Invertebrate Standard Advice for Essex

October 2014

Introduction

This standard advice note is a local pilot which will be subject to regular review as appropriate. It is relevant to all local planning authorities in Essex, and replaces the majority[1] of the individual comments that Natural England has provided in the past when consulted by local authorities on planning applications that potentially affect s41[2] invertebrate species.

This advice is targeted towards brownfield sites, as these are often under greater development pressures. Many invertebrate species (including s41 species) will however be found on **non**-brownfield land (with a similar "open mosaic" habitat structure), and in this instance, much of this advice will still apply. This might apply to habitats such as grasslands (including Thames Terrace Grasslands[3]), coastal grazing marsh (and associated ditches / dykes), and woodland (particularly ancient woodland). It is not possible to cover every eventuality where invertebrates might be a consideration within the planning system, however we have addressed the typical brownfield planning scenario in detail, with some cross-over with other habitats.

If you have any queries or feedback about this advice, please contact Natural England at consultations@naturalengland.org.uk.

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[1] The advice does not replace our comments on protected sites (Sites of Special Scientific Interest, Special Areas of Conservation, or Ramsar sites).

[2] "s41" species were formerly known as UK Biodiversity Action Plan (BAP) species. s41 refers to the relevant section of the Natural Environment & Rural Communities Act 2006 (the "NERC Act").

[3] http://www.essexbiodiversity.org.uk/species-and-habitats/grasslands

Guide to using this document...

...for Local Authority Planners

Our advice is that in making delegated decisions, or in providing recommendations to committees, that all material considerations relating to the impacts on invertebrates have been fully taken into account, based on an appropriate level of information. We suggest that you read in particular **section 1** which sets out Natural England's role as a consultee in the planning process, **section 2** for key planning policy references and basic background information, s**ection 3** which provides an overview of invertebrate considerations within a planning application, **section 4** for information on determining what is "reasonable likelihood" and when surveys should be requested from developers in support of their applications, and **section 8** for details on assigning planning weight in decision making with a local context.

...for Developers

Our advice is that when submitting planning applications, they are accompanied with all necessary information to ensure that they are contemporary, valid, and fully informed by the necessary ecological information. This will help reduce delays which might otherwise occur, and ensure that you are fully aware of any avoidance, mitigation, and compensation measures required, to integrate these into your development proposals. We suggest that you read **sections 2 and 4** in particular to understand the need for invertebrate surveys in the first instance, and commission an appropriate survey(s) from your consultants. **Section 7** gives details on the requirements for mitigation, which should be factored into development design at an early stage.

...for Consultants

Our advice is that the surveys you undertake for your clients are fit-for-purpose, and take into account the particular needs of brownfield ecology, which do not fit neatly into other methodologies. We also advise that your survey is well timed seasonally, and is based on a robust desk study, which factors-in local knowledge. **Sections 4-12** are most relevant to you.

1. Natural England Engagement

Please note that Natural England will continue to provide bespoke advice in the usual manner where planning applications are likely to damage features of a SSSI, and we may refer to this advice note (but without bespoke advice) where applications affecting invertebrates require an EIA. This standard advice replaces the bespoke comments we would have made when applications are submitted:

i) without the relevant invertebrate surveys;
ii) with scoping surveys that recommend further surveys but where these have not been undertaken; and
iii) applications are submitted with detailed invertebrate survey reports.

Please note that Natural England will not arbitrate between developers, their consultant ecologists, and local planning authorities / third parties. It is for local planning authorities to satisfy themselves that they have taken all material considerations into account when reaching planning decisions. The local planning authority is encouraged to make use of their own in-house ecologists if available, or contract-in ecological support from outside, e.g. Essex County Council. Other bodies and individuals with relevant expertise (Essex Wildlife Trust, Buglife) may make comments that will help the Local Planning Authority to fully take account of the environmental value of proposed development sites in the decision making process.

The over-arching aim of these advice notes is to ensure that in reaching these decisions, the local planning authority has all the relevant survey information at the time of making the decision, it can assign an acceptable quality to the assemblage, and add appropriate weight to material considerations when having to balance competing interests.

There will be occasions when some professional judgement is required when reaching a view, particularly on the acceptability of mitigation, however consultant entomologists are expected to be impartial and professional, in particular when they are accredited by professional bodies, such as the Institute of Ecology and Environmental Management (IEEM).

If the local planning authority consults Natural England on an application with an invertebrate survey, we will respond by referring to this standard advice (unless a SSSI is involved). We advise that the local planning authority uses this advice to identify where further information is requested from an applicant. In this advice we have highlighted alert maps and initial site assessment forms to determine whether or not detailed surveys should be requested - this is not the role of Natural England.

2. Background and Overview

The NERC Act lists "species of principal importance for the purpose of conserving biodiversity". These are known as "s41" species, and the list contains nearly 400 invertebrate species. A few invertebrates are separately mentioned in other legislation (The Conservation Regulations 2010, and the Wildlife and Countryside Act 1981), and many others are elsewhere noted for their rarity and are listed in the Red Data Books and other Species Reviews which indicate species of some conservation concern. The purpose of this note is to provide advice to local planning authorities, developers, and ecological consultants, on the consideration of invertebrates in the determination of planning applications in Essex. Natural England no longer provides bespoke advice to every planning application consultation involving invertebrates. We prioritise our engagement in planning to our statutory responsibilities involving European and National protected sites, such as Special Protection Areas (SPA), Special Areas of Conservation (SAC), Ramsar sites, and Site of Special Scientific Interest (SSSI)[4].

The lack of case specific comment from Natural England should not be interpreted as a statement that there are no impacts on the natural environment. Other bodies and individuals with relevant expertise may make comments that will help the Local Planning Authority (LPA) to fully take account of the environmental value of proposed development sites in the decision making process.

s41 species are recognised in planning policy as material considerations, and must therefore be addressed in the planning process. s41 species are specifically highlighted in ODPM Circular 06/2005[5]: "Biodiversity and geological conservation – statutory obligations and their impact within the planning system[6]". Paragraph 84 states that "the potential effects of a development, on habitats or species listed as priorities in the UK Biodiversity Action Plan (BAP), and by Local Biodiversity Partnerships, together with policies in the England Biodiversity Strategy, are capable of being a material consideration in the... making of planning decisions."

Local planning authorities are also encouraged to take account of biodiversity (including brownfield biodiversity) in the National Planning Policy Framework – we draw your attention to paragraphs 109, 111, 113, 117,118, and in particular paragraph 111: "Planning policies and decisions should encourage the effective use of land by re-using land that has been previously developed (brownfield land), provided that it is not of high environmental value." Brownfield habitat that meets the definition of Open Mosaic Habitats on Previously Developed Land (see section 2), is considered a Priority habitat in its own right. It may also hold some species that are Priorities themselves.

Our advice is that the local planning authority is provided with all the required information when an application is submitted to ensure that these collective material considerations can be fully taken into account. The ODPM circular (paragraphs 98 and 99) also sets out the

[4] We will continue to provide bespoke responses to planning applications affecting the invertebrate interest of SSSIs designated for their invertebrate interest (e.g. Canvey Wick SSSI).
[5] At the time of writing, this circular is under review.
[6] http://www.communities.gov.uk/documents/planningandbuilding/pdf/147570.pdf

principle to ensure that ecological surveys are undertaken ***in advance***, and only in exceptional circumstances secured using a planning condition.

For example, Essex County Council have a Biodiversity Validation Checklist. This checklist is a requirement for all major development planning applications to Essex County Council (ECC) as defined by Article 2 of The Town and Country Planning (Development Management Procedure) (England) Order 2010 (as amended). ECC is the determining planning authority for mineral, waste and Regulation 3 applications. This checklist may also highlight where invertebrate surveys are required of developers for the consideration of the planning authority.

In Essex, certain parts of the county are known to be especially important for invertebrates, particularly (but not exclusively) in the south and Colchester area, where many factors combine to form favourable conditions for invertebrate communities of elevated importance. These are the driest parts of the country, with frequent soil water deficit in the months of May through to August. In summer these areas are among the warmest parts of the country with high sunshine levels. The predominant southerly aspect rising from the northern Thames shoreline, the presence of “Thames terrace” grasslands with a free-draining substrate, and a conglomeration of formerly developed brownfield sites with highly variable habitats provide many suitable habitats in which invertebrate assemblages can flourish. These include sites with artificial substrates such as sands, gravels, dredging, pulverished fly ash (PFA), former quarries, former railway sidings, as well as remnants of more natural habitats such as grazing marsh, and coastal borrow-dykes.

The very nature of the substrate deposits on many of these sites (such as exposed sand in quarries, pulverised fly ash dumps, tailings, river dredgings, composite industrial debris) mean that vegetation finds it hard to establish and so the habitat is dominated by low vegetation and much “bare” ground. It is the range and transitions between the two that give so many opportunities for invertebrates, in additional to the increased opportunities for nest or burrow construction, shelter, and exposure to large amounts of warming sunlight.

Such conditions are now very rare in “natural” situations and only found on the better managed heathlands and chalk grasslands, as well as soft rock and slumping earth cliffs. As such, the open mosaic habitats that develop on brownfields have an important role to play in the conservation of a range of rare species and a number of important invertebrate assemblages.

The objectives of this advice are therefore to set out Natural England’s local advice for the consideration of invertebrates in planning applications, including sign-posting relevant local data sources and background information, to set out technical survey standards, and encouraging reporting which reduces ambiguities and increases consistency in site quality evaluation. We believe this information will assist local planning authorities in meeting their biodiversity duties under the Natural Environment and Rural Communities Act 2006, alongside other ecological resources available to them, including in-house (or contracted) ecologist, County Council ecologist, Essex Wildlife Trust, Essex Field Club, local biodiversity action groups (such as Thurrock Biodiversity Action Group), as well as other interested groups and individuals with appropriate levels of expertise.

3. Considering Invertebrates in a Planning Application

The following approach will help to ensure that a planning application is fit-for-purpose:-

We advise that an application:-

- provides relevant planning policy context for brownfield sites;
- identifies whether s41 species or habitats are "reasonably likely" to be present, through the use of a provisional site assessment;
- provides local context with a desk study using appropriate data sources;
- meets or exceeds the survey effort outlined and discusses the 5 key reporting points described in section 6 (site size, connectivity, substrate, wetness, and structure);
- highlights the presence of s41 species or habitats, as material considerations;
- robustly evaluates the importance of the site for invertebrates, for instance through reference to significance levels and / or quality of assemblages (ISIS, SQI);
- identifies and quantifies the impacts of the development on habitats and species;
- sets out appropriate avoidance, mitigation, and compensation measures, and mechanisms for delivery;

If the application is unclear in any of the above areas, we advise that further information (or clarification) is requested.

4. Provisional Site Assessment

How can the presence of s41 invertebrates and habitats be determined? A provisional site assessment should identify any habitats of conservation importance in their own right, and consider if a site supports other features of importance for invertebrates,

Habitat Assessment Where there is a history of development or soil modification at a site the presence of the s41 habitat open mosaic habitats on previously developed land (OMH) should be considered. Sites can be checked against the national OMH inventory published by Natural England and freely available via the OMH website. This inventory distinguishes potential OMH sites from other brownfields and incorporates the All of a Buzz in the Thames Gateway survey maps (see page 9 of this advice note for more information). As with all Priority Habitat inventories some OMH sites may be missing from the inventory. A site's absence on the inventory does not preclude the habitat present meeting the S41 habitat criteria for OMH. The UK definition and description for OMH can be downloaded from the JNCC website.

OMH sites tend to be a poor fit to established vegetation classifications. Attempting to fit brownfield vegetation into the National Vegetation Classification (NVC) or producing plant species lists are not reliable ways of determining the habitat quality of a brownfield site. This approach will normally lead to the biodiversity value of a site being underestimated. Indeed, the individual habitat components of the habitat mosaic may be not conservation priorities in their own right and non-native species which are not invasive often contribute to the value of open mosaic habitats for invertebrates.

We recommend the use of Defra's OMH survey form and handbook to support the identification of OMH in the field during the provisional site assessment. As well as determining the presence of the priority habitat the survey also records a wider range of information such as topographical variation, nectar and pollen sources, vegetation type and vegetation structure to highlight where a site has features of value to invertebrates. This is a reliable and rapid methodology that can be undertaken by surveyors without entomological expertise. In addition to the Defra survey handbook, surveyors new to OMH sites may also find Buglife's pictorial guide to OMH identification useful. Where the survey indicates that OMH is present and significant changes to the site are proposed it may be necessary to undertake a more detailed survey. Further guidance is provided on page 27 of the OMH survey handbook.

Most other sites should benefit from a Phase 1 habitat survey, which acts as a precursor to more detailed and targeted ecological surveys. This survey identifies the major habitat types on a site, and if "extended", will make recommendations for further survey as required. At this stage, the survey can identify s41 habitats, by comparing the Phase 1 and the s41 habitat classifications[7].

[7] JNCC have produced a habitat classification comparative tool, here, whereby Phase 1 and s41 habitats can be aligned.

In addition to habitats and invertebrates, the initial site assessment may identify vascular plants, lichens or bryophytes of conservation concern that are capable of being material considerations in their own right.

Invertebrate Assessment Brownfield sites can also be assessed for their invertebrate value (as distinct from their habitat value) using a brownfield site assessment form developed by the Essex Field Club. This form records some basic habitat information including activity, substrates, wet areas, vegetation types, plant diversity, flower diversity, flower abundance, along with specific plant species groups (positive and negative), to generate a potential invertebrate species diversity assessment of low – medium – high. The website also provides a "help" page to aid interpretation.

This methodology was used for the *All of a Buzz in the Thames Gateway* project, produced jointly by the former English Nature and Buglife. The recommendations of the report were that all sites with medium and high invertebrate potential should have a detailed invertebrate survey undertaken. The project generated maps[8] with sites highlighted according to their status. Whilst these maps are useful, they are unlikely to be comprehensive, and a site's absence from these maps should not be the sole basis upon which a decision not to survey is based.

[8] Maps are available on request from Buglife.

5. Desk Study

Once initial habitat surveys have concluded that a proposed development site contains the s41 habitat "open mosaic habitat on previously developed land" or that the site may have medium – high invertebrate potential, a more detailed invertebrate study is appropriate. Our advice is that this consists of a thorough desk study, combined with a targeted invertebrate survey. This section provides advice on an appropriate invertebrate desk study, and the following section will provide more technical detail on survey methods.

A thorough desk study[9] is undertaken in order to establish which species might readily be expected in a given area, for which survey effort can be targeted accordingly. A good desk study can be especially valuable at establishing local emergence times for particular species, which might display geographical variance. A desk study will also ensure that consultant entomologists working outside their own local "patch" are more fully equipped to make appropriate judgements as to survey findings in other areas. The desk study should be completed prior to field surveys, to ensure appropriate survey planning. If this is not the case, then the desk study is still valuable as it can and should be used to interpret the survey findings, and identify any survey limitations which will then emerge.

Data sources for desk studies will vary from county to county, and even district to district. It is important therefore that appropriate sources are consulted so that all relevant data is collated. This search includes not only biological records data, but also others which may include a local authority biodiversity review, local wildlife sites review, specific invertebrate site and species studies etc. We advise that the following data sources are consulted (and presented) for any invertebrate survey. We recommend that all of those sources are consulted to give a ***background context*** to the landscape within which the brownfield sits. Please note however that it is of limited value in speculating about what "ought" to occur on a brownfield site based on this data search, whilst not putting in the proper survey effort to see what actually is present.

- Essex Field Club – the major source for invertebrate records[10]. The EFC website hosts a Datasearch service[11]. Please note that other commonly used data sources, such as EECOS, do not hold comparable or county records for invertebrates (although can be useful for other species groups[12]). The National Biodiversity Network (NBN) is unlikely to hold records with sufficiently detailed resolution, and the data are not available for commercial use without specific permission from each dataset provider. A desk study which does not utilise a comprehensive invertebrate datasource should be considered inadequate.

- Local Planning Authority Wildlife Sites Survey – e.g. Thurrock Biodiversity Study. This study lists sites, provides a habitat summary, basic management prescriptions,

[9] A desk study is more than just a data search, but should include collation of information on the county distribution, status, and phenology of species.
[10] Comprehensive records for other non-bird groups are also available.
[11] At the time of writing, the Datasearch service is hosted by the Essex Field Club. This may later form a part of the Biological Records in Essex records centre, in which case BRIE should be consulted.
[12] We understand that EECOS no longer provide data to consultancies.

biodiversity issues and recommended surveys. Even if they are old studies, they can still provide useful context.

- Alert Maps – e.g. *All of a Buzz in the Thames Gateway*. Report available here.
- Local Wildlife Sites – sites of local[13] importance for invertebrates may have already been formally recognised. Details and citations of Essex local sites can be accessed here. Please note however that other sites have been recognised as Potential Local Wildlife Sites which are likely to qualify but which did not have sufficient evidence at the time of consideration. Further sites are therefore likely to be added to the local sites list in due course.
- Other key reference material – please refer to the bibliography for details of additional sources for key Essex s41 invertebrates.

[13] The term "local wildlife site" or "LoWS" is used for clarity to refer to sites of county level importance which have historically been referred to by several different terms.

6. Invertebrate Survey Standards

Once the need for an invertebrate survey has been established, and contextual information has been collated in a desk study, the survey itself follows. We advise that you read Organising surveys to determine site quality for invertebrates *A framework guide for ecologists* as an initial reference, and also for more technical information Surveying terrestrial and freshwater invertebrates for conservation evaluation. You may also wish to refer to the references on the IEEM website.

Standards for effective evaluation of open-mosaic habitats / brownfield sites and their invertebrate assemblages

The approach to site reporting and survey needs to be informed by the following points.

Site size - on the whole, the bigger the site the more opportunities it can potentially offer, though some small sites have an immense range of conditions.

Connectivity – is the site part of a string of sites locally, or is it isolated?

Substrate – what is the core substrate across the site, does it vary in extent and depth?

Wetness - does the site have water or seasonally wet areas, either fresh, brackish, or both?

Structure – if viewed as a set of surfaces lying on the tops of the vegetation stands and bare ground, does the site show structural habitat diversity, or is it a uniform planar surface?

The invertebrate survey of the brownfield site should seek to describe the site both structurally and in terms of the nature, extent, and depth of the underlying substrate. The extent, coverage and species range of the vegetative, nectar and pollen resources present on the site also need evaluation. This should be the common standard product for all brownfield and open habitat mosaic sites.

Timing and nature of invertebrate surveys

The May - late September period reflects the crucially important period for many invertebrate assemblages, with judicious tempering through local weather and latitude effects needing to be factored in. Within that window, there should be at least two main survey effort periods (e.g. May - June and August-September), though the more survey the better the understanding will be of the resource. Three – seven days of field work should be seen as a standard, for an “average” site of between 10 – 50ha. Standardised sweeping, spot sweeping from flowers, ground searching, and beating should reveal enough of the fauna for a reasoned assessment. Vacuum sampling can be useful if the effort is standardised. This should not preclude the use of pitfall, water or malaise traps, the passive nature of which can overcome the vagaries of weather. However, trapping methods are not a replacement for active fieldwork, which should be undertaken by a competent, experienced invertebrate specialist for five to seven hours per survey day[14] in summer, with less time usually needed in spring and autumn. For very large sites, survey coverage should be good enough to be able to adequately map sample areas and end up with a visually well covered site.

[14] Survey reports should include the duration of each survey, in addition to the dates on which the survey took place.

Importantly, it is critical to map the areas searched and trapped, and to relate these to the structural survey.

Species groups to target

To manage the costs, do not attempt to generate a full site species inventory. See Appendix 1 for the families to sample depending on the habitats on the site.

Data context and use of status accounts

It is recognised and accepted that surveys are incomplete, and that the aim is not an inventory approach, but enough data (nb but see above for survey effort) from the core taxa to both inform an assessment of the assemblage and to highlight s41 and other "rare" species.

It is recommended that Natural England's ISIS database is used as part of the site survey analysis. The ISIS software[15] uses the standardised species inventory from a site survey to identify the most important habitats on that site. This approach links species with different habitat types within statistically defined "assemblages", and has much less reliance on RDB / rarity status than other techniques. It is therefore particularly valuable where a number of species within an assemblage have doubtful status accounts. We suggest that both the ISIS and Species Quality Index (SQI) approaches are used alongside each other with an appropriate commentary, as they serve linked but distinct purposes. SQI values the whole assemblage, whereas ISIS identifies key habitats within a site (and can be particularly useful in guiding mitigation). Since both are sensitive to survey effort, care should be taken to balance effort across a site, especially where it is very large and the reports seek to separate out different zones. Although ISIS does deliver a SSSI Favourable Condition output, this can only be used if the strict ISIS sampling protocols are used, and should not be believed with less stringent sampling regimes.

The variable progress in updating invertebrate species IUCN threat status accounts must be recognised, and blind adherence to old published Red Data Book status accounts, whilst technically correct, is of limited use. The sources of the species threat status accounts should be identified and referenced. Species Quality Index (SQI) or similar calculations using old RDB values ought to sit alongside more recent Species Review assessments where available, so that a more accurate picture of site quality is given. Personal opinion should be avoided. In Essex[16], a county red data list exists and should be referred to in placing taxa into local context.

The views of the relevant County Recorders should be sought where a different context is made. Whilst this contextual information is of value, the GB context should always be given precedence, as there is always a danger of "locally common" being portrayed as of less importance, even where the species has no other UK locations. Similarly, status account information for less well worked and contextually understood groups should be treated with caution, and it may be unwise to base a conservation argument on such species in isolation.

[15] Please contact Natural England for a copy of the software at consultations@naturalengland.org.uk.
[16] The lack of county red data lists in many other counties means that SQI is problematic outside of Essex.

7. Mitigation and Compensation

Given the number of invertebrate species, specific mitigation measures are not provided. We recommend local authorities seek the advice of their in-house or retained ecologist on the potential impacts and mitigation requirements. Below, however are a number of general points which should be considered when an application may impact upon a s41 invertebrate.

Mitigation is usually the term used for the combination of *avoidance* measures (such as careful timing to remove the impacts or positioning of the development avoid loss of important habitat), *mitigation* (which are actions to lessen or reduce the impact) and *compensation* (measures to compensate for any residual impacts such as replacement habitat). Natural England believes that the process for assessing mitigation should be hierarchical – that avoidance measures should be considered first, followed by measures which seek to ameliorate or reduce the severity of the impact only if it is not possible to entirely avoid an impact. Compensation measures should only be considered if impacts cannot be entirely avoided or ameliorated. We advise that alternative[17] sites for development are considered as part of initial avoidance mitigation where significant harm is likely (see NPPF paragraph 118, first bullet). The NPPF states that if significant harm cannot be avoided, mitigated, or compensated, then planning permission should be refused.

Mitigation should include, for example, redesign of the scheme to avoid impacts upon protected invertebrate species through the timing of works or the design of the development, minimising the scale of the impact by reducing the footprint of the development and creation of new habitat. Best practise prioritises *in-situ* (on-site) mitigation, although in some situations *ex-situ* (off-site) solutions may be appropriate[18]. The latter is likely to require greater than 1:1 habitat replacement ratio, on a case-by-case basis.

Proposals to translocate species should be treated as a compensation measure of last resort. Such schemes require extensive monitoring, should be managed by someone with experience of translocation projects, and detailed knowledge of the ecology of the species involved, and can be expensive to undertake. Many invertebrate species have exacting ecological requirements, and as a result translocation schemes carry a high risk of failure. Where translocation schemes are proposed, particular note should be taken of the expertise and experience of the individual managing the scheme, and to the length and methodology of any monitoring scheme. You may wish to require that an applicant provides evidence of the success of any translocation scheme prior to undertaking any work that would result in the loss of the original habitat. This could be secured through the use of an appropriately worded condition.

Proposals to bring post-development habitat remnants into favourable management for invertebrate species should be accompanied by undertakings that allow for the continuation of management for sufficient time to safeguard the survival of the species, as well as a suitable monitoring scheme. Some invertebrates have complex habitat requirements, including variation in vegetation structure, or areas of bare earth or dead or decaying wood,

[17] Assessment of “alternatives” is also a formal part of the Environmental Impact Assessment process, and needs to be specifically discussed within an Environmental Statement.
[18] Off-site solutions may include Biodiversity Offsetting projects.

for example. Remnant habitat post-development must be sufficiently large, and be linked, to permit these species to complete their entire lifecycle. The relative rarity of the some of the important substrates mean that attention should be placed on resource conservation, and an acknowledgment that many other substrates, even if of larger area, will be of lower value to much of the fauna.

8. Approach to Site Quality Evaluation

Section 4 gives some information on how site quality is evaluated for invertebrates using a Species Quality Index approach, bearing in mind the limitations of some of the RDB data (and the need to include both old and revised status values). We also promote the use of the ISIS software, which can be used in parallel with other methods.

Natural England has reviewed the s41 list and highlighted a prioritised list of s41 species which are more likely to be encountered in on brownfield sites in Essex, and for which arguably greater conservation effort should be given, on account of elevated threats from development. Whilst this list is subjective to a degree, it stems from local experience, and attempts to assist LPAs in assigning planning weight with greater local context[19]. These species are:-

1) Brown banded carder bee *Bombus humilis*

2) Shrill carder bee *Bombus sylvarum*

3) Red-shanked carder bee *Bombus ruderarius*

4) The solitary wasp *Cerceris quadricincta*

5) 5-banded tailed digger wasp *Cerceris quinquefasciata*

6) Black-headed mason wasp *Odynerus melanocephalus*

7) Phoenix fly *Dorycera graminum*

8) Distinguished jumper spider *Sitticus distinguendus*

9) Tall fescue plant hopper *Ribautodelphax imitans*

10) Scarce four-dot pin-palp *Bembidion quadripustulatum*

11) Mellet's downy-back *Ophonus melletii*

12) Sea-aster colletes bee *Colletes halophilus*

13) Salt-marsh short-spur beetle *Anisodactylus poeciloides*

14) Fancy-legged fly *Campsicnemus magius*

15) Hornet robberfly *Asilus crabroniformis*

Species 12-14 have strong links with saline habitats, and are more likely to be found on brownfield sites within a coastal setting. Species 15, the Hornet robberfly, whilst not a typical brownfield species, is included on account of its historic (and possible remnant) associations with south Essex pastures grazed by cattle, horses, or rabbits.

[19] Please note that all UK BAP species are capable of being material considerations, and this prioritised list should not be taken to imply that others should not be given due weight when making decisions.

Environmental Impact Assessments (EIA) require the significance of impacts to be assigned at a certain level, usually whether local / district / county / national / international. The IEEM has published criteria to help define significance levels. Natural England suggests that the following additional criteria can help distinguish county, national, and international significance levels, where greater weight is applied.

County – The site is already designated as a local wildlife site, or qualifies against local site criteria, even if it has not been formally assessed. We refer you to the Essex Wildlife Trust's local wildlife site selection criteria in making this judgement, and in particular criteria HC27 "post-industrial sites", HC28 "small-component mosaics", SC18 "UK BAP Priority Invertebrates", SC19 "important invertebrate assemblages", and SC20 "notable 'flagship' macro-invertebrates".

National – The site is already designated as a Site of Special Scientific Interest (SSSI). In these cases Natural England will provide bespoke advice. SSSIs represent a series, and do not include every qualifying site exhaustively. Hence a site may be of national importance even though it does not have formal SSSI status. A judgement as to whether a site is of national importance can be made using Natural England's Invertebrate Species-habitat Information System[20] (ISIS) if the sampling protocols are strictly adhered to. This database tool assigns "favourable condition" status for a variety of habitats according to the invertebrate species list entered. "Favourable condition" is defined in a SSSI context, although again this does not mean that the site should or will be designated as such.

International – Some international sites are designated for their invertebrate communities (or the habitats that they support), such as Special Areas of Conservation (SAC), or Ramsar sites. Development affecting these sites will require bespoke comment from Natural England, and assessment against the Habitats Regulations[21].

Projects requiring an Environmental Impact Assessment are also required by these regulations to consider **cumulative impacts**, particularly where other consented developments have yet to begin, or be completed. This is especially important for invertebrate species[22] which operate in meta-populations[23] over a large area, to ensure that the impacts to that meta-population are properly understood, and have been adequately assessed. At present we do not provide bespoke advice on EIAs in relation to s41 priority species unless they are also protected or a notified feature of a SSSI or European Site.

[20] Please contact Natural England for a copy of the software at consultations@naturalengland.org.uk.
[21] The Conservation of Habitats & Species Regulations 2010
[22] Particularly bumblebees.
[23] A metapopulation consists of a group of spatially separated populations which interact at some level. This structure offers greater stability to the population as a whole.

9. Report Quality

Whilst it is not Natural England's role to advise consultants how to write reports, we highlight a few key points which can significantly improve the quality of survey reports, reduce ambiguities, and aid interpretation. We advise that:-

- reports include details of the surveyor's qualifications and experience, to demonstrate clearly their suitability to undertake the required survey. This includes sub-contractor specialists if used for identifications;
- reports make every effort to highlight positive invertebrate habitat features of the site, and map and illustrate them with colour photographs;
- survey results are clearly presented, disaggregated from any other data, with the survey dates recorded and time spent undertaking survey on site clearly reported, and that data sources are given;
- the sampling techniques used are clearly stated, along with their spatial and numerical deployment across the survey site. This is especially important on very large sites. Maps here are often very useful;
- reports avoid introducing value judgements when using habitat descriptors. For instance, the terms "ruderal" and "rank" may be misleading, and would be better explained with reference to structure, sward height, and species composition etc. See Appendix for further details on recording site structure;
- the results of surveys are provided to the county recorders and local record centre, so that the information can be validated and included in county records, in accordance with IEEM guidelines.

10. Bibliography

This bibliography highlights key reference material for a suggested prioritised s41 species list. It is not exhaustive, and comprises English Nature / Natural England research reports, relevant articles from the Essex Naturalist journal, and a selection of assorted references and reports which may be helpful. The references could be used to help determine whether a certain species might be reasonably likely to occur on a site, and thus require survey, and in the design of mitigation and compensation.

Buglife. A review of the impact of artificial light on invertebrates.

Buglife. Planning for brownfield invertebrates.

Buglife. Species management sheet: shrill carder bee and brown-banded carder bee

Buglife. Species management sheet: hornet robber fly

Buglife. Species management sheet: large garden bumblebee

Buglife *All of a Buzz in the Thames Gateway* resources

Connop, S. (2008) *Habitat and habitat management requirements of the shrill carder bee (Bombus sylvarum) and the brown-banded carder bee (Bombus humilis) in South Essex*. PhD thesis, University of East London.

Connop, S., Hill, T., Steer, J. and Shaw, P. (2009) The role of dietary breadth in national bumblebee (*Bombus*) declines: simple correlation? Biological Conservation 143 (11), 2739-2746.

Connop, S., Hill, T., Steer, J. and Shaw, P. (2011) Microsatellite analysis reveals the spatial dynamics of *Bombus humilis* and *Bombus sylvarum*. Insect Conservation and Diversity 4, 212-221.

Essex BAP Grassland Study. Report for Essex Biodiversity Partnership and Essex County Council. September 2011. *Includes Thames Terrace Grassland.*

Essex Field Club species accounts:-

- Brown banded carder bee *Bombus humilis*
- Shrill carder bee *Bombus sylvarum*
- Red-shanked carder bee *Bombus ruderarius*
- The solitary wasp *Cerceris quadricincta*
- 5-banded tailed digger wasp *Cerceris quinquefasciata*
- Black-headed mason wasp *Odynerus melanocephalus*

Phoenix fly *Dorycera graminum*

Distinguished jumper spider *Sitticus distinguendus*

Tall fescue plant hopper *Ribautodelphax imitans*

Scarce four-dot pin-palp *Bembidion quadripustulatum*

Mellet's downy-back *Ophonus melletii*

Sea-aster colletes bee *Colletes halophilus*

Salt-marsh short-spur beetle *Anisodactylus poeciloides*

Fancy-legged fly *Campsicnemus magius*

Hornet robberfly *Asilus crabroniformis*

Essex Naturalist vol.16 pg79 A report on the status of the shrill carder bee *Bombus sylvarum* in Essex.

Essex Naturalist vol.18 pg161 Notes on Essex specialities. 6: the mining bee *Colletes halophilus.*

Essex Naturalist vol.19 pg76 The picture winged fly *Dorycera graminum* in abundance at a threatened site in West Thurrock, with records from other sites in South Essex.

Essex Naturalist vol.19 pg78 Bumblebees in Essex in 2001

Essex Naturalist vol.21 pg79 Brown roofs for invertebrates.

Essex Naturalist vol. 21 pg125 Desmoulin's whorl snail

Essex Naturalist vol.23 pg37 A further record of *Dorycera graminum* in Essex.

Essex Naturalist vol.23 pg34 The jumping spider *Sitticus distinguendus* new to Britain and Essex.

Essex Naturalist vol. 23 pg52 The scarlet malachite beetle *Malachius aeneus* in Essex: ecology and population dynamics.

Essex Naturalist vol.24 pg8 Brownfield invertebrates in Essex – nationally important and under threat

Essex Naturalist vol.24 pg66 Bumblebee report for 2006-7

Essex Naturalist vol.25 pg69. The sphecid wasp *Cerceris quadricincta* (Panzer, 1799) recorded in South Essex.

Essex Naturalist vol.25 pg8 The 2008 AGM Address. Bees, wasps and ants of Essex.

Essex Naturalist vol. 26 pg67 The use of green haying as targeted habitat management for rare UK bumblebees (*Bombus* Latr.).

Essex Naturalist vol.27 pg214 Weather-dependance of Lucanus cervus L. (Coleoptera: Scarabaeoidea: Lucanidae) activity in a Colchester urban area.

English Nature Research Report no. 274 *The hornet robber fly (Asilus crabroniformis Linnaeus) - adult behaviour at selected sites in Dorset, Hampshire and Surrey in 1997*

English Nature Research Report no. 395 *The status, distribution and biology of Dorycera graminum (Fabricus) (Diptera, Ulidiidae)*

English Nature Research Report no. 273 *The values artificial habitats have for uncommon invertebrates*

People's Trust for Endangered Species. Stag beetle web pages.

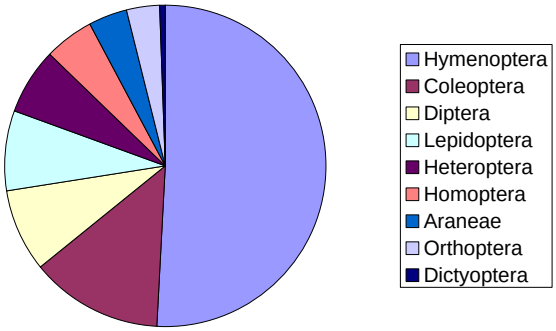
Report on the current status of Hornet Robber Fly *Asilus crabroniformis* in Essex. P. Harvey report for Essex Biodiversity Partnership.

Webb J.R. and Lott D.A. 2006. The development of ISIS: a habitat-based invertebrate assemblage classification system for assessing conservation interest in England. J. Insect Conserv. 10:179-188

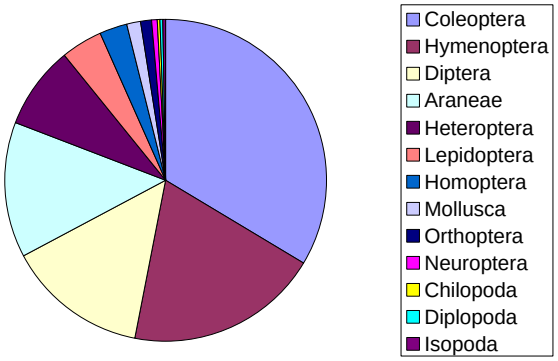
Appendix 1 - Target families for survey

The pie charts below illustrate the target families for survey, according to the habitat components present. Based on the core assemblages typically found on brownfield and open habitat mosaic sites, the Araneae (spiders), aculeate Hymenoptera (ants, bees, wasps), Coleoptera (beetles), Diptera (flies), Heteroptera (true bugs), and larger day-flying Lepidoptera (butterflies, moths) are likely to be the prime sampling targets. If wetland or scrub habitats are present, then the taxon survey list may need to be broadened.

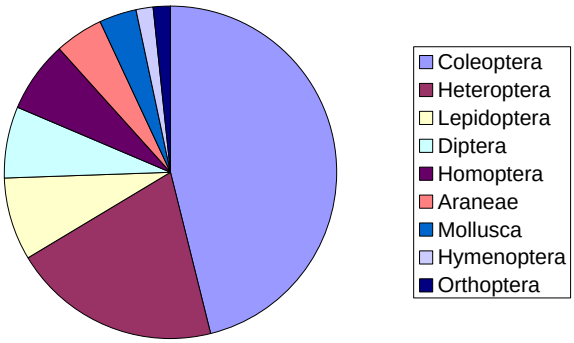
Scrub assemblage



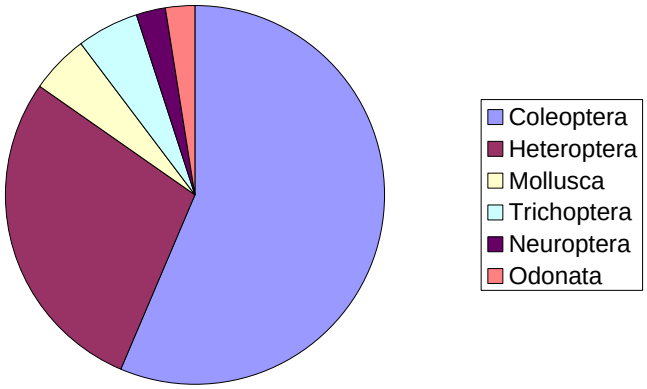
Open substrate assemblage



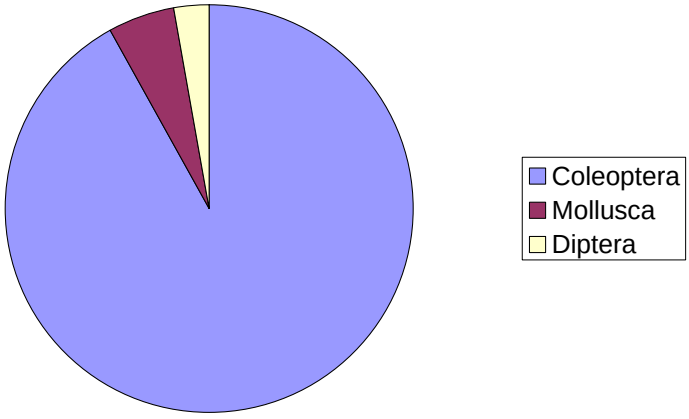
Short sward assemblage



Open water on disturbed sediments



Undisturbed fluctuating marsh



Appendix 2 - A possible way to record site structure

A pragmatic approach to capturing a site's structural complexity is to look at the diversity and range of 'functional ecological surfaces' (F.E.S.) - habitat surfaces - present within a habitat/ vegetation type. This is the technique used by Natural England advisors across the English SSSI suite between invertebrate survey years, to ensure the habitat resource is maintained through management.

Within a site, the vegetation and other surfaces (such as exposed sediment or water) are imagined as a series 3-dimensional 'blocks' with an average 'surface' height. Particular individual plants or clumps or areas of vegetation might be seen to exist within the bounds of an imaginary box, or 'block', and a habitat can be seen as a series of 3-D blocks with a particular, but differing, surface topography.

Important considerations in what constitutes a surface:

- surfaces are independent of species composition – the same species or plant community can form different surfaces and a single surface can be composed of several species
- as a working rule, a surface should be large enough in area such that, if it was on the ground, you could stand in it
- a water surface *always* constitutes a separate surface, though the water body needs to be a 'reasonable size' i.e. bigger than a dinner plate
- if you cannot easily see a surface, it is probably not really there
- wet mud, peat, sand or shingle adjacent to water always form a surface, albeit a wet one
- Individual shrubs / small trees within an otherwise uniform sward form a surface; (i.e. where a fairly uniform vegetation surface is punctuated by higher, sparser pieces of vegetation, there is only one surface to consider).

Early successional surfaces need to have more bare / thin / lower plant cover than successional higher plant cover (for example, ground-hugging composites) for them to count.

It is important to note that the underlying topography of the substrate is <u>not</u> what is being assessed here, so that a uniform grass sward over ridge and furrow would still only express a single surface and not take account of the undulations. However, it the vegetation responded differently to these changes, for example having a lush and taller growth, then this would be recorded as a change in surface.

Site description can then be referenced to defined surfaces present on the site to give a site structural map. In conjunction with considerations of substrate availability, and species records, they together provide a picture of what the site holds.