

Invertebrate Survey

Survey site address:

Land off Holbeach Rd, Spalding, PE12 6JP

Site Location

The site is centred at National Grid Reference TF 26643 23786 and has a size of approximately 1.3 ha.

Client:

Commercial Development Projects Ltd.

Survey date:

4th June, 10th July, 1st August 2025

Project:

The proposal is described as: “The construction of two commercial buildings, along with car parking spaces, EV charging facilities and access road”

LPA:

South Holland District Council

Executive Summary

The following is a summary of baseline ecological conditions identified at the time of survey and work you will need to commission to obtain planning permission and/or comply with legislation and other policy.

Overall Summary

An invertebrate survey at Holbeach Road, Spalding (c. 1.3 ha) in June–August 2025 identified that the site provides habitat for specialist invertebrate assemblages, despite the limited records of species with conservation designations. Notably, felled trees provide valuable deadwood habitat and combined with the scrub and grassland mosaic, the site has the ability to support specialist invertebrate assemblages throughout their life cycles. Despite its small size and isolated nature, the site is of value to invertebrates and may also act as a “stepping-stone” habitat.

Results

- Four species of note were recorded, including one Nationally Scarce (NS) beetle and three Hymenoptera with legacy conservation designations, and the site has potential to support stag beetle (*Lucanus cervus*), a NS Species of Principal Importance (SPI), which is also protected from sale under Section 5 of the Wildlife and Countryside Act 1981.
- Whilst a moderately diverse invertebrate assemblage was recorded, the analysis reflects relatively low conservation value in terms of protected / rare species, however, results are constrained by limitations, particularly the absence of spring sampling, which likely under-represented nectar- and blossom-feeding species.
- Deadwood resources, scrub–grassland mosaics, and flower-rich areas were identified as the most important habitats, supporting valuable specialist assemblages, likely of value to the local area. A small, relict wetland assemblage was also noted, which supported a NS ground beetle *Stenolophus teutonius*.
- Despite its small size, relative landscape isolation, and missed seasonal survey window, the results highlight valuable habitat structure and deadwood resources on site.

Impacts & Recommendations

The proposed development will result in the loss of these habitats, leading to a moderate impact on site invertebrates. To minimise impacts and retain ecological function:

- **Deadwood:** Retain best examples of deadwood or freshly felled tree trunks during site clearance where feasible, to re-locate to western boundary. Removal of broadleaf deadwood to be performed under the supervision of an **Ecological Clerk of Works (ECoW)**, given the potential presence of stag beetle and/or their larvae.
- **Scrub–grassland mosaics:** Compensation through habitat bank unit purchase. Attempt to mimic lost features by using a variety native floral and scrub species within landscaping, where feasible.
- **Wetland features:** Compensation through habitat bank unit purchase. A common feature in the wider landscape, species likely to disperse.

Further information including conclusions, justifications, precautionary measures and opportunities for biodiversity enhancement, is provided within the body of the report.

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Version control

Status	Issue	Name	Date
Draft	1.0	Author: Lucy Pocock, MSc, BSc (Hons), ACIEEM, Mem.RES – Bowland Ecology, Quality Assurance: Sarah Birtley, MBiolSci (Hons), MCIEEM – Bowland Ecology	26/09/2025
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Proportionality

The work involved in preparing and implementing all ecological surveys, impact assessments and measures for avoidance, mitigation, compensation and enhancement should be proportionate to the predicted degree of risk to biodiversity and to the nature and scale of the proposed development. Consequently, the decision-maker should only request supporting information and conservation measures that are relevant, necessary and material to the application in question. Similarly, the decision-maker and their consultees should ensure that any comments and advice made over an application are also proportionate. This approach is enshrined in Government planning guidance, for example, paragraph 185 of the National Planning Policy Framework for England. The desk studies and field surveys undertaken to provide a Preliminary Ecological Appraisal (PEA) might in some cases be all that is necessary.

(BS 42020, 2013)

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1.0 Introduction

Background

Bowland Ecology Ltd was instructed to undertake an Invertebrate Survey (variously referred to as the; “survey, report”) by Arbtech, on behalf of Commercial Development Projects Ltd. The project, site, and client details are named on the title page. A plan of the proposal is provided in Appendix 2.

The report is based on information from previous reports (see below), a desk study, and a suite of site surveys during 2025.

The site comprises a small area of native, species-rich, mixed scrub lined with neutral grassland and dry ditches, situated within urban fringe of Spalding Town Centre, which is located within the South Holland district of Lincolnshire. The site is bordered by main linkway roads to the north and west, with intensively farmed arable fields to the south, and a residential property to the east. The wider landscape is characterised predominantly by urban overspill within an agricultural landscape.

The site is subject to plans for the development of two commercial buildings, along with car parking spaces, EV charging facilities and an access road.

Previous Reports, Conclusions and Recommendations

Previous ecological reports have been produced for the site. These comprise the following:

- **Preliminary Ecological Appraisal (PEA) (Seedman Foreman, May 2024).**
- **Reptile Survey (Arbtech, 2025)**

An Excel file is also appended, with full details of the invertebrate species recorded at the site:

- **BOW17.1834_Spalding Invertebrate Data_2025**

Relevant information from the PEA and other reports is incorporated within the report. The PEA desk study identified notable invertebrates within the search radius comprising small heath (*Coenonympha pamphilus*) and wall butterfly (*Lasiommata megera*), both SPI. It also noted several commonly occurring invertebrates during the site visit, in particular *Lepidoptera* species. Due to the species rich grassland and scrub mosaic in conjunction with wetland and deadwood features, a suite of invertebrate surveys were recommended. This report presents the results of Phase 2 invertebrate surveys.

Site Visit Based Conclusions

Whilst a moderately diverse invertebrate assemblage was recorded, the analysis reflects relatively low conservation value in terms of protected / rare species, however, results are constrained by limitations, particularly the absence of spring sampling, which likely under-represented nectar- and blossom-feeding species. Despite these constraints, deadwood resources, scrub-grassland mosaics, and flower-rich areas were shown to provide locally important habitat, supporting specialist assemblages and species of note. While the site’s small size, isolation, and missed seasonal survey window restrict confidence in the absolute species list, the results highlight the ecological importance of structural diversity and deadwood resources for sustaining invertebrate interest both on site and within the local landscape. From this, it is not unreasonable to extrapolate the likely high value of the site to local invertebrates during the Spring flowering period.

Aims

Three surveys alongside passive trapping was employed to gather information on invertebrates and their habitats present at the site.

Using this information, the survey aims thus to;

- 1) Using the methodology and scoring systems set out in Dobson/Lee (2017), conduct a Habitat Quality Assessment.
- 2) Using Pantheon (the successor to ISIS (Invertebrate Species-habitat Information System), obtain a Species Quality Index (SQI) score and thus determine the quality of the habitats on site for invertebrates, alongside noting any specialist assemblages that may be present.
- 3) Identify individuals of, or potential for, invertebrate species of conservation importance present at the time of the field survey, including legally protected species, Species of Principal Importance (SPI) for biodiversity in England (s41 species), Red Listed / Red Data Book species, and/or Nationally Rare or Scarce invertebrates, or otherwise notable records / assemblages.

The conclusions drawn from the assessment will facilitate the following assessments of;

- 1) Conservation value of the site for invertebrates.
- 2) Impacts upon invertebrates and their magnitude.
- 3) Recommendations for compensation, mitigation and/or enhancement.

The results will inform any resultant follow-up work or report updates.

2.0 Surveyor and Limitations

Surveyor Experience and Qualifications

All field surveys were performed by Lucy Pocock MSc, BSc (Hons) ACIEEM, Mem.RES, with assistance from Lauren Fairfax BSc (Hons). Lucy holds an MSc degree in Entomology and is an experienced invertebrate field surveyor, with previous works including surveying invertebrates for Natural England, the Lancashire Wildlife Trust, and the National Trust, amongst many other personal and consultancy-based projects over the course of a 7 year career. Lauren F is a skilled Ecologist and assisted mainly with double manning surveys and collection of traps, alongside helping with sweep surveys.

Limitations

Specific limitations comprised the following:

Survey Timing/Number of Visits

- The site is formed of a grassland scrub mosaic. Scrub is most valuable to invertebrates throughout Spring, the main flowering period. This site in particular has a species rich scrub mosaic thus is likely of peak value to nectaring invertebrates during the Spring. Due to the late commissioning of surveys, the Spring flowering period was missed. Therefore, the species list is highly likely to be constrained. In the interest of proportionality given the small size and isolated nature of the site, it will be appropriate to precautionarily use the given species list as proxy for Spring diversity, to sufficiently account for this constraint. This constraint must also be considered with regards to Pantheon data processing (see below).

Deadwood survey techniques

- Deadwood survey techniques can be difficult and / or destructive. Given the size of the deadwood (large trunks unable to be moved or rolled), the small size of the site, and thus overall finite deadwood resource, destructive survey techniques were not employed. To account for this vane traps were strategically set around the site, which will account for this constraint.

Desk Study Resources

- Data gleaned from the desk study is based upon information provided by third parties. This has not been independently verified by Arbtech Consulting Limited. Publicly data from British Geological Society and the Landis Soils App is of low resolution and ground truthing may be required to inform any required habitat creation works. Data on Magic cannot be relied upon to capture all Important Habitats, especially where they occur at the small and fragmentary scale. Further, information on priority habitats with MAGIC may not be accurate. Habitats on-site have been ground truthed.

Species-complexes and hybrids

- Certain taxa comprise 'micro-species' within larger "aggregates" the identification of which requires highly specialised skills and knowledge. Flies (Diptera) are specific examples. In addition, taxonomy is in constant flux and new species and sub-species as well as varieties of named species are continually being named. Where such species existed and if they were deemed to be valuable toward the overall site evaluation, they were sent to national experts for identification. For example, difficult Diptera groups were sent to Geoff Wilkinson. Notable species or those with conservation statuses are retained within the Bowland Ecology reference collection, should further examination be necessary.
- Species identification was restricted to those groups considered to provide the most meaningful results in relation to evaluating the habitats present on site (Drake *et al.* 2007). This means that not every specimen present on site will have been collected and/or identified.

Pantheon (was 'ISIS')

- It should be noted that the confidence in the Pantheon analysis is reduced where survey work does not follow the precise ISIS sampling protocols (developed primarily for condition assessments of designated sites). Since the objective of the survey was to identify a broad range of invertebrates across key areas of habitat, the methods employed do vary slightly from the ISIS protocol. In such instances Webb *et al.* (2018) advises that caution is applied when using the assessments, and that confidence in scores should be

considered as 'Medium' for semi-ISIS compliant samples. In the present context, the analysis is considered to be broadly indicative; and may therefore help to understand which assemblages within the survey area are likely to be important. However, as the Spring season was missed the survey is only 'semi-compliant' as the survey may have missed species whose flight or emergence period is earlier in the year.

- Species with nature conservation statuses are highlighted with the Pantheon software, based on a series of Species Status Reviews¹ being undertaken. However, some species are automatically excluded from Pantheon analysis if they are not listed on the database. This is usually if there is limited/lacking habitat and resource associations or an absence of status review. All reasonable effort has been made to ensure that the most recent publications at the time of writing have been reviewed for each species, including amending any discrepancies. However, there is no guarantee that all have been captured, given the nature of invertebrate recording and reporting.
- At the time of writing the draft Aculeate Hymenoptera status values in Pantheon have reverted to those of the 1991 Status Review. As such, every effort has been made to manually review up-to-date status' for Hymenoptera.

All limitations have been considered during the evaluation of the site and in any further recommendations made.

3.0 Desk Study & Site Description

Desk Study Methodology

The aim of the desk study was to identify the presence of any legally protected species and/or SPI for the conservation of biodiversity (Section 41 NERC Act 2006), noted nearby which may utilise habitats on the site.

Local records of protected species within 1 km of the site were obtained from existing data search information provided within the PEA. The Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk) was reviewed for information on habitats in the wider area. 1 km was considered sufficient in this instance, given the small size of the site.

Additional information has been obtained through desk-based internet searches with the NBN Atlas (www.nbnatlas.org), taxa specific websites (e.g. BWARS Website www.bwars.com), and Natural England/JNCC Species Status Review² publications for information on species distribution and conservation status. Information on long term/seasonal weather trends was sourced from the Met Office website (www.metoffice.gov.uk). The British Geological Society Mapping Tool was used to explore the geology of the site (www.geologyviewer.bgs.ac.uk) and the Buglife Mapping Tool was used to determine Important Invertebrate Areas (www.buglife.org.uk/our-work/important-invertebrate-areas) and B-Lines (<https://www.buglife.org.uk/our-work/b-lines/>).

¹ Species Status Reviews are research documents authored by taxonomic specialists, which assess the current nature conservation status for species against both international criteria (IUCN – International Union for the Conservation of Nature), and national criteria relevant to Great Britain.

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Desk Study Results

2025 Weather Trends

Summer 2025 has been marked by exceptional warmth, abundant sunshine, and persistent dry conditions across much of the UK.

While recent rainfall and unsettled weather have brought some relief, the impacts of prolonged dry spells remain significant. The southeast and central south district experienced an average maximum temperature of 23.53°C and a mean of 18.15°C. Sunshine hours were the highest in the UK at 725.3, while rainfall remained low at 125.7 mm, 74% of the season's average and continuing the trend of warm, dry, and sunny conditions in southern England (Met Office 2025).

Site Context and Landscape Assessment

Landscape and Local Habitats

Located on urban fringe, the site is poorly connected to a wider quality semi-natural landscape, being bounded by main link-way rounds and associated infrastructure, the nearest connecting habitat is an intensive arable landscape. This limits the sites value for invertebrates, and is reflected in the species assemblage which contains many arable pest species.

Site History and Management

The scrub habitat has formed from a parcel of rough, unmanaged grassland. Figs. 1 – 4 below show the transition of the habitat over time, it is unclear whether the scrub community has been intentionally planted, however, the high diversity of species suggests that it may have. The current habitat appears mature and unmanaged, except for evident deer browsing which is maintaining small pockets of open grassland within the dense scrub canopy. The habitat is on the verge of succession to a young woodland, with semi-mature silver birch and ash beginning to create an upper canopy. Along the eastern boundary, there has been the felling of several conifer and birch trees by the adjacent landowner, which has created valuable deadwood habitat on and directly adjacent to the site. A lack of ditch management has evidently choked the watercourses, resulting in them being dry for the majority of the season.



Figures 1 – 4 in order from left to right: **2005** – rough, potentially grazed grassland, appears marshy/wet; **2016** – grassland with scattered scrub, also note the transition to arable land in the adjacent fields; **2020** – dense scrub with pockets of grassland; **2025** – mature scrub beginning to create a closed canopy.

Geology and Soils

Bedrock geology: Oxford Clay Formation - Mudstone. Sedimentary bedrock formed between 166.1 and 157.3 million years ago during the Jurassic period.

Superficial deposits: Tidal Flat Deposits - Clay and silt. Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.

Aspect

The site is situated on flat, open ground, allowing maximum sunlight penetration but leaves some areas vulnerable to winds. In particular, the Eastern and Southern aspects, along with grassland glades within the scrub provide warm, still air habitats suitable for invertebrates.

Statutory and Non-Statutory Designated Sites

There are no statutory designated sites within the 1 km search radius.

There is a single non-statutory designated Local Wildlife Site (LWS) 'Coronation Channel' Located 0.35 km west of the site, comprising a drain lined with rank grassland.

Habitats of Principal Importance

22 parcels of Deciduous Woodland – the nearest is showing with the redline boundary, however ground truthing has confirmed this is not a priority woodland habitat. The next nearest area is located within Festival Gardens, 100 m northwest. However, the site is fragmented from this habitat by the A16 road.

7 parcels of Coastal Flood Plain Grazing Marsh (CFPGM) – the closest of which is shown as being located on site. Ground truthing has confirmed that this site does not qualify as CFPGM at present though google earth indicates it may have in the past (See Fig. 1 above, 2005). Likewise, the areas outlined as CFPGM 20 m west across the A16 do not qualify, which mainly comprise developed land. The nearest potential areas are 0.5 km south of the site, which are partially connected to the site via arable field margins.

2 parcels of Mudflats – the nearest is located approximately 0.65 km north west of the site, associated with the banks of the River Welland.

Important Invertebrate Areas & B-Lines

The site is not located within a Buglife Important Invertebrate Area or B-Line. Nor is it reasonably close to/contextually related to one.

Biological Records Data/Notable Species

Existing biological records, including protected and notable invertebrates, were obtained from the Preliminary Ecological Appraisal (PEA). Records included several moths and butterflies. Of these, only two butterfly species hold a formal conservation designation: the small heath (*Coenonympha pamphilus*) and the wall (*Lasiommata megera*). Both are listed as SPI, with the wall also classified as *Near Threatened* on the IUCN Red List. These species typically favour short sward and bare ground habitats with dry soil conditions. Such habitat is very limited on site, and neither species was recorded during the present survey; therefore, they are not considered further within this report.

Other invertebrates listed as SPI in the PEA—such as the dark spinach moth (*Pelurga comitata*), dark-barred twin-spot carpet (*Xanthorhoe ferrugata*), buff ermine (*Spilosoma lutea*), cinnabar moth (*Tyria jacobaeae*), dot moth (*Melanchra persicariae*), and shaded broad-bar (*Scotopteryx chenopodiata*)—were incorrectly assigned official SPI status. These species are included on a “research only” list, a legacy from earlier Biodiversity Action Plan (BAP) categories, and therefore are not currently afforded protection or considered of conservation significance. Several widespread butterfly species were also recorded during the PEA but are of no conservation concern.

Stag beetle (*Lucanus cervus*) is a NS, SPI, which is also protected from sale under Section 5 of the Wildlife and Countryside Act 1981, with potential to occur locally. Although not recorded within the PEA, the NBN Atlas holds a single record from central Spalding in 2007, just outside the 1 km desk study area. Stag beetles are strongly associated with veteran oak trees and broadleaved woodland containing suitable deadwood. While this habitat type is not well represented on site, broadleaved woodland is beginning to establish, with oak trees and quality broadleaved deadwood present. These features may provide some suitability in the absence of other optimal habitat in the area.

4.0 Field Survey

Field Survey Methodology

Habitat Quality Assessment (Dobson, Lee, 2017).

A proxy assessment of invertebrate habitat quality was conducted on arrival using a semi-quantitative protocol developed by Dobson (2011). The method evaluates nine key habitat elements recognized as critical for invertebrates across broad geographic areas:

- 1) decaying timber, 2) rotational management, 3) Spring & Autumn nectar sources, 4) botanically-poor wetland, 5) structural patchwork, 6) still air habitat, 7) connectivity, 8) ecoclines, and 9) bare earth.

A tenth element allows recording of other significant microhabitats or features deemed valuable via professional judgement. Each element is scored 0–3 based on defined criteria (Appendix 5), with the lower score applied if features fall between grades, to clearly distinguish higher-quality habitats.

A score of three indicates potential need for follow-up species-level surveys. The assessment requires no species identification and provides a rapid proxy measure of habitat suitability for integration into Extended Phase 1 Habitat Survey. The full scoring criteria can be viewed in Appendix 5, along with the detailed criteria objectives.

Weather Conditions

Weather conditions were optimal on all survey occasions. The table below displays survey dates and detailed weather conditions.

Weather conditions during invertebrate surveys					
Date of survey	Temperature (°C)	Cloud Cover (%)	Wind (Beaufort)	Rain	Moon Phase
04/06/2025 (active survey 1 & moth trapping)	21	20	0-1	Nil	Waxing crescent
10/07/2025 (active survey 2)	19	10	0-2	Nil	Full moon
01/08/2025 (active survey 2 & moth trapping)	21	80	1-3	Nil	First quarter

Survey Effort

The surveys were conducted over three visits in June – August (see above). The Spring sampling period was missed due to late instruction (see limitations). The final August visit was brought forward given the progression of the summer in southern counties during 2025. Due to prolonged warm weather and drought, much of the grassland had already gone to seed by late June, which significantly impacts its value to pollinating species.

Active and Passive Sampling Methodology

Survey methods were adapted from standardised guidance outlined in Drake *et al.* (2007). Selected groups were targeted, based on groups which are characteristic of scrub and grassland matrix and which have sound literature available including Hymenoptera (Aculeata), Coleoptera, Hemiptera, and Diptera. Survey plots were chosen within perceived optimal examples of that particular habitat.

Habitat information was briefly recorded at each sample point and the abundance of floristic species was measured using the DAFOR³ scale, however, full habitat descriptions are outlined in the PEA (Seedman Foreman, May 2024), which should be read in conjunction with this report.

Active Sampling

Quantitative active sampling was performed comprising sweeping/spot sweeping, vacuum sampling, ground searching, and tree beating as outlined in Drake *et al.* (2007). Active surveys comprised three visits spaced throughout the field season. Invertebrates requiring collection were caught with a pooter and immediately stored in 70% Isopropanol. The collection of invertebrates followed good practice guidance⁴; specimens which could be readily identified on-site were not collected and those requiring collection were limited to two individuals per species where feasible.

Pitfall Trapping

Passive sampling was undertaken with pitfall traps in a transect format of 7 traps spaced approximately 2 m apart (Drake *et al.* 2007). Traps were pegged in place along with 2 x 2 cm metal mesh over the entrance to limit bycatch. A rain cover was used to prevent overflow and dilution of preservative in wet weather, or prevent evaporation during droughts (see Appendix 4 for example photographs). Each trap contained around 2-3 cm of preservative comprising a 1:1 ratio of Propylene Glycol and water, with several drops of washing up liquid to disrupt surface tension. The traps were

Water Traps

Water traps were installed at umbellifer level in suitable habitats to mainly target nectar feeding species such as solitary bees and wasps, alongside other foraging Hymenoptera and Diptera (Table 2). This comprised a trio of blue, white, and red dishes (see Appendix 4 for example photographs), with preservative as detailed above. The traps were set for the duration of June – August and emptied monthly.

Vane Traps

Bespoke vane traps, made from clear Perspex and plastic bottles/buckets, were deployed to capture canopy-dwelling and deadwood-associated species (See Appendix 4 for photographs). Traps were either suspended at various canopy heights using paracord or attached to trunks with brackets. Placement was strategic to maximize interception potential, for example, near likely wood-borer exit holes or along flight paths at habitat edges and ecoclines.

All traps were set for the duration of June – August and emptied monthly; collected contents were stored in a fridge until sorting.

Moth Trapping

Moth surveys were conducted in June and August using a portable actinic Heath trap (5W, 12V), placed on a 200 × 200 cm white sheet. This trap type was considered suitable given the lack of mains power on site. Traps were operated until approximately two hours after sunset, then left overnight and checked at 6 a.m. the following morning.

Identification

Species identification was performed by Lucy Pocock and Geoff Wilkinson. Lucy identified primarily Coleoptera (beetles), Hemiptera (true bugs), Lepidoptera (butterflies & moths), Odonata (crickets & grasshoppers), and Hymenoptera (Aculeates – bees & wasps). Lucy specialises in beetles and has over seven years' experience in identification. Geoff Wilkinson is a highly skilled Entomologist specialising in Diptera with special interest in the larval taxonomy and ecology of hoverflies and other Cyclorrhaphan flies and is an iRecord verifier for such.

³ The DAFOR scale is a standardised measure of plant abundance, where the acronym DAFOR denotes 'Dominant' 'Abundant' 'Frequent' 'Occasional' and 'Rare' occurrences of each plant species.

⁴ <https://www.benhs.org.uk/resources/collecting/>

Species identification was primarily performed with the aid of a 7x-90x Stereo Zoom Inspection Industrial Microscope and LED-6W Spot Light with diffuser. Where detailed identification of genitalia required a higher magnification, a 40x-2500x binocular compound microscope was used. Several dichotomous keys, as listed within the reference section, were utilised during the process.

Liaison with local and/or national recorders was pursued with difficult specimens or those requiring a second opinion/verification. In particular, most record confirmation was provided by the Tanyptera Trust at the Liverpool World Museum and the confirmation/verification process within iRecord and several other special interest groups.

Results

Habitat Quality Assessment (Dobson, Lee, 2017).

Habitat Description

The site consists of an unmanaged, mature scrub–grassland mosaic that is beginning to develop a more closed canopy. The scrub is highly species-rich, suggesting possible historic shrub planting. Dominant shrub species include hawthorn (*Crataegus monogyna*), field maple (*Acer campestre*), blackthorn (*Prunus spinosa*), elder (*Sambucus nigra*), guelder rose (*Viburnum opulus*), holly (*Ilex aquifolium*), wild privet (*Ligustrum vulgare*), dogwood (*Cornus sanguinea*), and dog rose (*Rosa canina*), with bramble (*Rubus fruticosus* agg.) and honeysuckle (*Lonicera periclymenum*) forming localised dense outer margins.

Successional processes indicate the site is likely to develop into young woodland within the next 10-20 years, with silver birch (*Betula pendula*), wild cherry (*Prunus avium*), sycamore (*Acer pseudoplatanus*), ash (*Fraxinus excelsior*), oak (*Quercus robur*), crab apple (*Malus sylvestris*), and pear (*Pyrus communis*) establishing a taller canopy. Evidence of deer browsing was recorded, creating small grassland glades within the scrub. These glades were species-poor and dominated by bent grasses (*Agrostis* spp.), cocksfoot (*Dactylis glomerata*) and Yorkshire fog (*Holcus lanatus*), with frequent vetch (*Vicia* spp.), but provided valuable warm, sheltered conditions for invertebrates with excellent ‘still-air’ formation.

The southern and western scrub edges form ecoclines that grade into species-rich neutral grassland with a diverse, tussocky sward. This habitat was not recorded in the PEA—potentially because it lay outside the redline boundary or because the survey was conducted outside the optimal survey window. However, for the purpose of assessing invertebrate suitability and conservation value, these grasslands are considered important components of the site’s overall habitat mosaic.

Within the grassland, floristic composition was dominated by bent grass, Yorkshire fog (*Holcus lanatus*), and false oat-grass (*Arrhenatherum elatius*), with abundant vetch and wild carrot (*Daucus carota*). Frequent species included white clover (*Trifolium repens*), rosebay willowherb (*Chamerion angustifolium*), and horsetail (*Equisetum* spp.), while occasional records comprised St John’s wort (*Hypericum* spp.), reed sweet-grass (*Glyceria maxima*), canary reed-grass (*Phalaris arundinacea*), bull thistle (*Cirsium vulgare*), creeping thistle (*Cirsium arvense*), Californian poppy (*Eschscholzia californica*), common nettle (*Urtica dioica*), brome (*Bromus* spp.), sow-thistle (*Sonchus* spp.), broadleaved dock (*Rumex obtusifolius*), ribwort plantain (*Plantago lanceolata*), mugwort (*Artemisia vulgaris*), cleavers (*Galium aparine*), cow parsley (*Anthriscus sylvestris*), and knapweed (*Centaurea nigra*). To the south, this grassland is bounded by a dry ditch overgrown with common reed (*Phragmites australis*), reed sweet-grass, and reed canary grass.

Along the western boundary, the neutral grassland–scrub ecocline extends partly across a 2 m high earth embankment with small areas of bare earth cliffs. Further west, the grassland grades into a short sward with patches of bare ground. The community here appears to result from recent pipeline or cable installation works and subsequent reinstatement. Here, the sward is dominated by common couch (*Elymus repens*), camomile (*Matricaria* spp.), and horsetail (*Equisetum* spp.), with abundant bristly ox-tongue (*Helminthotheca echioides*), and occasional lesser bird’s-foot trefoil (*Lotus corniculatus*), spear thistle (*Cirsium vulgare*), white clover, and Yorkshire fog.

All site ditches were dry at the time of survey. On the eastern boundary, the scrub terminates abruptly at a disused track. The track surface is moss-covered, providing further sheltered

still-air habitat between the scrub and the adjacent dry ditch, which was choked with common reed and hawthorn scrub. This area also contained a variety of deadwood, largely from recently felled conifers, with additional contributions from silver birch.

Quality Assessment

The table below details the quality assessment scores, following the criteria outlined in Appendix 5. As several categories scored 3 or above, alongside there being potential for stag beetle on site, a suite of terrestrial invertebrate surveys was performed. The results of these are listed in the relevant sections below

Habitat Quality Assessment Results (Dobson, Lee, 2017).		
Habitat	Score	Notes
1. Decaying timber	3	In proportion to the site's size, there is a notable deadwood resource along the eastern boundary and within several scrub glades. This largely comprises recently felled conifer (<i>Pinus</i> spp.) and silver birch (<i>Betula pendula</i>), left whole and in situ with exposed root plates and some standing stumps. Together, these features provide valuable deadwood habitat. Their positioning in semi-shaded areas, combined with pockets and linear still-air zones, creates favourable microhabitats. Although the resource is limited to relatively recent material (rather than veteran trees or late-stage decaying timber) it is still likely to attract an assemblage of specialist saproxylic invertebrates, particularly beetles and potentially stag beetle (<i>Lucanus cervus</i>).
2. Rotational management	0	No rotational management evident. Deer browsing present by a herd of roe deer.
3. Spring and Autumn nectar sources	3	A diverse tree and shrub mix provides an excellent spring foraging resource for the site and likely local area. Later flowering species such as wild carrot and buddleia are abundant, further providing a late-season foraging resource.
4. Botanically poor wetland	1	Dry ditches in site, choked with common reed, potentially a relic from historic CFPGM.
5. Structural Patchwork	3	Scrub-grassland matrix provides an excellent structural patchwork, in the context of the sites small size. Mixed deadwood and brash piles, earth cliffs and mounds, ground depressions and hollows, alongside tussocky grass provide microtopographic variation which add to this patchwork.
6. Still air habitats	2	In general, the site is quite exposed, particularly along the western boundary abutting the A16. However, due to the structural complexity of the habitats present, various areas of still air habitats exist. This score is let down by the vast majority of flower-rich grassland being exposed to prevailing winds.
7. Connectivity	1	This site is relatively isolated from any other quality habitats within the landscape. Particularly as the north and western edges are bounded by main roads and urban infrastructure. High intensity arable fields about the southern and eastern boundaries.
8. Ecoclines	2	There are some good examples of ecoclines, albeit on a small scale, particularly along the southern, eastern, and western edges, where scrub grades into neutral grassland and ditches.
9. Bare earth	1	There are small examples of bare earth cliffs along the western bund. Exposed root plates also off a thick bare earth substrate.
10. Other category	N/A	N/A

Invertebrate Species**Distribution Across Taxonomic Orders**

A full species list can be viewed in the Appended Excel file accompanying this document: 'BOW17.1834_Spalding Invertebrate Data_2025'. In summary, there were 339 records comprising 235 invertebrate species, found at the site. This is a smaller than expected species list for a southern site, however, this site is significantly limited by its size and position within the landscape. Nevertheless, a number of species with conservation designations and/or noteworthy statuses were found, along with specialist assemblage's indicative of quality habitat. The table below breaks down the species list by order, with the red parenthesis indicating the number of species found with conservation designations and/or noteworthy statuses.

Distribution of Species Across Taxonomic Orders	
Taxonomic Group	Number of species (no. of notable species)
Coleoptera (beetles)	69 (1)
True fly (Diptera)	58
Lepidoptera (moths)	29
Hemiptera (true bugs)26Hymenoptera (bees, wasps, and ants)	24 (3)
Lepidoptera (butterflies)	9
Orthoptera (grasshoppers and allies)	3
Raphidioptera (snakefly)1Neuroptera (lacewing)	1

Conservation Designations & Notable Records

One of the records holds an official current conservation designation⁵ of Nationally Scarce (NS), three others have legacy designations⁶, which remain in place whilst the new designation system is revised / updated within Pantheon for Hymenoptera. Whilst potentially out of date, Legacy Designations may still hold relevance and professional judgement will be used for a final determination in such cases; these are summarised in the Table below. One species of 'SPI – research only' status was also record (cinnabar moth), as mentioned above, this does not translate into a formal SPI status. The "research only" list, is a legacy list from earlier Biodiversity Action Plan (BAP) categories, it is not currently afforded protection or considered of conservation significance.

Stag beetle (*Lucanus cervus*) was not recorded during the surveys; however, a female lesser stag beetle (*Dorcus parallelipipedus*) was captured in a pitfall trap. Detecting stag beetle can be challenging, as larvae typically develop within buried wood and standing stumps, making standard survey techniques either highly destructive or impractical; such methods were avoided (see limitations). In addition, most deadwood on site comprises large, mature trunks that could not be moved; this form of deadwood is particularly valuable due to its slow decay process.

⁵ See: <https://pantheon.brc.ac.uk/content/scoring-systems> for full details on scoring systems used for nature conservation designations.

⁶ <https://pantheon.brc.ac.uk/news/2023/revision-conservation-status-output>

Given the presence of lesser stag beetle, together with known local records of stag beetle and the species' mobility, the absence of records here does not confirm absence. It remains possible that stag beetle is present or may colonise the site in future as suitable deadwood resources persist.

Invasive species

Several invasive and/or 'pest' species were recorded. This is not unusual given the sites position within an intensively farmed landscape. These included bean seed beetle (*Bruchus rufimanus*), the bug (*Nysius huttoni*), and cypress bark beetle (*Phloeosinus thujae*).

Notable species of conservation interest recorded			
Species	Conservation status	Ecology	Image
Coleoptera			
Stenolophus teutonius	Nationally Scarce (NS)	This is a predatory ground beetle, found in the mud and shallow leaf litter of drawdown zones with a wetland environment. Small examples of this habitat can be found within the ditches on site, though suitable habitat is very limited. This species is likely surviving as a small relict population from the former GFPGM.	 Stenolophus teutonius Image source: Lucy Pocock (Author)

Species	Conservation status	Ecology	Image
Hymenoptera			
<i>Lasioglossum malachurum</i>	Nb – legacy rating, Hymenoptera status under review [Scarce].	Once regarded as a scarce species of the south, it has expanded rapidly in both numbers and range over recent decades and is now locally common as far north as the Midlands. It is likely that the legacy rating is no longer applicable. It inhabits a range of environments, particularly short sward areas with bare, dry, clay-rich soils, where it can establish large nesting aggregations with disproportionately large nest tumuli for such a small bee. It visits a wide variety of flowers and spring blossoms and is known to be a host of <i>Sphecodes monilicornis</i> and possibly the oil beetle <i>Meloe proscarabaeus</i> (Falk, 2025).	 Image source: Steven Falk (See Falk 2025).
Species	Conservation status	Ecology	Image
<i>Lasioglossum pauxillum</i>	Notable a (Na) - legacy rating, Hymenoptera status under review [Scarce].	Historically a scarce species of southern England, it has undergone a marked expansion in the 21st century, spreading across much of central England. It is likely that the legacy rating is no longer applicable. It occupies a broad range of dry habitats, particularly calcareous grasslands and brownfield sites. A variety of flowers and spring blossoms are visited, and it is thought to be a host of <i>Sphecodes crassus</i> and <i>S. ferruginatus</i> (Falk 2025a).	 Image source: Steven Falk (See Falk 2025a).

Species	Conservation status	Ecology	Image
Microdynerus exilis	Nb - legacy rating, Hymenoptera status under review [Scarce].	Added to the British list in 1937 from Hampshire, this species was at first regarded as a great rarity confined to southern England. In recent decades, however, it has gradually increased in frequency and extended its range northwards to Warwickshire and Norfolk. Nevertheless, its range and populations are still very restricted and it is appropriate to retain the 'Scarce' designation here. <i>M. exilis</i> favours hot, sunny, sheltered sites with scattered shrubs or open scrub, including chalk downland, quarries and other brownfield habitats, heathland, broad woodland rides, and coastal locations. It nests in hollow twigs and old beetle burrows in wood, constructing cells from mud and fine pebbles. These are provisioned with the larvae of certain small weevils (Falk 2025b).	 Image source: Lucy Pocock (Author)

5.0 Invertebrate Analysis

Methodology

Analysis

There is currently no standard frame of reference to evaluate the nature conservation value of invertebrate assemblages for the purposes of Ecological Impact Assessment (EcIA). There are various methods available but these have been designed for specific purposes (i.e., Site of Special Scientific Interest SSSI Common Standards Monitoring). Reliance is also placed on professional judgement of the surveyor and associates. Each methodology has its advantages and disadvantages, so for the purposes of this study, more than one approach is used to draw a conclusion, which also incorporates professional judgement. A summary of evaluation methods applied for this project are described below.

Pantheon

Invertebrate species data was inputted into Pantheon⁷ software Version 3.7.6. Pantheon is an online tool developed by Natural England and the Centre for Ecology & Hydrology to analyse invertebrate data. The analysis produces two key metrics; a 'SQI' score and a 'SAT' score, both are described below. These metrics can be used to indicate site/habitat quality and assist in management decisions by revealing the key ecological resources present.

Species Quality Index (SQI)

The Species Quality Index (SQI)⁸ is a numerical scoring system which measures the quality of a location on the basis of the invertebrates present, through counting and assigning scores weighted towards rarer species. There is presently no published guidance on what SQI score might be classed as 'good' or 'average', as this might vary between habitats and regions (e.g., northern vs. southern Britain). Generally, a habitat with an SQI score exceeding 125 is likely to be of some value, however, professional judgment will be used when interpreting any SQI scores. Any SQI score based on less than 15 species should be treated with caution as it may be unreliable.

⁷ <https://pantheon.brc.ac.uk/>

⁸ <https://pantheon.brc.ac.uk/tags/sat>

Species Assemblage Types (SATs)

Species Assemblage Types (SATs)⁹ are generally regarded as the most valuable metrics for assessing site quality. This is because SATs are made up of species with a high degree of habitat specialisation, such species tend to be both uncommon and representative of sites supporting habitat of quality in terms of conservation value. However, SATs often require targeted sampling of specific habitat features and are not always well represented in broadscale surveys designed to gain an overall, or baseline assessment of a site's value and conservation designations, such as the survey at this site. The results may still be of use to inform future surveys and/or indicate key resources/habitats on site.

A level of confidence must be applied when reporting SATs, as certain methodologies must be applied when collecting data. The data in this report is considered 'semi-ISIS compliant' and therefore, only a medium degree of confidence can be placed on the SAT results¹⁰.

Results***Species Quality Index (SQI) Assessment***

The site achieved an overall SQI of 104, based on a list of 213 scoring species. This indicates that, in general, the site is of relatively low conservation value for invertebrates. However, when broken down by habitat type, the results provide a clearer indication of which habitats contribute most significantly to the site's invertebrate assemblage. The table below presents the division of scoring species across the main habitat categories recorded on site.

Overall, the majority of habitats support a broad range of commonly occurring species. Of particular note, however, is the SQI score for decaying wood. While still relatively low compared to expectations for a southern site, this score stands out against the generally low values recorded for other habitats. This suggests that the deadwood resource does contribute positively to invertebrate interest. The SAT results (see Species Assemblage Types (SATs) Assessment section below) further support this interpretation, confirming that the deadwood resource is of good quality and supports a specialist saproxylic assemblage.

Marshland and running water habitats returned very high SQI values. However, these scores are less reliable due to the small sample size (fewer than 15 species recorded), reflecting the very limited extent of wetland habitat currently present. The site lies within a floodplain, and aerial imagery indicates that it was formerly wet grassland bounded by ditches, MAGIC suggests that it may have been CFPGM. It is therefore likely that the wetland invertebrate community identified represents a relict assemblage from these former habitats. The wetland community is not a significant contributor to invertebrate interest at the site; however, it does hold a NS beetle.

⁹ <https://pantheon.brc.ac.uk/tags/sat>

¹⁰ <https://pantheon.brc.ac.uk/lexicon/reported-condition>

Species Quality Index (SQI) Assessment score breakdown

Broad biotope	Habitat	No. of species	% representation	SQI	Species with conservation status	Conservation status [Legacy ratings]
open habitats	tall sward & scrub	102	4	100	2	[Nb] Section 41 Priority Species - research only
	short sward & bare ground	29	2	100	2	[Nb] [Na]
tree-associated	arboreal	24	2	100		
	decaying wood	22	2	114	1	[Nb]
	shaded woodland floor	16	1	100		
	wet woodland	1	<1	100		
wetland	marshland	11	1	155	1	NS
	running water	5	<1	160		
	acid & sedge peats	4	<1	100		

Species Assemblage Types (SATs) Assessment

The SAT results indicate that there are specialist assemblages on site, some of which are / are almost within 'favourable condition', indicating habitat quality. Full results are in the table below, the most notable are discussed.

A212 Bark and sapwood decay, is represented by 18 species, falling just 1 short of 'favourable' condition. The assemblage type is found in and around trees and shrubs generally, but usually in older specimens. The assemblage is primarily associated with death and decay of the outer woody tissues of the trees or shrubs - the sapwood and bark. It is particularly found in dead limbs that are either still attached to living trees or recently fallen (Webb et al. 2018). These results indicate that the recently felled deadwood resource on site is of high quality and valuable for specialist saproxylic assemblages, particularly given the likely scarcity of such habitat in the surrounding urbanised landscape. The retention of whole felled specimens in situ has created a diverse range of microhabitats, with timber of varying sizes, forms, and decay stages, which is clearly supporting a strong invertebrate assemblage.

Flowering trees and scrub species on site are likely to provide vital early spring foraging resources for deadwood-associated assemblages. Although this period was not sampled, the value of these resources can be inferred from the species already recorded. In combination with the scrub-grassland mosaic, the deadwood resource offers the full range of habitat features required to support invertebrate life cycles, including foraging, nesting, larval development, and overwintering. It is therefore highly likely that additional species would have been recorded had spring surveys been undertaken, and the habitat can be considered of high local importance for this specialist assemblage.

A215 Epiphyte fauna, is represented by 3 species, falling 1 short of 'favourable' condition. It tends to be found with deadwood assemblages and is associated with the surface of trunks and branches of trees and shrubs. It includes grazers of epiphytes such as algae, lichens and mosses, as well as their predators and parasites. Some epiphyte feeders are also found on epiphytes growing on rocks and boulders (Webb et. al 2018). The presence of this assemblage further supports the conclusion that deadwood habitat on site is of ecological value.

F001 Scrub edge, is represented by 8 species, falling 3 short of 'favourable' condition. 8 specialist species is still a relatively high number given that the site is not a SSSI (which the SAT metric was developed for). The assemblage type is found where scrub or woodland grades into or is interspersed with open areas of grassland, heathland or early successional vegetation types. The juxtaposition of open vegetation with woody development is important to insects with complex life cycles that require different microhabitats at different stages of development

(Webb et. al 2018). This type of habitat dominates the site, and the presence of 8 SAT assemblage species indicates it is of at least moderate quality. The SQI for the SAT assemblage is also high (138), though the SQI calculation is based on fewer than 15 species, thus must be viewed with caution. Nevertheless, it still highlights the quality of this habitat.

F002 Flower Rich Resource, is represented by 17 species, being above the favourable threshold by 2 species. This is a resource-based assemblage type that is expressed across a large range of habitats. The poor discrimination in favour of high conservation quality assemblages militates against the use of this assemblage type as a 'stand-alone' assemblage suitable for SSSI site selection, but its expression on a range of habitats gives it good complementary use. This result indicates that the site is floristically rich and that such areas are likely to be an important resource for foraging invertebrates, which may rely on other areas of the site for fulfilling their life cycle. For example, the Scace mascon wasp *Microdynerus exilis* where females nest in hollow twigs and old beetle burrows in wood, are likely to use the deadwood resource on site, supported by the foraging resource within the flower-rich grassland, particularly males, which have a preference for umbellifers (Edwards 1997).

Considering all of the above together, its likely that the site and its habitats are of moderate local importance for specialist invertebrate assemblages, with a degree of higher value placed on deadwood habitats.

Species Assemblage Types (SATs) Assessment score breakdown									
Broad biotope	Habitat	SAT	No. of species	% representation	SQI	Species with conservation status	Conservation status	Code	Reported condition
tree-associated	decaying wood	bark & sapwood decay	18	4	117	1	Nb	A212	Unfavourable (18 species, 19 required)
open habitats		rich flower resource	17	7	100	2	[Nb] [Na]	F002	Favourable (17 species, 15 required)
open habitats		scrub edge	8	4	138	1	Nb	F001	Unfavourable (8 species, 11 required)
open habitats		scrub-heath & moorland	3	<1	100	1	[RDB 3]	F003	Unfavourable (3 species, 9 required)
open habitats	short sward & bare ground	open short sward	2	1	100			F112	Unfavourable (2 species, 13 required)
		epiphyte fauna	2	10	100			A215	Unfavourable (2 species, 3 required)
wetland	acid & sedge peats	reed-fen & pools	1	<1	100			W314	Unfavourable (1 species, 11 required)
tree-associated	decaying wood	fungal fruiting bodies	1	1	100			A213	Unfavourable (1 species, 7 required)
open habitats	short sward & bare ground	bare sand & chalk	1	<1	100			F111	Unfavourable (1 species, 19 required)
tree-associated	decaying wood	heartwood decay	1	<1	100			A211	Unfavourable (1 species, 6 required)

6.0 Survey & Analysis Conclusions

Conclusions

The following conclusions are based on the results of the field survey and pantheon analysis.

Overall Conservation Value

The site supports a moderately diverse invertebrate assemblage, with 235 species recorded across multiple orders. While the overall Species Quality Index (SQI) of 104 suggests that the site is of relatively low conservation value, the presence of specialist assemblages and several species with conservation designations indicates a quality habitat with locally important ecological value. Its value lies in the deadwood resource, flower-rich grasslands, and scrub-grassland mosaic, which together sustain both generalist and specialist invertebrate communities throughout their life cycles.

Key Habitat Contributions

Decaying wood: The most valuable habitat for invertebrates on site, supporting saproxylic species (those associated with deadwood). The A212 bark and sapwood decay assemblage nearly reaches “favourable condition,” highlighting the ecological importance of retained timber, stumps, and root plates.

Scrub edges and structural mosaics: Ecoclines and tussocky grass-scrub mosaics (F001 assemblage) provide microhabitats critical for species requiring multiple vegetation structures throughout their life cycle, along with creating still air habitat and an excellent early Spring foraging resource.

Flower-rich grassland: Provides essential nectar and foraging resources, supporting a range of pollinators and species such as *Microdynerus exilis*. The F002 assemblage type indicates that floral resources are both abundant and significant for sustaining local invertebrate populations.

Specialist and Notable Species

Several notable species or those with conservation designations were recorded, including:

- *Stenolophus teutonius* (Nationally Scarce).
- *Microdynerus exilis* and other Hymenoptera with legacy “scarce” designations.

Lesser stag beetle (*Dorcus parallelipipedus*) was recorded, suggesting potential for presence or future colonisation by the protected stag beetle (*Lucanus cervus*) due to suitable deadwood habitat and records in the wider area.

These records indicate that, although the site is relatively small and isolated, it provides quality habitat with resources supporting notable invertebrates and specialised assemblages.

8.0 Impacts and Recommendations

Impact Assessment & Recommendations

Impact Assessment

The site is subject to proposals for development, which will comprise the removal of habitat on site in its entirety. In its place, will be mixture of urban infrastructure comprising sealed surface and buildings, with likely low-ecological value ornamental landscaping.

Therefore, the development will directly impact locally important invertebrate assemblages and the habitats that support them, through direct loss of habitat. The loss of this site would represent a moderate impact on invertebrates due to the removal of key structural habitats (deadwood, scrub–grassland mosaics, and flower-rich areas) and specialist resources. While the site is small and isolated, it provides unique local ecological niches that are likely not well represented in the surrounding urban and intensively farmed landscape. The site likely serves as a ‘stepping-stone habitat’ and micro refuge; thus, loss of such may increase fragmentation and reduce local biodiversity connectivity, which may indirectly impact upon invertebrate populations in the local area.

In addition, as invertebrates are a mobile species, there is potential for stag beetle to occur on site within deadwood habitat. Thus, in the absence of mitigation, there is potential to disturb or harm this species through habitat removal, alongside negatively impacting local populations.

Other indirect impacts may include a reduction in invertebrate habitat quality both on site and in the wider area, through construction activities which may cause dust and chemical pollution and siltation via run off.

A more detailed impact assessment for key invertebrate habitats is listed within the table below.

Habitat	Key Functions for Invertebrates	Impact of loss
Decaying wood	Supports saproxylic beetles (including potential for stag beetle), epiphyte feeders, and bark/sapwood assemblages. Provides microclimates and breeding sites.	Moderate - High impact: removal would impact specialist deadwood-dependent species / assemblages, including scarce and locally notable species and a quality assemblage, with slow recovery if lost.
Scrub–grassland mosaics & ecoclines	Offers microhabitat diversity, shelter, and transitional zones critical for species with complex life cycles.	Moderate impact: loss of structural complexity would reduce opportunities for specialist edge species, and diminish habitat connectivity for mobile invertebrates.
Wetland ditches (limited extent)	Supports small relict population of wetland invertebrates, including the nationally scarce <i>Stenolophus teutonius</i> .	Low – Moderate impact: habitat is limited, but loss would eliminate relict populations with scarce species.
Flower-rich grassland	Provides nectar and pollen resources, foraging habitat for pollinators, and supports species with dual habitat requirements (e.g., nesting in deadwood, foraging in flowers).	Moderate impact: loss would reduce food availability for pollinators and species dependent on flower resources, potentially fragmenting local populations.

Recommendations

The following recommendations are suggested to mitigate and/or compensate for the loss of invertebrate habitat and/or reduce impacts to invertebrate species and/or assemblages on site.

Deadwood habitat

A key area of deadwood has results from adjacent ownership felling trees, which have spilled over in abundance, into the eastern site boundary. Retention of some elements of deadwood is important to maintaining structural habitat, microclimatic conditions, and continuity for specialist saproxylic invertebrates. When combined with complementary habitat creation (flower-rich grassland, scrub), these measures can significantly reduce the ecological impact of development.

As a precaution due to the potential for stag beetle, **where removal of broadleaf standing deadwood, stumps, and large fallen deadwood trunks is required, an Ecological Clerk of Works (ECoW) shall be present to observe for stag beetle and their larvae during removal / movement of dead wood.**

Retention of On-Site Deadwood

It's unlikely that the majority of deadwood within the red line boundary can be retained. However, site clearance may consider the following:

- Preserve the best examples of cleared wood for re-use within mitigation. For example; standing deadwood, larger felled trunks, and root plates, along with a variety of sizes and decay stages to support different specialist species, e.g., smaller twigs and branches for epiphyte feeders, larger logs for bark- and sapwood-dependent beetles.

Movement of Deadwood

The preserved deadwood from site clearance may be placed adjacent to the western boundary (near to public highway) in the following manner:

- Optimal placement of select clearance material:
 - Partial shading or dappled sunlight.
 - Shelter from prevailing winds.
 - Existing or recreated scrub/woodland structure.
- Reposition logs and stumps in a variety of orientations: lying, half-buried, or upright stumps, mimicking natural conditions.
- Try to retain microhabitat features, such as bark, cavities, and fungal colonisation, which are essential for specialist invertebrates.
- Cluster logs in small piles or linear arrangements to create still-air zones, enhancing microclimatic conditions.

Scrub & grassland mosaic

The entire scrub & grassland mosaic, with a diverse structure and flower rich resource, will be lost to facilitate the development. The development will be purchasing Biodiversity Net Gain (BNG) units from a habitat bank, preferably within the local area, to compensate for this loss.

The following measures are suggested to be included within landscaping wherever feasible, to increase invertebrate interest within the local urbanised area:

- Incorporate microtopographic variation (small mounds, depressions) to provide diverse microclimates.
- **Grassland:** Use a mix of native grasses and forbs with diverse flower sizes, shapes, and colours, along with staggered flowering periods, to support a diverse range of nectar- and pollen-feeding invertebrates throughout the season.

- **Scrub:** Plant native shrubs with an early flowering resource such as hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), spindle (*Euonymus europaeus*), guelder rose (*Viburnum opulus*), and native fruit trees such as wild cherry (*Prunus avium*) and crab apple (*Malus sylvestris*).
- Maintain friable bare soil patches within landscaping, for ground-nesting invertebrates.
- Ensure continuous flowering across the season by including early, mid, and late-flowering species.

Wetland Features

Whilst only a small proportion of the site, the wetland features support a nationally scarce species, whilst not legally protected, it still holds a degree of conservation value. The ditch on site is to be removed and will be compensated for through the purchase of compensatory BNG habitat units, preferably within the local area. There is a network of ditches within the wider landscape, including those associated with CFPGM, thus it is expected that associated species will be able to disperse.

Additional Management Considerations

- Follow best practice guidelines to mitigate impacts which may arise from chemical and dust pollution, and siltation of habitat¹¹.
- Avoid treating or chemically treating deadwood, as this can kill dependent invertebrates.
- Avoid using pesticides in landscaping.
- Use native, broadleaf tree species in landscaping schemes.
- Timing of removal aiming to avoid periods of high invertebrate activity (e.g., spring–early summer for emerging adults), where possible.

Survey Validity

This report is valid for 24 months from the date of issue. Should no works progress within this time frame, further survey may be necessary due to the mobility of animals.

¹¹ <https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/>

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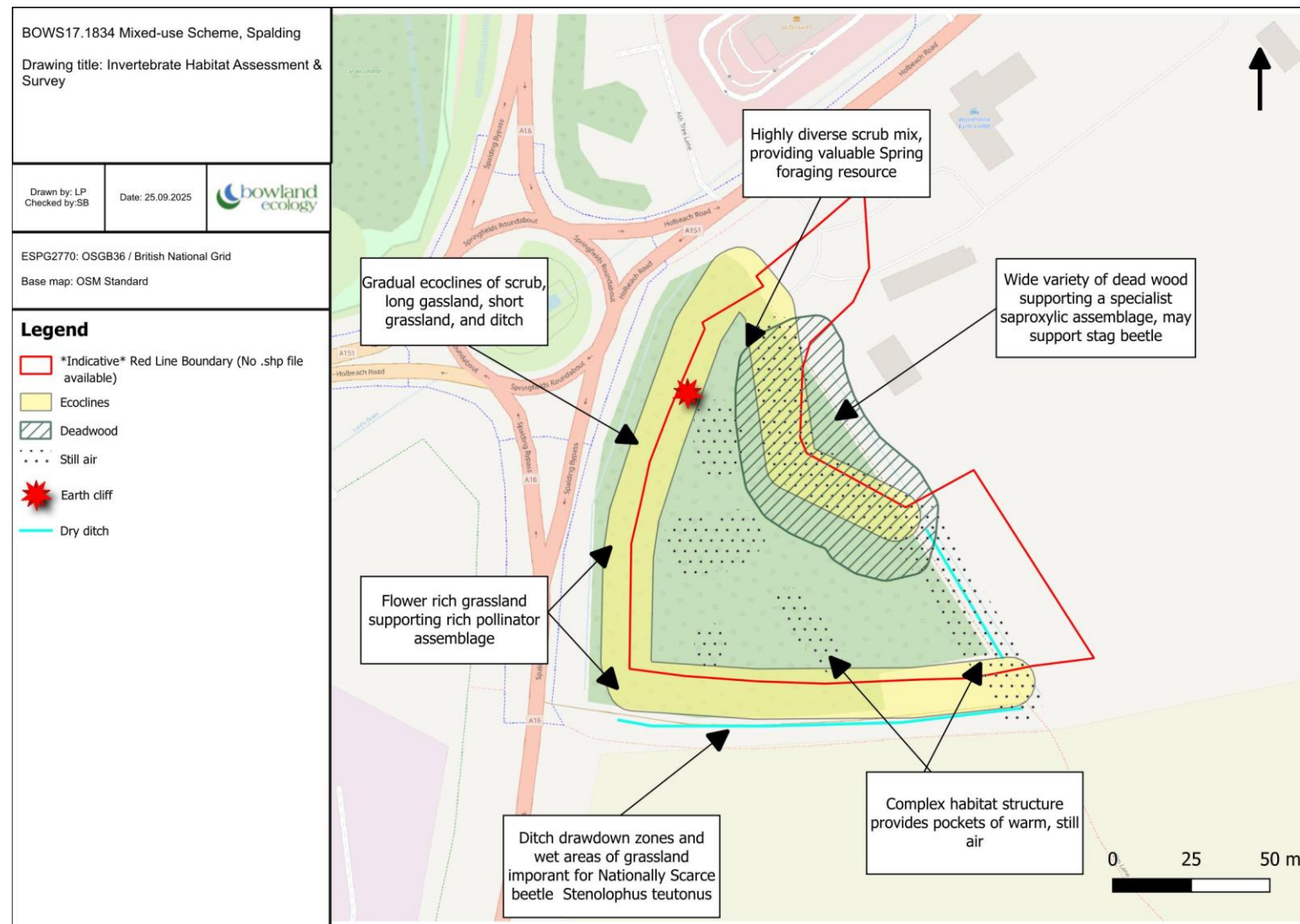
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Appendix 1 – Invertebrate Habitat Map



Appendix 2 - Proposed Development Maps



Appendix 3 - Photographs

Reference	Photograph	Notes
Vane 1		Bespoke vane attached to felled conifer tree with 7 exposed root plate (TF 26647 23844).
Vane 2		Vane attached to hawthorn, located within a scrub glade (TF 26629 23786).

Vane 3		Vane trap attached to fallen deadwood branch within a scrub glade (TF 26646 23797).
Dish 1		Water trap along ditch margins (TF 26708 23768).
Dish 2		Water trap within scrub/grassland ecocline (TF 26632 23742).

Pitfall set up	 3 Jun 2025 20:59:05 52.7968N 0.1237W pitfall row 1 - Spalding	Typical pitfall trap set-up.
Pitfall row	 3 Jun 2025 20:58:58 52.7968N 0.1237W pitfall row 1 - Spalding	Row of pitfalls, situated at the junction of long grassland and short sword and bare ground (TF 26602 23787).
Moth trap	 3 Jun 2025 21:18:27 52.7963N 0.1226W Moth trap June - Spalding	Moth trap at scrub edge (TF 26655 23738).

Earth cliff		Earth cliff along the western scrub edge with evidence of nesting holes, where there is a 2 m high earth mound (TF 26623 23835).
Short sward		Short sward and bare ground habitat, arising from recent disturbance (T F26599 23783).

Glade		Open glade within scrub, providing warm, still-air habitat (TF 26634 23788).
Ecocline		Example of an ecocline on site, where scrub gently grades into unmanaged grassland, which continues to short sward bare ground (TF 26602 23787).
Deadwood		Felled conifer and birch trees remain whole and in-situ (TF 26653 23811).

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Mixed Use Scheme, Holbeach Rd, Spalding PE12 6JP

Track with dry
ditch



Dis-used moss covered track bordering the eastern scrub boundary and a dry ditch. This track provided excellent still air habitat and was a particular 'hot spot' for invertebrate activity (TF 26707 23763).

Appendix 4 - Summary of scoring criteria for habitat assessment (After Lee, 2017).**Summary of scoring criteria for habitat assessment (After Dobson and Lee, 2017).****1. Scoring Criteria for Decaying Timber**

Habitat could not be reliably assessed (e.g. due to lack of access)	Unknown	k
Decaying Timber habitat insignificant or undetectable	Zero	0
Standing or fallen decaying timber observed or thought likely to provide (in terms of quality or quantity) a minor saproxylic resource (e.g. woodpiles of stacked sawn logs)	Minor	1
A number of living mature native or archaeophyte trees showing signs of decay; <i>or</i> A quantity of standing or fallen decaying timber observed or thought likely to provide (in terms of quality or quantity) a significant saproxylic resource	Moderate	2
A number of living large or post-mature native or archaeophyte trees with heart rot, rot holes, large decaying branches; and broken branches; <i>or</i> Veteran trees present within semi-natural habitat	Major	3

2. Scoring Criteria for Rotational Management

Habitat could not be reliably assessed (e.g. due to lack of access)	Unknown	k
No or negligible evidence of Rotational Management	Zero	0
Clearly observable but relatively minor evidence of Rotational Management	Minor	1
Evidence that some degree of Rotational Management is in play, either by design or as an unintended consequence of other activities	Moderate	2
Evidence that Rotational Management is a key management strategy, and that it is performed in such a way that it is likely to promote invertebrate habitat quality	Major	3

3. Scoring Criteria for Spring- and Autumn Nectar-Sources

Habitat could not be reliably assessed (e.g. due to lack of access)	Unknown	k
DAFOR Rare: or no significant Spring or Autumn nectar sources observed	Zero	0

DAFOR Occasional	Minor	1
DAFOR Frequent	Moderate	2
DAFOR Dominant or Abundant	Major	3
4. Scoring Criteria for Botanically Poor Wetland Features		
Habitat could not be reliably assessed (e.g. due to lack of access)	Unknown	k
Botanically-poor wetland habitat insignificant, or not meeting the given criteria	Zero	0
Botanically-poor wetland habitat present as a significant but minor component	Minor	1
A moderate amount of stable or semi-stable botanically-poor wetland habitat	Moderate	2
Significant area of stable/semi-stable botanically-poor wetland habitat present	Major	3
5. Scoring Criteria for Structural Patchwork		
Habitat could not be reliably assessed (e.g. due to lack of access)	Unknown	k
Structural patchwork component insignificant or absent	Zero	0
A true structural patchwork present, but comprising <20% of the parcel	Minor	1
A small-medium scale patchwork of structurally diverse habitats occurring as a significant element (20-50%) of the survey parcel) alongside more uniform elements	Moderate	2
More than 50% of the survey parcel comprising a small-medium scale patchwork of structurally diverse habitats	Major	3
6. Scoring Criteria for Still Air Habitats		
Habitat could not be reliably assessed (e.g. due to lack of access)	Unknown	k
No readily apparent structural conformations likely to lead to significant formation of still air habitat (<i>Featureless and exposed survey parcels</i>)	Zero	0
Structural conformations present which are considered likely to give rise to the formation of still air habitat(s) usable by invertebrates, but not compliant with the prescribed criteria for 2 or 3 (<i>Applies to most survey parcels</i>).	Minor	1
Structural conformations present which comply with at least one of the prescribed criteria, recorded in the absence of significant observed invertebrate activity believed likely to be associated with the habitat element	Moderate	2
Structural conformations present which comply with at least one of the prescribed criteria, along with significant observed invertebrate activity believed likely to be associated with the habitat element. (NB: this is only observable 'on the right day' so expect it to be an uncommon observation under most circumstances)	Major	3

7. Scoring Criteria for Connectivity		
Habitat could not be reliably assessed (e.g. due to lack of access)	Unknown	k
Ecologically isolated parcel without significant connectivity to similar and/or complementary semi-natural habitat with an area similar to or greater than the survey parcel	Zero	0
Ecologically semi-isolated parcel with minor but apparently genuine connectivity to an area of similar and/or complementary semi-natural habitat with an area similar to or greater than the survey parcel	Minor	1
Parcel directly connected with-, or closely adjacent (no substantial ecological barriers) to an area of similar and/or complementary semi-natural habitat less than three-times the area of the survey parcel in question; or Parcel connected indirectly (by reason of distance or moderate ecological barriers) to an area of similar and/or complementary semi-natural habitat at least three-times the area of the survey parcel in question	Moderate	2
Parcel directly connected with-, or closely adjacent (no substantial ecological barriers) to areas including similar and/or complementary semi-natural habitat at least three-times the area of the survey parcel in question	Major	3
8. Scoring Criteria for Ecoclines		
Habitat could not be reliably assessed (e.g. due to lack of access)	Unknown	k
No significant ecoclines present in the parcel	Zero	0
Ecocline(s) present but either small, significantly fragmented or of questionable quality	Minor	1
Ecocline(s) clearly present as a moderate-significant component. Good-quality (as assessed in the local context) semi-natural habitat either absent or a minor component. If ecocline(s) extensive then moderately fragmented or lacking clear gradation	Moderate	2
Ecocline(s) clearly present as a significant component, or if less extensive occurring as a clear gradation between habitats, at least one of which is a good-quality (as assessed in the local context) semi-natural habitat	Major	3
9. Scoring Criteria for Bare Earth		
Habitat could not be reliably assessed (e.g. due to lack of access)	Unknown	k
Bare Earth component insignificant or does not meet qualifying criteria	Zero	0
Minor qualifying bare earth component present	Minor	1
A moderate amount of qualifying bare earth component is present. This may include relatively small areas which are observed- or thought likely to be in usage	Moderate	2

Habitat is present which is observed- or thought likely to support a diverse assemblage of Bare Earth invertebrates. This habitat may be localised (in which case a Target Note can be added, in addition to scoring) or dispersed		Major	3
Criteria	Description		
Decaying timber	In general, early decay on living trees is more valuable than old, long-dead, well decayed timber. Broken or split branches are more valuable than sawn or cut ones and standing dead wood is more valuable than fallen timber. Species composition is less important than the type of decay (e.g. degree of moisture, fungal flora, shade or sun-baked). Signs of decaying timber include rot holes, sap runs, fungal fruiting bodies, signs of beetle exit holes and damage caused by foraging woodpeckers. The quantity of dead wood in a survey parcel is important, but small quantities of high quality decaying timber are equally valuable. The quantities of trees present to replenish decaying timber resources as a measure of the habitats sustainability needs to be considered		
Rotational management	This creates and maintains structural diversity. Examples include rotational grass cutting that allows persistence of overwintering patches of un-mown grassland, scrub thinning as opposed to blanket clearance, coppice rotation, staged ditch or pond de-silting. Rotational management can be within the survey parcel or integrated with adjacent parcels.		
Spring and Autumn nectar sources	Nectariferous species, i.e. those plants producing nectar, include early spring flowering species such as goat willow (<i>Salix caprea</i>), violets species (<i>Viola</i> spp.), bluebell (<i>Hyacinthoides</i> spp.), daffodil (<i>Narcissus</i> spp.), and Crocus spp., lungwort (<i>Pulmonaria officinalis</i>), bird-cherry (<i>Prunus padus</i>), blackthorn (<i>Prunus spinosus</i>), ramsons (<i>Allium ursinum</i>). It also includes late summer to autumn flowering species such as aster spp., ivy (<i>Hedera helix</i>), heather (<i>Calluna vulgaris</i>), ragworts (<i>Senecio</i> spp.), and buddleia sp.. Other species including ornamental non-natives may be noted if known to be important nectar sources		
Botanically poor wetland	Examples include shaded woodland ponds and wet woodland, wet flushes and seepages, areas of unstable exposed riverine sediments and inundation zones, decaying vegetation and leaf litter in wet situations and other wetlands that are poor botanically but likely or known to support notable invertebrates nevertheless.		
Structural complexity	This refers to the degree of structural complexity within a survey parcel. Whilst survey parcels are normally delineated in part on the extent of a uniform habitat type (such as unimproved grassland), structural complexity operates at a smaller scale. Structural complexity combines physical features e.g. topographical variation, and biological features i.e. variation in vegetation structure. Examples of good structural complexity are grasslands with scattered scrub, ancient woodland with canopy, shrub and herb layers or sites with varied topography, soil type or hydrology.		
Still air habitats	Typical features that form recognised important still air habitat for invertebrates include enclosed canopy woodlands (typically with higher than ambient humidity), scrub pockets in grassland (shaped to act as baffles on sites that are otherwise exposed to wind), glades and gaps within woodlands, scalloped edges to woodlands or woodland rides (note that straight woodland rides tend to channel the wind), or topographical features that give shelter from wind.		

Connectivity	The degree of connectivity of the survey parcel to adjacent parcels containing similar, or complementary, semi-natural habitat types. Connectivity may not necessarily be via direct contact as many invertebrates are aerial dispersers but the distance between habitat parcels and the barrier effect of habitats between them should be considered. Many invertebrate species require different habitat types for different components of their life history which should be included in the degree of connectivity score.
Ecoclines	These are transitional zones where different habitats grade into one another. Examples include successional sequences (grassland to woodland) and hydrological transition (some coastal habitats or wetland edges). This is more or less linear as opposed to 'structural patchwork', with a distinct blend of intermediate habitats across the ecocline.
Bare earth	A wide range of other invertebrates need bare earth for foraging and basking. However, bare earth habitat is particularly important to fossorial (ground nesting or digging) bees, ants and wasps. Not all bare earth is valuable habitat and it should only be scored if it meets the following specifications: (1) largely un-shaded and preferably south facing, (2) free draining, (3) not susceptible to flooding, and (4) no excessive disturbance from vehicles and pedestrian or livestock trampling.
Other habitats	Reserved for use by surveyors with invertebrate experience where a habitat feature is known to potentially support notable or scarce invertebrates and does not fit any of the above categories.
Other Habitat 1: suitable nesting / over wintering habitat for characteristic brownfield species / assemblages	Brownfields can provide nesting / over wintering habitat for important invertebrate assemblages in the form of friable ground, hollow plant stems, and dead seed heads. In particular, friable ground within south aspect slopes or cliffs, and creeping prostate bramble in open, sunny situations can be favoured habitat.

Appendix 5 – Relevant Legislation

This report provides guidance of potential offences as part of the impact assessment. This report does not provide detailed legal advice and for full details of potential offences against protected species the relevant acts should be consulted in their original forms i.e. The Wildlife and Countryside Act, 1981, as amended, The Countryside and Rights of Way Act 2000, The Natural Environment and Rural Communities Act, 2006 and The Conservation of Habitats and Species Regulations 2017.

Species	Legislation	Offences	Notes on licensing procedures and further advice
Species that are protected by European and/or national legislation			
Stag beetle (<i>Lucanus cervus</i>)	Wildlife and Countryside Act 1989 (as amended) ¹ S.9 (5) (part) only	Part A: Selling, offering for sale, possessing or transporting for the purpose of sale (live or dead animal, part or derivative) Part B: Advertising for buying or selling live or dead animal, part or derivative.	A licence is required for such activities .

Habitats & Species	Legislation	Guidance
Species of Principal Importance for the Conservation of Biodiversity	Natural Environment & Rural Communities Act 2006 S.40 (which superseded S.74 of the Countryside & Rights of Way Act 2000).	S.40 of the NERC Act 2006 sets out the duty for public authorities to conserve biodiversity in England. Habitats and species of principal importance for the conservation of biodiversity in England (identified by the Secretary of State in consultation with NE) are referred to in S.41 of the NERC Act: http://webarchive.nationalarchives.gov.uk/20140605090108/http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx The list of habitats and species was updated in 2007 to ensure that it remained focussed on the correct priorities: https://jncc.gov.uk/our-work/uk-bap/ The criteria for selection included international threat, responsibility and importance, rate of decline/risk, importance of habitats for key species, and other important factors. Ecological impact assessments should include an assessment of the likely impacts to these habitats and species.