



Preliminary Environmental Information Report

Chapter 8G: Invertebrate Survey Report

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8.0 Invertebrate Survey Report

8.1 Introduction

8.1.1 This report details the findings of a programme of invertebrate survey carried out for GE Consulting during 2020 and 2023, at Caldicot Level on the Gwent Levels, Monmouthshire (Watsonian vice county 35). A central grid reference for the Site approximates to ST423841. The area within the PEIR Assessment Boundary is referred to hereafter as 'Caldicot Level'.

8.1.2 The Gwent Levels is an extensive area of grazing marsh running along the coastal fringe between Cardiff in the west and the Magor-Undy conurbation in the east. Caldicot Level occupies the eastern part of the Gwent Levels, from south of Magor-Undy at its eastern end, stretching along the coastal strip west as far as the small settlement of Whitson.

8.1.3 The importance of the network of ditches (known locally as reens) for aquatic and wetland invertebrates is reflected in the designation of most of the Gwent Levels as a series of Sites of Special Scientific Interest (SSSI). The three pertinent to the current survey are, from east to west:

- Gwent Levels - Magor and Undy SSSI;
- Gwent Levels – Redwick and Llandevenny SSSI;
- Gwent Levels – Whitson SSSI.

8.1.4 The SSSI(s) relevant to each of the invertebrate survey units is shown in Table 8-1.

8.1.5 The SSSI citations for all three sites highlight the importance of the reens for aquatic invertebrates, with the Great Silver Water Beetle *Hydrophilus piceus* and the water beetle *Haliphus mucronatus* identified. The citations also mention the importance of these sites for aquatic molluscs and dragonflies; the bladder snail *Physa heterostropha* and the Hairy Dragonfly *Brachytron pratense* receiving specific mentions. However, *P. heterostropha* has now been synonymised with the much more widespread Acute Bladder Snail *Physella acuta* is also thought to be an introduction from North America. The value of hedges and banks bordering the reens

for terrestrial invertebrates is also stated, with the Pipunculid flies *Pipunculus fonscai* and *Tomosvaryella minima* listed.

- 8.1.6 Both the Shril Carder *Bombus sylvarum* and Brown-banded Carder *B. humilis* Bumblebees are nationally declining species that have important populations on the Gwent Levels. The former is now only known from a few places in southern Britain, with the Gwent Levels still holding a nationally important population. It is identified as a Special Feature on all three relevant SSSIs and as such, its protection and management is a key responsibility for NRW.
- 8.1.7 The individual citations for each SSSI also list some other specific details on the invertebrate interest of the site in question. That for the Magor and Undy SSSI mentions the presence of 43 Nationally Rare or Nationally Scarce species, amongst which the Flecked General soldierfly *Stratiomys furcata* (now *S. singularior* and no longer considered to be a Nationally Scarce species), and the snail-killing fly *Pherbellia brunnipes* are listed. The Redwick and Llandevenney SSSI citation includes the marsh beetle *Scirtes orbicularis*, the hoverfly *Parhelophilus consimilis* and the Chalcid wasp *Chalcis sispes*, the latter being a parasite of large soldierflies, with the Banded General *Odontomyia ornata* (see sub-section 3.x) and Flecked General being likely hosts on the Gwent Levels.
- 8.1.8 For the most part Caldicot Level is grassland, which is either grazed by cattle, sheep and horses or cut for silage. These are mostly agriculturally improved, with rather species-poor swards dominated by grasses such as Perennial Rye-grass *Lolium perenne* and Crested Dog's-tail *Cynosurus cristatus* with frequent to abundant White Clover *Trifolium repens*. In a few places, there are more species-rich semi-improved or unimproved grasslands, with a wider range of neutral grassland herbs amongst which Red Clover *Trifolium pratense*, Common Bird's-foot Trefoil *Lotus corniculatus*, Greater Bird's-foot Trefoil *Lotus pedunculatus*, Tufted Vetch *Vicia cracca*, Common Knapweed *Centaurea nigra* and Common Fleabane *Pulicaria dysenterica* are prominent constituents of the sward. There is also a significant extent of arable land, most of which is planted with either Maize or Wheat. Stands of rank grassland and tall, ruderal vegetation are frequent, especially around hedge margins.
- 8.1.9 The hedges that divide the fields have a range of native trees and shrubs, such as Ash *Fraxinus excelsior*, oak *Quercus* sp., Crack Willow *Salix cracca*, poplar *Populus*

sp., Grey Willow *Salix cinerea*, Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa* and Common Elm *Ulmus procera*. Bramble *Rubus fruticosus* is also abundant. In places, these hedges have a significant number of mature or over-mature Ash, oak and Crack Willow that have significant dead wood habitat features, such as tree holes, heart-rot and bracket fungi. Much of the Ash at Caldicot Level shows clear evidence of dieback associated with the fungus *Hymenoscyphus fraxineus*. There are additionally some small copses that have a similar composition of trees and shrubs to that of the hedges described above.

8.1.10 Much of the network of ditches (known locally as reens) is shaded by hedges that have been planted along the reens and/or has become dried out. However, most of the larger reens and some field ditches are still at least partially unshaded, permanently inundated and with a more diverse aquatic flora that includes species such as Frogbit *Hydrocharis morsus-ranae*, and submerged pondweeds, such as Canadian Pondweed *Elodea canadensis*, Rigid Hornwort *Ceratophyllum demersum*, Curled Pondweed *Potamogeton crispus* and Hair-like Pondweed *Potamogeton trichoides*. Eutrophic ditches may have a much less diverse aquatic flora, which is dominated by mats of floating duckweeds *Lemna* spp. and mats of Floating Sweet-grass *Glyceria fluitans*.

8.1.11 Emergent and marginal vegetation is usually dominated by mixtures of tall monocotyledons such as Common Reed *Phragmites australis*, Reed Sweet-grass *Glyceria maxima*, Branched Bur-reed *Sparganium erectum* and Greater Pond-sedge *Carex riparia*, along with Hemlock Water-dropwort *Oenanthe crocata*. Where there is a degree of saline influence (especially in the ditches running along the rear edge of the seawall), there may also be frequent stands of emergent Sea Club-rush *Bolboschoenus maritimus*. Moderate levels of cattle grazing along ditch margins is generally beneficial in reducing the overwhelming dominance of the tall fen species described above with a

8.1.12 range of other less robust wetland plants such as Water-cress *Rorippa nasturtium-aquaticum*, Celery-leaved Buttercup *Ranunculus sceleratus*, Lesser Water-parsnip *Berula erecta*, Tubular Water-dropwort *Oenanthe fistulosa*, Pink Water-speedwell *Veronica catenata* and Common Water-plantain *Alisma plantago-aquatica*.

8.1.13 Where the upper part of reen banks are open and fenced from stock, the most

frequent vegetation is rank grassland dominated by tussocks of False Oat-grass *Arrhenatherum elatius*, Cock's-foot *Dactylis glomeratus* and tall herbs such as Hogweed *Heracleum sphondylium*, Great Willowherb *Epilobium hirsutum*, Creeping Thistle *Cirsium repens*, Spear Thistle *Cirsium vulgare* and Common Nettle *Urtica dioica*. In some places, these tall grasslands can be more flower-rich with important invertebrate nectar and pollen sources such as Meadow Vetchling *Lathyrus pratensis*, Tufted Vetch and Marsh Woundwort *Stachys palustris*.

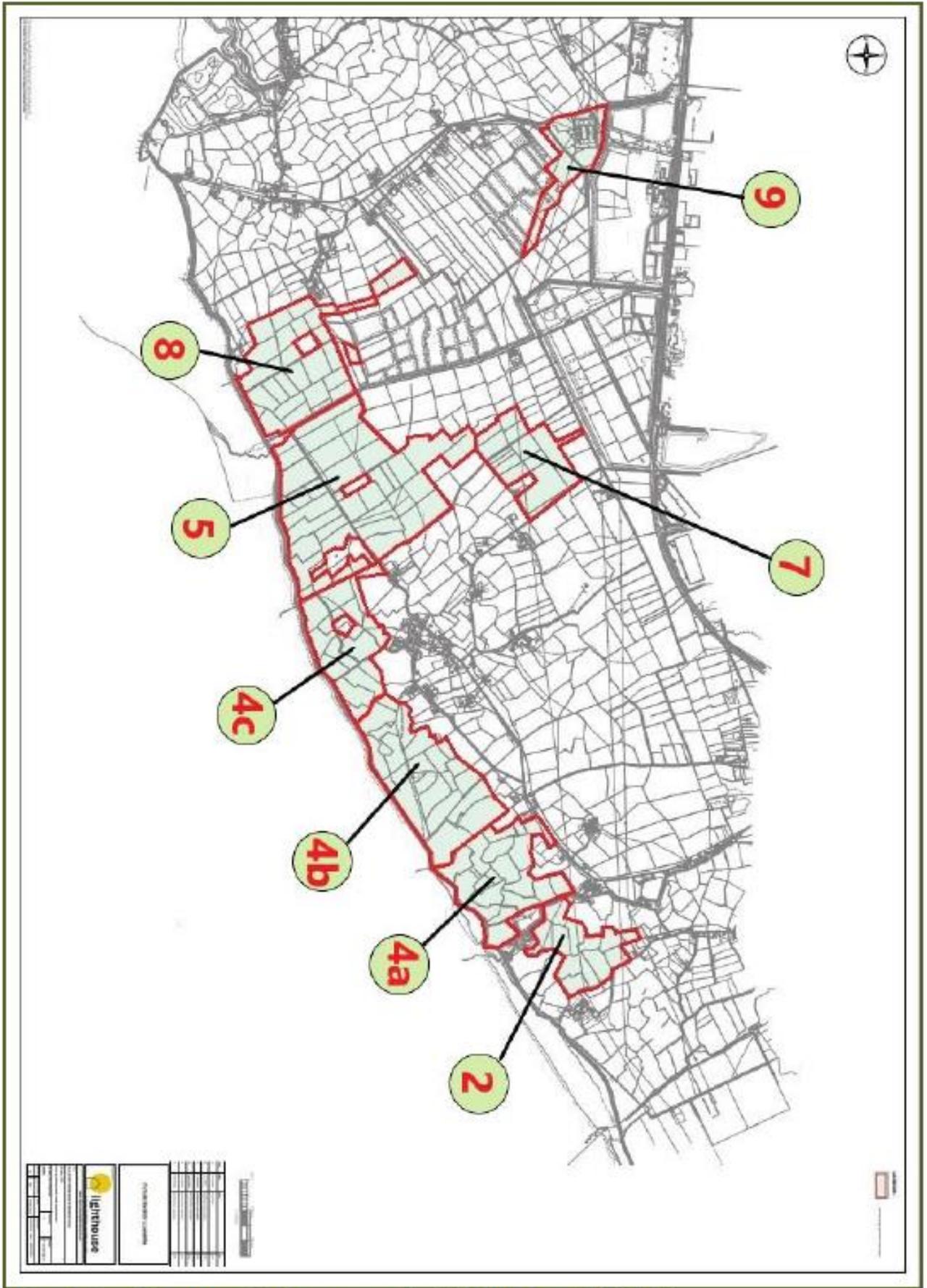


Figure 1. Location of invertebrate survey units at Caldicot Level, 2020-23

8.2 Methods

- 8.2.1 The original 2020 survey covered a larger area than the final PEIR assessment boundary. For the purposes of the original survey, the site had been divided into eight invertebrate survey units (SU, that were abbreviated to SU1-SU8) but these areas have been modified subsequently and three of the outlying blocks (SU1, SU3 and SU6) have been removed completely from the PEIR assessment boundary. These are not discussed further in this report. An additional outlying area (SU9 on Figure 1) has been added since 2020 but was not one of the areas the contractor was asked to re-survey in 2023.
- 8.2.2 The location of the survey units is shown on Figure 1 and **Table 8G-1** provides a brief description, including location and habitats. The large contiguous block of land south and west of Redwick has been sub-divided into two survey units (SU4 and SU5) of roughly equal size. For 2023, the former was further sub-divided into three sub-sample areas (SU4a, 4b and 4c on Figure 1). These and sample station 5 were the focus of the repeat survey.

Table 8G-1 Description of invertebrate survey units at Caldicot Level, 2020

Survey Unit (SU)	Approximate centroid	Habitat and other information
SU2	ST437855	Species-poor grassland. Reens mostly shaded by hedges and/or dried out. Only one open reen with good aquatic habitat. Part of Magor and Undy SSSI. Surveyed in 2020.
SU4	ST420839	Species-poor grassland and arable (maize). Most of the reens are shaded and/or dried out. Only a few of the larger ditches such as the Cold Harbour Reen and Windmill Reen are permanently water-filled and at least partly open. The latter marks the boundary between this unit and SU5 to the west but it was sampled from the east bank and is therefore included in SU4. Some areas with outgrown hedges and mature trees. Sub-sample station 4a is in the Magor and Undy SSSI, the remainder of SU4 is in the Redwick and Llandevenny SSSI. Surveyed in 2020 and 2023.
SU5	ST396837	Mostly species-poor grassland and arable. A few areas with somewhat more flower-rich semi-improved grassland. Most of the smaller field ditches are shaded and/or dried out, though a few in the northern section of this area are open and have permanent water. The large Elver Pill Reen,

		which marks the western boundary of this unit is also open, with a wide and very deep channel. This SU lies entirely within the Whitson SSSI. Surveyed in 2020 and 2023.
SU7	ST397850	Mostly species-poor grassland and arable but with a few stands of more species-rich grassland. The large, open Yoke Reen crosses this unit but the field ditches are mostly shaded and/or dried out. This SU is in the Redwick and Llandevenny SSSI and Whitson SSSI. Surveyed in 2020.
SU8	ST392831	Mostly species-poor grassland but towards the seaward edge, there are some more species-rich semi-improved grasslands. Most of the field ditches are shaded and/or dry but there are a couple that are still open, notably that on the southern boundary, which is immediately to the north of the seawall and appears slightly brackish. This SU lies entirely within the Whitson SSSI. Surveyed in 2020.
SU9	ST	This SU lies partly within the Whitson SSSI. Not surveyed.

Fieldwork

- 8.2.3 The first phase of 2020 survey work was undertaken in two blocks in late-spring to early-summer: the first session being carried out on the 20th to 24th of May 2020 and the second from the 29th of May to the 2nd of June. These first visits primarily involved sampling the aquatic invertebrate fauna of the reens and undertaking general sampling of terrestrial invertebrates.
- 8.2.4 The second main 2020 sampling session covered the mid- to late-summer period and was mainly undertaken between the 16th and 24th of July inclusive, with an additional two-day visit to the site on the 12th and 13th of August. The primary objective of this second block of survey was to assess the status of the Shrill and Brown-banded Carder Bumblebees, which both have nationally important populations on the Gwent Levels. Further general terrestrial invertebrate sampling was also carried out.
- 8.2.5 To supplement the results of the 2020 survey with more up-to-date data, additional sampling was repeated in 2023. This was more limited than the initial survey and the contractor was asked to focus on four areas within SU4 and SU5. The three sub-sample areas in the former are identified here as SU4a, SU4b and SU4c and their

location is shown on Figure 1. As with the original 2020 survey, the 2023 programme was split into two blocks, which were again focused on aquatic invertebrates and bumblebees respectively. The first block of survey work took place from the 3rd to the 5th of June 2023 inclusive and the second from the 29th to the 31st of July. The methodologies used to carry out the invertebrate survey in both years were the same and are described in more detail below.

Aquatic Invertebrate Sampling

- 8.2.6 Aquatic invertebrate sampling has followed the collecting protocols set out in Palmer *et al.* (2013) and further detail on the methodology can be found by consulting that source. This is the nationally adopted standard for the survey of aquatic invertebrates in grazing marsh ditches. Some additional casual aquatic invertebrate sampling was carried out in shallow water margins using a sieve. Each aquatic sample station has been allocated a unique survey number (AQ1-AQ24) and the location of these is shown on **Figures 2 to 7**.
- 8.2.7 Before beginning to collect aquatic invertebrates, an eight-figure GPS reading of the location of the sample was recorded. For each sample, the pond net was used to collect material from parts of the ditch that exhibited the greatest small-scale mosaic structure until the net began to fill to the point that it became more difficult to push. This generally took between one to three minutes and the net was usually about a quarter to a third full of plant material (about two to three litres by volume). The sample was then spread out onto a white polythene sheet and invertebrates were recorded/collected for eight to ten minutes as the material was teased apart.
- 8.2.8 The main taxonomic groups to be covered by the aquatic survey were water beetles (Coleoptera), water bugs (Hemiptera), dragonflies/damselflies (Odonata) soldierflies (Diptera: Stratiomyidae) and water snails (Mollusca). Some other invertebrate taxa were also collected where these were easily identified or were in groups familiar to the surveyor.

Table 8G-2 Description of aquatic invertebrate sample stations, Caldicot Level, 2020-23

Aquatic sample (AQ) and survey unit (SU)	Grid ref	Habitat and other information
AQ1	ST4378524	Prat Reen. Partly open reen with steep banks. Abundant submerged aquatic beds of Rigid Hornwort. SU2.
AQ2	ST43838535	Prat Reen. Partly open reen with steep banks. Some submerged aquatic vegetation with pondweed and Rigid Hornwort. SU2.
AQ3	ST43098438	Cold Harbour Reen. Large, open reen with abundant submerged pondweeds and fringe of tall emergent sedge, Branched Bur-reed etc. Cattle have access to the eastern bank, which has a well-grazed, shallow margin. SU4a.
AQ4	ST42848463	Cold Harbour Reen. Large, open reen with abundant submerged pondweeds and fringe of tall Greater Reedmace etc. Cattle have access to the eastern bank, which has a 'stepped', shallow margin. SU4a
AQ5	ST42248376	Mid-sized reen running behind rear edge of seawall. Some submerged pondweeds, Frogbit occasional and emergent Branched Bur-reed, Greater Reedmace and Sea club-rush frequent. SU4b.
AQ6	ST42098372	Mid-sized reen running behind rear edge of seawall. Abundant submerged pondweeds, frequent Frogbit and occasional emergent Branched Bur-reed, Common Water-plantain and Lesser Water-parsnip. SU4b.
AQ7	ST41428332	Deeply cut reen behind seawall with abundant emergent Sea Club-rush and frequent floating Frogbit. SU4c.
AQ8	ST41358330	Deeply cut reen behind seawall with abundant tall emergents, occasional submerged pondweeds and some Frogbit. SU4c.
AQ9	ST41168323	Deeply cut reen behind seawall with some emergent Lesser Water-parsnip and Floating Sweet-grass. SU4c.
AQ10	ST40898330	Windmill Reen, very large reen with frequent submerged beds of pondweed and fringing tall emergent Common Reed, Reed Sweet-grass and Branched Bur-reed. SU4c
AQ11	ST40888333	Windmill Reen, very large reen with frequent submerged beds of pondweed and fringing tall emergent Common Reed Reed Sweet-grass and Branched Bur-reed. SU4c

AQ12	ST40728362	Windmill Reen, very large reen with frequent submerged beds of pondweed and fringing tall emergent Common Reed and Branched Bur-reed. SU4c.
AQ13	ST40468314	Late-successional reen with abundant beds of submerged fine-leaved pondweed. Emergent Common Water-plantain, Sea Club-rush and Common Reed frequent. SU5
AQ14	ST40418321	Late-successional reen with abundant beds of submerged fine-leaved pondweed. Emergent Common Water-plantain, Sea Club-rush and Common Reed frequent. SU5.
AQ15	ST40238303	Reen behind seawall with abundant submerged macrophytes. Heavily poached and open at this point on north bank. SU5.
AQ16	ST39518318	Elver Pill Reed. Large open reen with abundant submerged beds of pondweed and fringe of emergent Common Reed. SU5.
AQ17	ST39418335	Elver Pill Reed. Large open reen with abundant submerged beds of pondweed and fringe of emergent Common Reed. SU5.
AQ18	ST3926583618	Elver Pill Reed. Very large mid-successional reen with submerged beds of fine-leaved pondweed dominating the water column and extensive floating mats of water-crowfoot. A little emergent Common Reed. SU5.
AQ19	ST4002183528	Mid-successional reen with frequent macrophytes and abundant floating duckweeds. Shaded by outgrown hedge on far bank. SU5
AQ20	ST3999483573	Mid-successional reen with abundant macrophytes and abundant floating duckweeds. Shaded by outgrown hedge on far bank. SU5
AQ21	ST39628494	Yoke Reen. Large, open reen with frequent submerged macrophytes and grazed emergent Branched Bur-reed, Common Reed and Reed Sweet-grass. SU7.
AQ22	ST39588500	Yoke Reen. Large, open reen with occasional submerged macrophytes and grazed emergent Branched Bur-reed, Common Reed, Greater Reedmace and Reed Sweet-grass. SU7.
AQ23	ST38948302	A mid-successional reen with abundant macrophytes and floating mats of duckweed. A low hedge is present along the southern bank. SU8.
AQ24	ST38828300	A mid-successional reen with abundant macrophytes and floating mats of duckweed. Open on both banks at this point. SU8.
AQ25	ST39428282	Ditch running along rear edge of seawall with mid-successional emergent and floating vegetation including frequent Sea Club-rush. SU8.

Terrestrial Invertebrate Sampling

- 8.2.9 For the terrestrial surveys, the methods have broadly followed those laid out by Drake *et. al.*, 2007. Grassland, wetland and ruderal vegetation were mostly sampled by spot searching with a butterfly net, sweeping with a heavy-duty entomological sweep net or tapping specific invertebrate foodplants over a tray. Ground-active invertebrates in grass tussocks and litter were sampled by shaking them out over a white plastic tray. Catches were collected into tubes with either ethyl acetate or isopropyl alcohol. The terrestrial invertebrate taxa collected were those that would provide the most useful information on the habitats being surveyed. For example, the ground beetles and rove beetles (Coleoptera: Carabidae and Staphylinidae) include a number of habitat specialists restricted to eutrophic wetlands such as grazing marsh ditch edges.
- 8.2.10 Because it was a large site, it was not feasible in the time available to survey the whole area in detail for terrestrial invertebrates. The main emphasis for more detailed survey was on those habitats likely to have the greatest invertebrate interest (e.g. ditch edges with shallow margins and a diverse flora; stands of relatively semi-improved or unimproved species-rich grassland; short ruderal vegetation etc.). Other less promising habitat types (e.g. shaded and/or dried-out ditches; improved/semi-improved species-poor grassland; species-poor tall ruderal vegetation) were also surveyed, but in less detail, with the aim being to ensure coverage of the range of main invertebrate habitats represented at Caldicot Level.

Bumblebee Surveys

- 8.2.11 For the bumblebee surveys, the whole of the site was walked over and a note was made of any bumblebee species. In those fields where the walkover survey identified good stands of suitable bumblebee pollen/nectar sources, such as clovers, Spear and Creeping Thistle and Common Knapweed, more detailed surveys for bumblebees were undertaken. This took the form of a 'W-route', with all flower-rich patches of likely bumblebee foraging resources being approached to within a distance of no more than ten metres. All *Bombus* species in each of these fields was recorded, with the number of Shrill and Brown-banded Carder Bumblebees being counted, along with the flower species at which they were seen foraging. Where

possible, bumblebees were identified in the field to species level, with any 'difficult' specimens netted for examination in a tube with a hand lens. Fortunately, the Shril Carder is easily distinguished in the field and the Brown-banded can also usual be distinguished, though older, more faded specimens or males sometimes had to be netted and examined with a hand lens to distinguish them from the Common Carder Bumblebee *B. pascuorum*. Workers of the White-tailed and Buff-tailed Bumblebees (*Bombus lucorum* and *B. terrestris* respectively) are indistinguishable without microscopic examination. As these are both very common and widely distributed, they were recorded as *B. lucorum/terrestris* workers. Males and queens of these two can be easily identified and were recorded to species level. Note also that *B. lucorum* is a complex of three very similar sibling species, which are only reliably distinguished by DNA analysis. For the purposes of this study, all records of this taxon refer to the *B. lucorum* aggregate. A unique coded survey number (BU1-27) has been assigned to all of those fields where W-walks were undertaken. The location of these can be found on Figures 2 to 7.

Identification of material

- 8.2.12 All material collected during this survey has been identified to species level by David Boyce. Where subsequent microscopic examination was required in order to ensure an accurate identification, specimens were collected into tubes with either ethyl acetate or iso-propyl alcohol. Subsequently, all samples were identified down to species level. A range of invertebrate groups have been covered, with a full checklist of all species identified given in Table 8-2. Specimens of any important invertebrates recorded during the surveys have been retained in the contractor's collection.

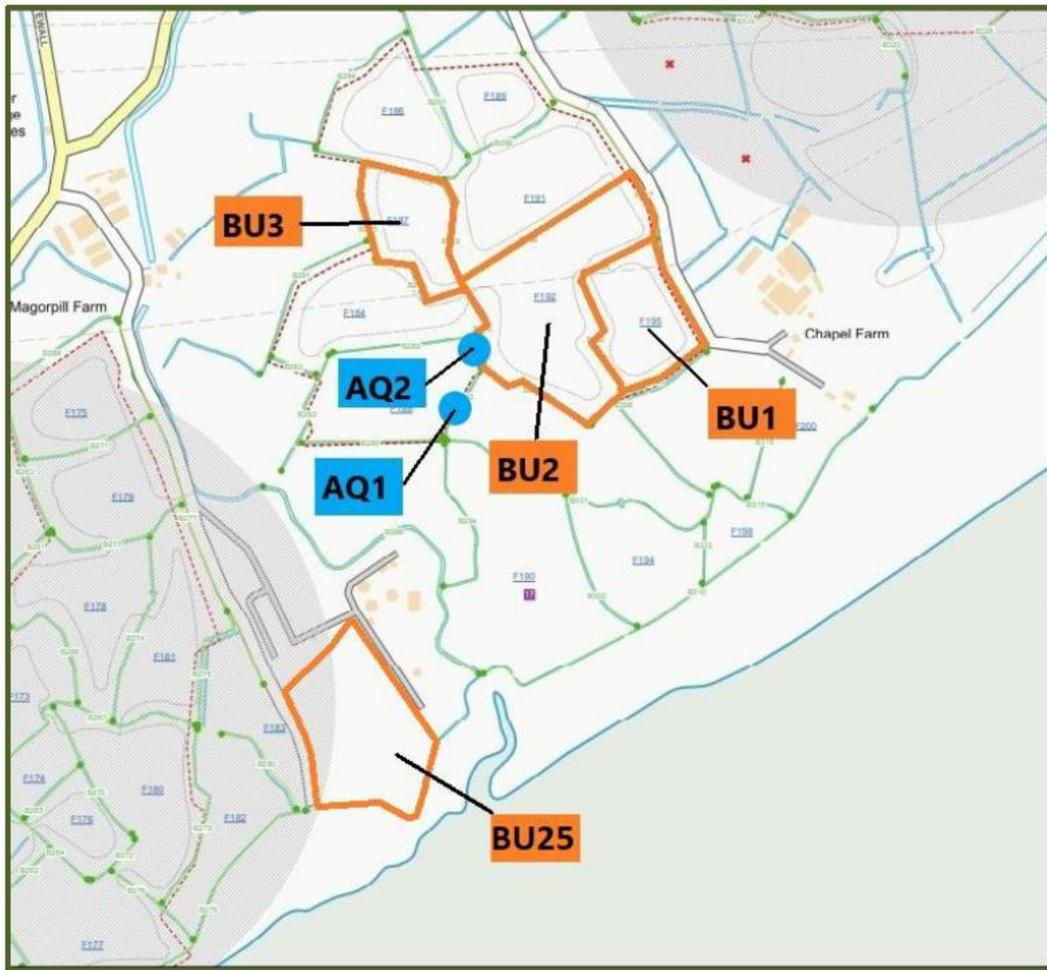


Figure 2. Location of aquatic (AQ) and bumblebee (BU) sample stations, SU2 & SU4a (BU25 only) - Caldicot Level, 2020-23

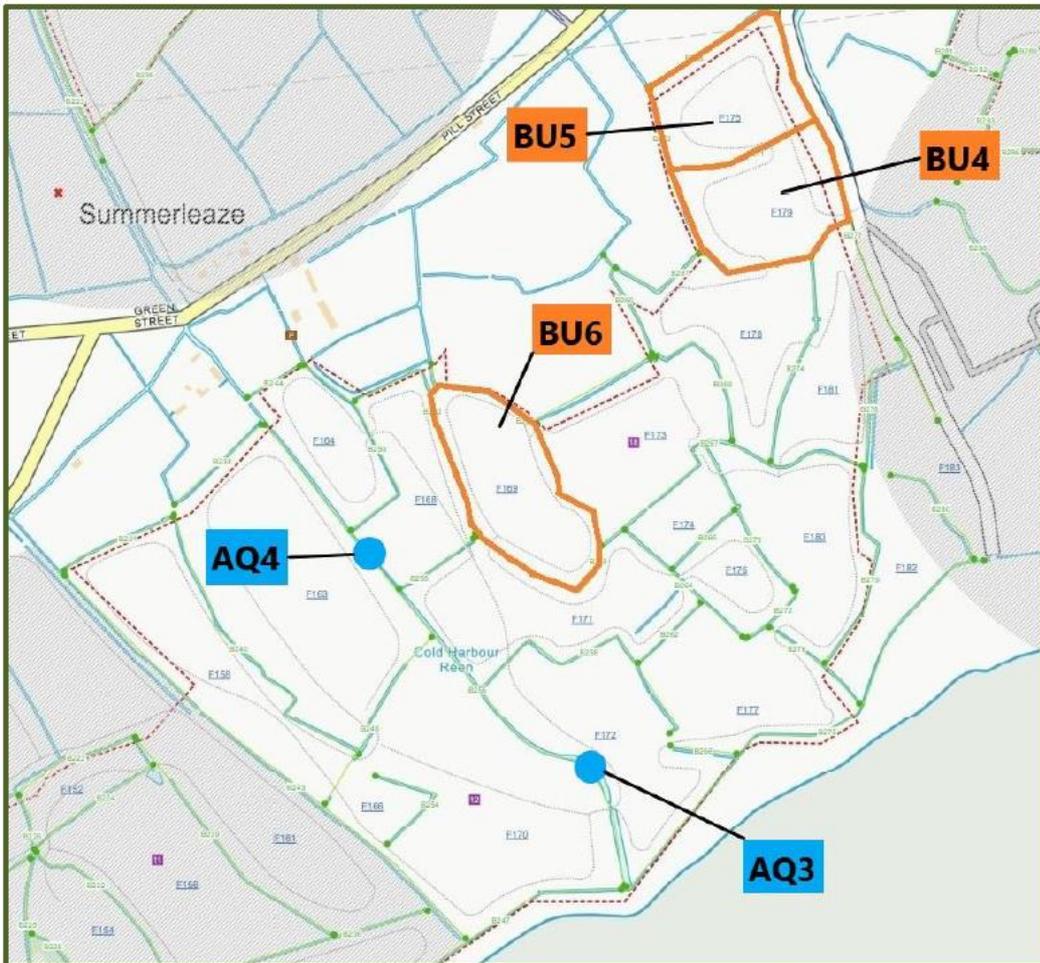


Figure 3. Location of aquatic (AQ) and bumblebee (BU) sample stations, SU4a - Caldicot Level, 2020-23

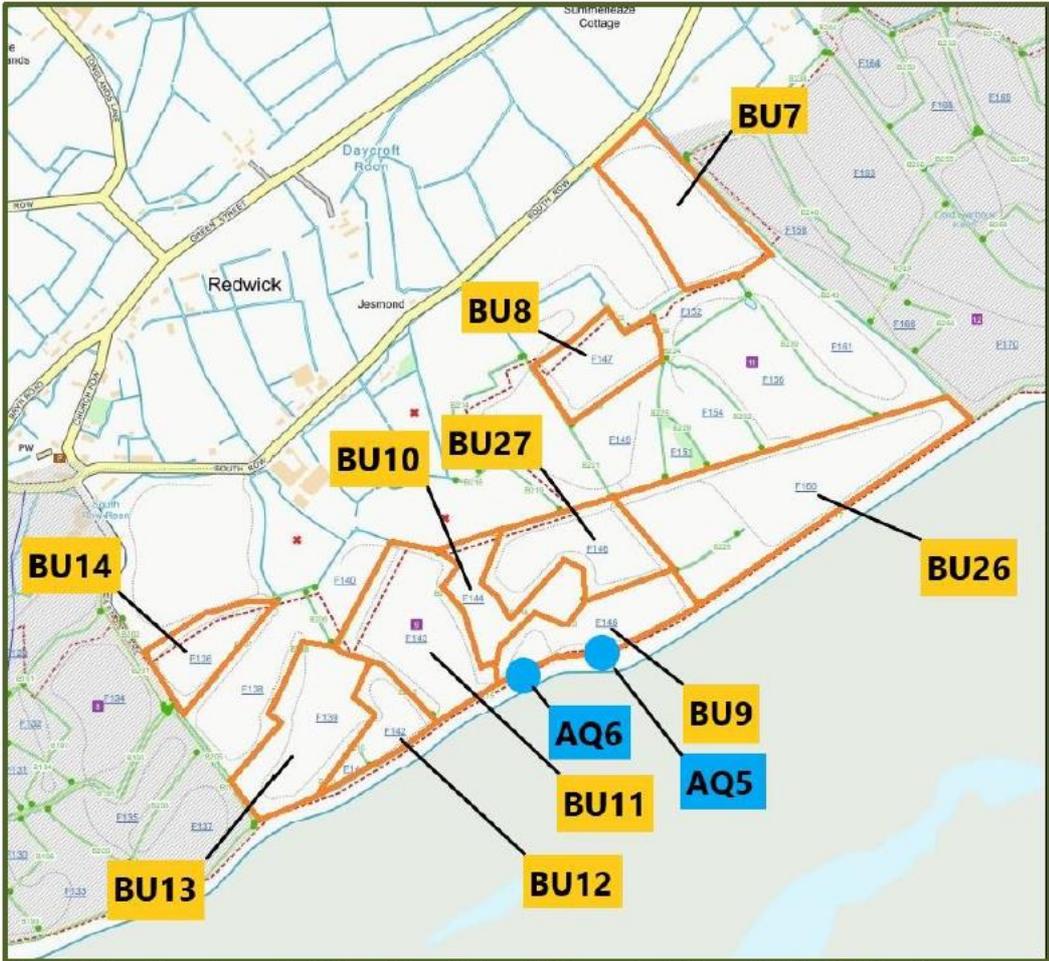


Figure 4. Location of aquatic (AQ) and bumblebee (BU) sample stations, SU4b - Caldicot Level, 2020-23

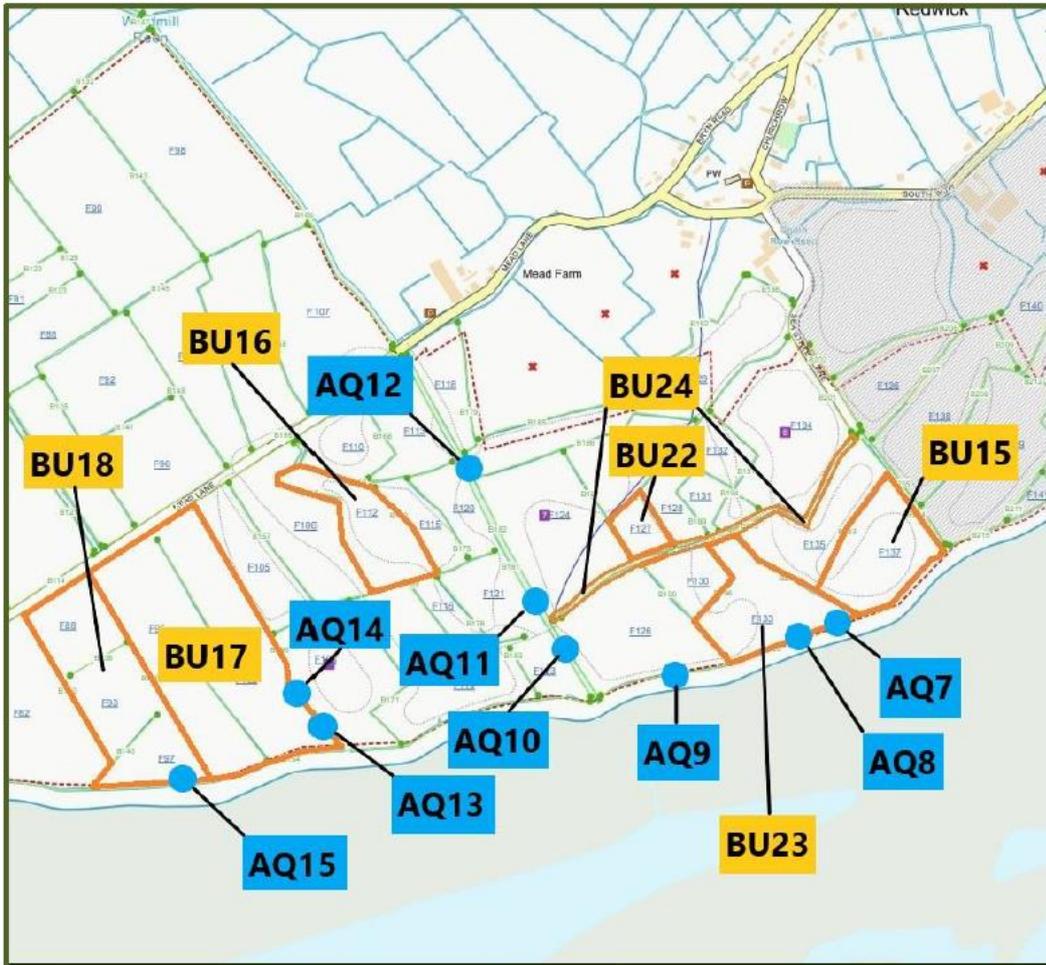


Figure 5. Location of aquatic (AQ) and bumblebee (BU) sample stations, SU4c & SU5, east - Caldicot Level, 2020-23



Figure 6. Location of aquatic (AQ) and bumblebee (BU) sample stations, SU7 - Caldicot Level, 2020-23

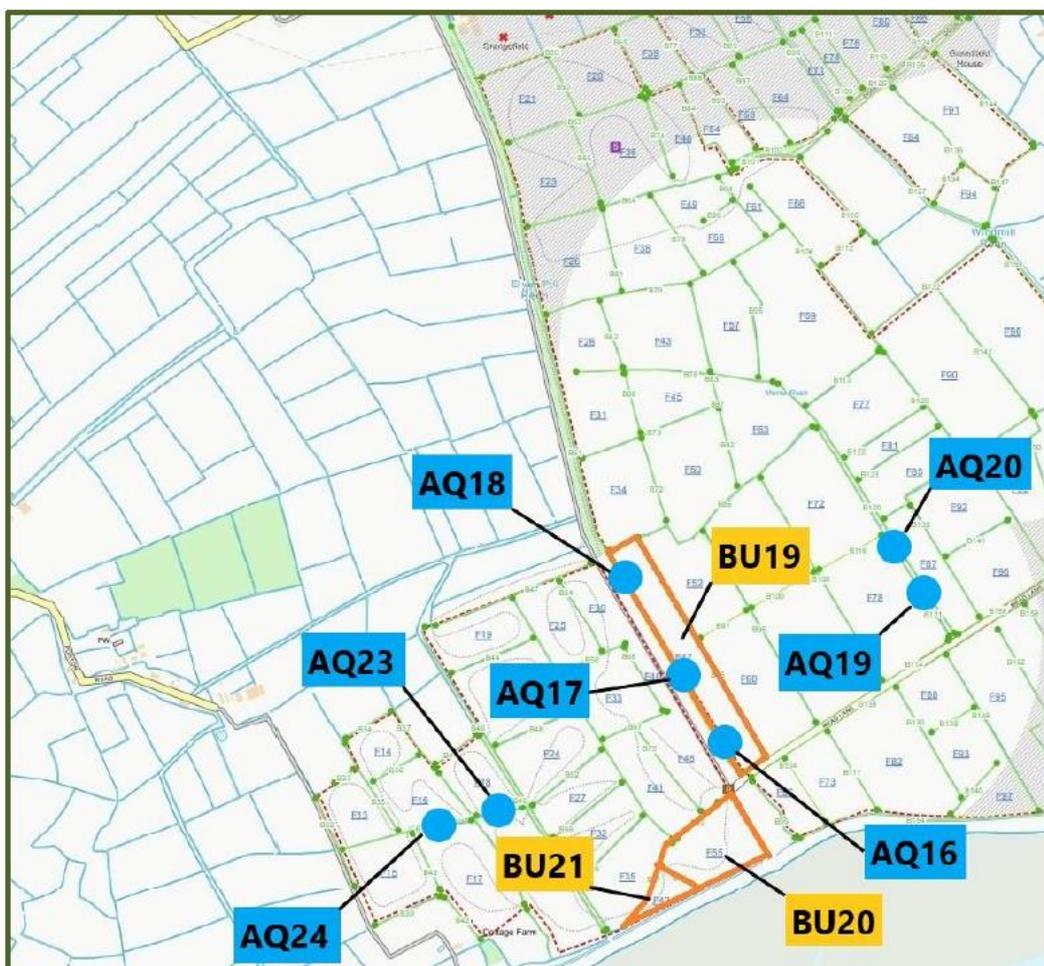


Figure 7. Location of aquatic (AQ) and bumblebee (BU) sample stations, SU5, west & SU8 - Caldicot Level, 2020-23

8.3 Results

8.3.1 **Table 8H-3** gives a checklist of all the invertebrates recorded during fieldwork in 2020 and 2023. Following this, sub-sections 8.3.4-8.3.25 lists all of those invertebrates with a formal conservation status that are regarded as key species when assessing the importance of the site for invertebrates. Sub-section 3.2 discusses the results of the aquatic invertebrate surveys and sub-section 3.3 presents the findings of the bumblebee survey. In sub-section 3.4, the list of key species are used to produce a list of key habitat features for invertebrates at Caldicot. Key habitats are defined here as being those that support at least one of the key species identified in sub-section 3.1.

8.3.2 The importance of the various invertebrate habitats at Caldicot is framed in terms of the Chartered Institute of Ecology and Environmental Management's (CIEEM) Geographical Frame of Reference (CIEEM, 2018). This includes a series of

geographically-defined importance categories, from 'International/European' for the most important sites, down to 'Local' at the lowest end of the scale.

8.3.3 The codes in the fourth column of **Table 8H-3** refer to the survey units in which species were recorded in 2020 and 2023. The location of these survey units is shown on Figure 1 above. The emboldened status categories given in the third column of Tables 8-3, 8-4, 8-5 and also after the scientific name in sub-sections 8.3.4-8.3.25 refer to those species having a formal rarity/threat status ascribed to them by the UK government conservation agencies. These are defined as follows:

- **S7 – Species of Principal Importance for the conservation of biodiversity in Wales. These are listed in** Section 7 of the Environment (Wales) Act 2016. Many of these were formerly Priority Species in the UK Biodiversity Action Plan (BAP).
- **NT (GB)** – GB Red List, Near Threatened. A taxon is Near Threatened when its GB populations have been evaluated against the IUCN criteria and do not currently qualify for Critically Endangered, Endangered or Vulnerable status, but are close to qualifying, or are likely to do so soon.
- **RDB3** – Red Data Book Category 3 - Rare. Taxa with small populations that are known from 15 or fewer 10 km squares of the UK National Grid and are at risk, but not Endangered (RDB1) or Vulnerable (RDB2) currently.
- **Na** – Nationally Scarce Category A. Taxa thought to occur in 16 to 30 10 km squares of the National Grid.
- **Nb** – Nationally Scarce Category B. Taxa thought to occur in between 30 and 100 10 km squares of the National Grid.
- **NS** – Nationally Scarce. In more recent second status reviews, the Na and Nb sub-divisions have been subsumed into a single category covering species occurring in 16 to 100 10km squares of the National Grid. Unlike the previous 'N' category, which covered the same range, the amalgamation does not necessarily result from inadequate information on the British distribution

Table 8H-3 Checklist of invertebrates recorded at Caldicot Level – 2020 and 2023

Species Scientific Name	Species English Name	Status	Survey Units
<i>Bithynia tentaculata</i>	Common Bithynia		2,4a,4b,4c,5,7,8
<i>Potamopyrgus antipodarum</i>	Jenkin's Spire Snail		4b,5
<i>Balea sarsii</i>	Western Tree Snail		8
<i>Discus rotundatus</i>	Radiated snail		5
<i>Zonitoides nitidus</i>	Shiny glass snail		4
<i>Cepaea nemoralis</i>	Brown-lipped Snail		4b
<i>Monacha cantiana</i>	Kentish Snail		4b
<i>Trochulus hispidus</i>	Hairy snail		4, 8
<i>Galba truncatula</i>	Dwarf Pond Snail		5, 8
<i>Lymnaea stagnalis</i>	Great Pond Snail		4a, 4c, 5, 7
<i>Lymnaea palustris</i> agg	Marsh Pond Snail		2, 4c, 5
<i>Radix auricularia</i>	Ear Pond Snail		5
<i>Ampullaceana balthica</i>	Wandering Pond Snail		2, 4a, 4b, 4c, 5, 7, 8
<i>Physa fontinalis</i>	Common Bladder Snail		2, 4a, 4b, 4c, 5, 7, 8
<i>Anisus vortex</i>	Whirlpool Ram's-horn Snail		2, 4a, 4b, 4c, 5, 7, 8
<i>Bathymorphalus contortus</i>	Twisted Ram's-horn Snail		5
<i>Gyraulus crista</i>	Nautilus Ram's-horn Snail		4
<i>Planorbarius corneus</i>	Great Ram's-horn Snail		2, 8
<i>Planorbis planorbis</i>	Margined Ram's-horn Snail		2, 4a, 4b, 4c, 5, 7, 8
<i>Oxyloma pfeifferi</i>	Pfeiffer's amber snail		4
<i>Succinea putris</i>	Large Amber Snail		4b, 4c, 5
<i>Sphaerium corneum</i>	Horny Orb Mussel		2, 4a, 4c, 5, 8
<i>Sphaerium lacustre</i>	Lake Orb Mussel		5,7
<i>Theromyzon tessulatum</i>	Duck Leech		5
<i>Glossiphonia complanata</i>	A leech		7
<i>Erpobdella octoculata</i>	A leech		2, 4c,5, 8
<i>Glomeris marginata</i>	Pill Millipede		4b
<i>Pyrrhosoma nymphula</i>	Large Red Damselfly		5
<i>Erythromma najas</i>	Red-eyed Damselfly		4c
<i>Coenagrion puella</i>	Azure Damselfly		2, 4a, 4b, 4c, 5, 7, 8
<i>Ischnura elegans</i>	Blue-tailed Damselfly		2, 4a, 4c, 5, 7, 8
<i>Brachytron pratense</i>	Hairy Dragonfly		4a, 4c, 5, 7
<i>Aeshna cyanea</i>	Southern Hawker dragonfly		2, 4b, 4c, 8
<i>Aeshna mixta</i>	Migrant Hawker dragonfly		4b
<i>Anax imperator</i>	Emperor Dragonfly		4a, 4b, 4c, 5, 7
<i>Libellula depressa</i>	Broad-bodied Chaser dragonfly		4, 5, 7
<i>Libellula quadrimaculata</i>	Four-spotted Chaser dragonfly		4c, 5

<i>Orthetrum cancellatum</i>	Black-tailed Skimmer dragonfly		4a, 4c, 7
<i>Sympetrum sanguineum</i>	Ruddy Darter dragonfly		4b, 4c, 5, 8
<i>Sympetrum striolatum</i>	Common Darter dragonfly		4b, 4c, 5, 8
<i>Pholidoptera griseoptera</i>	Dark Bush-cricket		4b
<i>Metrioptera roeselii</i>	Roesel's Bush-cricket		2, 4b, 4c, 5, 8
<i>Coconcephalus fuscus</i>	Long-winged conehead		4b, 5
<i>Leptophyes punctatissima</i>	Speckled Bush-cricket		4b, 8
<i>Tetrix subulata</i>	Slender Groundhopper		4b
<i>Tetrix undulata</i>	Common Groundhopper		4, 8
<i>Chorthippus brunneus</i>	Field Grasshopper		5, 8
<i>Pseudochorthippus parallelus</i>	Meadow Grasshopper		2, 4b, 4c, 5, 7, 8
<i>Chorthippus albomarginatus</i>	Lesser Marsh Grasshopper		2, 4b, 4c, 5, 8
<i>Forficula auricularia</i>	Common Earwig		4b
<i>Acanthosoma haemorrhoidale</i>	Hawthorn Shieldbug		4
<i>Coreus marginatus</i>	Dock Bug		4b
<i>Coriomeris denticulata</i>	Denticulate Leatherbug		8
<i>Dolycoris baccarum</i>	Sloe Bug		2, 4a, 5
<i>Eurydema oleracea</i>	Brassica Shieldbug		4, 5, 7
<i>Palomena prasina</i>	Common Green Shieldbug		4b
<i>Corizus hyoscyami</i>	A Rhopalid bug		4a
<i>Heterotoma planicornis</i>	A Mirid bug		4b
<i>Tingis ampliata</i>	Creeping Thistle Lacebug		4,8
<i>Tingis cardui</i>	Spear Thistle Lacebug		4
<i>Mesovelia furcata</i>	A Mesoveliid water bug		4a, 4c
<i>Hydrometra stagnorum</i>	Common Water Measurer		4a, 4c, 5
<i>Microvelia reticulata</i>	A Veliid water bug		4a, 4c, 5
<i>Nepa cinerea</i>	Water Scorpion		4c, 5, 7
<i>Ilyocoris cimicoides</i>	Saucer Bug		2, 4a, 4b, 4c, 5, 7, 8
<i>Notonecta glauca</i>	Common Backswimmer		2, 4a, 4b, 4c, 5, 7, 8
<i>Plea minutissima</i>	A Pleid water boatman		4a, 4c, 7
<i>Callicorixa praeusta</i>	A water boatman		4c
<i>Corixa punctata</i>	A water boatman		4a, 4b, 4c, 5
<i>Hespercorixa linnaei</i>	A lesser water boatman		4a, 4b, 5, 8
<i>Hespercorixa sahlbergi</i>	A lesser water boatman		5
<i>Sigara dorsalis</i>	A lesser water boatman		4a, 4c, 5
<i>Gyrinus caspius</i>	A whirligig beetle		4b
<i>Peltodytes caesus</i>	A Haliplid water beetle	NS	8
<i>Halipus heydeni</i>	A Haliplid water beetle		5, 8
<i>Halipus ruficollis</i>	A Haliplid water beetle		2, 4a, 4b, 4c, 5, 7, 8
<i>Halipus sibiricus</i>	A Haliplid water beetle		2, 5
<i>Halipus lineatocollis</i>	A Haliplid water beetle		2, 4c, 5, 7

<i>Noterus clavicornis</i>	A diving beetle		2, 4a, 4b, 4x, 5, 7, 8
<i>Hygrobia hermanni</i>	Screech Beetle		7
<i>Agabus sturmii</i>	A diving beetle		4a
<i>Agabus bipustulatus</i>	A diving beetle		4a, 4c, 5, 7, 8
<i>Agabus nebulosus</i>	A diving beetle		7
<i>Ilybius montanus</i>	A diving beetle		2, 5
<i>Ilybius quadriguttatus</i>	A diving beetle		4c, 5
<i>Colymbetes fuscus</i>	A diving beetle		4a, 4b, 5
<i>Nartus grapii</i>	A diving beetle		5
<i>Rhantus suturalis</i>	A diving beetle		5
<i>Laccophilus hyalinus</i>	A diving beetle		3, 7
<i>Dytiscus marginalis</i>	A great diving beetle		4a, 5, 8
<i>Hydaticus transversalis</i>	A diving beetle	NS	5
<i>Hydroporus angustatus</i>	A diving beetle		2, 4a, 5, 8
<i>Hydroporus incognitus</i>	A diving beetle		5
<i>Hydroporus palustris</i>	A diving beetle		2, 4a, 4c, 5, 7, 8
<i>Hydroporus planus</i>	A diving beetle		2, 4a, 4b, 4c, 5, 7, 8
<i>Hydroporus pubescens</i>	A diving beetle		4c, 4b, 5, 7, 8
<i>Hydroporus tessellatus</i>	A diving beetle		2, 4c, 5, 8
<i>Graptodytes pictus</i>	A diving beetle		4c, 5, 7
<i>Hygrotus inaequalis</i>	A diving beetle		4a, 4c, 5, 7
<i>Hygrotus versicolor</i>	A diving beetle		4c, 7
<i>Hyphydrus ovatus</i>	A diving beetle		4a, 4c, 5, 7
<i>Bembidion assimile</i>	A ground beetle		4
<i>Bembidion dentellum</i>	A ground beetle		4
<i>Bembidion varium</i>	A ground beetle		4c
<i>Bembidion biguttatum</i>	A ground beetle		4
<i>Bembidion lunulatum</i>	A ground beetle		4c
<i>Bembidion articulatum</i>	A ground beetle		4c, 8
<i>Tachys bistriatus</i>	A ground beetle	NS	4c
<i>Badister dilatatus</i>	A ground beetle	NS	4
<i>Anisodactylus binotatus</i>	A ground beetle		4c
<i>Stenolophus mixtus</i>	A ground beetle		4
<i>Agonum marginatum</i>	A ground beetle		4c
<i>Agonum fuliginosum</i>	A ground beetle		8
<i>Agonum emarginatum</i>	A ground beetle		4
<i>Paranchus albipes</i>	A ground beetle		4
<i>Demetrias imperialis</i>	A ground beetle		4a
<i>Demetrias atricapillus</i>	A ground beetle		5
<i>Helophorus aequalis</i>	A Helophorid water beetle		2, 4a, 4b, 4c, 5, 7, 8
<i>Helophorus brevipalpis</i>	A Helophorid water beetle		4a, 4b, 4c, 5, 7, 8
<i>Helophorus minutus</i>	A Helophorid water beetle		4c, 5, 8
<i>Berosus affinis</i>	A Hydrophilid water beetle		4c
<i>Laccobius bipunctatus</i>	A Hydrophilid water beetle		4a, 4b, 4c, 5, 8

<i>Hydrophilus piceus</i>	Great Silver Water Beetle	NT; NS	4c, 5, 8
<i>Hydrobius fuscipes</i> ss	A Hydrophilid water beetle		4b, 5, 8
<i>Anacaena globulus</i>	A Hydrophilid water beetle		4c
<i>Anacaena limbata</i>	A Hydrophilid water beetle		4a, 4c, 5, 7, 8
<i>Anacaena lutescens</i>	A Hydrophilid water beetle		5
<i>Cymbiodyta marginella</i>	A Hydrophilid water beetle		4c, 5, 8
<i>Enochrus melanocephalus</i>	A Hydrophilid water beetle		5
<i>Enochrus ochropterus</i>	A Hydrophilid water beetle		5
<i>Enochrus testaceus</i>	A Hydrophilid water beetle		2, 4a, 4b, 4c, 5, 8
<i>Enochrus coarctatus</i>	A Hydrophilid water beetle		4c, 5
<i>Helochares lividus</i>	A Hydrophilid water beetle		4a, 4c, 5, 7, 8
<i>Cercyon marinus</i>	A Hydrophilid water beetle		8
<i>Cercyon sternalis</i>	A Hydrophilid water beetle		4c
<i>Cercyon ustulatus</i>	A Hydrophilid water beetle		4a, 8
<i>Gnathoncus nannetensis</i>	Common Nestbox Clown Beetle		4b
<i>Dendrophilus punctatus</i>	Broad-legged Tree Clown beetle		4b
<i>Margarinotus merdarius</i>	Garden Clown Beetle		4b
<i>Ochthebius minimus</i>	A Hydraenid water beetle		4a, 4c
<i>Lesteva sicula</i>	A rove beetle		4
<i>Tachyporus nitidulus</i>	A rove beetle		2, 5
<i>Tachyporus dispar</i>	A rove beetle		4b
<i>Haploglossa gentilis</i>	A rove beetle		4b
<i>Cypha longicornis</i>	A rove beetle		8
<i>Hygronoma dimidiata</i>	A rove beetle		4
<i>Platystethus capito</i>	A rove beetle		4
<i>Platystethus nitens</i>	A rove beetle		4c
<i>Stenus cicindeloides</i>	A rove beetle		2, 4c
<i>Stenus latifrons</i>	A rove beetle		5
<i>Stenus pallitarsis</i>	A rove beetle		4
<i>Stenus bimaculatus</i>	A rove beetle		4
<i>Stenus boops</i>	A rove beetle		4, 8
<i>Stenus providus</i>	A rove beetle		4
<i>Lathrobium elongatum</i>	A rove beetle		4c

<i>Sunius propinquus</i>	A rove beetle		4c
<i>Paederus fuscipes</i>	A rove beetle		4a, 4c, 5, 7
<i>Paederus littoralis</i>	A rove beetle		4c
<i>Paederus riparius</i>	A rove beetle		4c, 8
<i>Philonthus micans</i> agg.	A rove beetle		8
<i>Philonthus quisquiliarius</i>	A rove beetle		4c, 8
<i>Philonthus umbratilis</i>	A rove beetle		8
<i>Trox scaber</i>	A Trogid beetle		4b
<i>Onthophagus coenobita</i>	A dung beetle		4c
<i>Microcara testacea</i>	A marsh beetle		4b
<i>Agrilus sinuatus</i>	A jewel beetle		2, 4
<i>Heterocerus fenestratus</i>	A mud beetle		4a, 4c
<i>Agriotes lineatus</i>	A click beetle		2
<i>Cantharis lateralis</i>	A soldier beetle		4, 5
<i>Cantharis livida</i>	A soldier beetle		5
<i>Cantharis rufa</i>	A soldier beetle		4
<i>Rhagonycha fulva</i>	A soldier beetle		2, 4a, 4b, 4c, 5, 8
<i>Ptilinus pectinicornis</i>	A woodworm beetle		4b, 8
<i>Malachius bipustulatus</i>	Common Malachite Beetle		2, 4c
<i>Telmatophilus caricis</i>	A Cryptophagid beetle		4b, 4c
<i>Telmatophilus typhae</i>	A Cryptophagid beetle		4b, 4c
<i>Olibrus aeneus</i>	A Phalacrid beetle		4b, 7
<i>Meligethes aeneus</i>	A pollen beetle		5
<i>Coccidula rufa</i>	A ladybird		2, 4b, 5
<i>Rhyzobius litura</i>	A ladybird		4a, 5, 8
<i>Psyllobora vigintiduopunctata</i>	22-spot ladybird		4b
<i>Tytthaspis sedecimpunctata</i>	16-spot Ladybird		4, 4b, 4c, 5, 8
<i>Hippodamia variegata</i>	Adonis' Ladybird	Nb	4b
<i>Adalia bipunctata</i>	2-spot Ladybird		8
<i>Coccinella septempunctata</i>	7-spot Ladybird		2, 4b, 4c, 5, 7, 8
<i>Harmonia axyridis</i>	Harlequin Ladybird		2, 4, 5
<i>Propylea quattuordecimpunctata</i>	14-spot Ladybird		4a, 8
<i>Subcoccinella vigintiquatuor punctata</i>	24-spot Ladybird		4a
<i>Cartodere bifasciata</i>	A mould beetle		8
<i>Cis submicans</i>	A Ciid beetle		5
<i>Lagria hirta</i>	A darkling beetle		4b, 8
<i>Oedemera lurida</i>	An Oedemerid beetle		2, 4c, 8
<i>Oedemera nobilis</i>	An Oedemerid beetle		2, 4c, 5, 8
<i>Pyrochroa serraticornis</i>	Common Cardinal Beetle		8
<i>Rutpela maculata</i>	A longhorn beetle		4c
<i>Anaglyptus mysticus</i>	A longhorn beetle		8
<i>Donacia marginata</i>	A reed beetle		4a, 4c, 5
<i>Donacia semicuprea</i>	A reed beetle		4c, 5, 7

<i>Donacia simplex</i>	A reed beetle		4a
<i>Donacia vulgaris</i>	A reed beetle		4c
<i>Plateumaris sericea</i>	A reed beetle		4a, 5
<i>Bruchus atomarius</i>	A seed beetle		2
<i>Bruchus rufimanus</i>	A seed beetle		5
<i>Cassida rubiginosa</i>	Thistle tortoise beetle		4, 5
<i>Cassida vibex</i>	Knapweed Tortoise Beetle		5
<i>Gastrophysa viridula</i>	Dock Leaf Beetle		4, 8
<i>Phaedon armoraciae</i>	A leaf beetle		5, 8
<i>Phaedon cochleariae</i>	A leaf beetle		4
<i>Sphaeroderma testaceum</i>	A flea beetle		2
<i>Psylliodes affinis</i>	A flea beetle		4b
<i>Psylliodes laticollis</i>	A flea beetle		4
<i>Aphthona lutescens</i>	A flea beetle		4c
<i>Derocrepis rufipes</i>	A flea beetle		4
<i>Neocrepidodera transversa</i>	A flea beetle		4a, 4c
<i>Hippuriphila modeeri</i>	A flea beetle		4b
<i>Epitrix pubescens</i>	A flea beetle		4b
<i>Apion frumentarium</i>	An Apionid weevil		4b
<i>Perapion curtirostre</i>	An Apionid weevil		2
<i>Perapion hydrolapathi</i>	An Apionid weevil		4
<i>Ceratapion onopordi</i>	An Apionid weevil		4a, 4b, 8
<i>Taeniapion urticarium</i>	An Apionid weevil		5
<i>Eutrichapion ervi</i>	An Apionid weevil		4a, 8
<i>Eutrichapion viciae</i>	An Apionid weevil		4a, 4b, 5
<i>Holotrichapion ononis</i>	An Apionid weevil		5
<i>Ischnopterapion virens</i>	An Apionid weevil		4b
<i>Stenopterapion tenue</i>	An Apionid weevil		4a, 5
<i>Protapion fulvipes</i>	An Apionid weevil		4a, 5
<i>Tanysphyrus lemnae</i>	An Errirhinid weevil		2, 4a, 4c, 5, 7
<i>Anthonomus rubi</i>	A weevil		4a
<i>Gymnetron villosulum</i>	A weevil	Nb	4c
<i>Tychius picirostris</i>	A weevil		2, 5
<i>Amallorhynchus melanarius</i>	A weevil		4, 5
<i>Ceutorhynchus obstrictus</i>	A weevil		5
<i>Ceutorhynchus pallidactylus</i>	A weevil		4c
<i>Ceutorhynchus typhae</i>	A weevil		7
<i>Microplontus melanostigma</i>	A weevil		4, 7
<i>Nedyus quadrimaculatus</i>	A weevil		4
<i>Poophagus sisymbrii</i>	A weevil		4
<i>Rhinoncus perpendicularis</i>	A weevil		4, 8
<i>Rhinoncus pericarpus</i>	A weevil		4
<i>Phyllobius pyri</i>	A weevil		2
<i>Sitona lineatus</i>	A weevil		2, 4a, 4c, 8
Sitona <i>obsoletus</i>	A weevil		4

<i>Sitona sulcifrons</i>	A weevil		2
<i>Sitona suturalis</i>	A weevil		4a, 8
<i>Larinus carlinae</i>	A weevil	Nb	4, 5
<i>Kissophagus vicinus</i>	A bark beetle	Nb	4b
<i>Scolytus scolytus</i>	Large elm bark beetle		5
<i>Thymelicus sylvestris</i>	Small Skipper butterfly		2, 4c, 5, 8
<i>Ochlodes sylvanus</i>	Large Skipper butterfly		2, 5, 7, 8
<i>Pieris brassicae</i>	Large White butterfly		2, 4b, 4c, 5, 8
<i>Pieris rapae</i>	Small White butterfly		2, 4b, 5, 8
<i>Pieris napi</i>	Green-veined White butterfly		4b, 4c, 5, 8
<i>Colias croceus</i>	Clouded Yellow butterfly		4c
<i>Pararge aegeria</i>	Speckled Wood butterfly		2, 4a, 4c, 5, 8
<i>Maniola jurtina</i>	Meadow Brown butterfly		2, 4a, 4b, 4c, 5, 8
<i>Pyronia tithonus</i>	Gatekeeper butterfly		2, 4a, 4b, 4c, 5, 8
<i>Vanessa atalanta</i>	Red Admiral butterfly		4b, 4c, 5, 8
<i>Aglais io</i>	Peacock butterfly		2, 4b, 4c, 5
<i>Aglais urticae</i>	Small Tortoiseshell butterfly		4b, 5, 7, 8
<i>Polygonia c-album</i>	Comma butterfly		2, 4b, 4c, 5, 8
<i>Lycaena phlaeas</i>	Small Copper butterfly		2, 4b, 4c, 5, 8
<i>Celastrina argiolus</i>	Holly Blue butterfly		2, 4b, 4c, 5, 8
<i>Aricia agestis</i>	Brown Argus butterfly		5, 8
<i>Polyommatus icarus</i>	Common Blue butterfly		2, 4b, 4c, 5, 8
<i>Myelois circumvoluta</i>	Thistle Ermine moth		5
<i>Lasiocampa quercus</i>	Oak Eggar moth		4b
<i>Camptogramma bilineata</i>	Yellow Shell moth		5
<i>Epirrhoe alternata</i>	Common Carpet moth		4c
<i>Abraxas grossulariata</i>	Magpie Moth		4b
<i>Opisthograptis luteolata</i>	Brimstone Moth		5
<i>Tyria jacobaeae</i>	Cinnabar Moth	S7	2
<i>Euclidia mi</i>	Mother Shipton moth		8
<i>Autographa gamma</i>	Silver Y moth		2, 4b, 4c, 5, 8
<i>Noctua pronuba</i>	Large Yellow Underwing moth		8
<i>Rhagio scolopaceus</i>	Downlooker Snipefly		5, 8
<i>Haematopota crassicornis</i>	Black-horned Cleg		4c
<i>Haematopota pluvialis</i>	Notch-horned Cleg		4b, 4c, 5
<i>Tabanus bromius</i>	Band-eyed Brown Horsefly		5
<i>Chloromyia formosa</i>	Broad Centurion Soldierfly		2, 4b, 4c, 5, 7, 8
<i>Odontomyia ornata</i>	Ornate Brigadier soldierfly	NS	2, 4b, 4c, 5, 8
<i>Odontomyia tigrina</i>	Black Colonel soldierfly		4a, 4c, 5
<i>Oplodontha viridula</i>	Common Green Colonel soldierfly		4c, 5, 8
<i>Stratiomys singularior</i>	Flecked General soldierfly		4c

<i>Leptogaster cylindrica</i>	Striped Slender Robberfly		2, 8
<i>Empis livida</i>	A dance fly		2, 4b, 5
<i>Poecilobothrus nobilitatus</i>	Semaphore Fly		4b, 5, 8
<i>Anasimyia lineata</i>	A hoverfly		8
<i>Episyrphus balteatus</i>	Marmalade Hoverfly		2, 4, 5
<i>Eristalinus sepulchralis</i>	A hoverfly		2, 4a, 4b, 5, 7, 8
<i>Eristalis arbustorum</i>	A drone fly		4b, 5
<i>Eristalis horticola</i>	A drone fly		4c
<i>Eristalis interruptus</i>	A drone fly		4c
<i>Eristalis intricarius</i>	Furry Dronefly		2
<i>Eristalis nemorum</i>	Stripe-faced Dronefly		4
<i>Eristalis pertinax</i>	Tapered Dronefly		5
<i>Eristalis tenax</i>	Common Dronefly		2, 4b, 4c, 5, 7, 8
<i>Helophilus hybridus</i>	A sun-fly		5
<i>Helophilus pendulus</i>	A sun-fly		4b, 5
<i>Parhelophilus frutetorum</i>	A hoverfly		5
<i>Platycheirus albimanus</i>	Grey-spotted Boxer hoverfly		2
<i>Rhingia campestris</i>	A hoverfly		4
<i>Scaeva pyrastris</i>	A hoverfly		5
<i>Sphaerophoria scripta</i>	Common Globetail hoverfly		4a, 4c, 8
<i>Syrirta pipiens</i>	A hoverfly		2, 4c, 5, 7, 8
<i>Tropidia scita</i>	A hoverfly		2, 4, 7
<i>Volucella bombylans</i>	Bumblebee Plumehorn hoverfly		2
<i>Volucella pellucens</i>	Pied Plumehorn hoverfly		2
<i>Physocephala rufipes</i>	A Conopid fly		8
<i>Sicus ferrugineus</i>	A Conopid fly		4b, 5
<i>Sepedon spegea</i>	A snail-killing fly		5
<i>Elachiptera brevipennis</i>	A Chloropid fly		8
<i>Scathophaga stercoraria</i>	A dung fly		4c, 5
<i>Mesembrina meridiana</i>	Noon Fly		4b, 4c, 5
<i>Graphomya maculata</i>	Painted Graphomya fly		4b, 8
<i>Eriothrix rufomaculata</i>	A parasite fly		4a, 4b, 5, 8
<i>Calameuta filiformis</i>	Dark-legged Stem-sawfly		2
<i>Crossocerus podagricus</i>	Trilobed Boxhead Wasp		4b
<i>Crossocerus megacephalus</i>	A hunting wasp		4b
<i>Ectemnius continuus</i>	Dark Fly Fox wasp		2, 7
<i>Andrena labialis</i>	Large Meadow Mining Bee		2, 4a, 4b, 4c, 5, 7, 8
<i>Andrena scotica</i>	Chocolate Mining Bee		2
<i>Andrena trimmerana</i>	Trimmer's Mining Bee	Nb	4c, 8
<i>Andrena cineraria</i>	Ashy Mining Bee		2
<i>Andrena chrysoceles</i>	Hawthorn Mining Bee		2, 5, 7

<i>Andrena dorsata</i>	Short-fringed Mining Bee		4b, 4c, 5, 8
<i>Andrena wilkella</i>	Wilke's Mining Bee		2, 8
<i>Andrena haemorrhoa</i>	Orange-tailed Mining Bee		5
<i>Andrena flavipes</i>	Yellow-legged Mining Bee		2, 8
<i>Apis mellifera</i>	Honeybee		2, 4a, 4b, 4c, 5, 8
<i>Bombus terrestris</i>	Buff-tailed Bumblebee		4b, 4c
<i>Bombus lucorum/terrestris</i>	Buff-tailed/White-tailed Bumblebee workers		2, 4a, 4b, 4c, 5, 8
<i>Bombus hortorum</i>	Garden Bumblebee		2a, 4a, 4b, 4c, 5, 7, 8
<i>Bombus lapidarius</i>	Red-tailed Bumblebee		2a, 4a, 4b, 4c, 5, 7, 8
<i>Bombus hypnorum</i>	Tree Bumblebee		2, 4
<i>Bombus jonellus</i>	Heath Bumblebee		4, 5
<i>Bombus pratorum</i>	Early Bumblebee		2, 4b, 4c, 5, 8
<i>Bombus humilis</i>	Brown-banded Carder Bumblebee	S7	2, 4a, 4b, 4c, 5, 7, 8
<i>Bombus pascuorum</i>	Common Carder Bumblebee		2, 4a, 4b, 4c, 5, 8
<i>Bombus sylvarum</i>	Shrill Carder Bumblebee	S7; Nb	2, 8
<i>Eucera longicornis</i>	Long-horned Bee	S7; Na	2, 4b, 4c, 5, 8
<i>Nomada flava</i>	Flavous Nomad Bee		4
<i>Nomada flavopicta</i>	Blunthorn Nomad Bee	Nb	4a, 4b, 4c, 5
<i>Nomada fucata</i>	Painted Nomad Bee		2, 4a, 4b, 5, 8
<i>Nomada goodeniana</i>	Gooden's Nomad Bee		2
<i>Nomada marshamella</i>	Marsham's Nomad Bee		2
<i>Nomada ruficornis</i>	Fork-jawed Nomad Bee		2
<i>Hylaeus confusus</i>	White-jawed Yellow-face Bee		8
<i>Hylaeus communis</i>	Common Yellow-face Bee		2, 4b
<i>Hylaeus dilatatus</i>	Chalk Yellow-face Bee		4c
<i>Hylaeus hyalinatus</i>	Hairy Yellow-face Bee		4c
<i>Halictus tumulorum</i>	Bronze Furrow Bee		2
<i>Lasioglossum villosulum</i>	Shaggy Furrow Bee		2
<i>Lasioglossum lativentre</i>	Furry-claspered Furrow Bee		4b, 8
<i>Lasioglossum malachurum</i>	Sharp-collared Furrow Bee		4b
<i>Lasioglossum pauxillum</i>	Lobe-spurred Furrow Bee	Na	2
<i>Sphecodes crassus</i>	Swollen-thighed Blood Bee	Nb	2
<i>Sphecodes ephippius</i>	Bare-saddled Blood Bee		2
<i>Sphecodes rubicundus</i>	Red-tailed Blood Bee	RDB3	4b, 5, 7
<i>Coelioxys inermis</i>	Shiny-vented Sharp-tail bee		4b, 4c, 5
<i>Megachile ligniseca</i>	Wood-carving Leafcutter Bee		4b, 5

Megachile versicolor	Brown-footed Leafcutter Bee		8
Hoplitis claviventris	Welled Mason Bee		8
Melitta leporina	Clover Melitta		4a, 4b, 4c, 5, 8
Lasius brunneus	Brown Tree Ant	Na	4b, 4c
Lasius flavus	Yellow Meadow Ant		8
Lasius niger	Black Garden Ant		2, 4b, 4c, 8
Temnothorax nylanderi	A Myrmicine ant		4
Ancistrocerus trifasciatus	A potter-wasp		4
Symmorphus bifasciatus	A potter-wasp		7
Dolichovespula media	Median Wasp		7
Vespula germanica	German Wasp		2
Crangonyx pseudogracilis	A freshwater shrimp		4a, 4b, 4c, 5
Asellus aquaticus	A water louse		2, 4a, 4c, 5, 7, 8
Asellus meridianus	A water louse		5
Trichoniscus pusillus	Common Pigmy Woodlouse		4
Oniscus asellus	Common Shiny Woodlouse		4a
Oniscus asellus	Common Shiny Woodlouse		4a
Porcellio scaber	Common Rough Woodlouse		4b
Chernes cimicoides	A false scorpion		4b
Gnathonarium dentatum	A money spider		5
Metellina segmentata	A Tetragnathid spider		2
Larinioides cornutus	An orb-weaving spider		4c
Pisaura mirabilis	Nursery Web Spider		8

Key invertebrates at Caldicot, 2020 and 2023

8.3.4 Key species are defined as belonging to one of the following status categories:

- IUCN International or UK threatened or near threatened;
- Section 7 Species of Principal Importance in Wales;
- Red Data Book (RDB), Nationally Rare (NR) or Nationally Scarce (Na, Nb, N, NS, pNS);

8.3.5 384 invertebrate species were recorded at Caldicot in 2020 and 2023. Of these, 18 are key species as defined above. These are listed in **Table 8G-4** below and following this, there are profiles that summarise their British distribution, autecology and occurrence at Caldicot.

8.3.6 The Cinnabar Moth is included on Section 7 of the Environment Act (Wales) as a Species of Principal Importance, but is not a key species here. This is because it is listed in Section 7 for 'research only' and though having declined in other parts of Britain, it is still relatively common and does not appear to have decreased so markedly in Wales. The Brown Tree Ant *Lasius brunneus* is listed as Nationally Scarce (Na). However, it is currently expanding its British range considerably and will certainly lose its status at the next review of the Aculeate Hymenoptera and is therefore also not considered to be a key species here.

Table 8G-4 Key Species Recorded at Caldicot, 2020-23

Scientific name	Species English name	Status	Survey unit(s)
<i>Peltodytes caesus</i>	A Haliplid water beetle	NS	8
<i>Hydaticus transversalis</i>	A diving beetle	NS	5
<i>Tachys bistriatus</i>	A ground beetle	NS	4c
<i>Badister dilatatus</i>	A ground beetle	NS	4
<i>Hydrophilus piceus</i>	Great Silver Water Beetle	NT; NS	4c,5,8
<i>Hippodamia variegata</i>	Adonis' Ladybird	Nb	4b
<i>Gymnetron villosulum</i>	A weevil	Nb	4c
<i>Larinus carlinae</i>	A weevil	Nb	4,5
<i>Kissophagus vicinus</i>	A bark beetle	Nb	4b
<i>Odontomyia ornata</i>	Ornate Brigadier soldierfly	NS	2,4b,4c,5,8
<i>Andrena trimmerana</i>	Trimmer's Mining Bee	Nb	4c,8
<i>Bombus humilis</i>	Brown-banded Carder Bumblebee	S7	2,4a,4b,4c,5,7,8
<i>Bombus sylvarum</i>	Shrill Carder Bumblebee	S7; Nb	2,4a, 4b, 4c, 8
<i>Eucera longicornis</i>	Long-horned Bee	S7; Na	2,4b,4c,5,8
<i>Nomada flavopicta</i>	Blunthorn Nomad Bee	Nb	4a,4b,4c,5
<i>Lasioglossum pauxillum</i>	Lobe-spurred Furrow Bee	Na	2
<i>Sphecodes crassus</i>	Swollen-thighed Blood Bee	Nb	2
<i>Sphecodes rubicundus</i>	Red-tailed Blood Bee	RDB3	4b,5,7

A water beetle *Peltodytes caesus* (Duftschmid, 1805). NS.

8.3.7 A small yellow-brown Haliplid water beetle with diagnostic pointed tips to the coxal processes. It is a very characteristic species of coastal grazing marshes, where it favours well-vegetated ditches with a soft muddy bottom. It can also be found less frequently in nutrient-rich bodies of still water at inland sites. Sometimes *P. caesus* can be found in mildly brackish conditions, though most sites are fresh water. Both adults and larvae feed on filamentous algae and possibly also stoneworts. *P. caesus* is very scarce, with most recent records from grazing marsh ditches in south-east England and East Anglia and with outlying populations on the Gwent and Somerset

Levels. It is a southern species that has not been found north of Lancashire. At Caldicot, it was recorded in sample AQ25 (SU8).

A diving beetle *Hydaticus transversalis* (Pontoppidan, 1763). **NS.**

8.3.8 The yellow transverse lines across the base of the wing cases make this medium-sized black diving beetle unmistakable. It is thought to favour late-successional pools and ditches with abundant macrophytes for breeding. *H. transversalis* is a very scarce insect in Britain, with most surviving populations in the fens of Cambridgeshire, Huntingdonshire and Norfolk and the Somerset and Gwent Levels. Away from these main populations, there are now just a few isolated colonies and it has certainly become extinct at some former breeding sites. Adults were collected in an aquatic sample in SU5 in 2020. Note that this sample station lies just outside the revised site boundary.

A ground beetle *Tachys bistriatus* (Duftschmid, 1812). **NS.**

8.3.9 *T. bistriatus* is a tiny brown ground beetle that is difficult to distinguish from its congeners without careful microscopic examination. It is a wetland species, found across a range of fen and mire habitats, though usually in areas of the site that are not too waterlogged (e.g. fen meadows and humid heaths). It has a very scattered distribution across southern England and Wales, but is very scarce everywhere, being most frequently encountered on the wet heaths of the New Forest. At Caldicot, a single adult was found at the edge of the Windmill Reen (SU4c) in May 2023.

A ground beetle *Badister dilatatus* Chaudoir, 1837. **NS.**

8.3.10 *B. dilatatus* is one of a group of three very similar black-brown ground beetles (the other two are the even scarcer *B. collaris* and *B. peltatus*) that are most readily distinguished by examination of the male genitalia. It is also generally larger and has more rounded pronotal hind angles than those species. It is an inhabitant of eutrophic wetlands, which have a permanently high watertable. Most British sites are in high-quality fens and coastal grazing marshes of south-east England and East Anglia. In south-west England and Wales, it is very scarce and restricted to a few coastal wetlands. It was found at Caldicot in a ground search undertaken in SU4 in May 2020.

Great Silver Water Beetle *Hydrophilus piceus* (Linnaeus, 1758). **NT/NS.**

8.3.11 *H. piceus* is an unmistakable insect, as both an adult and well-grown larva on account of its very large size. Adults may reach nearly 50 cm, which makes it the largest British beetle. It is a rare species, which occurs on coastal grazing marshes in Kent, Sussex, Somerset and Gwent, and also in the Norfolk Broads. It was formerly more widely distributed in the Midlands, the London marshes and the Cambridgeshire fens, but has disappeared from these areas. Larvae of *H. piceus* feed on water snails, leaving characteristic holes in the shells of their victims. They tend to be restricted to ditches with very dense mats of macrophytes, where their prey is most abundant, though adults disperse by flight and can be found in a much wider range of still water habitats. At Caldicot, adults and larvae were found in samples AQ7 and AQ9. An adult was also recorded by GE staff from SU8 in 2020.

Adonis' Ladybird *Hippodamia variegata* Fürsch, 1958. **Nb.**

8.3.12 Adonis' Ladybird is a 'classic' red ladybird with black spots but is easily distinguished by a combination of its small size, elongate body form, concentration of spots in the rear half of the elytra and white spots on the otherwise black thorax. It is a species of southern England, north as far as Yorkshire with most records coming from eastern England. There are only a handful of sites in Wales, all in the extreme south east. Like most of the larger ladybirds, it feeds on aphids on plants growing in dry, open habitats where there is much bare ground such as sand dunes, ruderal grassland, arable margins and brownfield sites. Though it is still listed as Nationally Scarce, it has undergone a significant range expansion, which is thought to be a result of the ongoing rise in average annual temperatures. At Caldicot, a single specimen was found on an arable field margin in SU4b on the 31st of July 2023.

A weevil *Gymnetron villosulum* Gyllenhal, 1838. **Nb.**

8.3.13 *G. villosulum* is a small, weevil with black elytra, which is most easily distinguished from its congeners by the dense yellowish setae covering the elytra. *G. villosulum* has a very scattered distribution across southern England, with almost all records being to the south-east of a line joining the Severn and Humber estuaries. Both larvae and adults feed in galled seed capsules of water-speedwells *Veronica* spp. At Caldicot, adults were tapped from Pink Water-speedwell on cattle-poached

margins of the Windmill Reen (SU4c).

*A weevil **Bagous subcarinatus** Gyllenhal, 1836. **Na.***

8.3.14 Amongst the very similar members of this genus, *B. subcarinatus* can be distinguished by its unusually long tarsi; approximately half as long as the tibia and with all the tarsal segments clearly elongate. It is known from a very few areas of southern Britain, with most sites being in ditches on coastal grazing marshes. There are clusters of records from the Thames marshes and on the Pevensey and Somerset Levels. It feeds on submerged water plants, with its primary host believed to be Rigid Hornwort *Ceratophyllum demersum*. A single female was netted from a ditch with abundant submerged vegetation (including Rigid Hornwort) in SU3 on the 22nd of May 2020. This would appear to be the first Welsh record.

*A weevil **Larinus carlinae** (Olivier, 1807). **Nb.***

8.3.15 The genus *Larinus* includes two British species, both of which are large, dark weevils with a thin covering of yellow-white scales. *L. carlinae* can be distinguished from the much rarer *L. turbinatus* by its broader, straighter rostrum. It is restricted to the southern part of England and Wales, where it occurs on various species of thistles in the genera *Cirsium* and *Carduus*. It is found in a range of dry, open habitats where there are good quantities of its foodplants. It is particularly associated with ruderal vegetation, where disturbance has favoured the establishment of large thistle populations. Adults were frequent at Caldicot, on Creeping *Cirsium arvense* and Spear *C. vulgare* Thistles in semi-improved grassland and tall ruderal vegetation in SU4 and SU5.

*A bark beetle **Kissophagus vicinus** (Comolli, 1837). **Nb.***

8.3.16 *K. hederæ* is a small and relatively elongate bark beetle, of a reddish ground colour in which the elytra are densely clothed in yellowish setae and have the basal margin raised and strongly crenulate. It is very sparsely distributed across England and Wales as far north as Yorkshire but appears to be absent from many areas of seemingly suitable habitat. The larvae of this species develop exclusively in dead stems of ivy where this is found in warm, dry micro-sites. At Caldicot, adults were beaten from dead ivy branches on an old hedgerow Ash in SU4b and a veteran Crack Willow in SU8.

Ornate Brigadier soldierfly *Odontomyia ornata* (Meigen, 1822). **NS.**

8.3.17 The adult of this soldierfly is a large, striking insect with orange wedges on the abdomen. The larvae are very elongate, with a long last segment in which the anal slit is placed in the middle. It shows a strong affinity with grazing marsh ditches, though there are a very few colonies at inland fen sites. The main British strongholds of the Ornate Brigadier are on the Somerset and Gwent Levels, though it also has sizeable populations on coastal grazing marshes in East Sussex, and a scatter of other colonies in southern England and East Anglia. The larvae can be found amongst lush, submerged vegetation in open, mid- to late-successional ditches. At Caldicot, it was recorded in aquatic samples AQ10, AQ16, AQ19 and AQ25. Adults were also seen on *Oenanthe crocata* flowers in SU2, SU4b, SU5 and SU7.

Trimmer's Mining Bee *Andrena trimmerana* (Kirby, 1802). **Nb.**

8.3.18 Trimmer's Mining Bee is one of a few species in the very large genus *Andrena* that has reddish patches or bands at the sides of abdominal tergites 1 and 2. It is a large mining bee with a local distribution across southern England and Wales. Most colonies are in scrubby habitats at or near the coast, including coastal cliffs and grazing marshes. Inland colonies are also known from flower-rich habitats such as chalk grassland and brownfield sites. It is double-brooded, with the spring brood visiting flowering shrubs such as Blackthorn *Prunus spinosa* and willows *Salix* spp. The summer generation visits a wide range of flowers including various Umbelliferae, Asteraceae and Bramble *Rubus fruticosus* agg. Nest burrows are usually located in sparsely vegetated ground or short swards in warm, dry situations on generally southerly aspects. At Caldicot, females were found feeding on Bramble flowers along hedgerows in SU4c and SU8.

Brown-banded Carder Bumblebee *Bombus humilis* Illiger, 1806. **S7.**

8.3.19 This is a medium-sized, pale ginger-brown bumblebee, lacking any trace of black hairs on the abdomen (unlike the common *B. pascuorum*), and possessing a few black hairs above the wing base (these being absent in the very similar *B. muscorum*). *B. humilis* is associated with large expanses of open, flower-rich habitats. Pollen is collected from a variety of plants, with clovers, labiates, knapweeds, thistles and Red Bartsia generally preferred. On sites where heathland

is the main habitat, heathers are visited. Queens emerge from hibernation in May and early-June. Workers are active from June to September and males appear in August and September. Small nests are constructed on the ground surface in moderately tall, but non-tussocky grassland, and are covered with moss and dead grass gathered initially by the queen and later by the workers. Nests seldom contain as many as 100 workers.

8.3.20 *B. humilis* is a southern species, with most records from the south and west coasts of England and Wales. The most northerly recent British records are from Anglesey, although old localities extend north to Cumbria. It has suffered a considerable decline and is now absent from many former sites, particularly away from the coast. The largest remaining inland population is on Salisbury Plain, Wiltshire. Because of its decline, *B. humilis* is listed as a Species of Principal Importance for the Conservation of Biodiversity. Further information on the status of the Brown-banded Carder Bumblebee at Caldicot can be found in Table 8-6 .

Shrill Carder Bumblebee *Bombus sylvarum* (Linnaeus, 1761). S7; Nb.

8.3.21 The Shrill Carder Bumblebee is a distinctive bumblebee. The ground colour is buff-grey, with a poorly defined black band across the centre of the thorax and a reddish-orange tail. Like other scarce bumblebees, it needs large expanses of open, flower-rich habitats. Pollen is collected from a wide range of plants, with clovers, vetches, labiates (e.g. Marsh Woundwort), knapweeds and thistles being some of the most frequently visited. Nests are made of moss and litter on the ground surface, or just under it in old vole runs in rather denser, cooler grassland sites than those used by *B. humilis*. Queens appear in mid-May, with workers foraging primarily from late-June and males flying in August and early-September. Like the Brown-banded Carder Bumblebee, *B. sylvarum* is a southern species in Britain, though there were formerly scattered populations north as far as the Scottish border. It has undergone a very severe decline in its British range, which formerly included much of Wales and southern England. Remaining populations are restricted to a few areas, the most important of which are: the Thames Estuary, Somerset and Gwent Levels and the Pembrokeshire coast. It is thought to have gone extinct on Salisbury Plain recently. Because of its decline, *B. sylvarum* is included on Section 7 of the Environment (Wales) Act 2016 as a Species of Principal Importance for the

conservation of biodiversity in Wales. Further information on the status of the Shril Carder Bumblebee at Caldicot can be found in sub-section 3.4.

Long-horned bee *Eucera longicornis* (Linnaeus, 1758). S7; Na.

8.3.22 This is a large, swift-flying bee in which the very long antennae of males makes them unmistakable. The stocky females are superficially similar to flower bees in the genus *Anthophora*, but they only have two (as opposed to three) sub-marginal cells in the forewings. A second much rarer species of the genus (*E. nigrescens*) formerly occurred in southern England but has not been recorded in Britain since 1970 and is now thought to be extinct. *E. longicornis* formerly occurred in a range of open, flower-rich habitats across southern England and Wales, north as far as Yorkshire. Habitats it has been found in include soft coastal cliffs, coastal grazing marshes, heathland, post-industrial sites and woodland glades and rides. It has undergone a severe decline in recent years and most remaining sites are on the south coast of England and Wales, with a few outlying inland sites on brownfields in the Midlands and on lowland heaths. It has a very strong relationship with legumes (Fabaceae), such as clovers *Trifolium* spp., bird's-foot trefoils *Lotus* spp., everlasting peas and vetchlings *Lathyrus* spp. and vetches *Vicia* spp. At Caldicot, a large nesting aggregation was found in a ditch bank with species-rich grassland and patches of bare clayey substrate in SU2 on the 21st of May 2020 and was still present here in June 2023. Adults were also recorded in SU4b, SU4c, SU5 and SU8.

Blunthorn Nomad Bee *Nomada flavopicta* (Kirby, 1802). Nb.

8.3.23 The Blunthorn Nomad has the abdomen entirely black and yellow with the markings on the second and third abdominal tergites being widely separated. There are yellow, lateral bars and a number of conspicuous yellow markings on the otherwise black thorax, including two yellow spots on the scutellum. Females have an almost hairless pronotum and prominent pointed tips to the fore coxae. *N. flavopicta* is very locally distributed in flower-rich grasslands, brownfield sites and heaths across southern Britain. It is very scarce in Wales, where it is confined to scattered sites most of which are near the coast. It is a cleptoparasite that feeds on the food store of blunthorn bees (genus *Melitta*). Adults were found quite frequently at Caldicot, in all three sub-units of SU4 and also in SU5. Most records related to individuals visiting White Clover flowers. The Clover Melitta *M. leporina* was also common in

these areas and is certainly the main host here.

Lobe-spurred furrow bee *Lasioglossum pauxillum* (Schenck, 1853). Na.

8.3.24 The genus *Lasioglossum* includes over 30 British species, most of which are small, dark bees that require very careful examination to ensure accurate identification. *L. pauxillum* is most readily distinguished from its congeners by the broad, blunt comb of teeth on the inner hind tibial spur. Though it was formerly regarded as a very scarce species, it has spread considerably across southern England in recent years and may no longer merit Nationally Scarce status and hence may not be a key species to consider when assessing the invertebrate interest of Caldicot. It is found in a range of open habitats, including chalk downland, coastal grassland and brownfield sites. A wide range of flowers are utilised by foraging workers, with Common Fleabane being particularly favoured in the late summer period. Nests are constructed in bare or sparsely vegetated sunny situations, with this being a primitively eusocial species, in which a number of females share a burrow, acting as workers for a queen that is indistinguishable from them. A single female was collected on Red Clover in SU2 on the 21st of May 2020.

Red-tailed Blood Bee *Sphecodes rubicundus* von Hagens, 1875. RDB3.

The 16 British *Sphecodes* are all black, small to mid-sized bees with a bright red band on the abdomen. The Red-tailed Blood Bee is one of the larger species in the genus and can be distinguished from its congeners by the very short, sparse hairs on the anterior face of the first abdominal tergite in females and the very extensive red marking on the abdomen of both sexes. It has a very southern distribution, with most colonies in a band of counties from Devon to Kent. There are also populations in East Anglia, the Midlands and in south-east Wales. Unlike most *Sphecodes*, which lay their eggs in the nest burrows of furrow bees (*Lasioglossum* spp.), *S. rubicundus* is a specialist cleptoparasite of the Large Meadow Mining Bee, which is found in a range of open habitats such as grassland, heathland and coastal grazing marshes where there is an abundance of clovers (especially White Clover) and other legumes. The host is common at Caldicot Level, with nesting females observed on ditch banks and in other places where cattle poaching is maintaining sparsely vegetated clay substrates. Female *S. rubicundus* were seen prospecting around these nest sites in SU4, SU5 and SU7.

Aquatic Invertebrates

8.3.25 **Table 8G-5** summarises the results of the aquatic invertebrate surveys undertaken at the 25 aquatic invertebrate sample stations in 2020 and 2023. Details of the aquatic sample stations are given in **Table 8G-2** and their location can be seen on Figures 2 to 7.

Table 8G-5 Aquatic Invertebrate Survey Results, Caldicot, 2020-3

Species scientific name	Species English name	Status	Aquatic sample stations (AQ1-25)
<i>Bithynia tentaculata</i>	Common Bithynia		1,3,4,5,6,7,9,10,11,12,13,14,16,17,18,20,21,22,24,25
<i>Potamopyrgus antipodarum</i>	Jenkin's Spire Snail		5,6,15
<i>Galba truncatula</i>	Dwarf Pond Snail		15,25
<i>Lymnaea stagnalis</i>	Great Pond Snail		3,4,10,11,12,16,17,18,21,22
<i>Lymnaea palustris</i> agg	Marsh Pond Snail		2,10,11,14,18
<i>Radix auricularia</i>	Ear Pond Snail		18
<i>Ampullaceana balthica</i>	Wandering Pond Snail		2,3,4,5,6,7,8,10,11,12,13,14,16,17,18,21,22,23,24
<i>Physa fontinalis</i>	Common Bladder Snail		1,3,4,5,6,10,11,12,13,14,16,17,18,19,20,21,22,25
<i>Anisus vortex</i>	Whirlpool Ram's-horn Snail		1,2,3,4,5,6,7,8,10,11,12,13,14,16,17,18,19,20,21,22,23,24,25
<i>Bathyomphalus contortus</i>	Twisted Ram's-horn Snail		17,18
<i>Gyraulus crista</i>	Nautilus Ram's-horn Snail		4
<i>Planorbarius corneus</i>	Great Ram's-horn Snail		2,23,24
<i>Planorbis planorbis</i>	Margined Ram's-horn Snail		3,4,7,8,9,10,11,13,14,16,17,18,20,21,22,23,24,25
<i>Succinea putris</i>	Large Amber Snail		7,8,9,13,14,18
<i>Sphaerium corneum</i>	Horny Orb Mussel		1,4,12,13,14,17,18,20,22,23,24
<i>Sphaerium lacustre</i>	Lake Orb Mussel		13
<i>Theromyzon tessulatum</i>	Duck Leech		17,18,20
<i>Glossiphonia complanata</i>	A leech		21
<i>Erpobdella octoculata</i>	A leech		1,2,11,19,20,24
<i>Erythromma najas</i>	Red-eyed Damselfly		11
<i>Coenagrion puella</i>	Azure Damselfly		3,4,5,6,9,10,11,12,13,14,15,16,17,18,19,20,21,22,24

<i>Ischnura elegans</i>	Blue-tailed Damselfly		2,3,4,10,11,12,13,14,16,17,18,21,22
<i>Brachytron pratense</i>	Hairy Dragonfly		3,4,9,10,11,13,14,15,16,17,18,20,22
<i>Aeshna cyanea</i>	Southern Hawker dragonfly		25
<i>Anax imperator</i>	Emperor Dragonfly		3,10,11,15,17,18,20,22
<i>Libellula depressa</i>	Broad-bodied Chaser dragonfly		20,22
<i>Libellula quadrimaculata</i>	Four-spotted Chaser dragonfly		11,17
<i>Orthetrum cancellatum</i>	Black-tailed Skimmer dragonfly		3,10,11,12,21,22
<i>Sympetrum sanguineum</i>	Ruddy Darter dragonfly		25
<i>Mesovelia furcata</i>	A Mesoveliid water bug		3,4,10,11,12
<i>Hydrometra stagnorum</i>	Common Water Measurer		3,11
<i>Microvelia reticulata</i>	A Veliid water bug		3,4,10,11,16,17,18
<i>Nepa cinerea</i>	Water Scorpion		9,14,17,21
<i>Ilyocoris cimicoides</i>	Saucer Bug		1,3,4,5,6,7,8,9,10,11,12,16,17,18,19,20,21,22,25
<i>Notonecta glauca</i>	Common Backswimmer		1,3,4,5,6,10,11,12,13,14,16,17,18,19,20,21,24,25
<i>Plea minutissima</i>	A Pleid water boatman		3,7,8,9,11,21,22
<i>Callicorixa praeusta</i>	A water boatman		11
<i>Corixa punctata</i>	A water boatman		3,4,5,6,10,12,15,19
<i>Hespercorixa linnaei</i>	A lesser water boatman		3,4,5,6,16,25
<i>Hespercorixa sahlbergi</i>	A lesser water boatman		17,18
<i>Sigara dorsalis</i>	A lesser water boatman		3,4,11,12,15
<i>Gyrinus caspius</i>	A whirligig beetle		5
<i>Peltodytes caesus</i>	A Haliplid water beetle	NS	25
<i>Haliplus heydeni</i>	A Haliplid water beetle		20,24
<i>Haliplus ruficollis</i>	A Haliplid water beetle		2,3,5,6,7,8,9,10,11,13,14,16,17,18,19,21,22,23,24
<i>Haliplus sibiricus</i>	A Haliplid water beetle		1,2,11,20
<i>Haliplus lineatocollis</i>	A Haliplid water beetle		1,7,8,18,22
<i>Noterus clavicornis</i>	A diving beetle		2,3,4,5,6,10,11,13,14,15,16,17,18,20,21,22,23,24
<i>Hygrobia hermanni</i>	Screech Beetle		22

Agabus sturmii	A diving beetle		3
Agabus bipustulatus	A diving beetle		3,10,16,17,22,23,24
Agabus nebulosus	A diving beetle		21
Ilybius montanus	A diving beetle		2
Ilybius quadriguttatus	A diving beetle		6,9,18
Colymbetes fuscus	A diving beetle		3,5,6,14,17
Rhantus suturalis	A diving beetle		13
Laccophilus hyalinus	A diving beetle		21
Dytiscus marginalis	A great diving beetle		3,16,18,14,23
Hydroporus angustatus	A diving beetle		2,4,18,20,23,24
Hydroporus palustris	A diving beetle		2,3,4,10,11,12,16,17,18,21,23
Hydroporus planus	A diving beetle		2,3,4,5,6,7,8,9,11,12,13,14,16,17,19,21,22,23
Hydroporus pubescens	A diving beetle		5,6,9,10,13,14,16,17,18,20,21,22,23,24
Hydroporus tessellatus	A diving beetle		2,10,17,23,24
Graptodytes pictus	A diving beetle		10,11,16,17,22
Hygrotus inaequalis	A diving beetle		3,4,11,16,17,19,20,21,22
Hygrotus versicolor	A diving beetle		11,22
Hyphydrus ovatus	A diving beetle		4,10,13,14,16,18,22
Helophorus aequalis	A Helophorid water beetle		1,2,3,4,5,6,11,12,15,16,17,18,19,20,21,22,24
Helophorus brevipalpis	A Helophorid water beetle		3,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24
Helophorus minutus	A Helophorid water beetle		7,9,10,11,15,24
Laccobius bipunctatus	A Hydrophilid water beetle		3,4,5,6,7,9,10,11,25
Hydrophilus piceus	Great Silver Water Beetle	NT; NS	7,9,13,18
Hydrobius fuscipes ss	A Hydrophilid water beetle		6,17,24
Anacaena globulus	A Hydrophilid water beetle		9,10

Anacaena limbata	A Hydrophilid water beetle		3,9,10,11,13,14,16,17,18,21,22,25
Anacaena lutescens	A Hydrophilid water beetle		18
Cymbiodyta marginella	A Hydrophilid water beetle		7,8,25
Enochrus melanocephalus	A Hydrophilid water beetle		18
Enochrus ochropterus	A Hydrophilid water beetle		17
Enochrus testaceus	A Hydrophilid water beetle		2,3,4,5,6,7,10,13,14,18,20,23
Enochrus coarctatus	A Hydrophilid water beetle		9
Helochaeres lividus	A Hydrophilid water beetle		3,7,8,9,10,11,14,16,17,21,23
Cercyon marinus	A Hydrophilid water beetle		25
Cercyon ustulatus	A Hydrophilid water beetle		3,25
Ochthebius minimus	A Hydraenid water beetle		3,4,8,12
Telmatophilus caricis	A Cryptophagid beetle		11
Telmatophilus typhae	A Cryptophagid beetle		5,10
Coccidula rufa	A ladybird		1
Donacia marginata	A reed beetle		3,11,16,18
Donacia semicuprea	A reed beetle		10,11,12,16,17,18,21
Donacia simplex	A reed beetle		3
Donacia vulgaris	A reed beetle		12
Plateumaris sericea	A reed beetle		3,16
Tanysphyrus lemnae	An Errirhinid weevil		1,2,4,10,18,20,22
Odontomyia ornata	Ornate Brigadier soldierfly	NS	10,13,14,16,19,25
Odontomyia tigrina	Black Colonel soldierfly		3,4,7,17

Oplodontha viridula	Common Green Colonel soldierfly	9,13,15,16
Stratiomys singularior	Flecked General soldierfly	9
Crangonyx pseudogracilis	A freshwater shrimp	3,4,5,6,10,11,13,14,15,16,17,18
Asellus aquaticus	A water louse	1,2,3,4,9,10,11,13,14,16,17,19,20,23,24
Asellus meridianus	A water louse	16,18

Bumblebee Surveys

8.3.26 **Table 8G-6** summarises the bumblebee survey work. The second column lists all bumblebee species recorded from each survey unit and the third gives the results from those 27 fields where flowering plants were sufficiently abundant to justify W-walks (BU1-27). The letters before the number in this column refer to the flower species upon which they were first noted and are explained in the notes at the bottom of the table. Figures 2 to 7 show the locations of the 27 bumblebee W-walks.

Table 8G-6 Bumble Bee Surveys at Caldicot, 2020 and 2023

Survey unit (SU)	Bumblebees recorded	Numbers by flower spp. on W-walks			Habitat Assessment
		BU1 ST44078541	BU2 ST43928541	BU3 ST43748554	
SU2	<i>B. lucorum/terrestris</i>	Lpr-1; Vc-2.	Hs-1; Lpr-3; Vc-3	Lpr-4.	Dominated by species-poor grassland and arable. The only frequent nectar/pollen source across much of this unit is White Clover. No good foraging habitat for bumblebees. Three fields were 'W-walked'. Two of these (BU2 and BU3) were arable fields with weedy margins and the third (BU1) was a semi-improved pasture with abundant White Clover and frequent Tufted Vetch and Meadow Vetchling
	<i>B. hortorum</i>	-	Cv-1; Tp-1.	-	
	<i>B. lapidarius</i>	-	Cv-5; Vc-2.	Cv-3.	
	<i>B. pratorum</i>	-	-	Lpr-3.	
	<i>B. humilis</i>	Lpr-1.	-	-	
	<i>B. pascuorum</i>	-	Cr-2; Cv-1; Lpr-1; Tp-2; Vc-8.	Cv-1. Cv-1; Lpr-2.	
	<i>B. sylvarum</i>	-	-	-	
SU4a		BU4 ST43288516	BU5 ST43248530	BU6 ST42958479	BU25 ST43658482

	<i>B. lucorum/terrestris</i>	Tr-1	Tr-1	Cv-1	P	No good foraging habitat for bumblebees. Four fields sampled were all Perennial Rye-grass dominated, agriculturally improved pastures in which White Clover was the only frequent nectar/pollen source. BU6 additionally had some stands of Spear Thistle around the margins of the field.
	<i>B. hortorum</i>	-	-	Cv-1	-	
	<i>B. lapidarius</i>	Tr-2	-	-	-	
	<i>B. humilis</i>	-	-	-	Cv-1	
	<i>B. pascuorum</i>	-	Tr-1	-	-	
	<i>B. sylvarum</i>	-	-	-	Cv-1	
SU4b		BU7 ST42378458	BU8 ST42228429	BU9 ST42198381	BU10 ST41998388	
	<i>B. terrestris</i>	Tr-1		Rf-1	Cv-1	Mostly species-poor improved grassland with some arable (Maize) in the eastern half. A small area in the south-west corner has semi-improved grassland with a little Meadow Vetchling, Tufted Vetch, Common Knapweed and Common Fleabane. Elsewhere White Clover is the only consistently frequent nectar/pollen source though there are a few stands of Creeping and Spear Thistle around field margins. Some small copses and outgrown hedges with good numbers of mature to overmature Ash, Crack Willow
	<i>B. lucorum/terrestris</i>	Tr-1	Rf-1; Tr-4	Cv-1; Rf-1;	Rf-1	
	<i>B. hortorum</i>	-	Tp-2	Tr-1	-	
	<i>B. lapidarius</i>	Tr-4	-	-	Rf-1	
	<i>B. pascuorum</i>	-	Tr-1	Cv-1; Tr-2	-	
		BU11 ST41908381	BU12 ST41798358	BU13 ST41698361	BU14 ST41498377	BU26 ST42608406
						BU27 ST42208397

	<i>B. terrestris</i>	Tr-1	-	Rf-1	-	-	-
	<i>B. lucorum/terrestris</i>	Tr-6	lf-2; Rf-2	Tr-1	Cv-1	P	P
	<i>B. hortorum</i>	-	-	-	-	P	-
	<i>B. lapidarius</i>	Rf-1; Tr-4	-	Cv-1; lf-1	Tr-5	P	-
	<i>B. pratorum</i>	-	Rf-1	-	-	-	-
	<i>B. humilis</i>	-	-	-	-	Cv-7; Vc-1	Tr-2
	<i>B. pascuorum</i>	-	Vc-2	-	-	P	P
	<i>B. sylvarum</i>	-	-	-	-	Cv-2	-
SU4c		BU15 ST41498345	BU22 ST41058349	BU23 ST41278335	BU24 ST41188347		
	<i>B. terrestris</i>	Tr-1	-	-	-	Dominated by species-poor improved to semi-improved grassland with some arable. Nectar and pollen sources restricted to White Clover and Spear Thistle, Bramble etc. around field margins. The BU24 sample was recorded along the green lane that runs across this part of the site.	
	<i>B. lucorum/terrestris</i>	Tr-4	-	P	P		
	<i>B. hortorum</i>	Tr-1	P	-	-		
	<i>B. lapidarius</i>	-	-	P	-		
	<i>B. pratorum</i>	-	-	-	P		
	<i>B. humilis</i>	-	Tp-5	Cn-1	Rf-1		
	<i>B. pascuorum</i>	-	P	-	P		
	<i>B. sylvarum</i>	-	-	-	Rf-1		
SU5		BU16 ST40568350	BU17 ST40278329	BU18 ST40108319			

<i>B. lucorum/terrestris</i>	Cv-2 Cv-3	Cv-1 -	Cv-5 Cv-3	Mostly species-poor improved grassland with some arable, including abandoned crops of Broad Beans (BU17) with abundant thistles at the time of the 2020 survey (growing cereals in 2023). Field BU16 is weedy improved grassland with frequent Creeping and Spear Thistles. BU18 has weedy, semi-improved grassland with a few remnants of more semi-natural grassland forbs such as Common Bird's-foot Trefoil.
<i>B. hortorum</i>	Cv-1	Cv-12	Cv-12	
<i>B. lapidarius</i>	-	-	Cv-1	
<i>B. jonellus</i>	Cv-2	-	-	
<i>B. pratorum</i>	-	-	Cv-2	
<i>B. humilis</i>	Cv-1	Cv-1	Rf-1	
<i>B. pascuorum</i>				

SU7 The forb-rich grassland fields in the northern part of SU7 were surveyed for bumblebees in 2020. However, these have been removed from the final iteration of the PEIR Assessment Boundary. The remaining areas within the survey unit are either species-poor grasslands or arable crops that lacked sufficient nectar/pollen sources to merit their inclusion in the bumblebee monitoring programme. All were still walked in 2020, but no important bumblebee species were noted.

SU8	BU19	BU20	BU21	
	ST39568304	ST39488293	ST39358281	
<i>B. lucorum/terrestris</i>	Cv-3; Lsp-2; Rf-3	Cn-1; Lpr-2; Tr- 2	Cv-6; Lpr-1; Rf-1	The main interest here are the two relatively flower-rich fields situated just behind the seawall (BU20 and BU21). Note that the former also included the southern portion of the large field to its north, which was somewhat marshy with some Common Knapweed, Red Clover and Common Bird's-foot Trefoil. SU8 also includes the flower-rich scrubby grassland along the track and pipeline (BU19) that divides
<i>B. hortorum</i>	-			
<i>B. lapidarius</i>	Cr-1; Cv-4	Lpr-1; Tr-1	Cv-1	
<i>B. humilis</i>	Lsp-2	Cn-5; Lc-2	Cv-4; Lc-3	
<i>B. pascuorum</i>	Lsp-1	Tr-1	Cv-6; Cr-2;	
<i>B. sylvarum</i>	Lsp-2		Vc-1 Vc-2	

this survey unit from SU5 to the east. A feature of the sward here is the abundance of everlasting-pea.

SU9 Not Surveyed

Notes on Table 3: The codes in the W-walk columns refer to bumblebees recorded in flight or the flower species on which each was first recorded. They are as follows:

Cn = Common Knapweed; Cv = Spear Thistle; Hs = Hogweed; If = In flight; Lc = Common Bird's-foot Trefoil; Lpr = Meadow Vetchling; Lsp = everlasting-pea sp.; Os = Spiny Restharrow; Rf = Bramble; Tp = Trifolium pratense; Tr = White Clover; Vc = Tufted Vetch. For some of the non-target bumblebee counts, numbers were not noted and they are recorded simply as 'P' = Present.

Key invertebrate habitats at Caldicot, 2020-23

8.3.27 The 18 key species listed in **Table 8G-4** are assigned here to five key invertebrate habitat features that are discussed below.

Grassland pollinators

8.3.28 Associated key species: Brown-banded and Shril Carder Bumblebees; Long-horned Bee; Blunthorn Nomad Bee; Lobe-spurred Furrow Bee; Swollen-thighed Blood Bee; Red-tailed Blood Bee.

8.3.29 Despite the absence of any high-quality unimproved grassland at Caldicot, it still has a surprisingly diverse bee fauna. Many of the key species are strongly associated with clovers and the presence of a high cover of White, and less frequently Red Clover, within otherwise species-poor agriculturally improved swards is doubtless one of the reasons for the survival of a rich pollinator assemblage here despite the extremely sub-optimal condition of the grassland.

8.3.30 However, the key bumblebee species are very scarce, with only nine Shril Carder Bumblebee workers recorded despite a considerable amount of survey effort. The few records of both scarce carder bumblebees mostly came from sites close to the coast that are thought most likely to relate to occasional foragers from a surviving population on the more suitable grassland along the coastal strip. The same may be true for the Long-horned Bee, which also had some very good breeding populations along the seawall.

8.3.31 The grassland pollinator assemblage at Caldicot is certainly of lower importance than that found in other areas of the Gwent Levels where there are still significant expanses of flower-rich grassland. However, it is still assessed to be of County to Regional Importance for invertebrates and the potential for creation and restoration of more diverse swards that could considerably enhance the population of Shril Carder Bumblebee and other pollinators is very high.

Freshwater aquatic habitats in mid- to late-successional reens

8.3.32 Associated key species: *Peltodytes caesus*; *Hydaticus transversalis*; Great Silver Water Beetle; Ornate Brigadier soldierfly.

- 8.3.33 This habitat feature includes aquatic invertebrate assemblages of reens that are in a cycle of management but have not been cleared of vegetation and detritus recently and where sufficient time has elapsed for submerged macrophytes and emergent vegetation to have become abundant. The better examples of this habitat feature are unshaded by trees and shrubs and are often open to cattle grazing. The latter preventing excessive dominance by tall fen species such as Common Reed and creating shallow, moderately poached water margins that are favoured by many of the more important aquatic invertebrates occurring on the Gwent Levels.
- 8.3.34 If it is not possible to graze with cattle or horses, management should seek to replicate the shallow, poached margins it creates by other means. This might be achieved through the adoption of a programme of ditch management works that includes the following measures. The maintenance of a regular programme of rotational clearance is one of the key requirements, with this carried out over a sufficient period to maintain a substantial resource of reens with an open water column and well-developed aquatic vegetation across the site. During rotational ditch clearance, excavation should aim to create flat shelving margins, shallow embayment's and/or gently sloping bank profiles (c.30-45°). The creation of new pools with similar characteristics to that described above might also enhance the aquatic invertebrate interest of the site.
- 8.3.35 Many of the smaller ditches at Caldicot are heavily shaded by hedges and it would be desirable to remove shading tree and shrub cover and reinstate at least a proportion of them into a ditch clearing rotation.
- 8.3.36 Though they still have a rich aquatic fauna, the reens at Caldicot are motly in sub-optimal condition currently and are therefore considered to be of County to Regional Importance for invertebrates using the CIEEM GFR.

Open ditch and pool margins

- 8.3.37 Associated key species: *Tachys bistratus*; *Badister dilatatus*; *Gymnetron villosulum*.
- 8.3.38 Most of the ditches here have either dried out or are heavily shaded by hedges or scrub woodland. However, there are a few open stretches that still hold water, especially along the larger ditches that are regularly cleared out. Moderate grazing of the ditch margin is vital to maintain the open, lightly poached margins favoured by

these three key terrestrial species (and many other important aquatic species of shallow water margins). This habitat feature is assessed as being of District to County Importance for invertebrates using the CIEEM GFR.

Ruderal vegetation

- 8.3.39 Associated key species: Adonis' Ladybird; *Larinus carlinae*.
- 8.3.40 Weedy vegetation with patchy bare ground occurs throughout the site, especially on arable margins and around gateways. Thistles are important as the foodplants of the weevil *Larinus carlinae*. It seems to favour stands of thistles growing in dry, ruderal situations where there is at least patchy bare ground. Spear Thistle on the Gwent Levels can also be very important as a late-summer forage plant for the two key carder bumblebees. Low weedy vegetation with patches of bare ground is required by Adonis' Ladybird, which is found on a range of plants, such as mayweeds, where there are an abundance of its aphid prey. Ruderal vegetation is assessed as being of District Importance using the CIEEM GFR.

Scrub edge

- 8.3.41 Associated key species: Trimmer's Mining Bee.
- 8.3.42 Unlike the other bees recorded at Caldicot, Trimmer's Mining Bee favours warm, scrub edge habitats. Its spring brood visits flowering shrubs such as Hawthorn and Blackthorn and the summer generation favours scrubby grassland with Bramble and umbels such as Hogweed. Management should aim to maintain thick, well-grown hedges that are cut on a sufficiently long rotation to allow shrubs to flower in profusion. Ideally, grazing and cutting regimes along hedge margins should allow for 'soft' edges, with rank tall-herb grassland and Bramble. The scrub edge habitat feature is assessed as of Local Importance for invertebrates using the IEEM GFR.

Dead wood

- 8.3.43 Associated key species: *Kissophagus hederæ*.
- 8.3.44 Mature trees in scrub woodland and outgrown hedges at Caldicot (especially in SU4b) have outgrown hedges with good numbers of overmature Ash and Crack Willow that have well-developed dead wood features. Old ivy stems growing on an

ancient Ash and were found to host one key species, the bark beetle *K. hederæ*. Retention of mature trees with dead wood habitat features across a range of species, primarily oak, Ash, Crack Willow Grey Willow and poplar, is important in order to maintain and enhance the dead wood invertebrate assemblage of this site. This habitat feature is thought to be of Local Importance for invertebrates using the IEEM's GFR.

8.4 Conclusions

8.4.1 Aquatic invertebrate assemblages at Caldicot associated with mid- to late-successional reens and the grassland pollinator community are of high ecological importance. However, both are currently in sub-optimal condition, with grassland habitats and their associated population of the Shrill Carder Bumblebee being small and severely threatened. Open ditch margins, ruderal vegetation, hedgerows and dead wood habitat features also have interesting invertebrate assemblages that include some important species.

8.5 Acknowledgements

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8.6 References

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