A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.7 Environmental Statement – Appendix 9.19 Terrestrial Invertebrate Survey Report

Part A

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EXECUTIVE SUMMARY

This technical report presents the findings of terrestrial invertebrate surveys undertaken by Jacobs UK Ltd. (Jacobs) on behalf of Highways England.

The aim of the survey was to assess terrestrial invertebrate species diversity and biotope/habitat quality at 3 locations within 500 m of the proposed upgrade to dual carriageway of the A1 between Morpeth and Felton: Section A - Morpeth to Felton.

Phase 1 surveys carried out in 2016 were used to identify areas containing a mosaic of habitats that were likely to support a diverse range, and abundance of terrestrial invertebrates. River Coquet and Coquet Valley Woodlands Site of Special Scientific Interest (SSSI) also fell within the 500 m buffer and was identified as a survey location due to its conservation status and the listing of insects of conservation importance within its citation.

The terrestrial invertebrate surveys were conducted between 25th May 2017 and 22nd September 2017, and were conducted in line with standard methodology.

Following sampling of the River Coquet and Coquet Valley Woodlands SSSI survey area 150 species were recorded. Of these, three are considered here as species of conservation importance. Two of the mayfly species recorded were of conservation importance and are specifically mentioned in the site's SSSI citation due to their limited distribution nationally. The running water element of the survey area was ranked highest in terms of species quality followed by the tall sward and scrub and finally the shaded woodland floor.

Sampling at a site East of Burgham Park Golf Course produced a diversity of 111 species. Of these, three are considered here as species of conservation importance. The open habitats biotope present in the survey area ranked highest in terms of species quality with three Species of Principal Importance (Section 41, NERC Act 2006) found within this habitat.

Sampling at Causey Park Farm yielded 53 species, the lowest species diversity of the three survey areas studied. Within the survey area, the tall sward and scrub habitat contained the highest diversity but no species holding a conservation status were found.

As the behaviour of wildlife is seasonal and highly unpredictable, it is therefore considered good practice that the surveys for terrestrial invertebrates should be repeated if the development is deferred for over 12 months from the date of the initial survey.

1 INTRODUCTION

1.1 Scheme Background

1.1.1 Following the outcomes of the 2014 A1 North of Newcastle Feasibility Study the Department of Transport confirmed, in its first Roads Investment Strategy, the intention to upgrade twenty-one kilometres of the existing A1 to a dual carriageway between Morpeth and Ellingham in Northumberland. This comprised two discreet sections:

- Section A - Morpeth to Felton, and;
- Section B - Alnwick to Ellingham.

1.1.2 At this stage of the project (PCF Stage 3) one option was under consideration for Section A, this is briefly described below:

Section A - Morpeth to Felton

- Offline Option – this option would be online at its north and south ends, but a large central section would form a new bypass to the west of the existing A1 between the Floodgate Burn crossing and Bockenfield Bridge. The existing A1 would be de-trunked and form part of a local road network, which would separate local and strategic traffic.

1.2 Report Rationale

1.2.1 The aim of this report is to present the terrestrial invertebrate survey results from surveys undertaken in 2017 by Jacobs on behalf of Highways England. The information presented will be used to identify the requirement for additional surveys to be completed at PCF Stage 3. The data will ultimately inform the Environmental Impact Assessment (EIA) for the preferred option.

1.3 Definitions

1.3.1 The study area relates to a 2 km buffer around the proposed option for Section A in which desk study information has been collated via online and third party sources.

1.3.2 The survey areas refer to sites surveyed within 500 m of the offline option for Section A.

1.4 Legislative and Regulatory Context

1.4.1 An assessment of the legislative and regulatory framework covering terrestrial invertebrates in the UK has been undertaken (Appendix A). Due consideration has been given to the following statutory instruments and policy frameworks in the preparation of this report:

- Conservation of Habitats and Species Regulations 2017 (as amended)[1];
- Wildlife and Countryside Act 1981 (as amended) (WCA)[2], and;
- Natural Environment and Rural Communities (NERC) Act 2006[3]

1.4.2 In addition, a review of International Union for Conservation of Nature (IUCN) Red List and National Rarity Status was undertaken.

1.4.3 Species of conservation importance were assigned in this report on the basis of both the legislative and regulatory framework, and IUCN Red List and National Rarity status (see Section 6 and Appendix B).

[1] http://www.legislation.gov.uk/uksi/2010/490/pdfs/uksi_20100490_en.pdf
[2] http://www.legislation.gov.uk/ukpga/1981/69
[3] http://www.legislation.gov.uk/ukpga/2006/16/pdfs/ukpga_20060016_en.pdf

2 METHODOLOGY

2.1 Desk Study and Incidental Records

2.1.1 A desk study was undertaken in May 2016 with species record data requested from the Environmental Records Information Centre (ERIC) North East. At the time that the desktop study data were collated three options for Section A were under consideration. The desktop study data refers to a 2 km buffer of the three options (Figure 1).

2.2 Survey Areas

2.2.1 Four survey areas were identified within 500 m of the offline option for Section A (Figure 2). These areas were selected due to their potential to support a diverse and abundant range of terrestrial invertebrate species and are detailed below. Access to one of the survey areas, east of Cuckoo Plantation (OS GB NZ 18486 91478), was restricted so that we were unable to access this area to carry out surveys.

River Coquet and Coquet Valley Woodlands Site of Special Scientific Interest (SSSI) (OS GB NZ 17439 99778)

2.2.2 The River Coquet is a "relatively unmodified fast-flowing upland river supporting characteristic fauna and flora" (Natural England 1996). The SSSI was identified as a survey area due to its conservation status and its citation which states that is significantly rich in insect life. A high species diversity of caddisflies (Trichoptera), black flies (Simulidae), mayflies (Ephemeroptera), and stoneflies (Plecoptera) have been identified from the river. In addition, the riverside shingle and sand habitats were capable of supporting an assemblage of ground beetles.

2.2.3 The survey area for the SSSI, defined in this survey, encompassed 250 m to the east and west of the offline option for Section A (Plate 1). The habitat within this area consisted predominantly of broad-leaved semi-natural woodland with some smaller areas of broad-leaved plantation woodland, coniferous plantation woodland, tall ruderal and bare ground.

2.2.4 Priority areas for invertebrate survey included areas with a with a high nectar resource suitable for pollinating insects, such as areas of dense flowering bramble (*Rubus fruticosus* agg.) and umbellifers (Compartments 1 and 6), standing and fallen dead wood for saproxylic invertebrates (Compartments 2 and 5), and the river edge incorporating marginal woodland, exposed shingle, and marginal vegetation (Compartments 3 and 4) (as shown on Figure 3).

Plate 1: River Coquet and Coquet Valley Woodland SSSI Survey Area

East of Burgham Park Golf Club (OS GB NZ 17940 97090)

2.2.5 The area to the east of Burgham Park Golf Club was identified as a survey area due to the diversity of habitats identified in the Phase 1 surveys conducted in 2016. This area consisted of a stream running through a mosaic of poor semi-improved grassland, marshy grassland, broad-leaved plantation woodland, tall ruderal, and standing water (pond). The area was bordered to the west by coniferous plantation woodland on the adjoining golf club (Plate 2).

2.2.6 This survey prioritised areas which were of high value for invertebrates, including the marshy grassland and bare earth banks surrounding the pond (Compartment 1), grassland and tall ruderal areas with nectar resource (Compartments 2, 4 and 6), stream margins including a large stand of butterbur (*Petasites hybridus.*), hedgerows, and trees (Compartment 5). (Figure 4).

Plate 2: East of Burgham Park Golf Club Survey Area

Causey Park Farm (OS GB NZ 18630 94443)

2.2.7 This area within Causey Park Farm was identified as a survey area due to the areas of marshy grassland, and abundance of nectar resource provided by the dense scrub (Plate 3). The grassland areas in (and adjacent to) the survey area were pastures grazed by cattle.

2.2.8 This survey prioritised the nectar-rich dense scrub area adjacent to the layby area off the A1 (Compartment 1), and gorse (*Ulex europaeus*) areas within marshy grassland bordering the stream (Compartment 2) (Figure 5).

Plate 3: Causey Park Farm Survey Area

2.3 Survey Techniques

2.3.1 Survey was carried out in accordance with the protocols described within Natural England terrestrial invertebrate report NERR005 (Drake, et al. 2007). Four main survey techniques were used across the survey areas consisting of sweep-netting, spot-sweeping, beating, and ground-searching. In addition, pitfall-trapping was used within the woodland areas of the River Coquet and Coquet Valley Woodlands SSSI. This combination of techniques allowed a large number of samples to be collected from a wide taxonomic range within the limited time available during single-day visits spread throughout the season.

2.3.2 For all survey techniques any features likely to harbour insects of conservation value were searched. Any specimens found were identified in the field or retained for closer examination by transferral to soda glass tubes filled with 70% Industrial Methylated Spirits solution together with a data label.

Sweep-netting

2.3.3 Compartments were sampled with a 40 cm diameter white-bag sweep-net, the net being swept from side to side as the recorder paced steadily through the grass, herbage or scrub foliage, or understorey vegetation for a period of 20 minutes. Specimens were extracted from the net with a pooter or, in the case of larger specimens, individually potted in 20 ml soda glass tubes

Spot-sweeping

2.3.4 Suitable features were searched and conspicuous specimens netted using a 60 cm x 46 cm kite net for a period of 30 minutes per compartment. During sampling, a range of suitable collecting points were visited throughout each compartment such as flower patches and areas of bare ground. Specimens were extracted from the net with a pooter or, in the case of larger specimens, individually potted in 20 ml soda glass tubes.

Beating

2.3.5 Foliage and branches of trees and bushes were sampled by beating the contents into a 50 cm diameter beating tray for a duration of 30 minutes per compartment. The tray was searched every five minutes during the sampling period and specimens extracted with a pooter.

Ground-searching

2.3.6 Suitable ground was searched and specimens collected using a pooter or, in the case of larger specimens, individually potted in 20 ml soda glass tubes for a duration of 30 minutes per compartment.

Pitfall Trapping

2.3.7 Ten steep-sided plastic pots were sunk in to the soil at regularly spaced (approximately 2 m spacing) sample points within each of Compartments 2 and 5 of the River Coquet and Coquet Valley Woodlands SSSI (Figure 3). Preservative (propylene glycol) was poured in to the bottom of each trap to preserve ground-dwelling insects that fell in to the traps. Each trap was covered with chicken mesh to prevent small mammals falling in. The traps were left in place from June to September and checked at 4 week intervals. During each check specimens were potted in to 20 ml soda glass tubes and each trap emptied and replenished with fresh preservative.

Aquatic Sampling

2.3.8 A sample of river shingle was taken from the River Coquet and Coquet Valley Woodlands SSSI survey area (Compartment 4) by a separate survey team for the purpose of an Aquatic Invertebrate assessment. The aquatic sampling survey method was adapted from Sadler and Bell (2002) and involved hand searching and small excavations down to the water level with subsequent collection of all beetles encountered. The aquatic sampling was undertaken on 3 August 2017 (Jacobs 2018). The beetle specimens collected contributed to the inventory and analysis presented in this report.

2.4 Sample Timing

2.4.1 The River Coquet and Coquet Valley Woodlands SSSI was visited on six occasions throughout the season in accordance with Natural England guidelines for SSSI monitoring (Drake, et al. 2007) (Table 1). These visits took place from May to September in order to record the species associated with different flowering periods and temporal conditions. These dates also encompassed late spring, high summer and autumnal species in line with recommended methodology for investigating wood decay assemblages.

2.4.2 The first visit took place on 9 May which was early enough for all but the very earliest spring species to be encountered and together with the second visit of the 13 June coincided with peak times for aquatic macroinvertebrate (mayfly and stonefly) survey. Late survey dates up to 19 September also allowed autumnal species to be targeted as well as fungal dependent species.

2.4.3 East of Burgham Park Golf Club and Causey Park Farm survey areas were visited on three occasions throughout the season (Tables 2 and 3 overleaf). These visits took place from June to September which are peak times for terrestrial invertebrate recording of grassland assemblages, especially with regards to bees and wasps.

Table 1: Dates and Weather for River Coquet SSSI Surveys

Date	Temperature at Midday (°C)	Weather
09/05/2017	8	Sunny and dry with light breeze.
13/06/2017	18	Mainly sunny with a little cloud in the afternoon. Dry.
18/07/2017	16	Warm and sunny. Dry.
01/08/2017	18	Cloudy but warm in the morning. Cloud clearing in the afternoon. Dry
16/08/2017	18	Cloudy but warm. Dry.
19/09/2017	14	Light breeze. Sunny and dry.

Table 2: Dates and Weather for A Site East of Burgham Park Golf Course Surveys

Date	Temperature at Midday (°C)	Weather
14/06/2017	16	Sunny and mainly dry. Very short spell of light rain approx. 2pm.
19/07/2017	15	Cloudy but warm. Dry.
20/09/2017	16	Sunny and dry. Some cloud in the afternoon. Light breeze.

Table 3: Dates and Weather for Causey Park Farm Surveys

Date	Temperature at Midday (°C)	Weather
15/06/2017	17	Sunny and dry. Light breeze.
20/07/2017	14	Some cloud with light breeze. Dry.
21/09/2017	14	Sunny and dry. Moderate cloud with light breeze.

2.5 Identification

2.5.1 Where practical, invertebrates were identified in the field, but wherever there was doubt, one or more specimens were collected for more detailed scrutiny. To achieve rigorously accurate identifications, specimens were identified using reference material and where these proved insufficient, specimens were submitted to relevant experts.

2.6 Taxonomic Coverage

2.6.1 It was desirable that as wide a taxonomic range as possible was identified, to sample numerous ecological types, i.e. invertebrates with widely differing natural histories. As there was only a limited amount of time available for identification, it was important to name the more readily identified groups which did not require very time consuming techniques or were out with the experience of the surveyor.

2.6.2 The main surveyor, and author of this report, is experienced in the identification of the majority of the taxonomic groups defined as target taxa for the surveyed habitats (as defined within the Natural England report NERR005). In addition, where a target taxa was out with the experience of the surveyor additional expertise was employed from another experienced entomologist who is also a Fellow of the Royal Entomological Society. Both hold doctorates in their respective entomological fields.

2.6.3 Table 4 details the orders and families of invertebrates which were sampled and named to species.

Table 4: Orders and families of invertebrates identified within the survey areas

Order / Family	Vernacular
Araneae	Spiders.
Coleoptera	Beetles (all except small Aleocharine rove beetles and other very small obscure families).
Diplopoda	Millipedes.
Diptera	True flies (including Bibionidae, Bombyliidae, Calliphoridae, Empididae, Lauxaniidae, Muscidae, Rhagionidae, Sarcophagidae, Scathophagidae, Stratiomyidae, Syrphidae, Tachinidae*, Tipulidae, and Trichoceridae).
Ephemeroptera	Mayflies.
Hemiptera, Auchenorrhyncha	Froghoppers, leafhoppers and planthoppers (including Aphrophoridae, Cicadellidae, Delphacidae).
Hemiptera, Heteroptera	True bugs (including Anthocoridae, Lygaeidae, Pentatomidae and Miridae).
Hymenoptera, Aculeata	Wasps and bees.

Order / Family	Vernacular
Hymenoptera, Ichneumonidae*	Parasitoid wasps.
Hymenoptera, Symphyta*	Sawflies.
Isopoda	Woodlice.
Lepidoptera	Butterflies and moths.
Mollusca	Slugs and snails.
Neuroptera	Lacewings.
Odonata	Dragonflies and damselflies.
Orthoptera & Dermaptera	Grasshoppers, crickets and earwigs.
Plecoptera	Stoneflies.

*Order or family not included within the Pantheon invertebrate sample analysis database and therefore not used in subsequent habitat assessment (see Section 2.7 for more details on Pantheon analysis).

2.7 Analysis

2.7.1 A system of British conservation statuses has long been in use since the Red Data Book for insects (Shirt 1987), subsequently updated by a series of Nature Conservation reviews (Nature Conservancy Council). These have since been updated in line with the latest IUCN assessment categories (IUCN 2001; IUCN 2012) as part of Natural England's Species Status Review Project The status categories and criteria relevant to this report are defined in Appendix B - IUCN Red List (IUCN 2012) and GB Rarity Status Categories.

Pantheon

2.7.2 Pantheon is a database tool developed by Natural England and the Centre for Ecology and Hydrology to analyse invertebrate sample data. Its original purpose was "to use strict survey protocols to sample for notified invertebrate assemblages (e.g. a dead-wood assemblage recognised in a SSSI citation)" (Webb, et al.).

2.7.3 One of Pantheon's principle aims is to help assess site quality. The tool analyses species lists by attaching associated habitat and assemblage type data and then gives the data numerical scores. The scoring systems utilise species richness, threat status, rarity and characteristic species for each broad biotope, habitat and resource.

2.7.4 Habitat quality can be compared across sub-compartments and survey areas using the "Species Quality Index". This is calculated from the combined "Species Quality Scores" for each species list associated with a particular "Broad Biotope" or "Habitat type". The "Species Quality Score" is a score given to a species based on its conservation status. Scores range from 0 for non-native species to 32 for species which are critically endangered or possibly extinct.

2.7.5 In order to use Pantheon, species data must be collected using a strict survey protocol i.e. systematic, consistent, timed survey methodologies across survey areas and sampling compartments.

2.7.6 Pantheon was used in the analyses presented here to compare habitat quality between survey areas and sampling compartments based on the quality of the invertebrate assemblages present.

2.7.7 The Pantheon system still needs further development in several areas e.g. one limitation of Pantheon is that it is yet to set index thresholds for use in site assessment (e.g. for the purposes of SSSI quality assessment). However, it remains a useful tool for comparison assessments across sites where Species Quality Indices are known. As such Pantheon should be used in conjunction with direct habitat quality assessment and evaluation of species diversity and rarity in order to gain an idea of a site's conservation value.

2.8 Survey Limitations

2.8.1 The following limitations were encountered while surveying, which resulted in certain survey areas being excluded from this report:

Access restrictions

2.8.2 Access to one of the survey areas, East of Cuckoo Plantation, was restricted so that we were unable to access this area to carry out surveys.

Weather constraints

2.8.3 Surveys were completed in generally sunny conditions for all survey areas (Tables 1, 2 and 3) with weather generally considered to be optimal for all site visits. The first visit to the River Coquet and Coquet Valley Woodlands SSSI was conducted on a relatively cold day with a temperature of 8°C at midday. However, afternoon temperatures reached a high of 10°C and sun-exposed areas, such as the floristic, river marginal and bare ground features, warmed up quickly to provide sufficient heat for a suitable level of invertebrates to be active during the day.

2.8.4 The results within this report reflect the condition of survey areas at the time of survey. Many invertebrates can disperse large distances overland to colonise new aquatic and terrestrial habitats. Therefore, colonisation of new areas is possible within a relatively short timescale. Consequently, if the construction of the proposed development is delayed for an extended period of time, the survey results would be less reliable and the surveys may need to be repeated in order to provide an up to date assessment.

2.8.5 The findings of this report represent the professional opinion of qualified ecologists and do not constitute professional legal advice. The client may wish to seek professional legal interpretation of the relevant wildlife legislation cited in this document.

3 BASELINE

3.1 Desk Study and Incidental Records

3.1.1 The desk study records revealed 22 designated terrestrial invertebrate species records consisting of one species of beetle (Coleoptera), one butterfly (Lepidoptera) and 20 moth (Lepidoptera) record(s)[4]. All of these species are Species of Principal Importance in England under Section 41 of the NERC Act (2006) (Table 5 and Figure 1) and therefore due regard should be paid to their conservation and the enhancement of their habitat. However, none of the species listed are afforded legal protection.

3.1.2 Four incidental invertebrate sightings were submitted from other species surveys carried out within the survey area in 2016 and 2017. One of these records is a Species of Principal Importance in England under Section 41 of the NERC Act (2006) (Table 6). This species, the ghost moth (*Hepialus humuli*), was found within the East of Burgham Park Golf Course survey area and has accordingly been incorporated in to the results and analysis presented here.

[4] It should be noted that an absence of records within the desk study does not identify an absence of a particular species, as the records provided are dependent on the level of data recording within the study area.

Table 5: Protected and notable invertebrate records within the study area

Taxonomic Group	Taxon Name	Common Name	Conservation Status	Habitat Requirements
Coleoptera (ground beetle)	*Amara famelica*	early sunshiner	Species of Principal Importance (S41 NERC 2006); IUCN Criteria: Endangered (Telfer 2016)	Sandy Heath
Lepidoptera (butterfly)	*Lasiommata megera*	wall	Species of Principal Importance (S41 NERC 2006) IUCN Criteria: Near Threatened (Fox, Warren and Brereton 2010)	Field margins, farm tracks, gardens, and dunes and coastal habitats
Lepidoptera (moth)	*Acronicta psi*	grey dagger	Species of Principal Importance (S41 NERC 2006)	Widespread
Lepidoptera (moth)	*Agrochola litura*	brown-spot pinion	Species of Principal Importance (S41 NERC 2006)	Woodlands, heathlands and scrub. Larval food: oak (*Quercus* spp.) and hawthorn (*Crataegus* spp.)
Lepidoptera (moth)	*Amphipoea oculea*	ear moth	Species of Principal Importance (S41 NERC 2006)	Wet, boggy grassland
Lepidoptera (moth)	*Amphipyra tragopoginis*	mouse moth	Species of Principal Importance (S41 NERC 2006)	Widespread
Lepidoptera (moth)	*Apamea remissa*	dusky brocade	Species of Principal Importance (S41 NERC 2006)	Widespread
Lepidoptera (moth)	*Arctia caja*	garden tiger	Species of Principal Importance (S41 NERC 2006)	Widespread

Taxonomic Group	Taxon Name	Common Name	Conservation Status	Habitat Requirements
Lepidoptera (moth)	*Atethmia centrago*	centre-barred sallow	Species of Principal Importance (S41 NERC 2006)	Woodland and hedgerows. Larval food: ash (*Fraxinus* spp.)
Lepidoptera (moth)	*Blepharita adusta*	dark brocade	Species of Principal Importance (S41 NERC 2006)	Moorland and heathland
Lepidoptera (moth)	*Diloba caeruleocephala*	figure of eight	Species of Principal Importance (S41 NERC 2006)	Widespread
Lepidoptera (moth)	*Ecliptopera silaceata*	small phoenix	Species of Principal Importance (S41 NERC 2006)	Woodland and open grassland. Larval food: willowherbs (*Epilobium* spp.)
Lepidoptera (moth)	*Hepialus humuli*	ghost moth	Species of Principal Importance (S41 NERC 2006)	Rough grassland and meadows
Lepidoptera (moth)	*Hydraecia micacea*	rosy rustic	Species of Principal Importance (S41 NERC 2006)	Widespread. Larval food: dock (*Rumex* spp.)
Lepidoptera (moth)	*Melanchra pisi*	broom moth	Species of Principal Importance (S41 NERC 2006)	Woodland and heathland
Lepidoptera (moth)	*Orthosia gracilis*	powdered quaker	Species of Principal Importance (S41 NERC 2006)	Widespread
Lepidoptera (moth)	*Rhizedra lutosa*	large wainscot	Species of Principal Importance (S41 NERC 2006)	Reed-beds, and marshy grassland. Larval food: common reed (*Phragmites australis*)

Taxonomic Group	Taxon Name	Common Name	Conservation Status	Habitat Requirements
Lepidoptera (moth)	*Scotopteryx chenopodiata*	shaded broad-bar	Species of Principal Importance (S41 NERC 2006)	Widespread. Larval food: vetch (*Vicia* spp.) and clover (*Trifolium* spp.)
Lepidoptera (moth)	*Spilosoma lubricipeda*	white ermine	Species of Principal Importance (S41 NERC 2006)	Widespread
Lepidoptera (moth)	*Spilosoma luteum*	buff ermine	Species of Principal Importance (S41 NERC 2006)	Widespread
Lepidoptera (moth)	*Tholera decimalis*	feathered gothic	Species of Principal Importance (S41 NERC 2006)	Rough grassland
Lepidoptera (moth)	*Xanthia icteritia*	sallow	Species of Principal Importance (S41 NERC 2006)	Wet woodland, marsh and heathland

Table 6: Incidental records from other species surveys in 2017

Taxonomic Group	Taxon Name	Common Name	Conservation Status	Habitat Requirements
Lepidoptera (moth)	*Hepialus humuli*	ghost moth	Species of Principal Importance (S41 NERC 2006)	Rough grassland and meadows
Lepidoptera (moth)	*Odezia atrata*	chimney sweep	None	Meadows (larval food plant: pignut)
Lepidoptera (moth)	*Xanthorhoe montanata*	silver-ground carpet	None	Woodland clearings and edges
Lepidoptera (butterfly)	*Parage aegeria*	speckled wood	None	Woodland, scrub, garden, and hedgerows

4 RESULTS

4.1.1 A list of all species recorded is given in Appendix C – Species Lists.

4.1.2 A broad range of invertebrate groups was covered the species list included representatives of the following groups: slugs and snails, woodlice, millipedes, spiders, lacewings, mayflies, dragonflies and damselflies, grasshoppers and crickets, earwigs, true bugs, froghoppers, planthoppers and leafhoppers, true bugs, butterflies and moths, beetles, true flies, sawflies, wasps and bees, parasitoid wasps and stoneflies. See Table 4 for details of the orders and families of invertebrates which were sampled and named to species level.

4.1.3 Details of habitat type and quality for each of the sites can also be found in the Extended Phase 1 Habitat Survey Report (Jacobs 2018).

4.2 River Coquet and Coquet Valley Woodlands SSSI

4.2.1 The main techniques of ground searching and pitfall trapping were the most productive methods employed with 59 (39%) species found composed primarily of ground-dwelling beetles. Spot-sweeping was the second most effective survey method with 49 (33%) species found comprising many river fly species swept from the river margin, and pollinator species swept from floristic areas. Sweep-netting captured a further 42 species (28%) composed primarily of true flies.

4.2.2 Of the 150 species identified by this survey, three were considered here as species of conservation importance, namely mayflies *Ameletus inopinatus* and *Ephemerella notata*, and the cinnabar moth (*Tyria jacobaea*). See Section 6: and Appendix C – Species Lists.

Pantheon Results

4.2.3 Pantheon covered 142 of the 150 species identified from this survey area, with eight species not included within the Pantheon conservation status database. Within that subset, three broad biotopes were represented. These broad biotopes could be subdivided in to habitat types (Table 7). Only habitat types which contained a sufficient number of species for accurate assessment are included hence the disparity in total species numbers between habitats and biotopes.

Table 7: Broad biotopes and habitats within River Coquet and Coquet Valley Woodlands SSSI

Broad biotope *(no. of species)	Broad biotope SQI	Habitats with a species quality score *(no. of species)	Habitat SQI
Open habitats (58)	100	Tall Sward & Scrub (52)	100
Wetland (40)	115	Running Water (23)	126
Tree-associated (35)	97	Shaded Woodland Floor (19)	94
		Arboreal (15)	100

SQI = Species Quality Index

4.2.4 The assemblage of "Tall Sward & Scrub" species was best represented at River Coquet and Coquet Valley Woodlands SSSI, with 52 associated species. This was followed by "Running Water" assemblages (23 species), and "Tree-associated" assemblages which could be further divided in to "Shaded Woodland Floor" and "Arboreal" habitat types (Table 7).

4.2.5 The full list of habitats identified from the survey area species list (in order of representative number of species) is as follows: tall sward and scrub, running water, shaded woodland floor, arboreal, marshland, peatland, short sward and bare ground, wet woodland, upland, lake and decaying wood.

4.2.6 The number of species representative of each assemblage or habitat is not necessarily an indicator of higher conservation importance. This is instead indicated by the Species Quality Index.

4.2.7 Three species were non-xylophages associated with "coarse woody debris" i.e. fallen dead trees and large branches lodged in water course and saturated with water. These were the banded demoiselle (*Calopteryx splendens*), yellow may dun mayfly (*Heptagenia sulphurea*), and blue-winged olive mayfly (*Serratella ignita*).

4.2.8 Three beetle species, *Bembidion decorum*, *Bembidion femoratum*, and *Bembidion tibiale*, were "Exposed Riverine Sediment" (ERS) associated. Specifically two of these species, *Bembidion decorum* and *Bembidion tibiale*, were ERS dependent.

4.2.9 The "Wetland" broad biotope for this survey area had the highest Species Quality Index, followed by the "Tree-associated" and "Open habitats" broad biotopes.

4.2.10 The "Running Water" habitat for this survey area had the highest Species Quality Index, followed by the "Tall Sward and Scrub" habitat, "Shaded Woodland Floor" habitat, and finally the "Arboreal" habitat.

4.2.11 Species of conservation importance within the "Running Water" habitat included the Nationally Scarce mayflies *Ameletus inopinatus* and *Ephemerella notata* which are listed within the River Coquet and Coquet Valley Woodlands SSSI citation (Appendix D).

4.2.12 A species of conservation importance within the "Tall Sward and Scrub" habitat was the Species of Principal Importance cinnabar moth.

4.2.13 Further details on species of conservation importance are presented in Section 6.

Assessment of Compartments

4.2.14 A map showing the location of all compartments is shown in Figure 3.

4.2.15 Compartment 1: This southern-most area comprised the top slope of the River Coquet and Coquet Valley Woodland SSSI and its associated footpath. In addition to the woodland edge, vegetation marginal to the footpath consisted of dense scrub with abundant nettles (*Urtica dioica*) and bramble (*Rubus fruticosus* agg.) (Photo 1). A more floristically diverse area was also present to the east of this area where a cinnabar moth was collected by spot-sweeping. Forty-one species were recorded within this compartment largely obtained by ground searching and sweep-netting. True flies were the most diverse species collected here followed by beetles and true bugs. This compartment contributed to the "Tall Sward and Scrub", "Shaded Woodland Floor" and "Arboreal" components of the Pantheon habitat assessment.

Photo 1: Compartment 1 (River Coquet and Coquet Woodlands SSSI)

4.2.16 Compartments 2 and 5: These compartments consisted of broadleaved woodland slopes primarily composed of field maple (*Acer campestre*), ash (*Fraxinus excelsior*), sessile oak (*Quercus petraea*) and alder (*Alnus glutinosa*) as well as abundant standing and fallen dead wood (Photo 2).

4.2.17 Ground searching, pitfall trapping and sweep netting were the most effective survey techniques employed in these areas. Compartments 2 and 5 were the main areas for pitfall trapping and accordingly compartment 2 generated 29 beetle species alone. The ground-beetle, *Pterostichus cristatus* was collected by ground searching in compartment 2. This species is very locally distributed, with most records occurring in Durham, Northumberland and Cumbria. The conservation status of *P. cristatus* was recently down-graded as it is regarded as non-native (Telfer 2016) however it remains a species worthy of note. The largest proportion of species were predatory in both adult and larval stages (33% and 41% respectively). However, a relatively large proportion (20%) were saprophagous in their larval stages i.e. consumers of dead or decaying organic matter, reflecting the importance of the dead wood / decaying matter present.

4.2.18 Perhaps unsurprisingly, as only the southern half of the survey area was designated as a SSSI (compartments 1, 2 and 3) and the northern half was subject to more public disturbance, compartment 2 was more diverse with 65 species collected in total whereas only 18 species were collected in compartment 5. These compartments contributed to the “Tall Sward and Scrub”, “Shaded Woodland Floor” and “Arboreal” components of the Pantheon habitat assessment.

Photo 2: Compartment 2 (River Coquet and Coquet Woodlands SSSI)

4.2.19 Compartments 3 and 4: These areas consisted of southern (compartment 3) and northern (compartment 4) river banks with a marginal woodland border of field maple, sessile oak and alder as well as scattered areas of goat willow and marginal vegetation such as purple loosestrife (*Lythrum salicaria*) and small balsam (*Impatiens parviflora*) (Photo 3). Areas of dead wood were present within the woodland margin and watercourse. Mayflies, stoneflies and beetles were the most diverse species collected in these areas with 11 species of mayfly collected in compartment 3 alone. Ground searching was conducted primarily in sandy, bare ground areas and generated ten and nine species of beetle in compartments 3 and 4 respectively.

4.2.20 Species of conservation importance, *A. inopinatus* and *E. notata* mayflies were collected in compartment 3 by beating overhanging branches and spot-searching along the river margin. Overall, 46 species were collected in compartment 3, and 19 in compartment 4. These compartments contributed to the "Tall Sward and Scrub", "Shaded Woodland Floor", "Arboreal" and "Running Water" components of the Pantheon habitat assessment. The "Running Water" habitat present held the highest Species Diversity Index for the survey area.

Photo 3: Compartment 3 (near side SSSI) and 4 (far side, non-SSSI) (River Coquet and Coquet Woodlands)

4.2.21 Compartment 6: This area was primarily composed of floristically rich bramble and abundant umbellifers (cow parsley (*Anthriscus sylvestris*) and common hogweed (*Heracleum*

sphondylium)) as well as bare ground areas (Photo 4). Forty-five species were collected within this area primarily by sweep netting and spot searching. Spot searching contributed to the sampling of groups such as butterflies, dragonflies and damselflies, and bees and wasps. Indeed, the majority of dragonfly and damselfly species were found in this area. Sweep netting concentrated on dense scrub areas and mainly collected spiders and true flies. The floristically rich nature of this compartment was reflected in the abundance of hoverflies and bees however no species of conservation importance were collected in this area.

Photo 4: Compartment 6 (River Coquet and River Coquet Woodlands non-SSSI compartment)

4.3 Site to the East of Burgham Park Golf Course

4.3.1 The main technique of sweep-netting was the most productive method employed within this survey area with 53 (45%) species collected composed primarily of true flies and beetles within the grassland areas. Spot-sweeping was the second most effective survey method with 50 (43%) species found comprising bees and wasps, and butterflies and moths found throughout the survey area. Ground-searching and beating captured relatively few species.

4.3.2 Of the 111 species identified by this survey, three are considered here as species of conservation importance. These are the small heath butterfly (*Coenonympha pamphilus*), ghost moth (*Hepialus humuli*), and the cinnabar moth. See Section 6 and Appendix C – Species Lists.

Pantheon Results

4.3.3 Pantheon covered 101 of the 111 species identified from this survey area, with 10 species not included within the Pantheon conservation status database. Within that subset, three broad biotopes were represented. Where possible, these broad biotopes were then subdivided in to habitat types (Table 8). Only habitat types which contained a sufficient number of species for accurate assessment are included hence the disparity in total species numbers between habitats and biotopes.

Table 8: Broad biotopes and habitats within A Site East of Burgham Park Golf Course

Broad biotope *(no. of species)	Broad biotope SQI		Habitats with a species quality score *(no. of species)	Habitat SQI
Open habitats (62)	100		Tall Sward & Scrub (53)	100
Tree-associated (21)	95		N/A*	N/A*
Wetland (13)	N/A*		N/A*	N/A*

* Species Quality Index would not be reliable as sample number is less than 15.

4.3.4 The assemblage of “Tall Sward & Scrub” species was best represented at East of Burgham Park Golf Course, with 53 associated species. This was followed by “Tree-associated” and “Wetland” assemblages (Table 8).

4.3.5 The full list of habitats identified from the survey area species list (in order of representative number of species) is as follows: tall sward and scrub, shaded woodland floor, arboreal, marshland, short sward and bare ground, peatland, running water, decaying wood, wet woodland and upland.

4.3.6 Please note: the number of species representative of each assemblage or habitat is not necessarily an indicator of higher conservation importance. This is instead indicated by the Species Quality Index.

4.3.7 One species, the yellow may dun mayfly, was a non-xylophage associated with “coarse woody debris”.

4.3.8 The “Open habitats” broad biotope for this survey area had the highest Species Quality Index.

4.3.9 It was not possible to calculate a Species Quality Index for the "Wetland" broad biotope owing to the small sample number within this assemblage. However, as it did not contain any species with a conservation status it is possible to infer that this broad biotope had a lower Species Quality Index than the "Open habitats" broad biotope.

4.3.10 A comparison of habitat scores was not possible as the broad biotopes could not be broken down in to enough habitats with a sufficient sample number for an accurate assessment.

4.3.11 Three Species of Principal Importance were present within the "Open habitats" broad biotope. Two of these species, the ghost moth and cinnabar moth were associated with a "Tall Sward and Scrub" habitat. The small heath butterfly was associated with a "Short Sward and Bare Ground" habitat.

4.3.12 Further details on species of conservation importance are presented in Section 6.

Assessment of Compartments

4.3.13 A map showing the location of all compartments is shown in Figure 4.

4.3.14 Compartment 1: This area was primarily composed of marshy grassland and tall ruderal surrounding a large pond (Photo 5). Emergent vegetation around the pond consisted of sweet-grass (*Glyceria* spp.) and common bulrush (*Typha latifolia*) surrounded by areas of abundant meadow thistle (*Cirsium dissectum*), cock's-foot (*Dactylis glomerata*) and meadow foxtail (*Alopecurus pratensis*).

4.3.15 Twenty-five species were recorded within this compartment largely obtained by spot-sweeping and sweep-netting. Groups recorded included beetles, true flies, true bugs, bees and wasps, and butterflies. A large proportion of the species were pollinators such as the buff-tailed bumblebee (*Bombus terrestris*) and chocolate mining bee (*Andrena scotica*). Mining bees in particular were able to utilise the bare, earth banks surrounding the pond. A night-time great crested newt survey carried out in this area also revealed an abundance of the ghost moth, a species of conservation importance (S41 NERC 2006). The larvae of this moth feed on grass roots, common nettle and docks (*Rumex* spp.) amongst other herbaceous plants.

4.3.16 Around the pond margin, dragonflies and damselflies formed the largest group, collected by spot-sweeping in this area. This sample consisted of azure (*Coenagrion puella*), common blue (*Enallagma cyathigerum*) and blue-tailed (*Ischnura elegans*) damselflies and a four-spotted chaser dragonfly (*Libellula quadrimaculata*).

4.3.17 This compartment contributed to the "Tall Sward and Scrub" and "Wetland" components of the Pantheon habitat assessment.

Photo 5: Compartments 1 and 2 (East of Burgham Park Golf Course)

4.3.18 Compartment 2: This area was a continuation of the marshy grassland from compartment 1 (Photo 5). Similarly, the majority of species were sampled by spot-sweeping and spot-netting

with true flies as the most diverse group. Hoverflies (Syrphidae), butterflies and moths, and bees and wasps were abundant within the sample and contributed to the high proportion of nectivores within the survey area (52%). This compartment contributed to the "Tall Sward and Scrub" component of the Pantheon habitat assessment.

4.3.19 Compartment 3: This sampling area encompassed a slow moving river approximately 3 m wide and 1 m deep. The banks were well-vegetated with butterbur (*Petasites* hybridus), common nettle, white dead-nettle (*Lamium album*), great willowherb (*Epilobium hirsutum*) and yellow flag iris (*Iris pseudacorus*) (Photo 6). This compartment contributed to the "Tall Sward and Scrub" and "Wetland" components of the Pantheon habitat assessment.

Photo 6: Compartments 3 and 7 (East of Burgham Park Golf Course)

4.3.20 Compartment 4: This area consisted of damp semi-improved grassland dominated by cock's-foot, meadow foxtail and side flowering rushes and curled dock (*Rumex crispus*). Bordering the area to the west were trees and shrubs such as alder, field maple and hawthorn (*Crataegus monogyna*) along a stream edge (Photo 7). The area was bordered to the east by a species-poor intact hedgerow predominantly composed of hawthorn (compartment 5).

4.3.21 This compartment ranked second in diversity for the survey area with 49 species sampled. A reasonable number of species for an area relatively isolated in terms of suitable habitat connectivity. Sweep-netting was the most effective technique employed generating 31 species of mainly true flies and beetles. The beetle, *Pterostichus cristatus* was again found here, as well as in the River Coquet and Coquet Valley Woodlands SSSI (see Section 4.2.17) by ground searching along the wooded, western edge of this area. This compartment contributed to the "Tall Sward and Scrub", "Tree-associated" and "Wetland" components of the Pantheon habitat assessment.

Photo 7: Compartment 4 (East of Burgham Park Golf Course)

4.3.22 Compartment 5: This area encompassed the intact species-poor hedgerow to the east of the survey area which borders the A1 carriageway (Photo 8). The hedgerow was predominantly composed of hawthorn and proved to be relatively species-poor in comparison to the rest of the survey area. Beating and sweep-netting were the most effective sampling methods employed here but only returned a small sample of spiders, beetles and true bugs. This compartment contributed to the "Tall Sward and Scrub" and "Tree-associated" components of the Pantheon habitat assessment.

Photo 8: Compartment 5 (East of Burgham Park Golf Course)

4.3.23 Compartment 6: This compartment was a continuation of the damp grassland habitat of compartment 4 with large areas of umbellifer (cow parsley, common hogweed and pignut (*Conopodium majus*)) and gorse dispersed throughout (Photo 9). It was the most species diverse with 74 species sampled predominantly by spot-sweeping and sweep-netting. Pollinator abundance and diversity was highest within this compartment with true flies (25 species), bees, wasps and sawflies (23 species) and butterflies and moths (13 species) well represented.

4.3.24 Two species of conservation importance were present within this area namely the cinnabar moth and small heath butterfly. Six species found here were also associated with a "Short

Sward and Bare Ground" habitat. These were the mining bees *Andrena scotica*, *Andrena nigroaenea* (and associated cleptoparasitic cuckoo bees *Nomada goodeniana and Nomada marshamella*) and *Andrena chrysoceles*. The small heath butterfly is also associated with this habitat type. This compartment contributed to the "Tall Sward and Scrub", "Tree-associated" and "Wetland" components of the Pantheon habitat assessment.

Photo 9: Compartment 6 (East of Burgham Park Golf Course)

4.3.25 Compartment 7: This compartment was a continuation of the grassland habitat of compartment 6 but also covered river marginal habitat including a large stand of butterbur (Photo 6). Many of the pollinator species found in compartment 6 were also present here in addition to river fly species such as the blue-winged olive. One species of interest was the hoverfly *Neoascia obliqua*, a butterbur specialist whose larvae develop on the stems or leaf stalks. This compartment contributed to the "Tall Sward and Scrub", "Tree-associated" and "Wetland" components of the Pantheon habitat assessment.

4.4 Causey Park Farm

4.4.1 The main technique of spot-sweeping was the most productive method employed with 27 (48%) species found composed primarily of pollinators such as bees and wasps and butterflies. Sweep-netting was the second most effective survey method with 19 (34%) species sampled comprising many true fly species. Beating and ground-searching captured the remaining species composed of spiders and beetle.

4.4.2 Of the 53 species identified by this survey, none were considered here as species of conservation importance. See Appendix C – Species Lists

Pantheon Results

4.4.3 Pantheon covered 47 of the 53 species identified within this survey area, with six species not included within the Pantheon conservation status database. Within that subset, three broad biotopes were represented. These broad biotopes were then subdivided in to habitat types (Table 9). Only habitat types which contained a sufficient number of species for accurate assessment are included hence the disparity in total species numbers between habitats and biotopes.

Table 9: Broad biotopes and habitats within Causey Park Farm

Broad biotope *(no. of species)	Broad biotope SQI	Habitats with a species quality score *(no. of species)	Habitat Species Quality Index
Open habitats (33)	100	Tall Sward & Scrub (25)	100
Wetland (5)	N/A*	N/A*	N/A*
Tree-associated (5)	N/A*	N/A*	N/A*

* Species Quality Index would not be reliable as sample number is less than 15.

4.4.4 The assemblage of "Tall Sward & Scrub" species was best represented at Causey Park Farm, with 25 associated species. This was followed by "Wetland" and "Tree-associated" assemblages (Table 9).

4.4.5 The full list of habitats identified from the survey area species list (in order of representative number of species) is as follows: tall sward and scrub, shaded woodland floor, marshland, short sward and bare ground, and peatland.

4.4.6 Please note: the number of species representative of each assemblage or habitat is not necessarily an indicator of higher conservation importance. This is instead indicated by the Species Quality Index.

4.4.7 A comparison of broad biotope and habitat scores was not possible as the broad biotopes could not be broken down in to enough habitats with a sufficient sample number for an accurate assessment.

4.4.8 Further details on species of conservation importance are presented in Section 6.

Assessment of Compartments

4.4.9 A map showing the location of all compartments is shown in Figure 5.

4.4.10 Compartment 1: This area was adjacent to a layby off the A1 carriageway near Causey Park Farm. It consisted primarily of floristically rich dense scrub (predominantly bramble) laying adjacent to a stream (Photo 10). Twenty-three species were sampled here, the majority of which were pollinators such as nectaring hoverflies, bees and wasps, and butterflies. This relatively large sample of nectivores contributed to the high proportion found within the survey area as a whole (63%). This compartment contributed to the "Tall Sward and Scrub" component of the Pantheon habitat assessment.

Photo 10: Compartment 1 (Causey Park Farm)

4.4.11 Compartment 2: This was an area of cattle-grazed, semi-improved, and marshy grassland bisected by a small, shallow stream averaging 1 to 1.5 m in width. In-stream vegetation was comprised of marsh marigold (*Caltha palustris*), yellow flag and watercress (*Nasturtium officinale*). Semi-improved grassland on the stream banks included species such as wavy hair grass (*Deschampsia flexuosa*), crested dog's-tail (*Cynosurus cristatus*), sweet vernal-grass (*Anthoxanthum odoratum*) and perennial rye grass (*Lolium perenne*) (Photo 11).

4.4.12 Sweep-netting and spot-sweeping generated the majority of species samples for this area with true flies, bees and wasps, and butterflies proving the most diverse groups. Species of interest here included the dung beetles *Aphodius depressus* and *Aphodius obliteratus* which are dung specialists and of particular relevance to a cattle-grazed site. In accordance with this, dung and carrion were highlighted by Pantheon as a resource for this survey area.

4.4.13 Overall species diversity for the survey area was low perhaps due to the area's lower habitat diversity and large areas of surrounding arable and improved grassland reducing the areas' habitat connectivity.

Photo 11: Compartment 2 (Causey Park Farm)

5 SUMMARY

5.1.1 Within the River Coquet and Coquet Valley Woodlands SSSI the wetland broad biotope, in particular the running water habitat, held the highest species quality within that survey area. This is due in part to the presence of two Nationally Scarce species of mayfly. The riverine habitat and associated assemblages indicate that this is a high quality habitat capable of supporting a wealth of terrestrial and freshwater invertebrates.

5.1.2 The tall sward and scrub within the River Coquet and Coquet Valley Woodlands SSSI held the second highest species quality within that survey area. Species abundance and diversity was greater along sun-exposed woodland margins and floristic areas than in the shaded woodland layer.

5.1.3 Within a site East of Burgham Park Golf Course the open habitats, namely the semi-improved and marshy grassland areas, held the highest species quality. The survey area encompassed a range of habitat types with the floristic resource of the grasslands encouraging an abundance of pollinators and nectivores. As one of the only sites in the area containing a mosaic of habitats of this type it is an important resource for terrestrial invertebrates.

5.1.4 Causey Park Farm had the lowest species diversity of the three survey areas studied. Within the survey area, the tall sward and scrub habitat contained the highest diversity but no species holding a conservation status were found.

5.1.5 Although the Species Quality Index of the “Open habitats” biotope is equivalent across all survey areas Pantheon does not take in to account the presence of some species of conservation importance, such as the small heath butterfly, ghost moth and cinnabar moth, due to their non-rarity status within the Pantheon database. Overall differences in species diversity are also not accounted for.

5.1.6 The River Coquet and Coquet Valley Woodlands SSSI riverine habitat contained the highest quality invertebrate species assemblage of the three survey areas examined. Species within this assemblage were present within the SSSI’s citation and are an indicator of the habitat’s good condition. A site East of Burgham Park Golf Course held a relatively diverse number of species, particularly within its grassland areas where three species of conservation importance were present. Causey Park Farm held the lowest species diversity of the three survey areas which may in part be due to areas of overgrazing.

5.1.7 The data presented in this report reflect the status of the survey areas at the time of survey (May to September 2017). Invertebrates can disperse large distances overland to colonise new aquatic and terrestrial habitats, therefore colonisation of new areas is possible within a short timescale. Consequently, if the construction of the scheme is delayed for an extended period of time (e.g. more than two years), the survey results would be less reliable and the surveys may need to be repeated.

5.1.8 Mitigation strategies are dependent upon the specific significance of the construction impact. The Ecology Chapter of the Environmental Statement (ES) will present full details of the potential impacts on the species associated with the proposed scheme and suitable mitigation measures if required.

6 SPECIES OF CONSERVATION IMPORTANCE

6.1 IUCN Red List Category: Endangered (see Appendix B)

Amara famelica Early Sunshiner

(also S41 NERC 2006)

6.1.1 This species is one of a group of four species with extensively dark antennae and is a difficult species to identify. The most recent records which are discussed in Natural England's Review of the Beetles of Great Britain: Ground Beetles (Carabidae) (Telfer 2016) originate from Sutton Park, Warwickshire and Thursley Common, Surrey.

6.1.2 The beetle favours areas of open, flat, disturbed or bare ground within sandy or gravelly lowland heathland. Most records are early season, from March and early April, and therefore may be under-recorded. Records have predominantly consisted of insects on the wing but also have been found under stones, heather, on bare ground, and heathland paths. The species is showing a long-term decline with the inappropriate management of heathland flagged as a main threat.

6.1.3 This species was listed within the desk study records in the 2 km study area (Figure 1). However, it should be noted that this desk study record is listed as "unconfirmed" within the ERIC dataset and the lack of obviously suitable habitat where it was recorded casts some doubt as to the correct identification of this beetle record.

6.2 IUCN Red List Category: Near Threatened (see Appendix B)

Coenonympha pamphilus Small Heath Butterfly

(also S41 NERC 2006 – Research Only[5])

6.2.1 The small heath butterfly is a small, yellow – orange species which can be seen on the wing, flying close to the ground, from April to September. It occurs in a range of habitats such as heathland and coastland but can also be found along road verges and woodland rides.

6.2.2 This species has suffered substantial decreases in occurrence and abundance with a 57% decrease in its distribution since 1976 (Fox, Brereton , et al. 2015).

6.2.3 Collected by spot-sweeping in Compartment 6 of a site East of Burgham Park Golf Course (Figure 4)

Lasiommata megera The Wall Butterfly

(also S41 NERC 2006)

6.2.4 This orange and brown species is named after its habit of basking on walls, rocks, and stony and sandy ground. The wall favours open grassland with stony, broken turf but can also be found in coastal habitats, disused quarries, waste land, farm tracks, field edges, and gardens.

6.2.5 The wall butterfly was once a common farmland butterfly but has suffered a 77% decrease in occurrence and 87% decrease in abundance since 1976. Recent evidence suggests that climate change may be driving the butterfly's decline although other factors such as nitrogen pollution may play a part (Fox, Brereton , et al. 2015).

6.2.6 This species was listed within the desk study records in the 2 km study area (Figure 1) and is likely to be found throughout the study area in appropriate habitats.

[5] "Research only" species have been designated with the aim of stimulating studies into the causes of their decline.

6.3 GB Rarity Status: Nationally Scarce (see Appendix B)

Ameletus inopinatus Upland Summer Mayfly

6.3.1 This species has a limited distribution confined to Northern England and Scotland. Current research predicts that the range of this species will contract by over 50% by 2080 (Taubmann, et al. 2011), by which time the remaining populations will be found in the Scottish Highlands (Macadam 2016).

6.3.2 The nymphs of *A. inopinatus* typically live in upland streams (above 300 metres) and are good swimmers, often swimming in darting bursts. They feed on fine organic matter which they collect from river sediment. There is one generation per year, overwintering as nymphs before finally emerging as imagos between May and early August.

6.3.3 Collected by spot-sweeping in Compartment 3 of the River Coquet and Coquet Valley Woodlands SSSI (Figure 3).

6.3.4 This species is specifically mentioned within the River Coquet and Coquet Valley Woodlands SSSI citation due to its restricted distribution (Natural England 1996).

Ephemerella notata Yellow Hawk Mayfly

6.3.5 This mayfly is a widespread though localised species showing a recent slight increase in its area of occupancy (Macadam 2016).

6.3.6 The nymphs of *E. notata* live on vegetation present within rivers or streams or within the river bed itself. They can often be found clinging to submerged vegetation and stones. They feed on fine organic matter which they collect from river sediment. There is one generation per year, overwintering as eggs or nymphs before finally emerging as imagos between May and June.

6.3.7 Collected by spot-sweeping in Compartment 3 of the River Coquet and Coquet Valley Woodlands SSSI (Figure 3).

6.3.8 This species is specifically mentioned within the River Coquet and Coquet Valley Woodlands SSSI citation due to its restricted distribution (Natural England 1996).

6.4 Species of Principal Importance (S41 NERC 2006; see Appendix A - Legislative and planning context)

6.4.1 Only Species of Principal Importance found within the survey areas are detailed here. Details of those found within the baseline desk study are detailed within Table 5.

6.4.2 Two Species of Principal Importance found within the survey areas also have an IUCN Red Listing or GB Rarity Status and details of these species can be found in Sections 6.1 and 6.2 (see Table 10).

Table 10: Species of Principal Importance holding an additional conservation status

Species of Principal Importance	Additional Conservation Status
Amara famelica	IUCN Red List: Endangered (Section 6.1)
Coenonympha pamphilus	IUCN Red List: Near Threatened (Section 6.2)

6.4.3 Two Species of Principal Importance, the ghost moth and cinnabar moth, do not hold any additional conservation statuses. These species are detailed below:

Hepialus humuli Ghost Moth

(S41 NERC 2006 – Research Only[5])

6.4.4 This moth is named after the males of this species which are completely white and ghost-like when flying in the evening. However, the females have a yellow forewing with orange

markings. The adults do not feed but the caterpillars feed on a variety of grasses and herbaceous plants. The species can be found within grassland and woodland areas.

6.4.5 Butterfly Conservation's State of Britain's Larger Moths report (Fox, et al. 2013) highlights the ghost moth as a species whose continuing decline is of concern. Although its population trend has recently ameliorated from a strong decline to declining category the species was shown to have suffered a 62% decrease over a period of 40 years.

6.4.6 This species was spotted during a night-time great crested newt survey in Compartment 1 of a site East of Burgham Park Golf Course (Figure 4)

Tyria jacobaea Cinnabar Moth

(S41 NERC 2006 – Research Only[5])

6.4.7 This back and red moth can be seen on the wing from May to August and is often found near common ragwort (*Senecio jacobaea*). It is often found in open grassy habitats, sand dunes and heathland but also within gardens, on waste ground, and along woodland rides.

6.4.8 Butterfly Conservation's State of Britain's Larger Moths report (Fox, et al. 2013) highlights the cinnabar moth as a species whose continuing decline is of concern. Although its population trend has recently ameliorated from a strong decline to declining category the species was shown to have suffered a 67% decrease over a period of 40 years.

6.4.9 Collected by spot-sweeping in Compartment 1 of the River Coquet and Coquet Valley Woodlands SSSI (Figure 3) and Compartment 6 of a site East of Burgham Park Golf Course (Figure 4).

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8 FIGURES

FIGURE 1

Legend

2km Scheme Buffer

Lepidoptera (moth)

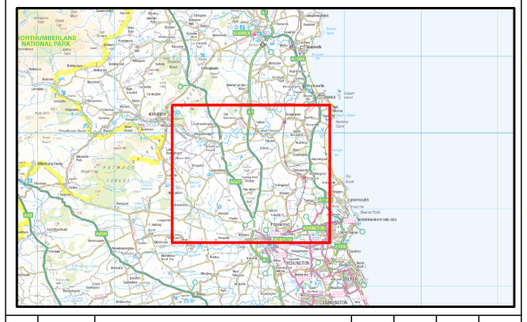
- Shaded Broad-bar
- 17 Species
  - Brown-spot Pinion
  - Buff Ermine
  - Centre-barred Sallow
  - Ear Moth
  - Feathered Gothic
  - Figure of Eight
  - Garden Tiger
  - Ghost Moth
  - Grey Dagger
  - Large Wainscot
  - Mouse Moth
  - Powdered Quaker
  - Rosy Rustic
  - Sallow
  - Shaded Broad-bar
  - Small Phoenix
  - White Ermine
- 6 Species
  - Broom Moth
  - Dark Brocade
  - Dusky Brocade
  - Powdered Quaker
  - Small Phoenix
  - White Ermine

Lepidoptera (butterfly)

- Wall

Coleoptera

- Early Sunshiner



0 2,500 m

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	JAN 18	Initial Issue	LT	IM	AM	PF

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Project: A1 IN NORTHUMBERLAND

Drawing Title: PROTECTED AND NOTABLE TERRESTRIAL INVERTEBRATE SPECIES DESK STUDY RECORDS

Drawing Status:

Scale @ A3	1:65,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		
Drawing No.	B2104701_EC_INV_01	

FIGURE 2

River Coquet and Coquet Valley Woodlands SSSI (Figure 3)

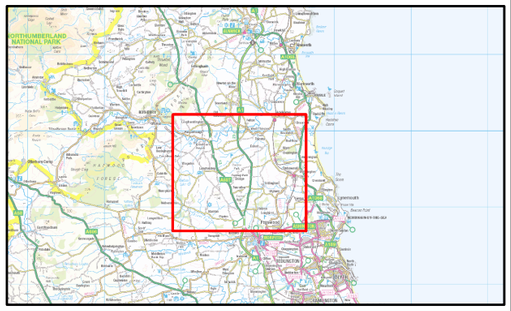
Site to the East of Burgham Park Golf Course (Figure 4)

Causey Park Farm (Figure 5)

East of Cuckoo Plantation (No Access)

Legend

- 500m Scheme Buffer
- Survey Area
- No Access



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Drawing Title: PROTECTED AND NOTABLE TERRESTRIAL INVERTEBRATE SPECIES TERRESTRIAL INVERTEBRATE SURVEY AREAS

Drawing Status

Scale @ A3	1:55,000	DO NOT SCALE
Jacobs No.	B2104700	
Client No.		

Drawing No.: B2104701_EC_INV_02

0 2,000 m

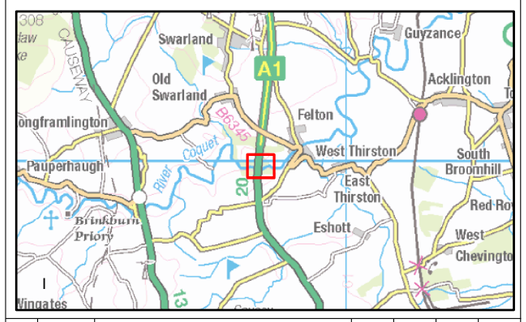
FIGURE 3

Legend

Survey Area Compartment

Phase 1 Habitat Survey

- Broad-leaved Scattered Tree
- Scattered Scrub
- Fence
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Wall
- Amenity Grassland
- A Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Building
- Coniferous Plantation Woodland
- I Improved Grassland
- Marshy Grassland
- Mixed Plantation Woodland
- Mixed Woodland - Recently Felled
- Mixed woodland - semi-natural
- Semi-improved Neutral Grassland
- Standing Water
- Tall Ruderal



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Project

A1 IN NORTHUMBERLAND

Drawing Title

RIVER COQUET AND COQUET VALLEY WOODLANDS SSSI
TERRESTRIAL INVERTEBRATE SURVEY AREA

Drawing Status

Scale @ A3	1:2,500	DO NOT SCALE
Jacobs No.	B2104701	
Client No.		

Drawing No.

B2104701_EC_INV_03

0 100 m

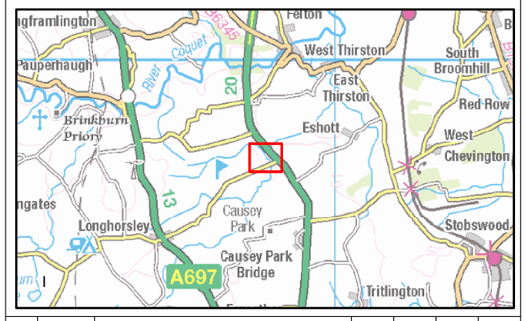
FIGURE 4

Legend

Survey Area Compartment

Phase 1 Habitat Survey

- Broad-leaved Scattered Tree
- Scattered Scrub
- Earth Bank
- Fence
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- Amenity Grassland
- A Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Building
- Coniferous Plantation Woodland
- Dense/Continuous Scrub
- I Improved Grassland
- Marshy Grassland
- Mixed Plantation Woodland
- S Poor Semi-improved Grassland
- Standing Water
- Tall Ruderal



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Client: highways england

Project: A1 IN NORTHUMBERLAND

Drawing Title: SITE TO THE EAST OF BURGHAM PARK GOLF COURSE TERRESTRIAL INVERTEBRATE SURVEY AREA

Drawing Status

Scale @ A3	1:3,000	DO NOT SCALE
Jacobs No.	B2104701	
Client No.		

Drawing No. B2104701_EC_INV_04

0 100 m

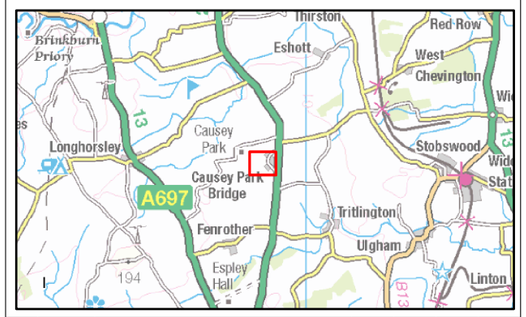
FIGURE 5

Legend

Survey Area Compartment

Phase 1 Habitat Survey

- Broad-leaved Scattered Tree
- Scattered Scrub
- Fence
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- Wall
- Amenity Grassland
- A — Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Building
- Coniferous Plantation Woodland
- Dense/Continuous Scrub
- I — Improved Grassland
- Marshy Grassland
- Mixed Plantation Woodland
- S — Poor Semi-improved Grassland
- Spoil
- Tall Ruderal



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Client: highways england

Project: A1 IN NORTHUMBERLAND

Drawing Title: CAUSEY PARK FARM
TERRESTRIAL INVERTEBRATE SURVEY AREA

Drawing Status:

Scale @ A3	1:2,500	DO NOT SCALE
Jacobs No.	B2104701	
Client No.		

Drawing No.: B2104701_EC_INV_05

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APPENDIX A - LEGISLATIVE AND PLANNING CONTEXT

The Habitats Regulations, and Wildlife and Countryside Act 1981 (as amended) (WCA)

The Habitat Regulations transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into UK law. The Regulations provide for the designation and protection of 'European Sites', the protection of 'European Protected Species' (EPS), and the adaptation of planning and other controls for the protection of European Sites. EPS are listed on Schedule 2 of the Conservation Regulations.

Under the combined measures included in the Habitats Regulations and WCA it is an offence to:

- deliberately capture, injure or kill any wild animal listed as an EPS;
- deliberately disturb wild animals of any such species in such a way as to be likely to impair their ability:
    - to survive, to breed or reproduce, or to rear or nurture their young; or
    - in the case of animals of a hibernating or migratory species, to hibernate or migrate;
- to affect significantly the local distribution or abundance of the species to which they belong;
- deliberately take or destroy the eggs of such an animal; or
- damage or destroy a breeding site or resting place of such an animal.

Natural Environment and Rural Communities Act 2006 (NERC 2006)

Section 40 of the Act concerns biodiversity and states: "*Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*."

Section 41 of the NERC Act sates that: "*The Secretary of State must, as respects England, publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity*". Many terrestrial invertebrate species are categorised as 'Species of Principal Importance' under the NERC Act. The list of species can be downloaded from the natural England website at:

http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx

The Act stresses that "*it is important that public authorities seek not only to protect important habitats and species, but actively seek opportunities to enhance biodiversity through development proposals, where appropriate. Incorporating enhancement opportunities into projects may help applicants to achieve planning permission*."

A full list of UK Invertebrate Species protected by the Habitats Regulations, WCA and NERC Act (2006) can be found at: http://jncc.defra.gov.uk/page-3408

APPENDIX B – IUCN RED LIST (IUCN 2012) AND GB RARITY STATUS CATEGORIES

Extinct (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died. Extensive surveys in the taxon's known and / or expected habitat have failed to record an individual.

Extinct in the Wild (EW)

A taxon is Extinct in the Wild when it is known to only survive in cultivation, captivity or as a naturalised population/s well outside its past range. A taxon is Extinct in the Wild when extensive surveys in the taxon's known and / or expected habitat have failed to record an individual.

Critically Endangered (CR)

A taxon is Critically Endangered when it is considered to be facing an extremely high risk of extinction in the wild. The taxon must meet any of the following criteria:

- Reduction in population size based on any of the following:
  - population size reduction of ≥90% over the last 10 years of three generations, whichever is the longer, where the causes are clearly reversible, understood and ceased.
  - population size reduction ≥80% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may NOT be reversible, understood or ceased.
  - projected population size reduction ≥80% to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years).
  - observed or projected population size reduction ≥80% over any 10 year or three generation period, whichever is the longer (up to a maximum of 100 years in the future). The time period must include the past and future and the reduction or its causes may not be reversible, understood or ceased.

- Extent of occurrence is estimated to be less than 100 km^2 or area of occupancy is estimated to be less than 10 km^2 and indicates at least two of: severe fragmentation, continuing decline (observed or projected) and/or extreme fluctuations.

- Population size is estimated to be fewer than 250 mature individuals and either:
  - an estimated decline of at least 25% within three years or one generation whichever is the longer (up to a maximum of 100 years in the future).
  - a continuing decline, observed or projected with no subpopulation estimated to contain more than 50 mature individuals or at least 90% of mature individuals are in one subpopulation.

- Population size estimated to be fewer than 50 mature individuals.

- Probability of extinction in the wild is at least 50% within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

More details of these criteria can be found in the IUCN Red List Categories and Criteria report (IUCN 2012).

Endangered (EN)

A taxon is Endangered when it is considered to be facing an extremely high risk of extinction in the wild. The taxon must meet any of the following criteria:

- Reduction in population size based on any of the following:
  - population size reduction of ≥70% over the last 10 years of three generations, whichever is the longer, where the causes are clearly reversible, understood and ceased.
  - population size reduction ≥50% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may NOT be reversible, understood or ceased.
  - projected population size reduction ≥50% to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years).
  - observed or projected population size reduction ≥50% over any 10 year or three generation period, whichever is the longer (up to a maximum of 100 years in the future). The time period must include the past and future and the reduction or its causes may not be reversible, understood or ceased.

- Extent of occurrence is estimated to be less than 5000 km^2 or area of occupancy is estimated to be less than 500 km^2 and indicates at least two of: severe fragmentation, continuing decline (observed or projected) and/or extreme fluctuations.

- Population size is estimated to be fewer than 2500 mature individuals and either:
  - an estimated decline of at least 20% within five years or two generations whichever is the longer (up to a maximum of 100 years in the future).
  - A continuing decline, observed or projected with no subpopulation estimated to contain more than 250 mature individuals or at least 95% of mature individuals are in one subpopulation.

- Population size estimated to be fewer than 250 mature individuals.

- Probability of extinction in the wild is at least 20% within the next 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

More details of these criteria can be found in the IUCN Red List Categories and Criteria report (IUCN 2012).

Vulnerable (VU)

A taxon is Vulnerable when it is considered to be facing an extremely high risk of extinction in the wild. The taxon must meet any of the following criteria:

- Reduction in population size based on any of the following:
  - population size reduction of ≥50% over the last 10 years of three generations, whichever is the longer, where the causes are clearly reversible, understood and ceased.

  - population size reduction ≥30% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may NOT be reversible, understood or ceased.
  - projected population size reduction ≥30% to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years).
  - observed or projected population size reduction ≥30% over any 10 year or three generation period, whichever is the longer (up to a maximum of 100 years in the future). The time period must include the past and future and the reduction or its causes may not be reversible, understood or ceased.

- Extent of occurrence is estimated to be less than 20 000 km^2 or area of occupancy is estimated to be less than 2000 km^2 and indicates at least two of: severe fragmentation, continuing decline (observed or projected) and/or extreme fluctuations.

- Population size is estimated to be fewer than 10 000 mature individuals and either:
  - an estimated decline of at least 10% within 10 years or three generations whichever is the longer (up to a maximum of 100 years in the future).
  - A continuing decline, observed or projected with no subpopulation estimated to contain more than 1000 mature individuals or 100% of mature individuals are in one subpopulation.

- Population size estimated to be fewer than 1000 mature individuals and with a very restricted area of occupancy or number of locations.

- Probability of extinction in the wild is at least 10% within the next 100 years.

More details of these criteria can be found in the IUCN Red List Categories and Criteria report (IUCN 2012).

Near Threatened (NT)

A taxon is Near Threatened when it has been evaluated against the Red List criteria but does not qualify for any of the above threatened categories 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 does not qualify for the above criteria. Widespread and abundant taxa are included in this category.

Data Deficient (DD)

A taxon is Data Deficient when there is inadequate information to make an assessment of its risk of extinction based on its distribution and/or population status.

Not Evaluated (NE)

A taxon is Not Evaluated having not yet been evaluated against the Red List criteria.

GB Rarity Status Categories

At the national level countries are permitted to refine the definitions for non-threatened categories and define categories of their own. Nationally Rare and Nationally Scarce categories are unique to Great Britain.

Nationally Rare

Taxa which occur in 15 or fewer hectads (10 km squares) in Great Britain

Nationally Scarce

Taxa which are recorded in 16 – 100 hectads (10 km squares) in Great Britain but are not included in one of the Red List Categories

APPENDIX C – SPECIES LISTS

River Coquet and Coquet Valley Woodlands SSSI

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Araneae: Araneidae	*Araneus diadematus*	garden orb-web spider		X					X
Araneae: Araneidae	*Araniella cucurbitina*								X
Araneae: Lycosidae	*Pardosa pullata*								X
Araneae: Tetragnathidae	*Tetragnatha montana*								X
Araneae: Theridiidae	*Enoplognatha ovata*								X
Araneae: Theridiidae	*Theridion mystaceum*								X
Coleoptera: Cantharidae	*Cantharis nigra*				X				
Coleoptera: Cantharidae	*Cantharis lateralis*				X	X			
Coleoptera: Cantharidae	*Cantharis livida*				X				
Coleoptera: Cantharidae	*Cantharis nigricans*			X					

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Coleoptera: Cantharidae	*Cantharis rufa*				X	X			
Coleoptera: Cantharidae	*Podabrus alpinus*							X	
Coleoptera: Carabidae	*Abax parallelepipedus*				X		X		
Coleoptera: Carabidae	*Amara eurynota*					X			
Coleoptera: Carabidae	*Amara plebeja*				X				
Coleoptera: Carabidae	*Bembidion decorum*						X		
Coleoptera: Carabidae	*Bembidion femoratum*						X		
Coleoptera: Carabidae	*Bembidion tibiale*						X		
Coleoptera: Carabidae	*Leistus fulvibarbis*			X					
Coleoptera: Carabidae	*Leistus rufomarginatus*				X				
Coleoptera: Carabidae	*Nebria brevicollis*				X	X	X		

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Coleoptera: Carabidae	*Notiophilus biguttatus*				X				
Coleoptera: Carabidae	*Oxypselaphus obscurus*				X				
Coleoptera: Carabidae	*Paranchus albipes*				X	X	X		
Coleoptera: Carabidae	*Pterostichus cristatus*		Formerly Nationally Scarce		X				
Coleoptera: Carabidae	*Pterostichus madidus*	black clock beetle			X	X	X		
Coleoptera: Carabidae	*Pterostichus minor*					X			
Coleoptera: Carabidae	*Pterostichus niger*				X	X	X		
Coleoptera: Cerambycidae	*Grammoptera ruficornis*				X				
Coleoptera: Cerambycidae	*Platynus assimilis*				X				
Coleoptera: Chrysomelidae	*Altica lythri*			X					
Coleoptera: Chrysomelidae	*Chrysolina fastuosa*				X				

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Coleoptera: Chrysomelidae	*Gastrophysa viridula*	green dock beetle						X	X
Coleoptera: Chrysomelidae	*Phaedon tumidulus*	celery leaf beetle		X					
Coleoptera: Coccinellidae	*Adalia decempunctata*	ten-spot ladybird							X
Coleoptera: Coccinellidae	*Coccidula rufa*								X
Coleoptera: Coccinellidae	*Halyzia 16-guttata*	orange ladybird							X
Coleoptera: Coccinellidae	*Psyllobora vigintiduopunctata*	22-spot ladybird							X
Coleoptera: Curculionidae	*Barypeithes pellucidus*	hairy spider weevil			X				
Coleoptera: Curculionidae	*Otiorhynchus singularis*	clay-coloured weevil			X				
Coleoptera: Curculionidae	*Phyllobius glaucus*				X				
Coleoptera: Curculionidae	*Phyllobius pomaceus*			X					
Coleoptera: Curculionidae	*Phyllobius pyri*	common leaf weevil		X	X			X	

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Coleoptera: Curculionidae	*Polydrusus cervinus*				X				
Coleoptera: Curculionidae	*Polydrusus pterygomalis*			X					
Coleoptera: Elateridae	*Athous haemorrhoidalis*			X	X	X			
Coleoptera: Elateridae	*Hemicrepidius hirtus*				X				
Coleoptera: Nitidulidae	*Meligethes aeneus*	common pollen beetle		X	X	X	X	X	X
Coleoptera: Silphidae	*Nicrophorus investigator*				X				
Coleoptera: Silphidae	*Nicrophorus vespilloides*				X				
Coleoptera: Silphidae	*Oiceoptoma thoracicum*	red-breasted carrion beetle			X				
Coleoptera: Staphylinidae	*Tachinus rufipes*				X				
Dermaptera: Forficulidae	*Forficula auricularia*	common earwig		X	X			X	X
Dermaptera: Sphongiphoridae	*Labia minor*	lesser earwig						X	

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Diptera: Bibionidae	*Bibio marci*	St Mark's fly		X	X				
Diptera: Calliphoridae	*Calliphora vomitoria*	bluebottle		X					
Diptera: Calliphoridae	*Lucilia sericata*	sheep-strike greenbottle		X					X
Diptera: Lauxaniidae	*Meiosimyza decempunctata*			X	X		X	X	
Diptera: Rhagionidae	*Chrysopilus asiliformis*			X	X				
Diptera: Sarcophagidae	*Sarcophaga carnaria*			X	X				
Diptera: Stratiomyidae	*Beris chalybata*	murky-legged black legionnaire fly		X	X	X			
Diptera: Stratiomyidae	*Beris geniculata*	long-horned black legionnaire fly			X	X			
Diptera: Syrphidae	*Cheilosia proxima*							X	
Diptera: Syrphidae	*Cheilosia scutellata*				X				
Diptera: Syrphidae	*Episyrphus balteatus*	marmalade hoverfly							X

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Diptera: Syrphidae	*Eristalis nemorum*								X
Diptera: Syrphidae	*Eristalis pertinax*								X
Diptera: Syrphidae	*Melanostoma mellinum*			X				X	X
Diptera: Syrphidae	*Melanostoma scalare*			X	X				X
Diptera: Syrphidae	*Leucozona glaucia*							X	
Diptera: Syrphidae	*Syrphus ribesii*								X
Diptera: Tachinidae	*Tachina fera*								X
Diptera: Tipulidae	*Tipula cava*			X	X				
Diptera: Trichoceridae	*Trichocera annulata*			X					
Ephemeroptera: Ameletidae	*Ameletus inopinatus*	upland summer mayfly	Nationally Scarce			X			
Ephemeroptera: Ephemerellidae	*Ephemerella notata*	yellow evening hawk mayfly	Nationally Scarce			X			

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Ephemeroptera: Ephemerellidae	*Serratella ignita*	blue-winged olive Mayfly				X	X		
Ephemeroptera: Ephemeridae	*Ephemera danica*	green drake mayfly				X			
Ephemeroptera: Ephemeridae	*Ephemera vulgata*					X	X		
Ephemeroptera: Heptageniidae	*Ecdyonurus insignis*					X			
Ephemeroptera: Heptageniidae	*Ecdyonurus torrentis*					X			
Ephemeroptera: Heptageniidae	*Ecdyonurus venosus*					X			
Ephemeroptera: Heptageniidae	*Electrogena lateralis*					X			
Ephemeroptera: Heptageniidae	*Heptagenia sulphurea*	yellow may dun mayfly				X			
Ephemeroptera: Heptageniidae	*Rhithrogena semicolorata*					X			

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Glomerida: Glomeridae	*Glomeris marginata*	pill millipede			X				
Hemiptera: Cicadellidae	*Cicadella viridis*								X
Hemiptera: Lygaeidae	*Scolopostethus affinis*			X					
Hemiptera: Miridae	*Calocoris alpestris*				X				
Hemiptera: Miridae	*Leptopterna dolabrata*	meadow plant bug		X	X			X	X
Hemiptera: Miridae	*Liocoris tripustulatus*				X				
Hemiptera: Miridae	*Stenodema calcarata*			X					
Hemiptera: Miridae	*Stenodema holsata*			X					
Hemiptera: Pentatomidae	*Pentatoma rufipes*	forest bug		X	X	X	X	X	X
Hemiptera: Pentatomidae	*Troilus luridus*	bronze shieldbug				X			
Hymenoptera: Apidae	*Bombus hypnorum*	tree bumblebee		X					

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Hymenoptera: Apidae	*Bombus lucorum*	white-tailed bumblebee							X
Hymenoptera: Apidae	*Bombus pascuorum*	common carder bee							X
Hymenoptera: Apidae	*Bombus pratorum*	early bumblebee							X
Hymenoptera: Apidae	*Bombus terrestris*	buff-tailed bumblebee			X	X			X
Hymenoptera: Formicidae	*Formica fusca*	black ant		X	X	X	X	X	X
Hymenoptera: Halictidae	*Lasioglossum albipes*	bloomed furrow bee							X
Hymenoptera: Tenthredinidae	*Athalia ancilla*							X	
Hymenoptera: Tenthredinidae	*Platycampus luridiventris*					X			
Hymenoptera: Tenthredinidae	*Stauronematus compressicornis*							X	
Hymenoptera: Tenthredinidae	*Strombocerus delicatulus*								X
Isopoda: Oniscidae	*Oniscus asellus*	common shiny woodlouse		X	X	X	X	X	

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Isopoda: Philosciidae	*Philoscia muscorum*	common striped woodlouse		X	X	X			
Isopoda: Porcellionidae	*Porcellio scaber*	common rough woodlouse			X	X			
Diplopodada: Julidae	*Tachypodoiulus niger*	white-legged snake millipede		X	X	X			
Lepidoptera: Erebidae	*Atolmis rubricollis*	red-necked footman moth				X			
Lepidoptera: Erebidae	*Tyria jacobaeae*	cinnabar moth	S41 NERC 2006	X					
Lepidoptera: Lasiocampidae	*Euthrix potatoria*						X		
Lepidoptera: Noctuidae	*Anorthoa munda*	twin-spotted quaker moth					X		
Lepidoptera: Nymphalidae	*Aglais io*	peacock butterfly		X					X
Lepidoptera: Nymphalidae	*Maniola jurtina*	meadow brown butterfly		X					X
Lepidoptera: Nymphalidae	*Parage aegeria*	speckled wood butterfly		X					X
Lepidoptera: Nymphalidae	*Vanessa atalanta*	red admiral butterfly							X

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Lepidoptera: Pieridae	*Pieris napi*	green-veined white butterfly							X
Megaloptera: Sialidae	*Sialis lutaria*				X				
Neuroptera: Chrysopidae	*Chrysoperla carnea*				X	X			
Neuroptera: Hemerobiidae	*Micromus paganus*				X				
Neuroptera: Osmylidae	*Osmylus fulvicephalus*				X				
Odonata: Aeshnidae	*Aeshna grandis*					X	X		X
Odonata: Aeshnidae	*Anax imperator*	emperor dragonfly							X
Odonata: Calopterygidae	*Calopteryx splendens*	banded demoiselle						X	X
Odonata: Coenagrionidae	*Enallagma cyathigerum*	common blue damselfly				X		X	X
Odonata: Coenagrionidae	*Ischnura elegans*	blue-tailed damselfly				X			X
Odonata: Lestidae	*Lestes sponsa*	emerald damselfly							X

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Odonata: Libellulidae	*Libellula depressa*								X
Odonata: Libellulidae	*Sympetrum striolatum*	common darter dragonfly							X
Opiliones: Nemastomatidae	*Mitostoma chrysomelas*				X	X	X		
Opiliones: Nemastomatidae	*Nemastoma bimaculatum*				X				
Opiliones: Phalangiidae	*Dicranopalpus ramosus*			X	X				
Opiliones: Phalangiidae	*Mitopus morio*				X	X			
Opiliones: Phalangiidae	*Oligolophus tridens*				X				
Opiliones: Phalangiidae	*Paroligolophus agrestis*			X	X	X			
Plecoptera: Chloroperlidae	*Siphonoperla torrentium*					X			
Plecoptera: Leuctridae	*Leuctra geniculata*					X			
Plecoptera: Nemouridae	*Nemoura cambrica*					X			

				Compartment					
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**
Plecoptera: Nemouridae	*Nemurella picteti*					X			
Plecoptera: Perlidae	*Perla bipunctata*					X			
Plecoptera: Perlodidae	*Isoperla grammatica*					X			
Pulmonata: Arianta	*Arianta arbustorum*			X	X				
Pulmonata: Arionidae	*Arion flagellus*	green-soled slug			X				
Pulmonata: Clausiliidae	*Clausilia bidentata*	two-toothed door snail			X				
Pulmonata: Helicidae	*Cepaea nemoralis*	brown-lipped snail		X					
Pulmonata: Hygromiidae	*Trochulus hispidus*	hairy snail		X					X
Pulmonata: Succineidae	*Oxyloma elegans*	Pfeiffer's amber snail			X				

East of Burgham Park Golf Club

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Araneae: Araneidae	*Araneus diadematus*	garden orb-web spider			X		X			
Araneae: Araneidae	*Araneus quadratus*							X	X	
Araneae: Araneidae	*Araniella cucurbitina*								X	
Araneae: Thomisidae	*Xysticus cristatus*						X		X	
Coleoptera: Cantharidae	*Cantharis cryptica*						X			
Coleoptera: Cantharidae	*Cantharis decipiens*						X			
Coleoptera: Cantharidae	*Cantharis pellucida*								X	X
Coleoptera: Cantharidae	*Cantharis rufa*				X				X	X
Coleoptera: Cantharidae	*Rhagonycha fulva*	common red soldier beetle		X	X				X	X
Coleoptera: Carabidae	*Curtonotus aulicus*						X			

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Coleoptera: Carabidae	*Pterostichus cristatus*		Formerly Nationally Scarce				X			
Coleoptera: Carabidae	*Pterostichus niger*						X		X	
Coleoptera: Cerambycidae	*Rhagium mordax*						X			
Coleoptera: Chrysomelidae	*Crepidodera aurea*						X			
Coleoptera: Chrysomelidae	*Gastrophysa viridula*				X		X		X	
Coleoptera: Chrysomelidae	*Lochmaea crataegi*	hawthorn leaf beetle					X			
Coleoptera: Chrysomelidae	*Phaedon tumidulus*	celery leaf beetle					X			
Coleoptera: Coccinellidae	*Psyllobora vigintiduopunctata*						X			
Coleoptera: Coccinellidae	*Nedyus quadrimaculatus*	small nettle weevil		X						
Coleoptera: Curculionidae	*Otiorhynchus singularis*	clay-coloured weevil					X			

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Coleoptera: Curculionidae	*Phyllobius glaucus*						X			
Coleoptera: Curculionidae	*Phyllobius pyri*	common leaf weevil					X			
Coleoptera: Curculionidae	*Sitona lineatus*	pea-leaf weevil					X			
Coleoptera: Elateridae	*Agriotes obscurus*						X			
Coleoptera: Nitidulidae	*Meligethes aeneus*	common pollen beetle		X	X	X	X	X	X	X
Coleoptera: Scarabaeidae	*Aphodius depressus*			X						
Coleoptera: Silphidae	*Nicrophorus vespillo*	common burying beetle							X	
Dermaptera: Forficulidae	*Forficula auricularia*									X
Diptera: Bibionidae	*Bibio lanigerus*				X		X		X	
Diptera: Bibionidae	*Bibio marci*				X		X			
Diptera: Bombyliidae	*Bombylius major*									X

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Diptera: Calliphoridae	*Lucilia sericata*	Sheep-strike greenbottle							X	
Diptera: Empididae	*Empis tessellata*								X	
Diptera: Muscidae	*Mesembrina meridiana*				X		X		X	X
Diptera: Muscidae	*Phaonia pallida*				X				X	
Diptera: Muscidae	*Stomoxys calcitrans*				X		X		X	X
Diptera: Sarcophagidae	*Sarcophaga carnaria*				X				X	X
Diptera: Scathophagidae	*Scathophaga stercoraria*				X		X		X	
Diptera: Stratiomyidae	*Beris chalybata*				X		X		X	
Diptera: Stratiomyidae	*Beris geniculata*	long-horned black legionnaire fly			X		X		X	
Diptera: Stratiomyidae	*Chloromyia formosa*	broad centurion fly							X	
Diptera: Stratiomyidae	*Microchrysa flavicornis*	green gem fly							X	

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Diptera: Syrphidae	*Cheilosia illustrata*				X				X	
Diptera: Syrphidae	*Episyrphus balteatus*	marmalade hoverfly			X	X	X		X	
Diptera: Syrphidae	*Eristalis nemorum*			X	X		X		X	
Diptera: Syrphidae	*Eristalis pertinax*			X					X	
Diptera: Syrphidae	*Leucozona lucorum*			X					X	
Diptera: Syrphidae	*Melanostoma scalare*								X	
Diptera: Syrphidae	*Neoascia obliqua*								X	X
Diptera: Syrphidae	*Platycheirus tarsalis*				X		X		X	
Diptera: Syrphidae	*Rhingia campestris*						X		X	
Diptera: Syrphidae	*Scaeva selenitica*						X		X	
Diptera: Syrphidae	*Syrphus ribesii*				X	X	X		X	

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Diptera: Syrphidae	*Volucella pellucens*				X	X			X	
Diptera: Tachinidae	*Tachina fera*				X				X	
Diptera: Tipulidae	*Nephrotoma* sp.									X
Diptera: Trichoceridae	*Trichocera annulata*									X
Ephemeroptera: Ephemerellidae	*Serratella ignita*	blue-winged olive mayfly				X				X
Hemiptera: Aphrophoridae	*Aphrophora alni*						X			
Hemiptera: Aphrophoridae	*Philaenus spumarius*	cuckoo-spit insect		X				X		
Hemiptera: Cicadellidae	*Cicadella viridis*								X	
Hemiptera: Miridae	*Calocoris norwegicus*			X						
Hemiptera: Miridae	*Lygus rugulipennis*	European tarnished plant bug					X			
Hemiptera: Miridae	*Plagiognathus arbustorum*	potato capsid		X						

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Hemiptera: Miridae	*Stenodema holsata*			X						
Hymenoptera: Andrenidae	*Andrena chrysosceles*	hawthorn mining bee							X	
Hymenoptera: Andrenidae	*Andrena nigroaenea*	buffish mining bee							X	
Hymenoptera: Andrenidae	*Andrena scotica*	chocolate mining bee		X	X				X	
Hymenoptera: Apidae	*Anthophora furcata*	fork-tailed flower bee							X	
Hymenoptera: Apidae	*Apis mellifera*	honey bee		X	X	X			X	X
Hymenoptera: Apidae	*Bombus lapidarius*	large red-tailed bumblebee			X		X		X	
Hymenoptera: Apidae	*Bombus lucorum*				X		X		X	X
Hymenoptera: Apidae	*Bombus pratorum*	early bumblebee			X		X		X	
Hymenoptera: Apidae	*Bombus terrestris*	buff-tailed bumblebee		X	X		X		X	X
Hymenoptera: Apidae	*Nomada goodeniana*	Gooden's nomad bee							X	X

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Hymenoptera: Apidae	*Nomada marshamella*	Marsham's nomad bee							X	X
Hymenoptera: Cephidae	*Trachelus tabidus*									X
Hymenoptera: Ichneumonidae	*Ephialtes manifestator*								X	
Hymenoptera: Ichneumonidae	*Ichneumon xanthorius*								X	
Hymenoptera: Megachilidae	*Osmia bicornis*	red mason bee					X		X	
Hymenoptera: Tenthredinidae	*Dolerus sp.*				X		X		X	
Hymenoptera: Tenthredinidae	*Monophadnoides sp.*						X		X	
Hymenoptera: Tenthredinidae	*Pachynematus sp.*						X		X	
Hymenoptera: Tenthredinidae	*Periclista sp.*						X		X	
Hymenoptera: Tenthredinidae	*Taxonus agrorum*								X	
Hymenoptera: Vespidae	*Dolichovespula sylvestris*	tree wasp					X		X	X

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Hymenoptera: Vespidae	*Vespula germanica*	German wasp							X	X
Hymenoptera: Vespidae	*Vespula vulgaris*	common wasp							X	X
Lepidoptera: Erebidae	*Callistege mi*	Mother Shipton moth							X	
Lepidoptera: Erebidae	*Tyria jacobaeae*	cinnabar moth	S41 NERC 2006						X	
Lepidoptera: Geometridae	*Xanthorhoe montanata montanata*	silver-ground carpet							X	
Lepidoptera: Hepialidae	*Hepialus humuli*	ghost moth	S41 NERC 2006	X						
Lepidoptera: Hesperiidae	*Ochlodes sylvanus*	large skipper					X		X	
Lepidoptera: Lasiocampidae	*Lasiocampa quercus*	oak eggar		X						
Lepidoptera: Lasiocampidae	*Euthrix potatoria*	drinker moth					X			
Lepidoptera: Lycaenidae	*Lycaena phlaeas*	small copper		X	X		X		X	X

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Lepidoptera: Nymphalidae	*Aglais io*	peacock butterfly		X	X					X
Lepidoptera: Nymphalidae	*Aglais urticae*	small tortoiseshell					X		X	X
Lepidoptera: Nymphalidae	*Coenonympha pamphilus*	small heath butterfly	S41 NERC 2006 IUCN: Near Threatened						X	
Lepidoptera: Nymphalidae	*Maniola jurtina*	meadow brown butterfly							X	
Lepidoptera: Nymphalidae	*Parage aegeria*	speckled wood butterfly				X			X	X
Lepidoptera: Nymphalidae	*Vanessa atalanta*	red admiral butterfly							X	X
Lepidoptera: Pieridae	*Anthocharis cardamines*	orange-tip butterfly		X					X	X
Lepidoptera: Pieridae	*Pieris napi*	green-veined white butterfly							X	
Lepidoptera: Zygaenidae	*Zygaena lonicerae*	narrow-bordered five-spot burnet							X	

				Compartment						
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Odonata: Coenagrionidae	*Coenagrion puella*	azure damselfly			X					X
Odonata: Coenagrionidae	*Enallagma cyathigerum*	common blue damselfly			X					X
Odonata: Coenagrionidae	*Ischnura elegans*	blue-tailed damselfly			X					X
Odonata: Lestidae	*Lestes sponsa*	emerald damselfly								X
Odonata: Libellulidae	*Libellula quadrimaculata*	four-spotted chaser		X	X					
Odonata: Libellulidae	*Sympetrum striolatum*	common darter dragonfly							X	X
Orthoptera: Acrididae	*Chorthippus brunneus*	field grasshopper		X	X	X	X	X	X	X
Plecoptera: Leuctridae	*Leuctra geniculata*					X				
Pulmonata: Arianta	*Arianta arbustorum*									X
Pulmonata: Helicidae	*Cepaea hortensis*	white-lipped snail								X

Causey Park Farm

				Compartment	
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**
Araneae: Araneidae	*Araneus diadematus*	garden orb-web spider			X
Araneae: Araneidae	*Araneus quadratus*				X
Araneae: Araneidae	*Zygiella x-notata*				X
Araneae: Tetragnathidae	*Pachygnatha clercki*				X
Coleoptera: Coccinellidae	*Coccinella septempunctata*	seven-spot ladybird		X	X
Coleoptera: Gyrinidae	*Gyrinus substriatus*				X
Coleoptera: Nitidulidae	*Meligethes aeneus*	common pollen beetle		X	X
Coleoptera: Scarabaeidae	*Aphodius depressus*				X
Coleoptera: Scarabaeidae	*Aphodius obliteratus*				X
Diptera: Bibionidae	*Bibio marci*	St Marks fly		X	X
Diptera: Calliphoridae	*Lucilia sericata*	sheep-strike greenbottle		X	X

				Compartment	
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**
Diptera: Sarcophagidae	*Sarcophaga carnaria*				X
Diptera: Scathophagidae	*Scathophaga stercoraria*				X
Diptera: Stratiomyidae	*Beris chalybata*	murky-legged black legionnaire fly			X
Diptera: Syrphidae	*Cheilosia albitarsis*			X	X
Diptera: Syrphidae	*Episyrphus balteatus*	marmalade hoverfly		X	X
Diptera: Syrphidae	*Helophilus sp.*				X
Diptera: Syrphidae	*Melanostoma scalare*			X	X
Diptera: Syrphidae	*Rhingia campestris*			X	
Diptera: Syrphidae	*Syritta pipiens*			X	X
Hemiptera: Corixidae	*Corixa punctata*	a water boatman			X
Hemiptera: Gerridae	*Gerris lacustris*	a pond skater			X

				Compartment	
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**
Hymenoptera: Andrenidae	*Andrena fulva*	tawny mining bee			X
Hymenoptera: Andrenidae	*Andrena scotica*	chocolate mining bee			X
Hymenoptera: Apidae	*Apis mellifera*	honey bee		X	X
Hymenoptera: Apidae	*Bombus campestris*	field cuckoo bee			X
Hymenoptera: Apidae	*Bombus hortorum*	small garden bumblebee			X
Hymenoptera: Apidae	*Bombus hypnorum*	tree bumblebee			X
Hymenoptera: Apidae	*Bombus lapidarius*	large red-tailed bumblebee			X
Hymenoptera: Apidae	*Bombus lucorum*	white-tailed bumblebee		X	X
Hymenoptera: Apidae	*Bombus pascuorum*	common carder bee			X
Hymenoptera: Apidae	*Bombus pratorum*	early bumblebee		X	X
Hymenoptera: Apidae	*Bombus terrestris*	Buff-tailed Bumblebee		X	X

				Compartment	
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**
Hymenoptera: Apidae	*Nomada flava*	flavous nomad Bee		X	
Hymenoptera: Apidae	*Nomada marshamella*	Marsham's Nomad Bee		X	
Hymenoptera: Argidae	*Arge pagana*				X
Hymenoptera: Ichneumonidae	*Diphyus quadripunctorius*				X
Hymenoptera: Ichneumonidae	*Ephialtes manifestator*				X
Hymenoptera: Tenthredinidae	*Cladius sp.*				X
Hymenoptera: Tenthredinidae	*Dolerus sp.*				X
Hymenoptera: Tenthredinidae	*Rhogogaster viridis*	green sawfly			X
Hymenoptera: Vespidae	*Vespula germanica*	German wasp			X
Hymenoptera: Vespidae	*Vespula vulgaris*	common wasp		X	X
Lepidoptera: Lycaenidae	*Lycaena phlaeas*	small copper		X	X

				Compartment	
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**
Lepidoptera: Nymphalidae	*Aglais io*	peacock butterfly		X	X
Lepidoptera: Nymphalidae	*Aglais urticae*	small tortoiseshell			X
Lepidoptera: Nymphalidae	*Polygonia c-album*	comma butterfly			X
Lepidoptera: Nymphalidae	*Vanessa atalanta*	red admiral butterfly		X	X
Lepidoptera: Nymphalidae	*Vanessa cardui*	painted lady butterfly			X
Lepidoptera: Pieridae	*Anthocharis cardamines*	orange-tip butterfly			X
Lepidoptera: Pieridae	*Pieris brassicae*	large white		X	X
Lepidoptera: Pieridae	*Pieris napi*	green-veined white butterfly		X	
Lepidoptera: Pieridae	*Pieris rapae*	small white			X
Odonata: Coenagrionidae	*Enallagma cyathigerum*	common blue damselfly			X
Orthoptera: Acrididae	*Chorthippus brunneus*	field grasshopper			X

				Compartment	
Order: Family	**Taxon**	**Vernacular**	**National Status**	**1**	**2**
Pulmonata: Helicidae	*Cepaea nemoralis*	brown-lipped snail			X

APPENDIX D – RIVER COQUET AND COQUET VALLEY WOODLANDS SSSI CITATION

SITE NOTIFIED TO THE SECRETARY OF STATE ON THE 31ST JULY 1996

COUNTY: NORTHUMBERLAND **SITE NAME:** RIVER COQUET AND COQUET VALLEY WOODLANDS

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981 as amended.

Local Planning Authorities: Northumberland County Council
Northumberland National Park
Alnwick District Council
Castle Morpeth Borough Council

National Grid Reference: NT 786082 to NU 260051 **Area:** 1192.42 (ha.)

Ordnance Survey Sheets 1:50,000: 80 and 81 **1:25,000:** NT 80, 81, 90,91
NU 00, 10, 20
NY 99, NZ 09,19

Length of River: 125 km approx

First Notified: 1996

Description:
The River Coquet runs about 90km (57 miles) across Northumberland, from its tributaries south of Cheviot summit to reach the sea below Warkworth. As a relatively unmodified fast-flowing upland river supporting characteristic fauna and flora the Coquet is of key significance in the national resource fir nature conservation. The river vegetation shows a natural succession from mineral poor upland streams, through to vegetation which reflects the characteristics of gravel, sandstone, limestone and alluvial sediments of the middle and lower reaches. The river is one of the most important game fisheries in the north of England, with large runs of sea trout and salmon. The fish are dependent on the rich insect life, of which the many species of mayfly are particularly significant. Coquetdale is a key area for otters and supports a high diversity of breeding birds which depend on riverine habitats. Many of the woodlands rear the river are semi-natural and ancient woodland sites, representative of valley woodlands in Northumberland.

High in the Cheviot Hills the upper reaches of the river are torrential moorland streams on resistant bedrock. The descent becomes more gradual and substrates less stable in the middle reaches as the underlying geology changes in turn to cement stone, sandstone and limestone. Where the flood plain broad river meanders across the riverine deposits, forming oxbows, pools and marshy areas as the river channel moves with time. The lower river cuts through thick drift deposits, in places reaching underlying limestones and millstone grit, and forming a steep-sided, often wooded, valley with boulders along the river bed. Run-off within the catchment is very rapid, causing short but often violent floods. The water is clean, low in mineral content and moderately calcareous.

The plant life of the upper reaches, beyond Alwinton, 125m above sea level, is dominated by species typical of base and nutrient poor upland rivers. Several mosses including *Bryum pseudotriquetrum*, *Fontinalis antipyretica*, *Racometrium aciculare* and *Philonotis fontana* are abundant on boulders and bed rocks. The lack of tree cover in the grazed moorland catchment influences the vegetation of the river with filamentous green algae a characteristic feature. Two species of water-crowfoot; *Ranunculus penicillatus* v. *pseudofluitans* and *R. peltatus* are the most commonly found water plants of slacks and riffles. A diatom, *Didymosphenia*, found in the upper reaches, is a species which

produces a seasonal bloom in streams on volcanic rocks; and the Cheviots are the only location in England where this phenomenon is recorded. Waterside plants including soft-rush *Juncus effusus,* common spike-rush *Eleocharis palustris*, procumbent pearlwort *Sagina procumbens*, blinks *Monta fontana* and a variety of sedges *Carex* spp. occur along the banks. Between Alwinton and Rothbury the river flows through a transitional zone taking a meandering course over a relatively level floodplain. Water-crowfoots *Ranunculus* spp. are the dominant plants, floating over the gravel and pebbles of the river bed. Below Rothbury in the lower reaches where the river cuts through sand, gravel and alluvium the richer and finer sediments support a greater diversity of plants. On rocks, the mosses *Fontinalis antipyretica* and *Rhyncostegium lusitanicum* are found. River water-crowfoot *Ranunculus fluitans*, characteristic of large clean rivers, is common on riffles while the presence of curled, perfoliate and horned pondweeds *Potamogeton crispus*, *P. perfoliatus* and *Zannichellia palustris*, branched and unbranched bur-weeds *Sparganium erectum* and *S. emersum* and the alga *Enteromorpha* reflect the base-rich nature of the river.

Many of the species of insects dependent on the river are typical of fast flowing waters. Most noticeable are the large numbers of caddis flies, *Trichoptera* and black flies, *Simulildae*, with larvae living on the river bed, and the mayflies and stoneflies which emerge from their larval stars in the water for short lives on the wing. Of 23 species of mayfly identified from the river, two; *Ephemerella notata* and *Ameletus inopinatus* have a restricted distribution. The riverside shingle and sand habitats support an important assemblage of ground beetles with several nationally scarce species including *Bembidion schuppeli*.

The birdlife associated with the Coquet includes large numbers of common sandpipers, grey and yellow wagtails which nest and feed in high densities along or near the river above Alwinton. Oystercatchers, ringed plover, lapwing, snipe and redshank all breed on the haugh land, or floodplain. Dippers are common along the entire length and, unusually for a northern river, kingfishers hold several nesting territories in the lower reaches.

The lower and middle reaches of the river provide undisturbed habitat for otters, which are known to range throughout the catchment. The rich insect life also creates feeding grounds for bat colonies which roost and rear their young within the valley. Of particular note is the area around Brinkburn Priory where colonies of Daubenton's, natterer's, noctule, whiskered, Brandt's and pipistrelle bats have nursery roosts. The river is frequented by water voles along much of its length.

The fish fauna of the Coquet is diverse with salmon and trout being particularly significant Salmon *Salmo salar* are known to spawn in the main river, with redds at Rothbury and upstream to Blindburn and along the River Alwin and the Wreighburn. Over 20,000 sea trout *Salmo trutta trutta* travel up the main river to spawn in many of the tributaries (1994); the River Alwin, the Rowhope and Trows Burns and several of the Wreigh Burn tributaries provide extensive spawning grounds. Also important is the occurrence of lampreys; brook lampreys *Lampetra planeri* have been recorded in the fresh waters as high as Alwinton, with sea lampreys *Petromyzon marinus* coming into the lower river, below Morwick, to breed. Other fish found regularly in the river system include stone loach *Noemacheilus barbatulus*, eels *Anguilla anguilla*, minnows *Phoxinus phoxinus* and sticklebacks *Gasterosteus aculeatus*.

The Coquet valley has several woodlands which are as being long established, relatively unmodified by planting and retaining semi-natural plant communities. There are few such woodlands now remaining in Northumberland and most are confined to steep river valleys, as along the Coquet below Rothbury. Most of the woodlands included in this site are of those along river valleys in the east of the County. Red squirrels are found in many of the woodlands.

Much of the woodland immediately adjacent to the river is characterised by alder *Alnus glutinosa*, occasionally associated with ash *Fraxinus excelsior* or willows *Salix* spp. The ground flora here is diverse and characterised by meadowsweet *Filipendula ulmaria* and tufted hair-grass *Deschampsia cespitosa*, with pendulous sedge *Carex pendula*, yellow pimpernel *Lysimachia nemorum*, woodruff *Galium odoratum* and locally marsh Hawk's-beard *Crepis paludosa* and opposite-leaved golden-saxifrage *Chrysosplenium oppositifolium*. In the lower reaches where silt and debris is deposited the alder woodland has a species-poor ground flora characterised by stinging nettle *Urtica dioica* and cleavers *Galium aparine* and is locally bordered by osier *Salix viminalis*, both uncommon woodland habitats in Northumberland. Further back from the river ash and pedunculate oak *Quercus robur* are typical canopy species with wych elm *Ulmus glabra* found in sonic areas. Climbers including ivy *Hedera helix*, brambles *Rubus fruticosus* and honeysuckle *Lonicera periclimenium* are found in the oak woodlands with species-rich ground floras often dominated by great wood-rush *Luzula sylvatica* and other species present include bluebell *Hyacinthoides non-scripta*, wood-sorrel *Oxalis acetosella*, hedge woundwort *Stachys sylvatica* and wood avens *Geum urbanum*. Hawthorn *Cretaegus monogyna*, hazel *Corylus avellana*, rowan *Sorbus aucuparia*, holly *Ilex aquifolia* and downy birch *Betula pubescens* are the main shrub species found in the ash woods with dog's mercury *Mercurialis perennis* often dominating the ground flora and associated with wood avens *Geum urbanum*, enchanter's nightshade *Circea lutetiana*, several fans including male-fern *Dryopteris filix-mas*, broad buckler-fern *Dryopteris dilatata* and lady-fern *Athyrium filix-femina*, an abundance of mosses and occasionally sanicle *Sanicula europea*.

Other Information:

Parts of this site are notified as separate SSSIs under the Wildlife and Countryside Act 1981, as amended; overlapping SSSI are: Linbriggs, Harbottle Moors and Barrow Meadows. The River Coquet SSSI also abuts Warkworth Dunes and Saltmarsh SSSI.

Otters, red squirrel and all species of bats in Britain are protected under Schedule 5 of the Wildlife and Countryside Act 1981, otters and bats are also listed on schedule 2 of The Conservation (Natural Habitats, etc) Regulations 1994.

Floating vegetation of *Ranunculus* of plain and submountainous rivers is a habitat listed in Annex I of the EC Habitats and Species Directive (92/43/EEC). Of species associated with the River Coquet, Annexes IIa, VIa and Va of the EC Habitats and Species Directive (92/43/EEC) list the following as specially protected: otters (IIa, IVa), all species of bats (IVa), salmon (IIa, Va) and all species of lamprey (IIa,).

APPENDIX E – PANTHEON COMBINED SUMMARY OUTPUTS

River Coquet and Coquet Valley Woodlands SSSI

Combined summary: List 652 [RC Final Test]

Habitats & resources: broad biotopes

Broad biotope	No. of species	% representation	SQI	Conservation status	Species with conservation status
open habitats	58	1	100	1 Section 41 Priority Species - research only	1
wetland	40	1	115	2 NS	2
tree-associated	35	<1	97		

first prev 1 next last

Showing records 1 to 3 of 3

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Habitats & resources: habitats

Broad biotope	Habitat	No. of species	% representation	Conservation status	SQI	Species with conservation status
open habitats	tall sward & scrub	52	2	1 Section 41 Priority Species - research only	100	1
wetland	running water	23	2	2 NS	126	2
tree-associated	shaded woodland floor	19	2		94	
tree-associated	arboreal	15	1		100	
wetland	marshland	10	1		100	
wetland	peatland	6	<1		100	
open habitats	short sward & bare ground	4	<1		100	
tree-associated	wet woodland	2	<1		100	
wetland	wet woodland	2	<1		100	
open habitats	upland	1	<1		100	
wetland	lake	1	<1		100	
tree-associated	decaying wood	1	<1		100	

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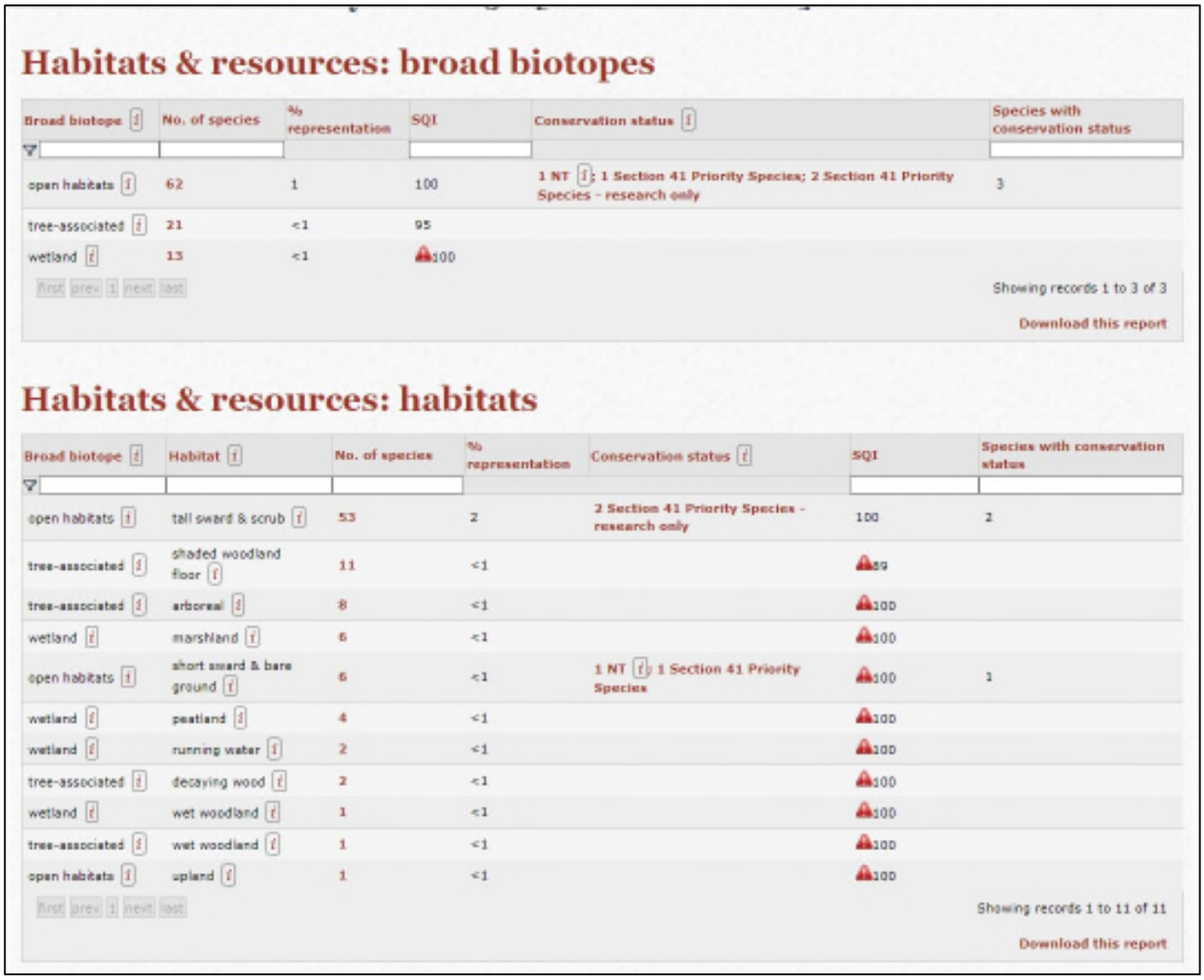
East of Burgham Park Golf Club



Habitats & resources: broad biotopes

Broad biotope	No. of species	% representation	SQI	Conservation status	Species with conservation status
open habitats	62	1	100	1 NT; 1 Section 41 Priority Species; 2 Section 41 Priority Species - research only	3
tree-associated	21	<1	95		
wetland	13	<1	100		

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Habitats & resources: habitats

Broad biotope	Habitat	No. of species	% representation	Conservation status	SQI	Species with conservation status
open habitats	tall sward & scrub	53	2	2 Section 41 Priority Species - research only	100	2
tree-associated	shaded woodland floor	11	<1		89	
tree-associated	arboreal	8	<1		100	
wetland	marshland	6	<1		100	
open habitats	short sward & bare ground	6	<1	1 NT; 1 Section 41 Priority Species	100	1
wetland	peatland	4	<1		100	
wetland	running water	2	<1		100	
tree-associated	decaying wood	2	<1		100	
wetland	wet woodland	1	<1		100	
tree-associated	wet woodland	1	<1		100	
open habitats	upland	1	<1		100	

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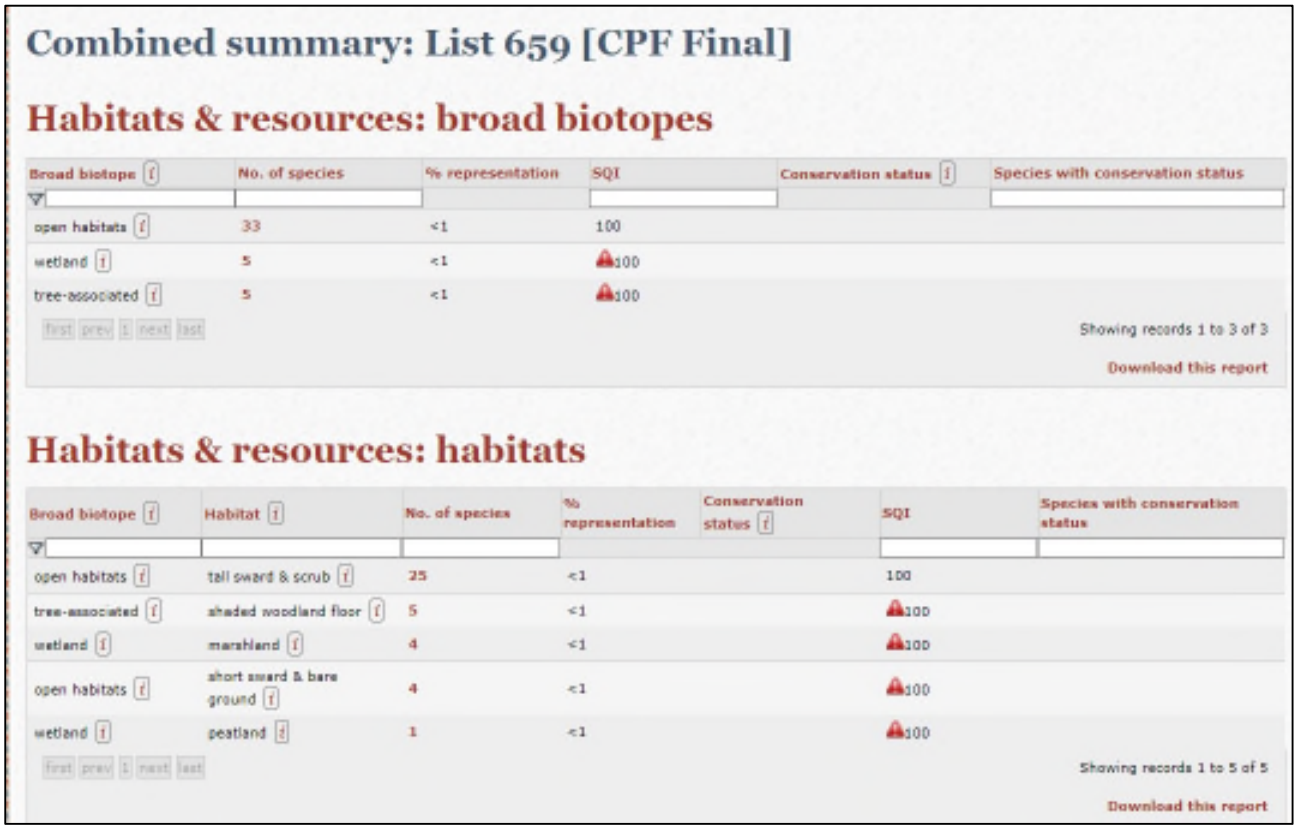
Causey Park Farm



Combined summary: List 659 [CPF Final]

Habitats & resources: broad biotopes

Broad biotope	No. of species	% representation	SQI	Conservation status	Species with conservation status
open habitats	33	<1	100		
wetland	5	<1	100		
tree-associated	5	<1	100		

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Habitats & resources: habitats

Broad biotope	Habitat	No. of species	% representation	Conservation status	SQI	Species with conservation status
open habitats	tall sward & scrub	25	<1		100	
tree-associated	shaded woodland floor	5	<1		100	
wetland	marshland	4	<1		100	
open habitats	short sward & bare ground	4	<1		100	
wetland	peatland	1	<1		100	

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