and sapwood decay (A212) can occur also on the areas of open short sward (F112) where piles of deadwood or desiccated brambles are present. Or at scrub fringe F001) on decaying branches.