



Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

**Annex 5-6: Terrestrial Invertebrate
Assessment Report**

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Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Annex 5-6: Terrestrial Invertebrate Assessment Report

June, 2018

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THANET EXTENSION OFFSHORE WIND FARM – ONSHORE GRID CONNECTION

Terrestrial Invertebrate Assessment Report
Prepared for: GoBe Consultants

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CONTENTS

1.0	INTRODUCTION	1
1.1	Background	1
1.2	Site Location and Description	1
1.3	Scope of Study	1
1.4	Relevant Legislation	2
1.4.1	Conservation of Habitats and Species Regulations 2017	2
1.4.2	Wildlife & Countryside Act 1981.....	2
1.4.3	Natural Environment & Rural Communities (NERC) Act 2006	2
2.0	METHODOLOGY	3
2.1	Study Area.....	3
2.2	Desk-based Study.....	3
2.2.1	Review of Existing Records.....	3
2.2.2	Potential for the Site to Support Invertebrate Species Forming Notified Features of Designated Sites.....	3
2.3	Field Survey.....	4
2.3.1	Sampling Methods.....	4
2.3.2	Assessment Methodology	4
2.3.3	Survey Timing.....	5
2.3.4	Survey Personnel	5
2.3.5	Survey Limitations	5
3.0	RESULTS.....	7
3.1	Desk Study Results	7
3.1.1	Review of Existing records	7
3.1.2	Potential for the Site to Support Invertebrate Species Forming Notified Features of Designated Sites.....	9
3.2	Field Survey Results	46
3.2.1	Sampling Results.....	46
3.2.2	Assessment of Terrestrial Invertebrate Habitats.....	46
4.0	SUMMARY AND CONCLUSIONS.....	52
5.0	REFERENCES AND OTHER SOURCES OF INFORMATION UTILISED	54

DOCUMENT REFERENCES

DRAWINGS

Drawing 1: Site Location and Boundary

Drawing 2: Site Boundary, Terrestrial Invertebrate Study Area and Study Area Sections

APPENDICES

Appendix 01: Checklist of Invertebrate Species recorded during field survey

Appendix 02: IUCN Status Categories and Criteria

Appendix 03: British Conservation Status Categories – Definitions

Appendix 04: Criteria used to Define Significance of Invertebrate Habitat - Colin Plant Associates (UK)

1.0 Introduction

1.1 Background

SLR Consulting was commissioned by GoBe Consultants (on behalf of Vattenfall Wind Power Ltd) in July 2017 to carry out a range of ecological surveys along the route of the onshore grid connection for the proposed Thanet Extension Offshore Wind Farm (TEOW). The purpose of the surveys was to provide baseline data to inform an Environmental Impact Assessment (EIA).

1.2 Site Location and Description

The site is located in east Kent, to the north of Sandwich and southwest of Ramsgate. The route of the proposed onshore grid connection extends from the proposed landfall within Pegwell Bay Country Park, south to the proposed substation location at the north end of the former Richborough Port site. The route then continues under the A256 to a connection at an under-construction National Grid substation within the former Richborough Power Station site. The site boundaries under consideration at the time of survey (henceforth referred to as the Red Line Boundary (RLB)) are shown in Drawing 1. It is important to note that at the time of survey the boundaries used were those being considered at the time of Preliminary Environmental Information, which have subsequently been subject to minor changes. The initial RLB and associated study areas considered at that time have been retained within this report for the purpose of illustration, with the refined RLB illustrated in the relevant chapters of the Environmental Statement (ES).

Within the RLB, access has not been granted to the former Richborough Power Station site, to the west of the A256, beyond an initial Phase 1 walkover. This area is subject to existing ecological monitoring, data from which have been provided to inform the EIA. This area is therefore not considered within this report.

The area within the part of the RLB considered by this report includes a range of habitat types including semi-improved, improved and amenity grassland, dense and scattered scrub, small blocks of broad-leaved woodland, scattered trees and areas of hardstanding. The part of the RLB considered by this report is bordered to the east by an extensive area of mudflats, coastal saltmarsh, coastal sand dune and floodplain grazing marsh. The Stonelees golf course lies to the west and north, to the west of Sandwich Road, with the remainder of the former Richborough Port site lying to the south.

The area within the RLB includes, in part, land forming part of the Sandwich and Pegwell Bay National Nature Reserve (NNR), Sandwich Bay to Hacklinge Marshes Sites of Special Scientific Interest (SSSI), Thanet Coast and Sandwich Bay Ramsar, and Thanet Coast and Sandwich Bay Special Protection Area (SPA). Sandwich Bay Special Area of Conservation (SAC) lies approximately 90m east of the RLB. The RLB also includes land within the Pegwell Bay Country Park and Stonelees Nature Reserve (NR), managed by Kent Wildlife Trust.

1.3 Scope of Study

This report presents the findings of an assessment of the potential value of the site for terrestrial invertebrates. The first issue of the report in November 2017 was based on a review of existing data and a site visit undertaken in August 2017. A second version of the report was issued in February 2018 which also included additional desk-based assessment of the potential for the area within the RLB to support invertebrate species forming qualifying features of the Thanet Coast and Sandwich Bay Ramsar Site. This third version of the report includes further desk-based assessment, considering the potential for the area within the RLB to support notified features of the Sandwich Bay to Hacklinge Marshes SSSI.

The aims of the assessment were to provide baseline data to inform the EIA and the detailed design for the project. The assessment of impacts resulting from the proposed development and the development of mitigation measures, if required, are beyond the scope of this report and are covered in the ES.

1.4 Relevant Legislation

1.4.1 Conservation of Habitats and Species Regulations 2017

The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) consolidate and update the Conservation of Habitats and Species Regulations 2010. The Habitats Regulations transpose Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (Habitats Directive) into English law, making it an offence to deliberately capture, kill or disturb wild animals listed under Schedule 2 of the Regulations. It is also an offence to damage or destroy a breeding site or resting place of such an animal (even if the animal is not present at the time). Schedule 2 includes three terrestrial invertebrate species, the large blue butterfly (*Maculinea arion*), Fisher's estuarine moth (*Gortyna borelii lunata*) and lesser whirlpool ram's-horn snail (*Anisus vorticulus*) although none of these species are known from East Kent.

1.4.2 Wildlife & Countryside Act 1981

The Wildlife and Countryside Act 1981 as amended by the Countryside and Rights of Way Act (CROW) 2000 and the Natural Environment and Rural Communities Act (NERC) 2006, consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive), making it an offence to intentionally kill, injure or take any wild animal listed under Schedule 5 to the Act; intentionally or recklessly damage, destroy or obstruct any place used for shelter or protection by any wild animal listed under Schedule 5 to the Act; intentionally or recklessly disturb certain Schedule 5 animal species while they occupy a place used for shelter or protection. There are a number of terrestrial invertebrate species listed in Schedule 5.

1.4.3 Natural Environment & Rural Communities (NERC) Act 2006

The NERC Act 2006 places a duty on authorities to have due regard for biodiversity and nature conservation during the course of their operations. Section 41 (S41) of the Act requires the Secretary of State to publish a list of species of flora and fauna and habitats considered to be of principal importance for the purpose of conserving biodiversity in England. The Section 41 list includes a number of terrestrial invertebrate species.

2.0 Methodology

The assessment was based on a site visit by a specialist entomologist, a review of existing species data and consideration of the habitat requirements for species forming notified features of the Sandwich Bay to Hacklinge Marshes SSSI and Thanet Coast and Sandwich Bay Ramsar Site.

During the site visit an assessment of the potential value of habitats present for terrestrial invertebrates was made. The assessment was supported by field sampling of invertebrates.

2.1 Study Area

The desk-based elements of the study focussed on terrestrial and freshwater habitats within and immediately adjacent to the RLB under consideration at the time of survey (excluding the former Richborough Power Station site to the west of the A256 – see Section 1.2).

The site visit focussed on those habitats within and immediately adjacent to the RLB that were considered to have the greatest potential value for terrestrial invertebrates, as identified during an initial ecological walkover survey by Natasha Nixon CEnv MCIEEM and Eleanor Davies MCIEEM on 8th-9th August 2017. These included all habitats within Pegwell Bay Country Park and Stonelees NR but excluded the habitats to the south of there, which are dominated by amenity grassland and hard standing. The study area is shown on Drawing 2.

The study area was divided into four sections based primarily on habitat and boundary features recognised to be present. The four sections are summarised as follows:-

- Section A: comprising a relatively short length of coastal margin vegetation (the upper littoral zone);
- Section B: comprising a mix of cut/uncut grassland, tall ruderals, bramble and other scrub;
- Section C: comprising scrub and trees, tall ruderal/herb and grassland along a well-defined path on which there is bare, disturbed and compacted ground; at the northern end of the site is a shallow seasonal pond but at the time of the visit this was quite dry; and
- Section D: comprising vegetation along a formal and informal paths of bare ground, mainly comprising tall ruderals, bramble and other scrub (including intact hedgerow) as well as some patches of short and tall grassland and some short ephemeral and perennial herbs on the path itself.

2.2 Desk-based Study

2.2.1 Review of Existing Records

An ecological desk study covering the site plus a minimum 2km buffer was carried out by Amec Foster Wheeler in March 2017, the results of which are summarised in their extended Phase 1 habitat survey report (Amec Foster Wheeler, 2017). This involved collation of existing ecological data, including records provided by the Kent and Medway Biological Records Centre (KMBRC) and Kent Wildlife Trust. The Amec Foster Wheeler report was reviewed for relevant records and subsequently the original data provided by KMBRC for species included in the Ramsar or SSSI assemblages were checked. In addition, relevant information was sourced from the Thanet Coast and Sandwich Bay Ramsar Information Sheet (RIS) and the Sandwich Bay and Hacklinge Marshes SSSI citation.

2.2.2 Potential for the Site to Support Invertebrate Species Forming Notified Features of Designated Sites

Published information regarding the invertebrate species forming notified features of the Thanet Coast and Sandwich Bay Ramsar Site and Sandwich Bay to Hacklinge Marshes SSSI was reviewed to establish the specific

habitat requirements of each species. The author undertook searches of his own entomological library, including out-of-print sources and those not available in electronic format, for relevant sources of information. These sources included a range of recent conservation reviews, national and regional/county atlases (such as Bees, Wasps and Ants of Kent) and journals (i.e. Entomologist's Monthly Magazine) supplemented with information from relevant websites (Bees, Wasps & Ants Recording Society (BWARS) / UK Moths / British Bugs etc.).

Habitat requirements were then compared with habitat information for the RLB and immediately adjacent area to determine whether each species is likely to be present within the study area. Habitat information was taken from the Phase 1 habitat survey and observations made during the author's site visit in August 2017 (see Section 2.3).

For the purposes of this assessment, it has been assumed that the wetland invertebrate assemblage forming a qualifying feature for the Ramsar site comprises the 14 invertebrate species listed in Section 22 of the RIS. These are *Lixus vilis*, *Stigmella repentiella*, *Bagous nodulosus*, *Deltote bankiana*, *Poecilobothrus ducalis*, *Emblethis verbasci*, *Pionosomus varius*, *Nabis brevis*, *Euheptaclacus sus*, *Melanotus punctolineatus*, *Eluma purpurescens*, *Ectemnius ruficornis*, *Alysson lunicornis* and *Orthotylus rubidus*.

In addition to the above, the assessment also included a number of additional non-wetland invertebrates of importance listed in Section 22 of the RIS. These include eight bee and wasp species and three moth species found in the dunes at Sandwich. Of the moth species, the bright wave moth *Idaea ochrata cantiata* is also a notified feature of the Sandwich Bay to Hacklinge Marshes SSSI.

The SSSI is also notified for its overall invertebrate assemblage. Although the SSSI citation does not provide details of the species considered to form part of the notified assemblage Natural England subsequently provided two lists of species¹ which they consider to represent the notified invertebrate assemblage.

2.3 Field Survey

2.3.1 Sampling Methods

The field survey aimed to sample as wide a range of invertebrates as possible, which involved the use of the following standard equipment and recommended methods:

- fine-meshed and calico sweep nets to sample flower-rich and other grassland and tall herb/ruderal vegetation;
- hand collection of specimens on the ground and from various types of vegetation as the opportunity arose; and
- Beating of scrub, climbers and young trees with beating tray and beater at various points within the study area.

2.3.2 Assessment Methodology

The assessment of the potential value of each section within the study area for invertebrates was based on:

- a. consideration of the conservation status of species recorded or likely to be present in each section (based on existing records and the nature of the habitats present); and
- b. a broader assessment of the potential of the habitats present to support invertebrate assemblages of value, using the surveyor's experience and judgment.

¹ Email from Will Hutchinson (NE) to Duncan Watson (SLR) dated 26th February 2018.

Criteria developed by Colin Plant Associates (published on the CIEEM website) to define the significance of invertebrate habitat (see Appendix 04) have been considered in the assessment and the same categories of significance have been adopted. These criteria largely use species rarity and the number of rare or scarce species recorded to categorise sites into international, national, regional, county, district, local or low significance. The criteria may be flexibly applied in certain circumstances but a good deal of judgment is required to come to the right evaluation, which also needs to take into account several other factors including geographical position and the relative importance of other similar sites within the wider area. In this case, where only a single survey visit was possible (see Section 2.3.4), it is also recognised that the number of rare or scarce species may have been under-recorded and this has been taken into consideration in the application of the criteria.

Notable/key species have been flagged up in this assessment using the relevant threat categories under IUCN criteria and British conservation designations where species have not yet undergone assessment using IUCN criteria (IUCN conservation reviews are currently in progress for many groups, including plantbugs and allied families and weevils). Appendices 02 and 03 give details of the criteria for each designation/threat category under the British system and IUCN. Reference is also made to species of principal importance for the purpose of conserving biodiversity in England under Section 41 of the NERC Act (2006).

2.3.3 Survey Timing

Field survey comprised one visit to the site made on the 31st August 2017. Between five and six hours was spent on the site in sampling a variety of habitats within and along the margins of the survey area.

2.3.4 Survey Personnel

The assessment was carried out by invertebrate specialist, Jim Flanagan ACIEEM. Identification of specimens was undertaken in the field and from samples collected and taken back to the lab. Mr Flanagan has over 15 years' professional experience undertaking both terrestrial and aquatic invertebrate surveys, including assessments at a number of sites in Kent. He has developed particular expertise on true bugs (Hemiptera: Heteroptera) and planthoppers and leafhoppers (Hemiptera: Auchenorrhyncha). He is currently one of the two co-organisers of the national recording scheme for terrestrial true bugs.

Beetle specimens were identified with the assistance of Coleopterist Mr Eric J. Smith. Mr Smith is an experienced Coleopterist with over thirty years of experience recording beetles in his role as Recorder of Coleoptera for the Sorby Natural History Society.

2.3.5 Survey Limitations

Due to the timing of the commission, relatively late in the field season, field sampling was limited to a single visit in late August. A second visit, in late September or early October, was also considered but a visit that late in the season was deemed unlikely to significantly add to the data collected in late August and was therefore not undertaken. Depending on the nature of the site being surveyed, a minimum of three survey visits, spread across the spring and summer period, would usually be recommended to record the seasonal variation of invertebrate assemblages. Further survey effort earlier in the season would almost certainly have identified additional invertebrate species within the study area, which would have added additional confidence to the assessments of potential value made in this report. However, given the nature of the habitats present it is considered unlikely that additional species records would significantly alter the conclusions of this assessment.

The study area was based on the RLB under consideration at the time of survey. After the survey was carried out the RLB was amended to include an additional area in the north of the site (see Drawing 2), which was not subject to detailed assessment. However, the habitats within the additional area are generally similar to those in Section B of the study area and it is considered likely that this area supports a similar invertebrate

assemblage to that recorded in Section B. The lack of survey data for this additional area is therefore not considered a major limitation.

On the day of the site visit survey work was conducted under suitable sunny conditions in the morning, although the vegetation was too wet following previous rain to deploy the use of a suction sampler. By mid-afternoon the weather changed resulting in strong winds and some heavy rain which persisted into the early evening hindering further recording and sampling with a sweep-net and preventing the deployment of the suction sampler. This limitation only affected a relatively small part of the study area and did not affect other sampling methods or prevent a visual assessment of the habitats present.

3.0 Results

3.1 Desk Study Results

3.1.1 Review of Existing records

The desk study commissioned by Amec Foster Wheeler produced 119 records of 44 notable invertebrate species (including four Section 41 species). The notable species records comprised 27 species of butterfly and moth, 14 species of bee and wasp, one species of beetle, one true fly and one planthopper. Records were drawn from the period 2007-2015. Details of two invasive species of invertebrate were also included: harlequin ladybird (*Harmonia axyridis*) and the horse chestnut leaf-miner (*Cameraria ochridella*). The Kent Red Data Book (Banks *et al.*, 1999) and, in the case of bees, wasps and ants (Hymenoptera), Allen (2009) have been drawn on to clarify the potential for occurrence of the notable species in the study area. The potential for all notable species previously recorded in the general area to be present within the study area is discussed below under their respective orders. For further information regarding the status categories given below see Appendices 02 and 03.

Coleoptera (beetles)

One notable aquatic beetle species was reported for the desk study search area – *Haliphus variegatus*. In the current water beetle review (Foster, 2010) this has been given an IUCN threat category of Vulnerable (VU) due to recent declines in populations, particularly in the Midlands. The Kent record dates from 2011 and would appear to be the first county record. It is associated with stoneworts (*Chara* sp.) within stagnant water overlying peat or clay in lowland fens. It is considered very unlikely to occur within the study area.

Diptera (true flies)

One notable species of bee-fly (Bombyliidae) was recorded in the desk study. This was for the dotted bee-fly (*Bombylius discolor*), which is mainly found in southern coastal areas in England and Wales but has spread into the Midlands of late. Its hosts are species of *Andrena* mining bees (particularly *A. flavipes* and *A. cineraria*). The habitats are varied and include grassland, gardens, rides and clearings in scrub and woodland. This is potentially a species that could occur within the study area.

Hemiptera (including true bugs and planthoppers/leafhoppers)

Two species of notable Hemiptera were identified in the desk study. One record was obtained of the planthopper *Asiraca clavicornis*, 0.3km from the RLB. This species could potentially occur within the study area as it is often found in areas of sparsely vegetated ground like paths and other disturbed habitats. It occurs in both inland and in coastal situations and is largely southern in distribution. It has historically been subject to fluctuating populations for reasons that are not clear, these possibly relate to susceptibility to parasites as well as habitat change (Kirby 1992). Currently *A. clavicornis* populations are in an expansive phase with many new records as far west as Somerset.

Hymenoptera (bees, wasps and ants)

The very rare RDB1 (Shirt, 1987 & Falk, 1991) four-banded weevil-wasp (*Cerceris quadricincta*) features in the data with two records from 2009. In Britain this species is confined to Kent and Essex with recent records only from Kent. The wasp has a preference for bare sandy areas and is therefore considered unlikely to occur in the study area.

The RDB2 *Philanthus triangulum* (aka the bee wolf) also prefers bare sandy areas (chiefly for nesting) and records are shown for land to the south of the study area (where there are dunes). Further information regarding this species is provided in Table 3-2.

The record of the pRDB3 cuckoo wasp *Hedychrum niemelai*, a rare species which uses weevil-wasps as hosts including the four-banded, dates from 2015. Further information regarding this species is provided in Table 3-2.

A number of nationally scarce Hymenoptera species were also identified in the desk study. These include three species of nomad (*Nomada* sp.) bees. Further information regarding the painted nomad bee (*Nomada fucata*) is provided in Table 3-2. Kent is a stronghold for the orange-horned nomad bee (*N. fulvicornis*), which is a pRDB3 species (Falk, 1991). It has been reported from the North Kent Marshes as well as inland on chalk and sand (Allen, 2009). Three species of *Andrena* mining bee are reported as hosts. At least one of these is mainly coastal (*A. pilipes* aggregate). This is likely to provide some potential for the presence of the nomad within the study area. The blunthorn nomad bee (*Nomada flavopicta*) is a kleptoparasite of blunthorn bees (particularly *Melitta leporina* and *M. tricincta*) and may also be found within the study area

The pantaloone bee (*Dasypoda hirtipes*) is a level ground nesting specialist that requires compact sandy areas to nest. Nesting is colonial and colonies can be small to very large. Given the absence of compact sandy areas present within the study area this species is considered unlikely to be present within the study area.

The silvery leafcutter bee (*Megachile leachella*) is described as scarce in the county by Allen (2009) but it is reported to be fairly widespread around the coastline of the southern half of Britain (Falk, 2015). This is a species mostly found on dunes, shingle, soft rock cliffs and coastal brownfield sites and for nesting has a preference for non-compacted sand. It is judged to have low potential to occur within the coastal margin of the study area as nesting aggregations are usually large and it is expected that it would have been found if present.

Four-banded flower bee (*Anthophora quadrimaculata*), a Section 41 species, requires south-facing sandy ground for nesting. Kent is a stronghold for the species in a national context and there have been reports of a possible decline (Allen, 2009). It nests on sand cliff faces and in the soft mortar of walls and occurs on sandy and chalk areas but not on clay. Records are from coastal and inland situations. Given its habitat requirements it is considered unlikely to have a breeding population within the study area but may be present foraging.

The sharp-collared furrow bee (*Lasioglossum malachurum*) is now not regarded as being scarce or threatened having become abundant in the county over recent years. It is considered likely to occur within the study area and was recorded during the field survey.

Four species of *Andrena* mining bee were also identified by the desk study. Trimmer's mining bee (*A. trimmerana*) is now no longer considered rare and is to be found in a number of coastal and inland habitats, including gardens. It has no Kent status. Potentially, this bee could occur within the study area. Black mining bee (*A. pilipes*) is strongly associated with coastal cliffs and black-headed mining bee (*A. bucephala*) is widely found in Kent but is not very coastal (mostly found in a variety of habitats inland, but especially on chalk scarps) and both species are considered unlikely to be found within the study area. The plain mini-miner bee (*A. minutuloides*) is now a frequently recorded bee in Kent and no Kent status has been given for this species.

Lepidoptera (butterflies and moths)

The desk study provided records of 27 notable butterfly and moths, with only one butterfly species featuring - small heath (*Coenonympha pamphilus*). Many of the moth species show typical southern coastal distributions (some occurring as migrants as well as residents). This includes species that are characteristic of reedbed habitats as well as dunes and shingle, habitats that are not represented within the study area. A significant proportion of the moths belong to micro-moth families and there are a small number of these that may occur within the study area. One species, which probably occurs, is the Kent bent-wing (*Phyllocnistis xenia*), the larvae of which mine and make cocoons on white poplar, a tree that is locally frequent in parts of Section C as well as pine-blossom knot-horn (*Vitula biviella*) which, since 1997, has colonised Britain from the continent and feeds on Scot's pine. Small heath (a Section 41 species with an IUCN status of Near Threatened) is also likely to occur within the study area, being a grass feeder with facility for occurring in a wide range of habitats wherever its hosts are present.

3.1.2 Potential for the Site to Support Invertebrate Species Forming Notified Features of Designated Sites

Table 3-1 summarises the conservation status, UK distribution and specific habitat requirements for the 14 species which are assumed to form part of the wetland invertebrate assemblage for the Thanet Coast and Sandwich Bay Ramsar site (although it is noted that several of the species are not actually wetland species).

Table 3-2 summarises the conservation status, UK distribution and specific habitat requirements for species listed as non-wetland invertebrates of importance listed in the Thanet Coast and Sandwich Bay RIS. Of these species, the bright wave moth *Idaea ochrata cantiata* is also a notified feature of the Sandwich Bay to Hacklinge Marshes SSSI.

Table 3-3 summarises the conservation status, UK distribution and specific habitat requirements for species forming part of the notified invertebrate assemblage for the Sandwich Bay to Hacklinge Marshes SSSI.

Tables 3-1, 3-2 and 3-3 each also include an assessment of whether each species is likely to occur within or adjacent to the onshore RLB, based on their specific habitat requirements. Species which could potentially occur within or adjacent to the RLB are highlighted in **bold**.

Note that Tables 3-1, 3-2 and 3-3 incorporate changes in taxonomy and nomenclature that have occurred since the Thanet Coast and Sandwich Bay RIS and the lists of species forming part of the Sandwich Bay and Hacklinge Marshes SSSI invertebrate assemblage were published. Some of the species names included in Tables 3-1, 3-2 and 3-3 therefore differ from those in the RIS and the relevant species lists underpinning the SSSI designation.

Table 3-1
Potential for the Site to Support Species Forming Part of the Thanet Coast and Sandwich Bay Ramsar Site Wetland Invertebrate Assemblage

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
COLEOPTERA					
Flowering rush beetle (<i>Bagous nodulosus</i>)	Curculionidae	RDB1 (Endangered) (Hyman & Parsons, 1992)	Recorded from South Hampshire, West Sussex, East Sussex, West and East Kent, Surrey, Middlesex, East Suffolk & Huntingdonshire before 1970 and South Somerset from 1970 onwards (Hyman & Parsons, 1992).	Ditches, dykes and ponds where its host, flowering rush (<i>Butomus umbellatus</i>), occurs (Hyman & Parsons, 1992).	Unlikely to occur within or adjacent to RLB due to unsuitability of the habitats present.
<i>Euheptaulacus sus</i>	Scarabeidae	IUCN VULNERABLE (Lane & Mann, 2016)	Records are few but widespread. The species has not been re-discovered at its one Scottish locality since 1985 but may still persist there. Main stronghold is at Northam Burrows NR in N. Devon in an area of sheep and horse-grazed coastal grassland covering less than 2 square kilometres. The East Kent (Deal & Sandwich Bay) and the Norfolk and Suffolk Breckland sites are smaller and comprise pasture grassland (Lane & Mann, 2016).	Stenotopic, mostly on exposed sites with sandy soils (Landin, 1961). All of the recent records have been associated with free-draining soils on sandy semi-improved pasture or sand dunes. Jessop (1986) cites dry and sandy pasture on littoral or alluvial plains as the preferred habitat. Associated with sheep and horse dung. Adults are present in the field in July, August and September (Lane & Mann, 2016).	Grazing only newly introduced into the part of the RLB and adjacent area in Stonelees NR and not sufficiently sandy in the quality of habitat. Cattle dung also not reported to be used by this species. Unlikely to be present within this area of the site and adjacent areas.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>Lixus vilis</i>	Curculionidae	RDB1 (Endangered) (Hyman & Parsons, 1992)	Only known in southern England and last recorded at Deal in 1905 and previous to that from South Somerset and South Hampshire; probably extinct. At the north-western edge of continental range (Hyman & Parsons, 1992; Duff, 2016).	Sand dunes and sandy places particularly near the coast. Associated with common stork's-bill.	Host plant not recorded within RLB and unlikely to be found given the paucity of historical records. A moderately large weevil that would rarely be overlooked for long in the field if present in any numbers.
Sandwich click beetle (<i>Melanotus punctolineatus</i>)	Elateridae	RDB1 (Endangered) (Hyman & Parsons, 1992) Section 41 species under the NERC Act	Recorded from East Kent, Surrey, Middlesex & Glamorgan before 1950 and east Kent from 1950 onwards. Reliably known from coastal sites in Kent at Deal (a sandpit, record from 1986), Dover, Pegwell Bay and from Littlestone in 1950 (Hyman & Parsons, 1992).	Sand dunes and grassland, particularly coastal grassland on sandy soils. Larvae live at the roots of marram grass. Adults mainly from April to June and in August. Adults possibly also from autumn	Very low probability of presence even within some of the sandier areas within and adjacent to RLB.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
		(2006) Kent RDB Status 1 (Waite, 2000) ²		to spring (Hyman & Parsons, 1992).	
DIPTERA					
<i>Poecilobothrus ducalis</i>	Dolichopodidae	Near Threatened (Falk & Crossley, 2005) Kent RDB Status 1 (Waite, 2000)	Widely scattered in southern England (Somerset, Hampshire, Sussex, Kent, Essex and Suffolk) with most of recent records/sites from coastal Kent - eight of the post-1960 sites are in Kent (Falk & Crossley, 2005).	Ditches and pools on coastal marshes appear to be the preferred habitats. Biology unknown. Larvae not recorded but may be semi-aquatic predators. Adults from June to September on mud beside pools and ditches (Falk & Crossley, 2005).	Unlikely to be present within the RLB, although the temporary shallow pools at Stonelees NR could potentially support this species if the season is a particularly wet one.

²The following Kent county statuses mentioned in Tables 3-1, 3-2 and 3-3 are taken from Waite (2000):-

KRDB1: County criteria: Endangered in Kent (species that have been found in 1-2 tetrads only); KRDB2: County criteria: Vulnerable in Kent (species that have been found in between 3-5 tetrads or, if more than this, where the species is considered to be undergoing a significant decline); KRDB3: County criteria: Rare in Kent (species that have been recorded in 6-10 tetrads); KRDBK: Species of county importance; no further breakdown has been possible (species known to be rare in Kent, but where insufficient information is available to enable any further division); KRDBX: Species considered to be extinct in Kent.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
HEMIPTERA					
<i>Emblethis griseus</i> (recorded as <i>Emblethis verbasci</i> in RIS)	Lygaeidae	RDB3 (Kirby, 1992)	The <i>Emblethis verbasci</i> previously reported as British was proven to be <i>E. griseus</i> (Judd, 1996). True <i>E. verbasci</i> has not so far been reported for Britain although it is present in France and the Netherlands and could colonise Britain in the future (Judd & Straw, 1997). Records (Walker 1900, Masee, 1952) of assumed <i>E. griseus</i> also intermittently documented for Deal where it may not be truly established (Judd & Straw, 1997). <i>E. griseus</i> is a very scarce species known only from single sites in Kent (Sandwich Bay) and Cornwall (Whitesand Bay/Sennen Cove) on the British mainland and on the Isles of Scilly (Kirby 1992).	Confined to coastal sand dunes where there is moderate vegetation cover and bare ground and associated common stork's-bill (<i>Erodium cicutarium</i>). It has been found within mixed shore vegetation with stork's-bill and spurges as well as in sparse grassland on stable sand and among marram grass on unstable sand. One annual generation with the new generation appearing from mid-August onwards (Kirby, 1992).	Unlikely to occur within RLB or adjacent areas due to unsuitability of habitat (i.e. lack of open sandy habitats with a mix of sparsely to moderate cover of vegetation.)
<i>Nabis brevis</i>	Nabidae	RDB3 (Kirby,1992) Kent RDB Status 1 (Waite, 2000)	There are suspected to be few reliable records of this damselbug from those held by the national recording scheme as identification of this species is very problematic. Very local. The exact status must remain uncertain at present, since the levels of under-recording and of misidentification	The British records, which are mostly southerly, appear to show a close association with wet heath and bog. Predacious and with one generation per year; overwinters as an adult (Kirby, 1992).	Unlikely to be present within the RLB or adjacent areas.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
			are unknown (Kirby 1992).		
<i>Orthotylus rubidus</i>	Miridae	RDB3 (Kirby, 1992) Kent RDB Status 2 (Waite, 2000)	Very local on the south and south-east coasts of England from Norfolk to Devon (Kirby, 1992).	Host plants are glassworts (<i>Salicornia</i> sp.). The bug is not found on open saltmarshes, but occurs in areas which, though saline, are not regularly inundated by the sea. Also reported to be possibly associated with prickly saltwort (<i>Salsola kali</i>) but not so far found on this plant. Two generations per year overwintering as an egg (Kirby, 1992).	Unlikely to be present within the RLB or adjacent areas as glasswort was not a prominent component within the coastal margin of the study area.
<i>Pionosomus varius</i>	Lygaeidae	RDB3 (Kirby, 1992) Kent RDB Status 1 (Waite, 2000)	Current populations in Britain are disjunct. Reported in Kent from Sandwich Bay (in 2010 and 2012) and, less recently (1960s) from Littlestone. Populations occur on the south Wales coast in Glamorgan and Pembrokeshire (with records as recent as 2009). A nineteenth century record from Dorset unsupported by specimens (Kirby, 1992).	Confined to sand dunes in Britain. Occurs in open bare sandy areas with sparse vegetation. As a seed-feeding bug it is thought to have possible associations with common stork's-bill, biting stonecrop (<i>Sedum acre</i>), and little mouse-ear (<i>Cerastium semidecandrum</i>); has been observed feeding on seeds	Unlikely to occur within the RLB or adjacent areas due to general unsuitability of habitat.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
				of shepherd's purse (<i>Capsella bursa-pastoris</i>). Populations are small and localised so possibly of (Kirby, 1992)	
HYMENOPTERA					
<i>Didineis lunicornis</i> (<i>Alysson lunicornis</i> syn.)	Crabronidae	RDB3 (Shirt, 1987) Na (Falk, 1991) Kent status (Allen, 2009) = pKa (based on 9-15 modern tetrad dots)	Southern England from the Devon side of Lyme Regis to east Kent and north to Huntingdonshire and Warwickshire. A record from Norwich (Bridgman, 1875) remains unconfirmed (Bees, Wasps and Ants Recording Scheme website); in Surrey only 6 records with the first in 1992 (Baldock, 2010).	Strongly associated with patches of sun-baked bare or sparsely vegetated clay soil where deep desiccation cracks develop during summer months (Packer, 1987). Banks and level ground are both used. Many records relate to coastal soft rock cliffs, whilst inland records include unimproved grasslands (especially south-facing slopes), woodland rides and clearings, and re-vegetating quarries. A late summer species flying from July to October (Falk, 1991 and additional information taken from Bees, Wasps	Potential for occurrence in Stonelees NR where temporary / ephemeral pools were dried up during August 2017.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
				and Ants Recording Scheme website). Females prey on hoppers which are brought to nests typically dug close to waterbodies (Allen, 2009).	
<i>Ectemnius ruficornis</i>	Crabronidae	RDB3 (Shirt, 1987) Nb (Falk, 1991) Kent status = pKa (based on 9-15 modern tetrad dots) (Allen, 2009)	Widespread and patchily distributed in England and Wales north to Yorkshire (Falk, 1991). Very scarce except in Yorkshire and the south-east corner of England where it is frequent (Baldock, 2010).	Associated with dead wood (fallen trees, stumps, old fence posts etc.) and dead parts of living trees, in sunny situations and in the vicinity of good stands of umbellifers. Seems to be more of a woodland insect in the southern parts of its British range (Richards, 1980, Falk 1991) but it likely has a preference for open woodland such as coppice (Falk, 1991). Nesting occurs in a variety of deadwood; the nest cells are provisioned with large hoverflies and other flies; two broods and adults often seen visiting	Low probability of occurrence but possible. Limited availability of dead wood within RLB and adjacent areas but some old shrubs (i.e. hawthorn) may provide some suitable deadwood features, though likely to be small in extent.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
				umbellifers between May and September (Falk, 1991).	
ISOPODA					
<i>Eluma caelata</i> (<i>E. purpurescens</i> syn.)	Armadillidiidae	No status (Lee, 2015)	Probably introduced several times via the horticultural trade; naturalised in synanthropic or disturbed coastal sites (Lee, 2015). Mainly found across the extreme south-east of England, but outlying (introduced) populations occur elsewhere, notably on the Cumberland coast (at Maryport and Workington) and the east coast of Ireland around the Dublin area (Gregory, 2009)	A woodlouse that closely resembles the pill woodlouse (<i>Armadillidium vulgare</i>). It has a preference for disturbed habitats, whether this is on the coast (e.g. 'soft' slumping cliffs) or in synanthropic habitats (e.g. waste ground, railway lines and gardens). It typically takes refuge under mat-forming plants, beneath stones and dead wood, or among leaf-litter, tussocks, rubbish and other debris (Gregory, 2009).	A potential presence within and around the RLB given the extent of disturbance in the recent and not so recent past.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
LEPIDOPTERA					
Silver barred (<i>Deltote bankiana</i>)	Noctuidae	RDB (Waring & Townsend, 2009) ³ Kent RDB Status 1 (Waite, 2000)	Immigrant/suspected transient resident in the south east and central south of England. Breeding sites in the Cambridgeshire fens (Chippenham & Wicken Fens) and since about 1980 a single coastal marsh in Kent (Waring & Townsend, 2009). Suspected immigrants from coastal Kent, Sussex, Essex, Suffolk and Norfolk (Waring & Townsend, 2009) KRISS list four records potentially for within the RLB dating from 1983, 1986, 1999 and 2000 and it is likely that these refer to immigrants.	Recorded in marsh, fenland and boggy heathland and coastal marsh; Strong association with purple moor-grass on the continent but smooth meadow-grass and other host species may be used in the UK (Waring & Townsend, 2009)	There is uncertainty as to whether this species has ever occurred as a resident population on the site. The current unsuitability of the habitats on site will make this a most unlikely prospect. Past and future records will be most likely continental migrants.
Sandhill pigmy moth (<i>Stigmella</i>)	Nepticulidae	RDB1 – based on occurrence in five or less	A rare species in the UK that is restricted to coastal sand dunes in Kent. One of the most recent records (November 2015) is	The leaf-mining larvae occur on creeping willow	No potential for presence in RLB or adjacent areas; host

³ There is no modern conservation status list covering macro-moths; scarcity is presently derived from work carried out by Butterfly Conservation's Moths Count which collates records in the National Moth Recording Scheme. The following criteria taken from Waring & Townsend (2009) are; RDB = occurrence in less than 15 10km squares and those species in over 15 10km squares but which have experienced significant decline; nationally scarce A = occurrence in 16-30 10km squares since 1980; nationally scarce B = local = occurrence in 101-300 10km squares since 1980; local = occurrence in 101-300 10km squares from 1960; and common = occurrence in over 300 10km squares since 1960.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>zelleriela</i> (<i>Stigmella repentiella</i> syn.)		10km squares (Davis, 2012) Section 41 species under the NERC Act (2006) Kent RDB Status 1 (Waite, 2000)	from around Sandwich Bay Bird Observatory (kentmicromoths.blogspot.co.uk)	(<i>Salix repens</i>).	plant not recorded as being present.

Table 3-2

Potential for the Site to Support Species Listed as Non-wetland Invertebrates of Importance in the Thanet Coast and Sandwich Bay RIS

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
HYMENOPTERA					
Plain mini-miner (<i>Andrena minutuloides</i>)	Andrenidae	Na (Falk, 1991) No Kent status (Allen 2009)	From the chalk districts of southeast England west to Dorset, and later records reported from the East Anglian Brecks. Apparently quite common where it occurs (Falk, 2015).	Strongly associated with open chalk grassland, sandy coastal grassland, vegetated shingle and heathland. Two generations per year with the second particularly utilising umbellifers such as wild parsnip (Falk, 2015).	Limited potential for nesting within RLB and adjacent areas of Stonelees NR as a range of different soil types are thought to be used. Parts of the RLB and adjacent wider areas provide some good foraging as umbellifers such as wild

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
					parsley (<i>Pastinaca sativa</i>) form a locally prominent feature of the vegetation.
Black mining bee (<i>Andrena pilipes</i>)	Andrenidae	Nb (Falk, 1991) No Kent status (Allen, 2009)	True <i>A. pilipes</i> (previously included records of <i>A. nigrospina</i>) appear to be entirely located on the southern English coast. Key populations are located in Devon and Cornwall and further important populations occur in the Thames Gateway (Allen, 2009, Falk, 2015).	Strongly associated with coastal cliffs (especially soft rock cliffs) but also occurs on brownfields, heathland and acid grassland in the Thames Gateway area. Two generations (spring, late summer/autumn); flowers visited in early generation include umbellifers such as alexanders (<i>Smyrnum olusatrum</i>), crucifers, willows and blackthorn (<i>Prunus spinosus</i>); nests on cliff-faces and south-facing slopes (Falk, 2015)	Unlikely to occur within the RLB as quality of nesting habitat appears to be somewhat poor.
<i>Cerceris quadricincta</i>	Crabronidae	RDB1 (Shirt, 1987 & Falk, 1991) Kent status = pKRDB2 (based on 3-4 modern tetrad dots) (Allen, 2009) Section 41 species under the NERC Act	It appears that Kent is a stronghold in Britain for this species but even here it is rare (Allen, 2009).	Occurs in sandy areas and also soft rock cliffs. Preys on weevils and is a probable host of <i>Hedychrum niemelai</i> (Allen, 2009).	Unlikely to occur within the RLB or adjacent areas due to insufficient suitable habitat for nesting.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
		(2006)			
<i>Hedychrum niemelai</i> (or <i>H. nobile</i> ?)	Chrysididae	RDB3 (Falk, 1991) Kent status = pKa (based on 9-15 modern tetrad dots) (Allen, 2009)	Southern England from Cornwall to Norfolk as well as inland counties such as Surrey, Oxfordshire and Berkshire (Falk, 1991). Records in Kent mainly around the Thames Estuary. Decidedly rare in East Kent (Allen, 2009). Continental <i>Hedychrum nobile</i> recently identified from material under the name <i>H. niemelai</i> (Baldock & Hawkins, 2013). Kentish distribution atlases have been produced for the two species. Material of both species from Pegwell Bay. First Kentish record of <i>H. nobile</i> was 2010 and is thought to be a new arrival to the county. First UK record from East Sussex in 2007 (Beavis & Allen, 2016). In the light of this new taxonomic development the <i>H. niemelai</i> record needs further validation of any supporting voucher specimens.	Open sandy localities, especially on heathland, but also coastal dunes, cliffs with sandy head deposits, and other disturbed locations on sandy substrates such as sand pits, footpaths and railway cuttings (Falk, 1991). On Eocene and alluvial sands in West Kent. Hosts are various species of <i>Cerceris</i> wasps (Allen, 2009). A parasitoid of larvae of wasps in the genus <i>Cerceris</i> (including <i>C. ruficornis</i>). These nest in open sandy habitats fully exposed to the sun (Falk, 1991) Host of <i>H. nobile</i> thought to be <i>C. arenaria</i> , a fairly common species restricted to sandy habitats, both inland and on the coast, that nests in bare or sparsely vegetated sandy soils with a south-facing aspect or slope (Beavis & Allen, 2016).	The two <i>Hedychryum</i> species are considered unlikely to occur within the RLB or adjacent areas due to the high probability of the absence of hosts due to poor habitat suitability.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
Clover melitta (<i>Melitta leporina</i>)	Apidae	No national status No Kent status (Allen, 2009) BWARS recommends a review of current non-status (2012)	Mainly south-east England and rather local south of the Thames (scarce in southwest England, the Midlands and Wales). Records extend thinly north to Yorkshire. There are no records from Scotland or Ireland (Falk, 2015).	Quite a wide range of habitats utilised including a range of grasslands (including improved), brownfield sites, coastal dunes and occasionally gardens. Obtains pollen mainly from legumes (clovers, vetches, melilots). Nests in light soils (loose aggregations) in aggregations of various sizes ranging from locations like garden lawns to coastal cliffs. (Falk, 2015).	Some potential for presence as preferred foraging species present within RLB and adjacent areas. Soils in the RLB appear to be overall rather compacted, especially along paths but cannot absolutely rule out the possibility that some nesting may take place – most suitable locations would be within Stonelees NR.
Painted nomad bee (<i>Nomada fucata</i>)	Apidae	Na (Falk, 1991) No Kent status (Allen, 2009)	Widespread and locally common in southern England with recent expansion into the Midlands north to Shropshire following similar expansion by the host. Most records in Wales for south coast but also recently discovered from Denbighshire. Not recorded from Scotland or Ireland (Falk, 2015).	Various habitats utilised but mostly on soft rock cliffs, chalk downland and brownfield sites such as quarries and sandpits Host species is <i>Andrena flavipes</i> (yellow-legged mining bee). Like the host, <i>N. fucata</i> is twin brooded (Falk, 2015). The distribution of the parasite is positively correlated with sandy soils: sedimentary, alluvial and coastal. Apparently goes through cyclical periods of abundance which do not relate to the abundance of the host (Allen, 2009).	Some potential for this species to occur within RLB and adjacent areas within Stonelees NR as its host utilises a range of soils for nesting within a wide variety of open habitats on the coast and inland.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
Bee wolf <i>(Philanthus triangulum)</i>	Crabronidae	RDB2 Shirt (1987) RDB2 (Falk, 1991) No Kent status (Allen, 2009)	Formerly within a very restricted range in the south-east of England but over the last 10-15 years has undergone a significant range expansion and increase in abundance. The most northerly records are currently from South Yorkshire.	Principal prey items are honey bees. Rarely takes other species (Allen, 2009).	Low to moderate probability of occurrence within RLB and adjacent areas. Has a preference to nest in open level ground and may utilise this habitat in Stonelees NR.
<i>Smicromyrme rufipes</i>	Mutillidae	Nb (Falk, 1991) Kent status = pKa (based on 9-15 modern tetrad dots (Allen, 2009)	Resident from Dorset to Kent, including the Isle of Wight, and north to Oxfordshire, Bedfordshire, Cambridgeshire and Norfolk (information from BWARS website). A very scarce Kent species, modern records only from East Kent (Allen, 2009).	Bare and sparsely vegetated, sandy situations in warm, sunny locations both inland and on the coast including heathland, coastal dunes, soft rock cliffs and other disturbed sandy places such as paths, sandpits, banks and landslips (Falk, 1991) A recorded parasitoid of various ground nesting crabronid and pompilid wasps, and Halictine bees (information from BWARS website).	Considered unlikely to be present within the RLB and adjacent areas due to lack of extent of open warm sandy situations.
LEPIDOPTERA					
Rest harrow <i>(Aplasta ononaria)</i>	Geometridae	RDB (Waring & Townsend, 2009) Section 41 species under the NERC Act	Only two long-term breeding colonies known, both in Kent, at Folkestone Warren and on the coastal dunes between Sandwich and Deal. Has occasionally appeared elsewhere (Kent,	Host plant is restharrow (<i>Ononis repens</i>) growing in calcareous short-grass swards in open but sheltered sun-trap locations (Waring & Townsend, 2009).	Host plant not recorded within RLB so currently thought unlikely to be present.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
		(2006) Kent RDB Status 2 (Waite, 2000)	Sussex, Hampshire and Essex) as a suspected migrant (Waring & Townsend, 2009). KRISS lists four records for locations now within the boundary of Stonelees Nature Reserve (1983, 1986, 2000 & 2001) and these are likely referable to migrants.		
Bright wave (<i>Idaea ochrata cantiata</i>)	Geometridae	RDB (Waring & Townsend, 2009) Section 41 species under the NERC Act (2006) Kent RDB Status 1 (Waite, 2000)	Resident in Kent where it is confined to three golf courses and a nature reserve in a continuous population from just north of Sandwich to Deal where it is quite numerous; outlying populations on the north shore of Pegwell Bay and on the upper beach of vegetated shingle at Kingsdown. Not seen at its Suffolk sites since 1990 and last seen in Essex in 1985. Records in other counties most likely to be immigrants (Waring & Townsend, 2009).	A progression of herbs through the season (smooth tare, hare's-foot clover (<i>Trifolium arvense</i>), vetches, daisies and a report of lesser stitchwort (<i>Stellaria graminea</i>). (Waring & Townsend, 2009). Occurs on un-grazed vegetated shingle in the nature reserve. On the golf courses occurs on the 'roughs', open areas with fine grasses and herbs growing on stabilised sand. On sandy undercliff on the north shore of Pegwell Bay (Waring & Townsend, 2009).	Unlikely to be resident within RLB and adjacent areas – if it has occurred here it is more likely to be as an immigrant.
Oblique striped (<i>Phibalapteryx virgata</i>)	Geometridae	Nationally Scarce B (Waring & Townsend,	A fairly local species which occurs in coastal sand hills mostly in the south of Britain but also in North and South Wales, the Breckland	Larval foodplant is lady's bedstraw (<i>Galium verum</i>) (Waring & Townsend, 2009).	Not thought to be present within RLB or adjacent areas as host plant not recorded

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
		2009)	district of East Anglia, Lancashire and Cumbria. Also possibly occurs on dunes on the Lincolnshire coast and at Spurn in Yorkshire (Waring & Townsend, 2009). Extremely local in Kent (Waite, 2000).		within RLB

Table 3-3

Potential for the Site to Support Species forming part of the Invertebrate Assemblage for the Sandwich Bay and Hacklinge Marshes SSSI

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
ARACHNIDA: ARANEAE					
<i>Agroeca lusatica</i>	Liocranidae	IUCN Endangered (Harvey <i>et al.</i> , 2017). Kent RDB Status 1 (Waite, 2000).	In the UK only present in East Kent at two locations. First recorded from Sandwich in 1938 where it appears to be well established and second location at Greatstone discovered in 2005 (Spider Recording Scheme, 2018).	Sand dunes (Spider Recording Scheme, 2018).	Unlikely to be present due to its strong preference for sand dune habitat.
<i>Clubiona frisia</i> (syn.	Clubionidae	IUCN Near Threatened	British records are all from the east and south-east coasts of	Coastal sand dunes. The spider occurs in marram tussocks on	Unlikely to be found within the RLB due to

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>Clubiona similis</i>)		(Harvey <i>et al.</i> , 2017). Kent RDB Status 1 (Waite, 2000).	England from Norfolk to Kent (Spider Recording Scheme, 2018).	sand dunes (Spider Recording Scheme, 2018).	unsuitability of habitat.
<i>Enoplognatha oelandica</i>	Theridiidae	IUCN Critically Endangered (Harvey <i>et al.</i> , 2017). Kent RDB Status 2 (Waite, 2000).	Historic records from mid-south and south-east of England but some of these are likely to be mis-identifications. Only one record from a single site since 1993 at Juniper Hall, Surrey (Harvey <i>et al.</i> , 2017)	Has been recorded in coastal areas from sand dunes, dry sandy heaths and grassland. It is found under stones or among vegetation (Spider Recording Scheme, 2018).	Unlikely to be found within the RLB due to extreme rarity.
<i>Pardosa purbeckensis</i>	Lycosidae	IUCN Least Concern (Harvey <i>et al.</i>, 2017)	Widespread on the coasts of Britain. Confusion with <i>P. agrestis</i> means that coastal records of this species are actually <i>P. purbeckensis</i> (Spider Recording Scheme, 2018).	Occurs in saltmarsh, and tidal habits on mudflats and estuary shores. Adults may be found early to mid-summer with females persisting later (Spider Recording Scheme, 2018).	Considered likely to occur on the inter-tidal part of the RLB.
<i>Phlegra fasciata</i>	Salticidae	IUCN Near Threatened (Harvey <i>et al.</i> , 2017). Kent RDB Status 2 (Waite, 2000).	Recorded from a number of sites on the south coast between Sandwich Bay, East Kent and Chesil Beach, Dorset and also present in South Wales on the Gower Peninsula (Spider Recording Scheme, 2018).	In sand dunes and sometimes in other dry coastal habitats such as shingle. In South Wales the spider was found on steep rocky limestone sea cliffs, on bare and sparsely vegetated limestone slopes with loose rocks and sparse, herb-rich	Unlikely to be found within the RLB due to poor habitat suitability.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
				limestone grassland vegetation on skeletal soils providing very warm micro-climates (Spider Recording Scheme, 2018).	
<i>Trichopterna cito</i>	Linyphiidae	IUCN Endangered (Harvey <i>et al</i> , 2017). Kent RDB Status 1 (Waite, 2000)	Recorded from only three locations in Essex, Kent and Sussex since 1993. This species appears to have experienced a reduction in range since, but it may still persist at Sandwich, Kent, where it was last found in 1992. Although apparently formerly numerous at all three sites, at Colne Point, Essex, extensive fieldwork in the early 1990s and in 2004 located only males, in very small numbers, despite the use of pitfall traps (Harvey <i>et al.</i> , 2017).	The spider has been found among moss and grass on old sand dunes and among sparse vegetation on sandy shingle (Spider Recording Scheme, 2018).	Unlikely to be found within the RLB due to unsuitability of habitat.
COLEOPTERA					
<i>Adrastus rachifer</i>	Elateridae	RDB3 (Hyman & Parsons, 1992).	In the UK confined to East Kent coast and some neighbouring inland localities (Hyman & Parsons, 1992).	Hyman & Parsons (1992) refer to calcareous grassland as a key habitat but it has also been found sweeping hedges and grass on a cliff top.	Low probability of being present within the RLB.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>Amara infima</i>	Carabidae	IUCN Near Threatened (Telfer, 2016).	Very local in south-east England and south Wales; scarce (Duff, 2012).	At plant roots on dry, sandy or gravelly heaths (Duff, 2012).	Unlikely to be present within the RLB due to unsuitable habitat.
<i>Bembidion (Emphanes) normannum</i>	Carabidae	IUCN Least Concern (Telfer, 2016).	Widespread in east/central and south-east England, Wales, south-west Scotland and southern Ireland; frequent where it occurs (Duff, 2012).	In litter in saltmarshes (Duff, 2012).	Could be present in the inter-tidal areas within the RLB.
<i>Bradycellus distinctus</i>	Carabidae	IUCN Endangered (Telfer, 2016).	Very local in coastal regions of SE England (S. Essex and W. and E. Kent) and SE Ireland. Formerly more widespread including NW England (Duff, 2012).	In litter on sandy or stony soils (Duff, 2012).	There is some potential for this species to be present within the RLB and adjoining areas where litter is present.
<i>Ceutorhynchus hirtulus</i>	Curculionidae	Nb (Hyman & Parsons, 1992).	Widespread but local in England and Wales (Hyman & Parsons, 1992 & Duff, 2016); very local in Scotland and Ireland (Duff, 2016).	A predominantly maritime species of dry, sandy open ground such as in sand dunes. Also on disturbed ground and more rarely in wetland and woodland. Associated with common whitlow-grass (larvae in stem galls) and, in continental Europe, other	Possibly present in low numbers within the RLB and adjoining areas.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
				Cruciferae (Hyman & Parsons, 1992 & Duff, 2016).	
<i>Dicheirotrichus obsoletus</i>	Carabidae	IUCN Least Concern (Telfer, 2016).	Widespread in SE England, very local in SW England; locally frequent (Duff, 2012).	In litter in saltmarshes, damp clayey seashores and estuary banks (Duff, 2012).	Possible presence on the shoreline or in inter-tidal habitats within the RLB.
<i>Dyschirius extensus</i>	Carabidae	IUCN Critically Endangered (Possibly Extinct) (Telfer, 2016).	Formerly in W. Sussex. E. Kent and N. Essex. Last recorded from near Deal in E. Kent in 1940 and now probably extinct in Britain (Duff, 2012).	In damp fine coastal sands (Duff, 2012).	Unlikely to occur within the RLB due to combination of unsuitable habitat and great rarity
<i>Ethelcus verrucatus</i> Syn. <i>Ceutorhynchus verrucatus</i>	Curculionidae	RDB3 (Hyman & Parsons, 1992); Kent RDB Status 2 (Waite, 2000).	Southern coastal counties from Cornwall to Suffolk but from 1970 only from East Sussex and East Kent (Hyman & Parsons, 1992).	Occurs on coastal shingle and associated with yellow-horned poppy. A difficult species to identify and may be confused with other species of the genus (Hyman & Parsons, 1992).	Unlikely to occur within the RLB due to unsuitable habitat.
<i>Harpalus attenuatus</i>	Carabidae	IUCN Least Concern (Telfer, 2016)	Local in SE England; very local and exclusively coastal in NE and SW England, W. Wales, Isle of Man and Northern Ireland (Duff, 2012).	On dry sandy soils in open areas (Duff, 2012).	Could possibly occur within the RLB especially along paths and tracks if tolerant of some vegetation cover.
<i>Masoreus wetterhallii</i>	Carabidae	IUCN Least Concern (Telfer,	Very local at the coast in southern England from W.	At plant roots on dry sandy or stony soils (Duff, 2012).	Low probability of being present on the

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
		2016).	Cornwall to N. Lincolnshire and inland in the Brecks of East Anglia; rare (Duff, 2012).		upper shoreline of the RLB.
<i>Ophonus (Metophonus) cordatus</i> (Syn. <i>Harpalus cordatus</i>)	Carabidae	IUCN Endangered (Telfer, 2016); Kent RDB status 1 (Waite, 2000).	Very local in southern England from Dorset to East Kent; rare (Duff, 2012).	On dry sandy or stony soils at the coast (Duff, 2012).	Possible presence along the shoreline within the RLB.
<i>Panagaeus bipustulatus</i>	Carabidae	IUCN Least Concern (Telfer, 2016).	Local in southern and eastern England and south Wales; scarce (Duff, 2012).	Usually on dry sandy or stony soils in open situations (Duff, 2012).	Possible presence along the shoreline within the RLB.
<i>Pogonus littoralis</i>	Carabidae	IUCN Least Concern (Telfer, 2016).	Very local in southern England (N. Somerset to N. Lincolnshire, S. Wales and Ireland; occasionally found abundant (Duff, 2012).	Under stones by brackish pools at the coast (Duff, 2012).	Could be present in the inter-tidal parts of the RLB
<i>Pselactus spadix</i>	Curculionidae	Nb (Hyman & Parsons, 1992).	Records of this local species are quite widespread from southern English counties to East Anglia, East Midlands, north-eastern England and south Wales (Hyman & Parsons, 1992).	Primarily coastal, on timber/driftwood on the shoreline (Hyman & Parsons, 1992).	Low probability for it to be present on the shoreline within the RLB.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>Pseudophloeophagus truncorum</i> (Syn. <i>Pseudophloeophagus aeneopiceus</i> & <i>Caulotrupodes aeneopiceus</i>)	Curculionidae	Formerly Nb (Hyman, 1986). No status (Hyman & Parsons, 1992).	A predominantly coastal species in recent times from Suffolk south along the south and west coasts of England and Wales as far north as Ayrshire. Two Kent records: Shakespeare Cliff, Aycliff, near Dover in 1987 and previous to that one from 1907 (Welch, 1989).	Wood boring species in rotten wood and old timber products including strandline driftwood or in logs and dead trees on, or close to, the top of the beach), or in woodland litter. First documented use of herbaceous species in 1987 from Kent (Welch, 1989 & Duff, 2016).	Unlikely to occur within the RLB unless there is suitable dead wood debris on shoreline. Low probability of presence on herbaceous plants with woody like pith/stems.
<i>Thalassophilus longicornis</i>	Carabidae	IUCN Least Concern (Telfer, 2016).	Very local in NW England, Wales and W. Scotland (north to W. Ross), plus one confirmed record from Dungeness in E. Kent; rare (Duff, 2012).	Subterranean, in fine gravel on the banks of rivers, streams and gravel pits (Duff, 2012).	Considered very unlikely to be present within the RLB.
DIPTERA					
<i>Melieria omissa</i>	Ulidiidae	No current National status.	Widely distributed in England and Wales with a distinct preference for coastal habitats (Hackston, 2014).	A range of wetland (reedbed and marsh) and early successional/ disturbed habitats from brownfield to saltmarsh and coastal and other grasslands.	Considered likely to occur within the RLB and adjoining areas.
<i>Platycheirus immarginatus</i>	Syrphidae	Nationally Scarce (Ball &	Mainly a coastal species in England & Wales. Also in	Occurs in coastal grazing marshes, tidal rivers and	Low probability of occurrence but if

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
		Morris, 2014).	Scotland where it occurs additionally inland (Ball & Morris, 2014).	brackish marshes. Larvae predacious on the aphid <i>Trichocallis cyperi</i> often within rank low marshy vegetation including sedge-rich habitats (Ball & Morris, 2014).	present would be found in the more rank vegetation occurring in Stonelees Nature Reserve.
<i>Teucophorus spinigerellus</i>	Dolichopodidae	No current national status.	Widely recorded in England (including Kent) and Wales as far north as Yorkshire; also present in Ireland. Considered uncommon by d'Assiz Fonseca (1978).	Possible wet habitats with exposed rock as found along streams and rivers (d'Assiz Fonseca, 1978).	Considered unlikely to occur within the RLB.
HEMIPTERA - HETEROPTERA					
<i>Emblethis griseus</i> (recorded as <i>E. verbasci</i> in SSSI assemblage list)	See Table 3.1				
<i>Micracanthia marginalis</i>	Saldidae	IUCN Near Threatened (Cook, 2015)	Recorded from England and Wales. Only three confirmed records from three sites since 1990 (Cumbria and Surrey). Historic records from Norfolk, Dorset, Hampshire, Shropshire and Yorkshire (1980); records from Welsh Peatland Invertebrate Survey (WPIS)	Usually found in bare or sparsely vegetated ground in damp hollows and at the margins of small areas of standing water on heathland. Colonies are small. Predatory (Cook, 2015).	Old records by A. M. Massee from Essex and Kent are thought to be erroneous, possibly in error for <i>Saldula saltatoria</i> var. <i>marginella</i> or <i>Saldula opacula</i> .

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
			from Denbighshire and Cardiganshire (Cook, 2015).		A single KRSSI record dating from 1983 in the Sandwich Bay area by A. Henderson also needs further verification. Further information will need to be obtained to determine the basis of the record (voucher specimens, if available, would help to resolve this uncertainty)
Greater streaked shieldbug (<i>Odontoscelis fuliginosa</i>)	Scutelleridae	IUCN Vulnerable (Bantock, 2015). Kent RDB Status 1 (Waite, 2000).	In Britain all recent records are from two strongholds where the species has a long history; the Sandwich Bay and Deal area of Kent and sand dune systems on the south coast of Pembrokeshire (Bantock, 2015).	Strongly ground-dwelling and burrowing species which inhabits open or semi-fixed sand dunes. The bug lives in small, discrete colonies in bare or very sparsely-vegetated areas and all life stages are associated with common stork's-bill, probably the only host plant (Bantock 2015).	Unlikely to occur within the RLB due to sub-optimal habitat conditions.
Lesser streaked shieldbug	Scutelleridae	IUCN Least Concern	No evidence of a decline although remains very	Similar ecological traits to <i>O. fuliginosa</i> on open and semi-	Unlikely to be present within the

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>(Odontoscelis lineola)</i> (Syn. <i>Odontoscelis dorsalis</i>)		(Bantock, 2015).	localised (Bantock, 2015).	fixed sand dunes.	RLB due to unsuitable habitat.
<i>Ortholomus punctipennis</i>	Lygaeidae	RDB3 (Kirby, 1992). Kent RDB status K (Waite, 2000).	First UK record in 1937 with few sites since then; East Anglian brecklands, Lincolnshire coversands, Dorset (Studland Bay) and Sandwich Bay (Kirby, 1992); two recent (2014) records from East Sussex and East Kent (Hersden Colliery).	Very sparse vegetation, including short moss & lichens on very dry sand in hot sheltered positions such as in coastal dunes and other habitats. There are reports of associations with spring cinquefoil (a plant not found in Kent), biting stonecrop, mouse-ear hawkweed and various fine-leaved grasses. (Kirby, 1992).	Unlikely to occur within the RLB due to the unsuitable prevailing conditions.
<i>Peritrechus gracillicornis</i>	Lygaeidae	RDBK (Kirby, 1992). Kent RDB status K (Waite, 2000).	Most records are from southern coastal counties (from Cornwall to Kent, including the Isle of Wight) in the UK from a variety of habitats including dunes, coastal cliff, coastal heath and on chalk areas (Kirby, 1992). 2 records in KRSSI for Sandwich Bay. Can be a difficult species to identify without	Warm, sheltered sunny locations with low or sparse vegetation (Kirby 1992).	Low probability of occurring within the RLB due to limited extent of optimal habitat.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
			comparative material.		
<i>Pionosomus varius</i>	See Table 3.1				
Dalman's leatherbug (<i>Spathocera dahlmanii</i>)	Coreidae	IUCN Least Concern (Bantock, 2015).	Southern England; scarce, but undergoing range expansion and now found as far north as the Norfolk Brecks (Bantock, 2015).	Mainly confined to heathland favouring warm and sparsely vegetated areas where it is found feeding on the seeds of its host plant (sheep's sorrel). Also recorded from acid grassland and dunes.	Unlikely to be present within the RLB and surrounding areas due to mostly unsuitable habitat and lack of abundance of host plant.
HYMENOPTERA					
Gwynne's mining bee (<i>Andrena bicolor</i>)	Andrenidae	No national conservation status (BWARS, 2018). No Kent status (Allen, 2009)	One of the commonest mining bees in lowland districts of Britain and Ireland (Falk, 2015). An abundant species in the county, mostly on chalk and sand, less so on clay soils. Records are less frequent in E. Kent (Allen, 2009).	One of the most versatile of mining bees habitat-wise in UK with the exception of high altitudes or shady interiors of woods. Nests in south facing slopes or banks either singly or in loose aggregations (Falk, 2015).	Possible occurrence as a breeding species in low numbers within the RLB and adjoining areas due to the presence of some nesting suitability.
Yellow-legged mining bee (<i>Andrena flavipes</i>)	Andrenidae	No national conservation status (BWARS, 2018). No Kent status	Widespread and locally common in southern Britain with recent expansion into the Midlands and north Wales (Falk, 2015). An abundant bee	Found on all soil types but most frequently on sand. Two generations per year (Allen, 2009).	Likely to occur as a breeding species within the RLB and surrounding areas due to its great

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
		(Allen, 2009).	in Kent (Allen, 2009).		flexibility in use of a variety of habitats for nesting.
<i>Andrena minutuloides</i>	See Table 3.2				
<i>Andrena pilipes</i>	See Table 3.2				
Cliff mining bee (<i>Andrena thoracica</i>)	Andrenidae	No national conservation status (BWARS, 2018). Kent status pKa (Allen, 2009).	Coastal districts of southern UK from north Wales to Norfolk. Inland it occurs in heathland areas of Surrey, Staffordshire and Norfolk (Falk, 2015). Infrequent and suspected recent decline (Allen, 2009).	Strongly associated with coastal soft rock cliffs and occurs also in other coastal habitats. Also inland on heath, sandpits and other sandy sites (Falk, 2015). Two generations per year (Allen, 2009).	Unlikely to occur as a breeding species within the RLB due to suboptimal habitat.
<i>Cerceris arenaria</i>	Crabronidae	No national conservation status (BWARS, 2018). No Kent status (Allen, 2009).	Locally common and widely distributed throughout much of southern Britain including on the Brecks (BWARS, 2018). In Kent occurs entirely on sandy soils (Allen, 2009).	Coastal but also on inland heaths. May nest in dense aggregations containing thousands of nests. The wasp <i>Hedychrum niemelai</i> is a cleptoparasite of <i>C. arenaria</i> (BWARS, 2018). A predator of adult weevils (Allen, 2009).	Unlikely to be present within the RLB due to its preference for very sandy sites.
<i>Cerceris quadricincta</i>	See Table 3.2				
<i>Cerceris rybyensis</i>		No national	Locally common in southern	In Kent this wasp has a	Unlikely to be

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
	Crabronidae	conservation status (BWARS, 2018). No Kent status (Allen, 2009).	England but no records from Wales (BWARS, 2018). An abundant species where it occurs in the county. Most records from west Kent (Allen, 2009).	preference for sandy and chalk (heath) habitats and rarely on clay soils. Preys on small bees of several genera including <i>Halictus</i> , <i>Lasioglossum</i> and small <i>Andrena</i> (Allen, 2009).	present within RLB preferring more chalk and sandy habitats.
Large sharp-tail bee (<i>Coelioxys conoidea</i>)	Megachilidae	No national conservation status (BWARS, 2018). Kent status pKa (Allen, 2009).	Southern coastal and heathland districts (Falk, 2015), extending north to Cumbria and Yorkshire (Falk, 2015). As uncommon in Kent as its host (Allen, 2009).	Cleptoparasite of <i>Megachile maritima</i> . Coastal dunes, soft rock cliffs, vegetated shingle, sandy heathland and brownfield sites as per host (Falk, 2015).	Unlikely to be present due to lack of suitable habitat to support host.
<i>Hedychridium ardens</i>	Chrysididae	No national conservation status (BWARS, 2018). No Kent status (Allen, 2009).	From Kent to Cornwall, north to Cumberland and SE Yorkshire and with four records from Scotland (BWARS, 2018). Mostly on sandy heaths in Kent where it is considered common (Allen, 2009).	Sandy heath and coastal dune. Host is the ground nesting Crabronid <i>Tachysphex pompiliformis</i> (BWARS, 2018).	Unlikely to be present within RLB due to unsuitable habitat.
<i>Hedychrum niemelai</i>	See Table 3.2				
Coast leafcutter bee (<i>Megachile maritima</i>)		No national conservation status (BWARS,	Widespread and locally frequent in coastal areas of southern Britain with records	Coastal dunes, soft rock cliffs, vegetated shingle, sandy brownfield sites, sand pits and	Populations unlikely to be present due to the suboptimal

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
	Megachilidae	2018). Kent status pKb (Allen, 2009).	extending to SW Scotland. Also inland in heathy districts and the East Anglian Brecks (Falk, 2015). Scarce in Kent with modern records confined to coastal sand and shingle (Allen, 2009).	very sandy heath. Nests occur in sandy ground (Falk, 2015).	habitat within RLB.
<i>Melitta leporina</i>	See Table 3.2				
<i>Myrmica specioides</i>	Formicidae	RDB3 (Falk, 1993).	Modern records are predominantly from coastal sites: East Sussex, Kent, Essex, East Suffolk and East Norfolk (BWARS, 2018).	Warm, dry, sunny situations with sparse vegetation. Coastal south-facing slopes and sand dunes are favoured locations but it has also been found in suitable post-industrial sites (BWARS, 2018).	Low probability of occurrence within the RLB.
<i>Nomada fucata</i>	See Table 3.2				
Bee wolf (<i>Philanthus triangulum</i>)	See Table 3.2				
<i>Smicromyrme rufipes</i>	See Table 3.2				
LEPIDOPTERA					
Sand dart (<i>Agrotis ripae</i>)	Noctuidae	Nb (Waring & Townsend, 2009).	Coastal distribution from Isle of Wight to Scotland (east and west coasts) (Waring & Townsend, 2009). Locally	Sand dunes, especially those just above the high water mark. Polyphagous on many strandline plants. Especially	Low probability of presence in areas of the shoreline within the RLB.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
			abundant on the Kent coast (Kent RDB, 1999).	Chenopods (Waring & Townsend, 2009).	
Restharrow (<i>Aplasta ononaria</i>)	See Table 3.2				
Feathered brindle (<i>Aporophyla australis pascuea</i>)	Noctuidae	Nb (Waring & Townsend, 2009)	Scattered colonies in coastal south Wales (Pembrokeshire) and coastal southern England from Scilly Isles and Cornwall to east Kent, Essex and Norfolk coasts (range includes the Isle of Wight). Also on coastal southern Ireland (Waring & Townsend, 2009).	Shingle beaches, vegetated sand dunes, soft-rock sea cliffs and south-facing chalk downland. Larvae feed on a range of plants (polyphagous) including sea campion, common sorrel, bramble and wood sage and possibly grass species (Waring & Townsend, 2009).	Low probability of presence within the RLB and surrounding areas due to unsuitable habitats.
Scarlet Tiger (<i>Callimorpha dominula</i>)	Erebidae	Local and possible immigrant (Waring & Townsend, 2009).	Locally common in south and south-western England, south and west Wales. In Kent colonies on the east coast have gone extinct with only reports of individuals, possibly immigrants from Sandwich (2004) and St Leonards, East Sussex (2006) (Waring & Townsend, 2009).	Single generation flying in June and July. Dampish habitats favoured such as wet meadows, fens, marshes, river banks and soft rock cliffs but also found in and other habitats such as woodland, gardens, and along ditches. Polyphagous (Waring & Townsend, 2009).	Most unlikely to be present within the RLB and surrounding areas as a breeding species. Wandering individuals from the continent may occasionally turn up.
Scarce chocolate tip (<i>Clostera</i>)	Notodontidae	RDB (Waring & Townsend,	In Britain was at one time only known to breed at Dungeness,	Coastal shingle colonised by scrub (Waring & Townsend,	Unlikely to occur within the RLB due to

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>anachoreta</i>)		2009); Kent RDB status X (Waite, 2000).	Kent. Since 2000 it has spread to the Sandwich Bay and Ramsgate areas (Kent Moth Group, 2018). Apart from south-east Kent other historic records occur for Dorset and Essex. More recent records are from Suffolk (1976), Essex (1997) and Dorset (2003) (Waring & Townsend, 2009).	2009).	unsuitable habitat and also its great rarity.
Speckled footman (<i>Coscinia cribraria</i>)	Erebidae	Two sub-species occur in Britain; <i>C. c. bivittata</i> (RDB, resident species) Kent RDB status 1 (1999); <i>C.c. arenaria</i> (immigrant) (Waring & Townsend, 2009).	<i>C. c. bivittata</i> was formerly widespread especially in the New Forest but now declined (from 1990s) to just 3 sites in Dorset where small numbers are recorded. Non-resident sub-species <i>C. c. arenaria</i> has been recorded in Kent, Sussex, Hampshire & Suffolk (Waring & Townsend, 2009).	A heathland species feeding on heather, bell heather, cross-leaved heath and bilberry but also larvae recently recorded on bristle bent. Avoids very young/early successional heath and mature/old heath (Waring & Townsend, 2009).	Unlikely to occur within the RLB and adjacent areas due to very specific host plant preferences.
Silver barred (<i>Deltote bankiana</i>)	See Table 3.1				
Pygmy footman	Erebidae	Two sub-	<i>E. p. pygmaeola</i> (resident and	Coastal sand dunes and shingle	Low probability of

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>(Eilema pygmaeola)</i>		species occur in Britain; both RDB designated (Waring & Townsend, 2009); <i>E. p. pygmaeola</i> Kent RDB status 2; <i>E. p. pallifrons</i> Kent RDB status 1 (Waite, 2000).	suspected immigrant – locally frequent in Kent between Sandwich and Deal, on one area of the Norfolk coast and, since 1976, on the Isle of Sheppey); <i>E. p. pallifrons</i> occurs as a single population on coastal shingle at Dungeness (Waring & Townsend, 2009). KRISS provide several records on or close to the RLB. One record dating from 2001 is for a location within Stonelees Nature Reserve (TR338625) and a second record, dating from 2007, is for a location within the CP (TR343634).	beaches with a mosaic of grasses and lichens. Larvae feeding mainly on lichens and algae (Waring & Townsend, 2009).	occurring within the RLB as a resident population due to unsuitable habitat conditions therein
Shaded pug (<i>Eupithecia subumbrata</i>)	Geometridae	Local (Waring & Townsend, 2009).	Mainly SE England coast from Dorset to East Anglia and on the downs in Kent. Also populations in limestone areas such as Gower in S. Wales, N. Wales, Cumbria and Yorkshire.	Wide range of habitats from chalk downland, flowery margins of road-side verges to saltmarshes, soft rock cliffs and other coastal habitats. Polyphagous (Waring & Townsend, 2009).	Possibly present within parts of the RLB given the wide range of habitats it has been documented from in the SE.
Bright wave (<i>Idaea</i>)	See Table 3.2				

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>ochrata</i>)					
Lyme grass moth (<i>Longalatedes elymi</i>) Syns. <i>Photodes elymi</i> & <i>Chortodes elymi</i>	Noctuidae	Nb (Waring & Townsend, 2009).	Confined to the east coast from Suffolk to eastern Scotland and to one site on the south coast (East Sussex); recent reports of records on the Lancashire coast between 2010-2016 (Butterfly Conservation Lancashire Branch); only record from Kent was on two dates at Dungeness during 1992 (Waring & Townsend, 2009).	Coastal sand dunes and dune slacks and occasionally found in saltmarsh and other coastal habitats. Larvae feed on lyme-grass (Waring & Townsend, 2009).	Low probability of occurring within the RLB and adjacent areas due to largely unsuitable habitat although the host plant is present in a few locations.
Kent black arches (<i>Meganola albula</i>)	Nolidae	Nb (Waring & Townsend, 2009).	Coastal distribution from Devon to Norfolk, including Isle of Wight and inland in several counties including Hampshire, Surrey and Berkshire. Occasional in coastal Yorkshire (Spurn), Wales and Cornwall. Some records may refer to immigrants, especially from among Kent records (Waring & Townsend, 2009).	Coastal heathland, saltmarshes, shingle and sandy beaches. Inland on chalk downland and woodland glades. Larvae on bramble, raspberry and wild strawberry (Waring & Townsend, 2009).	Possibly present given the ready availability of some of the foodplants within the RLB.
Oblique striped	See Table 3.2				

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
<i>(Phibalapteryx virgata)</i>					
White colon (<i>Sideris turbida</i>) Syn. <i>Sideris albicolon</i>	Noctuidae	Nb (Waring & Townsend, 2009).	A scattered distribution around the British coast from Scotland to southern England (Waring & Townsend, 2009). Very local and scarce in Kent (Kent RDB, 1999).	Coastal habitats, particularly vegetated sand dunes, shingle and marshes. Breeds inland on heathland. Polyphagous on a wide range of coastal plants including restharrow and Chenopods. Larvae feed by night (Waring & Townsend, 2009).	Possibly present along the shoreline within the RLB.
Sandhill pygmy moth (<i>Stigmella zelleriella</i>)	See Table 3.1				
MOLLUSCA - GASTROPODA					
Carthusian snail (<i>Monacha cartusiana</i>)	Hygromiidae	IUCN Near Threatened (Seddon, Killeen & Fowles, 2014). Kent RDB Status 2 (Waite, 2000).	South-east England restricted. A clear decline recorded over the last 40 years (Kerney, 1999 and Seddon, Killeen & Fowles, 2014).	Restricted to dry open, unshaded habitats on calcareous soils. Also found in moister sites among nettles and other weeds of waste ground on road side banks and ploughed fields etc. (Kerney, 1999). Lowland calcareous grassland sites including calcareous sand dune grasslands favouring taller	Unlikely to be present within the RLB due to preference for calcareous habitats.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
				swards (Alexander, 2003).	
ORTHOPTERA					
Long-winged conehead (<i>Conocephalus discolor</i>)	Tettigoniidae	IUCN Least Concern (Sutton, 2015)	Formerly a largely southern (England) and coastal distribution in Britain. Over the last decade or more this species has colonised much of inland southern Britain (including coastal south-east Wales) and with recent records as far north as south Yorkshire.	Coarse vegetation in a range of open and scrubby habitats. Often now found on brownfield sites.	Confirmed to be present within the RLB during 2017 survey (adult males and females locally frequent so a breeding population assumed to be present).
Roesel's bush-cricket (<i>Metrioptera roeselii</i>)	Tettigoniidae	IUCN Least Concern (Sutton, 2015).	At one time mainly coastal but has been expanding range and abundance inland and further north to south and south-east Yorkshire (Orthoptera Recording Scheme, 2018).	Wide range of habitat containing coarse vegetation including saltmarshes and dunes on the coast as well as brownfield sites and agricultural set aside (Orthoptera Recording Scheme, 2018).	Suitable habitat is present within the RLB so thought to be possibly present within or adjacent to the site at low densities.
Grey bush-cricket (<i>Platycleis albopunctata</i>) Syn. <i>Platycleis denticulata</i>	Tettigoniidae	IUCN Least Concern (Sutton, 2015).	More or less exclusively coastal from southern England and south Wales (one population on Llyn Peninsula) (Orthoptera Recording Scheme, 2018).	Coastal coarse grassland and rough vegetation on sand dunes, shingle banks and south-facing cliffs (Orthoptera Recording Scheme, 2018).	Habitat within RLB considered to be sub-optimal for this species and unlikely to be present.

Species	Family	Conservation Status	UK Distribution	Habitat requirements	Potential for occurrence within or adjacent to the onshore RLB
			Scheme, 2018).		

3.2 Field Survey Results

3.2.1 Sampling Results

A total of 77 species of terrestrial invertebrate were recorded during the survey. No Red Data Book species or species designated with an IUCN threat category were recorded from the sampling and none of the species listed in the Thanet Coast and Sandwich Bay RIS were found. However, four nationally rare/scarce species were recorded. The nationally rare Chalcid wasp *Brachymeria minuta* was recorded from Section B. This is a distinctive wasp from a small group that are characterised with enlarged hind femora. It is quite widespread in Britain but rarely recorded. It is parasitic on a range of Diptera including flesh flies (*Sarcophaga* sp.). To the author's knowledge there is at least one other (recent) record of this wasp locally, this from the north Thanet coast. The nationally scarce rove beetle *Paederus fuscipes* was also recorded within an area adjacent to Section B, from the underside of reptile refuges deployed at that location. The red bartsia bee (*Melitta tricincta*) was found in Section C and the sharp-collared furrow bee was found in Section B. The red bartsia bee was proposed as a nationally scarce bee by Falk (1991) but in Kent it is not uncommon and has not been flagged up as a species of concern (Allen, 2009). The sharp-collared furrow bee, a eusocial mining bee, was until recently quite a scarce species in the UK and was unknown in Kent prior to 1966. Over the last three decades it has increased greatly in range and abundance, likely related to climate change, and consequently it has not been given a Kent status. In addition five Local⁴ species were found in a variety of locations within the study area. It is of interest also to note that about 10% of the species recorded during the survey are those newly established in Britain within the last 16 years.

The major part of the sample comprised Hemiptera forming just over half (37) of the taxa recorded with four Local species. The remainder comprised species from nine major invertebrate groups which were mainly common and widespread species.

A checklist of species recorded in each section of the study area during the survey and their conservation status is provided in Appendix 01.

3.2.2 Assessment of Terrestrial Invertebrate Habitats

Section A

This section comprised the margins of an upper zone of saltmarsh supporting a range of coastal marsh plants (Plate 1) including saltmarsh rushes (*Juncus* sp.) and sea club-rush (*Scirpus maritimus*), sea purslane (*Atriplex portulacoides*) and a range of other oraches (*Atriplex* sp.) along with some common cord grass (*Spartina anglica*). This study was restricted to terrestrial invertebrates (surveys of inter-tidal habitats have been undertaken separately) and therefore sampling was confined to the near margins of the low fringing grassy bank as shown in Plate 1.

⁴ 'Local' is a designation derived from the development of Recorder software by JNCC in the early 1980s to the 1990s. The software is current (Recorder 6) and the designation is still valid as an indication of those species that are not commonly encountered but may be widespread in distribution.



Plate 1: View of Section A from within Study Area

Sweep-netting resulted in a small number of Local species being found among which were the leafhopper *Paramesus obtusifrons*, this occurring on sea club-rush, and the reed damselfly (*Nabis lineatus*), a species associated with common reed. Also present in some abundance was the planthopper *Prokelisia marginata*, a species native to the eastern seaboard of North America where its host is the American cord-grass (*Spartina alterniflora*). This was first recorded in Britain from the Hampshire coast in 2008 and may have been introduced into Europe via packaging materials using cord-grass for the purpose (Badmin & Witts, 2010). It has also subsequently been recorded from the coasts of the Netherlands (2010) and northern Germany (2015) showing that the species is expanding its range on the continent (den Bieman and van Klink, 2016). In Britain, it has now colonised as far west as South Wales and as far north as the Humber Estuary.

It can be seen, therefore, that Section A supports some distinctive and characteristic species of the upper littoral shore, and likely also supports some saltmarsh species of interest. Some of these may be of notable status and further sampling would probably add to the list of typical species. For example, these could include the planthopper *Neophilaenus longiceps* and the lacehopper *Pentastiridius leporinus*, both of which are to be found mainly on southern coastal saltmarshes. Although nationally scarce these are often found in some abundance. Section A thus adds a distinctive element to the invertebrate diversity of the study area. The habitat is extensive in neighbouring coastal areas and is judged in this context to have local or potentially district significance for invertebrates.

Section B

This section comprised a mix of tall ruderals and bramble (*Rubus fruticosus* agg.) on the margins of some grassy rides and a more open grassy glade (Plate 2). Tall ruderals included common nettle (*Urtica dioica*), hogweed (*Heracleum sphondylium*), mugwort (*Artemisia vulgare*) and hedge mustard (*Sisymbrium officinale*). In addition false oat-grass (*Arrhenatherum elatius*) was locally frequent and other herbaceous species such as common mallow (*Malva sylvestris*), locally frequent black horehound (*Ballota nigra*) and hedge bindweed (*Calystegia sepium*) were locally prominent in the vegetation mix.

A total of 37 invertebrate species were recorded in Section B. The most notable records were of two nationally scarce species. The sharp-collared furrow bee was swept from herbage in the middle of the section, on the

edges of a glade where artificial refugia (made of roofing felt) had been deployed for the reptile survey. Here too, the groundbug *Beosus maritimus* was found by inspecting the underside of the mats. *B. maritimus* is a local species that frequents mostly coastal locations in the southern half of Britain. Larger numbers of *B. maritimus* were found a short distance further south-west in areas of grassland on a sandy substrate supporting locally abundant sea couch (*Elytrigia atherica*) where reptile refuge mats had also been laid. At this location a population of the nationally scarce rove beetle *Paederus fuscipes* was also found by examining the undersides of these reptile refuges.



Plate 2: View (to north) of the Vegetation Characteristic of much of Section B

The habitats and vegetation within this Section are of common and widespread distribution. Most of the plant species recorded are also not uncommon in the region. These provide a range of potential breeding/nesting and foraging potential for a lot of mobile field and ground layer invertebrates and the sampling of these habitats resulted in the finding of many common and widespread species. It is considered likely that other rare and scarce species may occur, such as the groundbug *Raglius alboacuminatus*, a nationally scarce groundbug associated with black horehound, either utilising pollen/nectar sources and to feed on specific plants or to predate on other species. This level of likely interest would be equivalent to a site that is of district significance.

Section C

This section comprised a length of bare ground alongside a length of common nettle-rich coarse grassland with locally abundant bramble which narrowed to the north to become a mixed stand of young trees and shrubs (Plates 3 and 4) including hawthorn (*Crataegus monogyna*), white poplar (*Populus alba*), evergreen oak (*Quercus ilex*), field maple (*Acer campestre*), sycamore (*Acer pseudoplatanus*), ash (*Fraxinus excelsior*), pine (*Pinus* sp.) and sea buckthorn (*Hippophae rhamnoides*). A track runs along the west side of this section, parallel with Sandwich Road, which is lined on either side by hedgerow and scrub.



Plate 3: View (Looking North East) of a Part of Section C

A total of 34 species was recorded from this section. The major part of these were, unsurprisingly, largely arboreal in character. The most interesting species recorded, however, was a single male specimen of the red bartsia bee. This species times its flight period when its host plant, red bartsia, is in flower.

Sampling the various trees and shrubs provided records of a small number of host specific insects including the leafhoppers *Zygina nivea*, *Populicerus albicans* and *Viridicerus ustulatus* which are largely specific to white poplar (*Populus* sp.) and the leafhopper *Acericerus ribauti* which is found on field maple. From the bramble-rich herbage common and widespread species included groundbug and plantbug species with a preference for nettles and nettle beds. Dark bush-cricket was observed frequently resting on low vegetation in this area. Many more mobile species, such as hoverflies (Syrphidae), were a feature of these margins. The hedgerow forming the western boundary of the study area contained some locally abundant climbing ivy which was starting to come into flower. It was here that a single ivy bee (*Colletes hederæ*) was recorded feeding on the pollen (this species times its flight period specifically to coincide with the plant's main flowering period).

Section C has potential to support some notable species such as the Kent bent-wing already mentioned. Overall, Section C predominantly contains habitat types and plant species that are commonly distributed nationally and regionally but it has the potential to support, in one way or another, populations of invertebrates that are considered scarce or rare or threatened in the wider area. On the basis of this Section C is considered of local or potentially district significance for its invertebrate assemblages and species.



Plate 4: View (Looking South) of Another Part of Section C

Section D

Section D comprised areas of vegetation on either side of a track within Stonelees NR (Plate 5). The track itself comprised a 'central reservation' of flower-rich vegetation with bare compacted ground on the margins. Also present and shown on some maps is a seasonal pond at the northern end of the section which, at the time of survey, was found to be dry with a sparse cover of ruderals and pioneer species of disturbed open ground (Plate 6). It is likely to only hold water in winter or following periods of particularly heavy rainfall.

The vegetation adjacent to the margins of the track included stands of tall ruderals/herbs such as rosebay willowherb (*Chamerion angustifolium*) and tansy (*Tanacetum vulgare*). These tended to predominate in combination with bramble and hawthorn, although the very southern end of this section was rather different in character. This was as a result of some previous ground disturbance and, along with heavier shade from surrounding trees and shrubs, resulted in more open and somewhat sparser stands of vegetation. Other tall ruderals included teasel (*Dipsacus fullonum*), fat hen (*Chenopodium album*), hedge mustard, prickly ox-tongue (*Helminthotheca echioides*), creeping thistle (*Cirsium arvense*) and common valerian (*Valeriana officinalis*) as well as locally abundant field horsetail (*Equisetum arvense*), locally frequent common fleabane (*Pulicaria dysenterica*), and with occasionally some agrimony (*Agrimonia eupatoria*) and Asparagus (*Asparagus officinalis*) which was an uncommon component of the vegetation. In damper areas common reed and rushes were locally frequent.

Section D provided records of 24 species of largely common invertebrates. These comprised a range of species characteristic of flower-rich and ruderal habitats and included a large proportion of characteristic true bugs (particularly plantbugs: Miridae). Potentially this section is likely to support the foraging needs of many bees and wasps due to the presence of flower-rich stands of several plant species. One species flagged up in the desk study could also potentially be present – the planthopper *Asiraca clavicornis* which would likely inhabit the margins of the open bare ground of the paths. Section D provides some level bare ground and disturbed areas which may be of use to some ground nesting bees and wasps but the main value to this group would be the availability of nectar and pollen resources. On the basis of the records and observations of the nature of the vegetation and its potential value to local populations of invertebrates Section D is judged to have local or potentially district significance for invertebrates.



Plate 5: View (to south) of a Part of Section D



Plate 6: View (Looking South) of a Part of Section D with Dried Up Waterbody

4.0 Summary and Conclusions

This report presents the findings of an assessment of the potential value of the site for terrestrial invertebrates. The aims of the assessment were to provide baseline data to inform the EIA and the detailed design for the project. The assessment of impacts resulting from the proposed development and the development of mitigation measures, if required, are beyond the scope of this report and are covered separately in the ES.

The assessment was based on a site visit by a specialist entomologist on 31st August 2017 and a review of existing species data. During the site visit an assessment of the potential value of habitats present for terrestrial invertebrates was made. The assessment was supported, where possible, by field sampling of invertebrates using a range of sampling methods. An additional desk-based assessment of the potential for the area within the RLB to support invertebrate species forming notified features of the Sandwich Bay to Hacklinge Marshes SSSI and Thanet Coast and Sandwich Bay Ramsar Site has also been undertaken.

The survey focussed on those habitats within and immediately adjacent to the site that were considered to have potential value for terrestrial invertebrates. These included all habitats within Pegwell Bay Country Park and Stonelees NR but excluded the habitats to the south of there, which are dominated by amenity grassland and hard standing and were not considered likely to support important invertebrate assemblages. The study area was divided into four sections based primarily on habitat and boundary features recognised to be present (see Drawing 2).

A desk study commissioned by Amec Foster Wheeler in 2017 produced 119 records of 44 notable invertebrate species within a radius of 2km of the site. Most of these species exist in habitats which are not present within the study area, e.g. sand dunes, although there is potential for a relatively small number of these species to occur within the study area.

Three species forming part of the wetland invertebrate assemblage qualifying feature for the Thanet Coast and Sandwich Bay Ramsar Site and four species listed as non-wetland invertebrate species of importance in the Thanet Coast and Sandwich Bay RIS could potentially be present within the study area based on an assessment of their specific habitat requirements. It is noted however that for some of these species the potential for occurrence is considered to be relatively low. It is also noted that none of the wetland assemblage species which could potentially occur within the study area are true wetland species however, being associated instead with disturbed habitats, dead wood and bare ground on clay soils. The other species of importance are all species of open grassland. If present within the study area, all seven species are most likely to occur within Stonelees NR.

21 species⁵ forming part of the invertebrate assemblage notified feature for the Sandwich Bay and Hacklinge Marshes SSSI, representing 30% of the assemblage species, could potentially be present within the study area based on an assessment of their specific habitat requirements. It is noted however that for some of these species the potential for occurrence is considered to be relatively low whilst a number of these species are actually relatively common and widespread. 14 of the SSSI assemblage species which could potentially be present, including species which utilise a wide range of habitats, are associated with relatively open terrestrial habitats. Nine of the SSSI assemblage species which could potentially be present, including two of the species also associated with open terrestrial habitats, are most likely to be present in inter-tidal and or shoreline habitats.

A total of 77 species of terrestrial invertebrate were recorded during the survey, including four nationally rare or scarce species, the nationally rare Chalcid wasp *Brachymeria minuta*, the nationally scarce rove beetle *Paederus fuscipes*, the red bartsia bee and the sharp-collared furrow bee. In addition five Local species were

⁵ Includes four species also listed on the RIS.

found within the study area. It is noted that further survey effort earlier in the season would almost certainly have identified additional invertebrate species within the study area. However, it is considered unlikely that additional species records would significantly alter the conclusions of this assessment.

All four sections within the study area were assessed to be of local or potentially district significance for invertebrates based on consideration of the conservation status of species recorded or likely to be present and a broader assessment of the potential of the habitats present to support invertebrate assemblages of potential value. None of the study area sections are considered likely to support an invertebrate assemblage of county or greater significance and overall the study area is considered likely to be of district importance for invertebrates.

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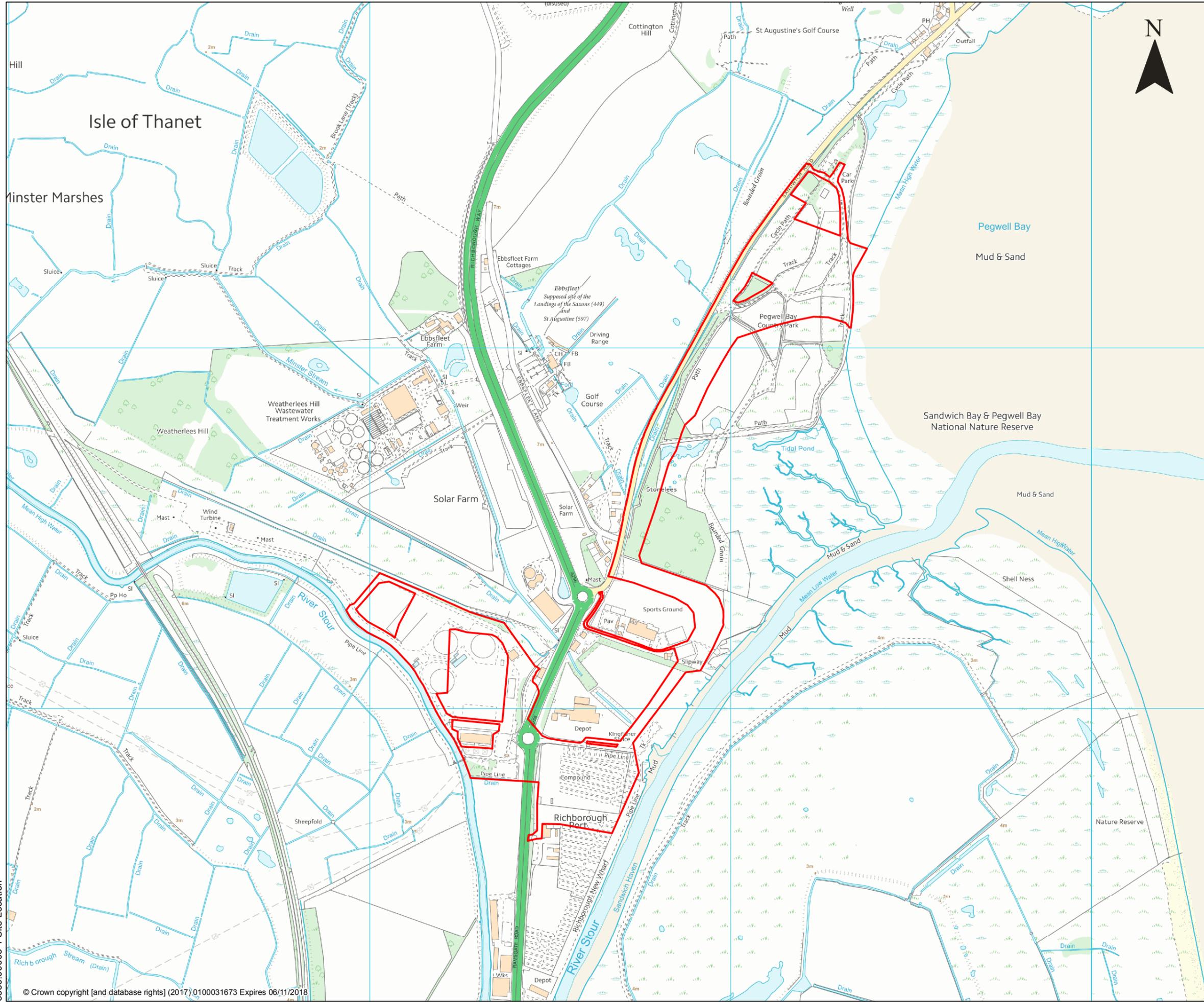
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DRAWINGS

Drawing 1: Site Location and Boundary

Drawing 2: Site Boundary, Terrestrial Invertebrate Study Area and
Study Area Sections



LEGEND

SITE BOUNDARY

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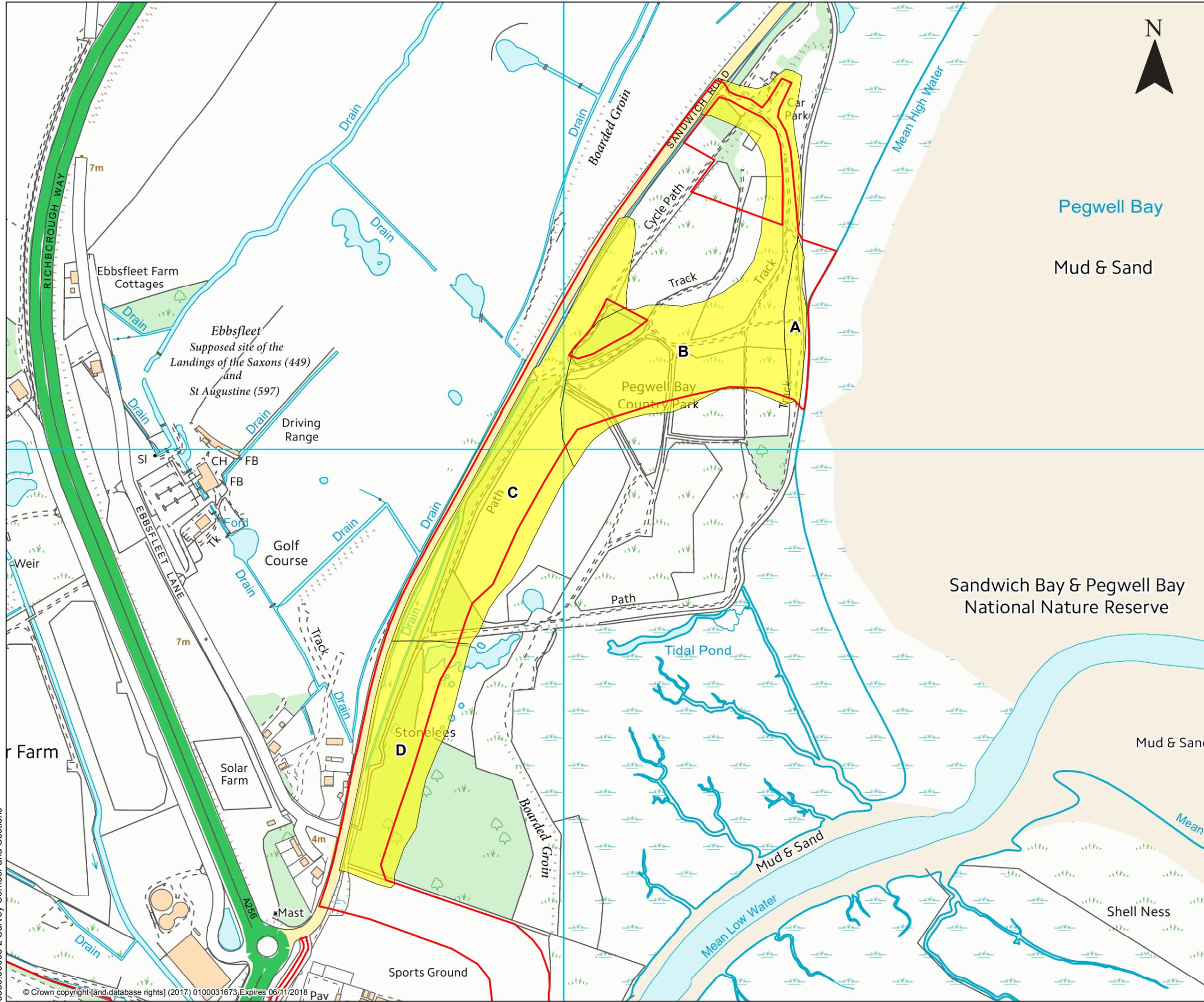
**THANET EXTENSION OFFSHORE
WIND FARM
ONSHORE GRID CONNECTION
TERRESTRIAL INVERTEBRATE
ASSESSMENT**

**SITE LOCATION
AND BOUNDARY**

1

Scale 1:10,000 @ A3 Date NOVEMBER 2017

5356.00003 1 Site Location



LEGEND

- SITE BOUNDARY
- STUDY AREA AND STUDY AREA SECTIONS

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SITE BOUNDARY, TERRESTRIAL INVERTEBRATE STUDY AREA AND STUDY AREA SECTIONS

2

Scale 1:5,000 @ A3 Date NOVEMBER 2017

5356.00003 2 Survey Corridor and Sections

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APPENDIX 01

Checklist of Invertebrate Species Recorded During Field Survey

Thanet Extension Offshore Windfarm – Results of terrestrial invertebrate survey of 31-08-2017

Species	IUCN/National status	Area A	Area B	Area C	Area D	Off-site areas adjacent to site boundary
Aranaea (spiders)						
Pisauridae (nursery web spiders)						
<i>Pisauria mirabilis</i> (common nursery web spider)	Common	◆		◆	◆	
Xysticidea (Crab spiders)						
<i>Xysticus cristatus</i> (common crab spider)	Common	◆	◆	◆		
Coleoptera (beetles)						
Apionidae (weevils)						
<i>Perapion curtirostre</i>	Common		◆	◆		◆
Chrysomelidae (leaf beetles)						
<i>Bruchidius varius</i>	Common		◆		◆	◆
<i>Chrysolina banksi</i>	Common		◆			
<i>Longitarsus luridus</i>	Common			◆	◆	◆
<i>Psylloides chrysocephala</i>	Common		◆	◆		

Species	IUCN/National status	Area A	Area B	Area C	Area D	Off-site adjacent areas to site boundary
Coccinellidae (ladybirds)						
<i>Coccinella septempunctata</i> (7-spot ladybird)	Common		◆			
<i>Harmonia axyridis</i> (harlequin ladybird)	New to Britain 2004	◆				
<i>Psyllobora vigintiduopunctata</i> (22-spot ladybird)	Common				◆	
Curculionidae (weevils)						
<i>Sitona lineatus</i>	Common		◆	◆		◆
Staphylinidae (rove beetles)						
<i>Paederus fuscipes</i>	Nb		◆			◆
Diptera (true flies)						
Stratiomyidae (soldierflies)						
<i>Chorisops tibialis</i>	Least Concern (LC)			◆		
Syrphidae (hoverflies)						
<i>Helophilus pendulus</i>	Common			◆		
<i>Sphaerophoria scripta</i>	Common			◆	◆	
<i>Syrphus ribesii</i>	Common			◆		

Species	IUCN/National status	Area A	Area B	Area C	Area D	Off-site adjacent to site boundary
Scathophagidae (dung flies)						
<i>Scathophaga stercoraria</i>	Common		◆	◆		
Sciomyzidae (snail-killing flies)						
<i>Coremacera marginata</i>	Common				◆	◆
Hemiptera: Auchenorrhyncha						
Aphrophoridae (froghoppers)						
<i>Aphrophora alni</i>	Common	◆				◆
<i>Neophilaenus lineatus</i>	Common		◆			
<i>Philaenus spumarius</i> (common cuckoo-spit froghopper)	Common		◆		◆	
Cicadellidae (leafhoppers)						
<i>Acericerus ribauti</i>	New to Britain 2007			◆		
<i>Lamprotettix nitidulus</i>	Local			◆		
<i>Opsius stactogalus</i>	Common					◆
<i>Paramesus obtusifrons</i>	Local	◆				
<i>Populicerus albicans</i>	Common			◆		

Species	IUCN/National status	Area A	Area B	Area C	Area D	Off-site adjacent areas to site boundary
<i>Viridicerus ustulatus</i>	Common			◆		
<i>Tremulicerus distinguendus</i>	Common			◆		
<i>Zygina nivea</i>	New to Britain 2010			◆		
Delphacidae (planthoppers)						
<i>Prokelisia marginata</i>	New to Britain 2008	◆				
<i>Stenocranus minutus</i>	Common		◆			
Hemiptera: Heteroptera						
Coreidae (squashbugs)						
<i>Coreus marginatus</i> (dock bug)	Least concern (LC)		◆	◆		
<i>Gonocerus acuteangulatus</i> (box bug)	Least concern (LC)		◆			
Cydnidae (burrowing shieldbugs)						
<i>Tritomegas sexmaculatus</i> (Rambur's shieldbug)	New to UK in 2011		◆			
Lygaeidae (groundbugs)						
<i>Beosus maritimus</i>	Local		◆			◆

Species	IUCN/National status	Area A	Area B	Area C	Area D	Off-site adjacent areas to site boundary
<i>Ischnodema sabuleti</i> (European cinch bug)	Common		◆			
<i>Peritrechus geniculatus</i>	Common			◆		
<i>Scolopostethus thomsoni</i>	Common		◆	◆	◆	
Miridae (plantbugs)						
<i>Adelphocoris lineolatus</i>	Common				◆	
<i>Deraeocoris lutescens</i>	Common			◆		
<i>Dicyphus epilobii</i>	Common				◆	
<i>Dicyphus errans</i>	Common			◆	◆	
<i>Liocoris tripustulatus</i>	Common			◆	◆	
<i>Lygus maritimus</i>	Local				◆	
<i>Lygus rugulipennis</i>	Common			◆	◆	
<i>Notostira elongata</i>	Common		◆	◆		
<i>Orthotylus flavosparsus</i>	Common	◆				
<i>Phytocoris varipes</i>	Common		◆			◆
<i>Plagiognathus arbustorum</i>	Common		◆		◆	

Species	IUCN/National status	Area A	Area B	Area C	Area D	Off-site adjacent areas to site boundary
<i>Tuponia brevisrostris</i>	New to Britain 2001					◆
Nabidae (damselfly)						
<i>Himacerus apterus</i> (tree damselfly)	Common		◆	◆		
<i>Himacerus mirmicoides</i> (ant damselfly)	Common		◆	◆		
<i>Nabis lineatus</i> (reed damselfly)	Local	◆				
Pentatomidae (shieldbugs)						
<i>Palomena prasina</i> (green shieldbug)	Least concern (LC)		◆	◆	◆	
<i>Podops inuncta</i> (turtle shieldbug)	Least concern (LC)		◆			
Hymenoptera (ants, bees & wasps)						
Apidae (honey bees etc.)			◆		◆	
<i>Apis mellifera</i> (honey bee)	Common		◆	◆		
Bombidae (bumblebees)						
<i>Bombus lucorum/terrestris</i>	Common			◆	◆	
<i>Bombus pascuorum</i> (common carder bee)	Common		◆	◆	◆	
Chalcidae (parasitic wasps)						

Species	IUCN/National status	Area A	Area B	Area C	Area D	Off-site adjacent areas to site boundary
<i>Brachymeria minuta</i>	'Nationally rare'		◆			
Colletidae (plasterer bees)						
<i>Colletes hederæ</i> (ivy bee)	New to Britain 2001			◆		
Halictidae (furrow bees)						
<i>Lasioglossum maluchurum</i> (sharp-collared furrow bee)	Nb		◆			
Melittidae (blunthorn bees)						
<i>Melitta tricincta</i> (red bartsia bee)	pNb			◆		
Isopoda (woodlice)						
Armadillidae (pill woodlice)						
<i>Armadillidium vulgare</i> (common pill woodlouse)	Least concern (LC)		◆		◆	
Philoscidae						
<i>Philoscia muscorum</i>	Least concern (LC)		◆	◆		
Lepidoptera (butterflies & moths)						
Lycaenidae (blues and hairstreaks)						

Species	IUCN/National status	Area A	Area B	Area C	Area D	Off-site adjacent to site boundary
<i>Celastrina argiolus</i> (holly blue)	Least Concern (LC)			◆		
Nymphalidae						
<i>Inachis io</i> (peacock)	Least Concern (LC)			◆		
Pieridae (whites)						
<i>Pieris rapae</i> (small white)	Least concern (LC)	◆	◆	◆		
Satyridae (browns)						
<i>Pararge aegeria</i> (speckled wood)	Least concern (LC)	◆		◆		
Mollusca - Gastropoda (slugs and snails)						
Cochlicellidae						
<i>Cochlicella acuta</i> (pointed snail)	Least concern (LC)		◆			
Helicidae						
<i>Cepaea nemoralis</i> (brown-lipped snail)	Least concern (LC)			◆	◆	
Hygromyiidae						
<i>Trochulus hirsutus</i> (hairy snail)	Least concern (LC)				◆	
Odonata (dragonflies & damselflies)						
Libellulidae (darters)						

Species	IUCN/National status	Area A	Area B	Area C	Area D	Off-site areas adjacent to site boundary
<i>Sympetrum striolatum</i> (common darter)	Least Concern (LC)		◆			
Orthoptera (bush crickets, grasshoppers & allied species)						
Acrididae (grasshoppers)						
<i>Chorthippus brunneus</i> (field grasshopper)	Least Concern (LC)		◆	◆		
<i>Myrmeleotettix maculata</i> (mottled grasshopper)	Least Concern (LC)	◆				
Tetrigidae (Groundhoppers)						
<i>Tetrix subulata</i> (slender groundhopper)	Least Concern (LC)				◆	
Tettigonidae (bush-crickets)						
<i>Conocephalus discolor</i> (long-winged conehead)	Least Concern (LC)	◆				
<i>Pholidoptera griseoptera</i> (dark bush-cricket)	Least Concern (LC)		◆	◆	◆	◆
Total number of species for each section		12	37	34	24	12

APPENDIX 02

IUCN Status Categories and Criteria

IUCN STATUS CATEGORIES AND CRITERIA

These status categories and criteria are based on IUCN Red List Categories and Criteria version 3.1 (IUCN, 2001) and have been applied to British butterflies, dragonflies and a growing number of other invertebrate groups.

- **Critically Endangered (CR)**

A taxon is Critically Endangered when the best available evidence indicates that it is facing an **extremely high** risk of extinction in the wild.

- **Endangered (EN)**

A taxon is Endangered when the best available evidence indicates that it is facing a **very high** risk of extinction in the wild.

- **Vulnerable (VU)**

A taxon is Vulnerable when the best available evidence indicates that it is facing a **high** risk of extinction in the wild.

N.B.: Species belonging to the above three categories may be collectively referred to as **Threatened**.

- **Data Deficient (DD)**

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

- **Near Threatened (NT)**

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

- **Least Concern (LC)**

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category. At the national level, countries are permitted under the IUCN guidelines to refine the definitions for the non-threatened categories and to define additional ones of their own.

APPENDIX 03

British Conservation Status Categories - Definitions

British conservation status categories – definitions

These status categories and criteria were introduced for British insects by Shirt (1987) and received some modifications by later authors (e.g. Hyman and Parsons (1992).

- **Red Data Book category EXTINCT**
Definition Species formerly native to Britain but have not been recorded since 1900.
- **Red Data Book category 1 (RDB1) Endangered**
Definition Species in danger of extinction and whose survival is unlikely if causal factors continue to operate. Endangered species either (a) occur as only a single population within one 10-km square, or (b) only occur in especially vulnerable habitats, or (c) have been declining rapidly or continuously for twenty years or more to the point where they occur in five or fewer 10-km squares, or (d) may already have become extinct.
- **Red Data Book category 2 (RDB2) Vulnerable**
Definition Species which are likely to move into the Endangered category in the near future if causal factors continue to operate. Vulnerable species are declining throughout their range or occupy vulnerable habitats.
- **Red Data Book category 3 (RDB3) Rare**
Definition Species which occur in small populations and although not currently Endangered or Vulnerable are at risk. Rare species exist in 15 or fewer 10-km squares, or are more widespread than this but dependent on small areas of especially vulnerable habitat.
- **Red Data Book category I (RDBi) Indeterminate**
Definition Species considered Endangered, Vulnerable or Rare but with insufficient information to say which.
- **Red Data Book category K (RDBK) Insufficiently Known**
Definition Species suspected to merit either an Endangered, Vulnerable, Rare or Indeterminate status but lacking sufficient information. Species included in this category may have only recently been discovered in Britain, or may be very poorly recorded for a variety of reasons.
- **Nationally Scarce Category A (Na)**
Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in 30 or fewer (typically between 16 and 30) 10-km squares of the National Grid, or for less well-recorded groups, in seven or fewer vice-counties.

- **Nationally Scarce Category B (Nb)**

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in between 31 and 100 10-km squares of the National Grid, or for less well-recorded groups, between eight and twenty vice-counties.

- **Nationally Scarce N (N)**

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain. This status category has been used where information has not been sufficient to allocate a species to either Na or Nb. These species are thought to occur in between 16 and 100 10-km squares of the National Grid.

- **Local**

Definition species which were identified as being of limited but widespread distribution from Recorder, a biological recording database which was developed by Nature Conservancy Council (NCC) in the late 1980s (the designations are usually taken from version 3.3) and which has since undergone continued further development (currently as Recorder 6).

APPENDIX 04

Criteria used to Define Significance of Invertebrate Habitat Colin Plant Associates (UK)

Significance	Description	Minimum qualifying criteria
International	European important site	Internationally important invertebrate populations present or containing RDB 1 (Endangered) species or containing any species protected under European legislation or containing habitats that are threatened or rare at the European level (including, but not exclusively so, habitats listed on the EU <i>Habitats Directive</i>).
National	UK important site	Achieving SSSI invertebrate criteria (NCC, 1989) or containing RDB2 (Vulnerable) or containing viable populations of RDB 3 (Rare) species or containing viable populations of any species protected under UK legislation or containing habitats that are threatened or rare nationally (Great Britain).
Regional (for border sites, both regions must be taken into account)	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in south-east England	Habitat that is scarce or threatened in the region or which has, or is reasonably expected to have, the presence of an assemblage of invertebrates including at least ten Nationally Notable species or at least ten species listed as Regionally Notable for the <i>English Nature</i> region in question in the Recorder database or elsewhere or a combination of these categories amounting to ten species in total.
County (for border sites, both counties must be taken into account)	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the county in question	Habitat that is scarce or threatened in the county and/or which contains or is reasonably expected to contain an assemblage of invertebrates that includes viable populations of at least five Nationally Notable species or viable populations of at least five species regarded as Regionally Scarce by the county records centres and/or field club.
District	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the administrative District	A rather vague definition of habitats falling below county significance level, but which may be of greater significance than merely Local. They include sites for which Nationally Notable species in the range from 1 to 4 examples are reasonably expected but not yet necessarily recorded and where this omission is considered likely to be partly due to under-recording.
Local	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the affected and neighbouring Parishes (except Scotland, where the local area may best be defined as being within a radius of 5 kilometres	Habitats or species unique or of some other significance within the local area.
Low significance	—	Although almost no area is completely without significance these are the areas with nothing more than expected “background” populations of common species and the occasional Nationally Local species.

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