RiverOak Strategic Partners

Annex 5, Appendices A and B: Applicant's Submission for the re-determination of the Manston Application

TR020002/RED/A5/APP
Redetermination Document

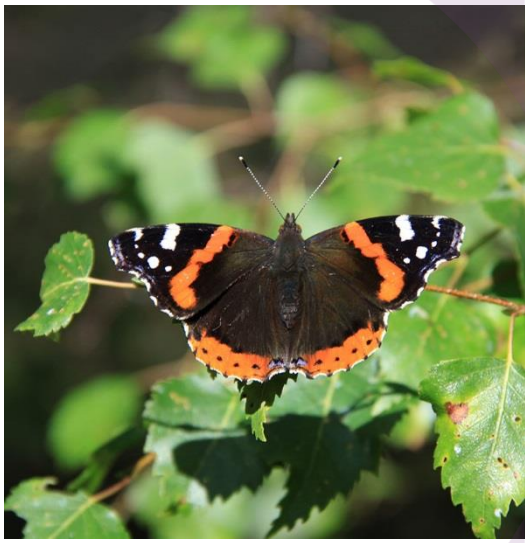
Project Name:	Manston Airport Development Consent Order
Application Ref:	TR020002
Date:	9 July 2021

Appendix A – Independent Ecological Surveys

RiverOak Strategic Partners Ltd

Manston Airport

Breeding Bird Survey Report 2020



Wood Group UK Limited – April 2021

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Document revisions

No.	Details	Date
001	First issue	February 2021
002	Re-issue with change to introduction	April 2021

Contents

1. Introduction

1.1 Project background

1.1.1 RiverOak Strategic Partners Ltd has commissioned Wood PLC. (hereafter referred to as 'Wood') to meet Condition 12 of the Development Consent Order (DCO) for the redevelopment of an area of approximately 296 hectares (ha) at Manston airport, Kent (hereinafter referred to as 'the Site'; central National Grid Reference TR 330 658). Condition 12 states:

1.1.2 *No part of the authorised development is to commence until for that part final preconstruction survey work has been carried out to establish whether European or nationally protected species are present on any of the land affected or likely to be affected by any part of the relevant works, or in any of the trees and shrubs to be lopped or felled as part of the relevant works.*

1.1.3 The Site is located in north-east Kent, approximately 1.1 kilometres (km) west of Manston, central National Grid Reference TR 330 658. The DCO sets out proposals for the demolition of buildings and development to deliver an area for cargo freight operations able to handle at least 10,000 movements per year, facilities for other aviation-related development including a passenger terminal and associated facilities, an aircraft teardown and recycling facility, a flight training school, a base for at least one passenger carrier, a fixed base operation for executive travel, and business facilities for aviation related organisations.

1.1.4 Since Wood's appointment, following an Order of the High Court made on 15 February 2021, the decision of the Secretary of State dated 9 July 2020 to grant the application for development consent for the proposed re-development of Manston Airport has been quashed. The Secretary of State must now redetermine the application. Notwithstanding this, the purpose of this report has not changed.

1.2 Purpose of this report

1.2.1 This report details survey work undertaken to establish the status of breeding birds using the Site. It presents the methods adopted and results of survey work undertaken in relation to the following programme of breeding bird surveys:

- Generic Breeding Bird Survey;
- Breeding Barn Owl Survey; and
- Breeding Short-eared Owl Survey.

1.2.2 It will be used to discharge Condition 12 of the DCO.

1.2.3 A full list of the bird species and their scientific names referred to in this report is provided in **Appendix A**, and the relevant legislation and policy designations pertaining to birds is provided in **Appendix B**.

1.3 Site description

The Site (covering 316ha), primarily comprises of open, semi-improved neutral grassland (c.190ha) and hardstanding such as former runways and taxi-ing areas etc. (covering c.105ha). The remaining habitats include buildings, bare ground, species-poor hedgerows, ephemeral short-perennial/ tall ruderal mosaics, standing water (two water bodies), scattered broad-leaved trees and scrub and arable farmland (17ha).

2. Methods

2.1 Field survey

Generic breeding bird survey

2.1.1 In order to assess the importance of the Site to breeding birds, including obtaining data on the likely population size and distribution of each species, a Generic Breeding Bird Survey was undertaken.

2.1.2 A territory mapping survey based on the British Trust for Ornithology (BTO) Common Bird Census (CBC) methodology[1] [2] was carried out within the Site and within approximately 100m of its boundary (the Study Area, see **Figure 2.1, Appendix F**). The Study Area was expanded to cover land within 100m of its boundary (to include territories of birds likely to be using the habitats within the Site for foraging), and within 250m of the runway to include those birds that might be affected by noise and the visual presence of aircraft arrivals and departures. Full access was obtained to areas within the Site boundary but was generally restricted to public footpaths and roads outside of this area. Access to land outside the Site boundary was considered sufficient to record the vast majority of territories present in these areas.

2.1.3 While eight to ten visits were required for CBC sites (being monitored over the long-term period), where territory mapping is being used for the purpose of assessing potential environmental impacts (including for EIA purposes), it is generally accepted (and in keeping with accepted best practice by Natural England) that six visits (undertaken from March to June inclusive) are sufficient to determine the numbers and distribution of breeding bird territories (for most terrestrial bird species) with reasonable accuracy.

2.1.4 Transects (no further than 50m apart) were walked across all open terrestrial habitats, while all field boundaries and the edges of scrub were also walked. During each visit, the location and activity of each bird detected (visually and/or aurally) was recorded. Birds were considered to be demonstrating breeding behaviour if they were singing, displaying, alarm calling, carrying food, and undertaking distraction displays or if eggs or chicks were found. All birds engaged in other forms of behaviour were considered to be feeding, resting or passing through and were not, therefore, considered to be breeding in the location of observation. The location of each registration was mapped using standard BTO species codes, and their activity using BTO behaviour, territory mapping notation[1].

2.1.5 Surveys were undertaken from early morning until midday (at the latest), and in appropriate weather conditions (not during periods of strong wind and/or heavy rain). The survey times for different parts of the Study Area were varied to ensure that all parts of the area received coverage during the early morning period, when bird song is usually at its highest.

Data analysis

2.1.6 Upon completion of the field survey, results were collated and analysed, and provided as maps of indicative territory centre-points made across all the visits. Territory mapping analysis was based on criteria adapted from Amar *et al.* (2006)[3] (further details of which is provided in **Appendix C**) and

[1] Marchant, J. (1983). *Common Birds Census Instructions*. British Trust for Ornithology, Tring.
[2] Gilbert, G, Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods: A manual of techniques for key UK species*. RSPB, Bedfordshire.
[3] Amar, A., Hewson, C. M., Thewlis, R. M., Smith, K. W., Fuller, R. J., Lindsell, J. A., Conway, G., Butler, S. & MacDonald, M. A. (2006). *What's Happening to Our Woodland Birds? Long-Term Changes in the Populations of Woodland Birds. BTO Research Report 169 & RSPB Research Report 19*. British Trust for Ornithology, Thetford and RSPB, Sandy.

involved the surveyor (an experienced ornithologist) looking for spatial groupings of song registrations. No temporal restrictions have been applied, such that any grouping with more than one record of potential breeding behaviour (e.g. singing), represented or consisting of at least one registration of confirmed breeding behaviour (e.g. an occupied nest) has been assessed as being a territory. These data have been used to determine the number and distribution of species and overall breeding assemblage within the Study Area.

2.1.7 As territory locations were derived from a combination of each visit map (as per the CBC methodology[1]), it should be noted that the locations do not necessarily represent specific nest locations (identifying these locations is not the aim of this survey method, which is designed to estimate population sizes).

Breeding barn owl survey

2.1.8 Results from previous desk studies and ecological surveys carried out at the Site, indicate that the area has the potential to support breeding barn owl, a species which is listed on Schedule 1 of the *Wildlife and Countryside Act 1981 (as amended)*[4] and therefore receives special protection from disturbance during the breeding season (see **Appendix B**). In response to this, a Breeding Barn Owl Survey was carried out at the Site in 2020, to confirm any breeding, and the location and number of pairs involved.

Inspection of buildings for barn owl roost and nest sites

2.1.9 The following buildings were identified as requiring a more detailed external and internal (where possible) inspection to determine their potential to support breeding and roosting barn owls (see **Figure 2.2, Appendix F** for their locations):

- B21;
- B22;
- B23;
- B37;
- B38;
- B46;
- B47; and
- B52.

2.1.10 The inspection followed the methodology set out in Shawyer (2011)[5] and included looking for secondary evidence of barn owls; including droppings, pellets, feathers and nest debris. An external and, where possible, internal assessment was also made on the suitability of the buildings to be used by barn owls for nesting and roosting. Internal inspections were undertaken of B21, B23 and B46. For B22, B37, B38 and B47, only an external inspection was carried out, as the buildings were sealed and not accessible due to health and safety reasons, these buildings did not contain any access points for barn owl and therefore were deemed unsuitable for the species. The inspection was undertaken on 13 March 2020.

[4] Parliament of the United Kingdom, *Wildlife and Countryside Act 1981* (Online). Available at: https://www.legislation.gov.uk/ukpga/1981/69 (Accessed February 2021).
[5] Shawyer, C. R. (2011). *Barn Owl Survey Methodology and Techniques for use in Ecological Assessment: Developing Best Practice in Survey and Reporting*. IEEM, Winchester.

Nest verification survey

2.1.11 A nest verification survey was undertaken in June 2020, a period considered likely to have high activity levels from nesting barn owls if present. An external survey of two buildings (B46 and B52) was carried out, from appropriate pre-determined vantage points (VPs). The VPs were located away from the buildings at a suitable distance as to not interfere or disturb barn owl activity, with a clear view of any potential barn owl access points (see **Figure 2.2, Appendix F***)*. The survey aim was to check for adult birds provisioning, incubating or brooding their chicks. The nest verification survey was undertaken between two hours before dusk and two hours after dusk.

Breeding short-eared owl survey

2.1.12 Results from the breeding bird surveys undertaken to support the Stone Hill Park Ltd (SHP)[6] proposal included confirmation of a pair of breeding short-eared owl within the Site in 2016. Short-eared owl is a very rare breeding species in Kent[7] and in the wider South East of England Region. In response to this, a Breeding Short-eared Owl Survey was carried out at the Site in 2020 in order to confirm the presence (or not) of any breeding birds.

2.1.13 The survey methodology followed that detailed in Hardey *et al*. (2013)[8], which involves a total of four survey visits, with each visit requiring two 2-hour watches. Details of the seasonal timing of each visit (aimed to coincide with key periods during the breeding cycle for the species in order to maximise the chances of detected and confirming the presence of breeding birds) is provided in **Table 2.1**.

Table 2.1 Breeding Short-eared Owl Survey: Recommended Visit Timings

Visit No.	Seasonal timing	Stage of breeding cycle / purpose of visit
1	Early March to mid-April	Check for occupancy
2	Mid-April to mid-May	Locate active nests
3	June	Check for young (dispersed or in nest)
4	July	Check for late young and late nests

2.1.14 The methodology[8] also states that if the occupancy survey (visit 1) is conclusively negative (i.e. no evidence to indicate the occupancy of breeding short-eared owl), then there is no requirement to complete visits 2-4.

2.1.15 Watches were conducted from two locations (vantage points) during each of the four periods of the breeding season for short-eared owl, from March 2020 to July 2020. Each watch was undertaken on separate days, with their timings varied during each visit to focus survey effort during the optimum time of the day to identify activity for that part of the breeding cycle. The VP locations are provided in **Figure 2.3, Appendix F**.

2.1.16 The survey visits were restricted to areas of the Site south of Manston Road, as to focus survey effort on the location of short-eared owl activity found in 2016 by SHP[6]. The area of grass to the north of the airfield has been subject to increased use by the public since 2016 and was therefore considered unsuitable for the species.

[6] WSP | Parsons Brinckerhoff (2016). *Stone Hill Park – Breeding Bird Survey. Project number 70009799, Report 009, September 2016*.
[7] Clements, R., Orchard, M., McCanch, N. & Wood, S. (2015). *Kent Breeding Bird Atlas 2008-13*. Kent Ornithological Society
[8] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring. Third Edition*. The Stationery Office, Edinburgh.

3. Results

3.1 Generic breeding bird survey

3.1.1 Six survey visits were completed within the Study Area (the Site, plus 100m buffer) from March 2020 to June 2020 inclusive, with each visit taking up to two days to complete by two surveyors working in tandem. The timings and weather conditions during the survey visits are provided in **Table D1** in **Appendix D**.

3.1.2 A total of 27 species were recorded breeding or holding territory within the Study Area in 2020, of which:

- No species listed on Schedule 1 of the *Wildlife & Countryside Act*[4] were recorded as breeding or holding territory within the Study Area;
- Seven species are listed as Species of Principle Importance (SPI) on Section 41 of the *Natural Environment and Rural Communities Act (NERC) 2006*[9]: corn bunting, dunnock, house sparrow, linnet, grey partridge, skylark, and song thrush;
- Seven species are Red listed in Birds of Conservation Concern (BoCC) 4[10]: corn bunting, house sparrow, linnet, grey partridge, ringed plover, skylark, and song thrush; and
- Five species are listed as species of conservation concern within Kent (Kent Red Data Book[11] [KRDB] Species[12]). Of these: house sparrow, linnet, song thrush and skylark are listed under KRDB2 due to severe declines in their breeding populations within the county.

3.1.3 **Table 3.1** provides the total number of territories for each species recorded within the Study Area in 2020. The indicative locations for the centre of the territories are illustrated in **Figure 3.1** (for SPI and BoCC Red listed) and **Figure 3.2, Appendix F** (for all other species).

Table 3.1 Generic Breeding Bird Survey: Number of Territories within the Study Area

BTO code	Species	Number of territories within Study Area	SPI	BoCC	KRDB
B.	Blackbird	15		Green	
BC	Blackcap	10		Green	
BT	Blue tit	7		Green	
C.	Carrion crow	1		Green	
CB	Corn bunting	9	✓	Red	

[9] Parliament of the United Kingdom, *Natural Environment and Rural Communities Act 2006* (Online). Available at: https://www.legislation.gov.uk/ukpga/2006/16/contents

[10] Eaton, M. A., Aebischer, N. J., Brown, A. F., Hearn, R. D., Lock, L., Musgrove, A. J., Noble, D. G., Stroud, D. A. & Gregory, R. D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708–746.

[11] Waite, A (2000). *The Kent red data book: A provisional guide to the rare and threatened flora and fauna of Kent*. Kent County Council.

[12] KRDB criteria are as follows: KRDB1 - breeding species with 25 pairs or fewer in Kent; KRDB2 - breeding species with more than 25 pairs in Kent but red-listed for their breeding decline (RSPB, 1996) - but not the 'high-alert' species; and KRDB3 - the remaining species on our KRDB list (including the 'high-alert' species and wintering KRDB species).

BTO code	Species	Number of territories within Study Area	SPI	BoCC	KRDB
CC	Chiffchaff	4		Green	
CH	Chaffinch	14		Green	
D.	Dunnock	20	✓	Amber	
FP	Feral pigeon	3 colonies		Green	
GO	Goldfinch	5		Green	
GT	Great tit	6		Green	
HS	House sparrow	9 colonies	✓	Red	✓
K.	Kestrel	1		Amber	
LI	Linnet	19	✓	Red	✓
LO	Little owl	1		Green	
LW	Lesser whitethroat	1		Green	
MP	Meadow pipit	33		Amber	
P.	Grey partridge	3	✓	Red	
R.	Robin	22		Green	
RP	Ringed plover	1		Red	
S.	Skylark	78	✓	Red	✓
SD	Stock dove	1		Amber	
SL	Swallow	1		Green	
ST	Song thrush	2	✓	Red	✓
WH	Whitethroat	32		Green	
WP	Woodpigeon	11		Green	
WR	Wren	22		Green	

Skylark

3.1.4 A total of 78 skylark territories were located within the Study Area, these being widely distributed across much of the area, principally on the semi-improved grassland on-Site, but also the adjacent arable farmland.

Corn bunting

3.1.5 Of the nine territories located within the Study Area, all were in semi-improved neutral grassland or arable farmland. Six territories were observed in the western section of the Study Area and three

territories in the eastern section, and all but two were along or close to the perimeter fence line. The birds were using the perimeter fence as an elevated perch from which to sing and feeding in the adjacent grassland and arable farmland.

Grey partridge

3.1.6 Three pairs were identified within the Study Area, including a pair observed on several visits within the western section of the Study Area in semi-improved neutral grassland, and up to two pairs were regularly noted in the eastern section, also in semi-improved grassland. Records from other ecological survey visits to the Site included a male heard calling during a nocturnal survey on the evening of 23 June 2020, and several birds observed during other nocturnal surveys.

Ringed plover

3.1.7 Within the Study Area, one pair was confirmed to have nested on-site on the eastern side of the runway on the hardstanding. A clutch of four eggs was confirmed on visit 2 and on visit 3, though no fledged young were observed on-site throughout the study period. A male was observed to be alarm calling frequently during visit 5 on the western section, suggesting either a new breeding attempt or relocation of a possible brood.

Habitats

3.1.8 The habitats within the Site boundary primarily comprise of semi-improved grassland, although there are also areas of scrub, hard standing and bare ground which are interspersed by numerous buildings. Outwith and within 100m of the Site boundary (the buffer area), the habitats primarily comprise of arable farmland. The breeding bird communities recorded within each of these different habitats is discussed further in the following paragraphs.

3.1.9 The semi-improved, neutral grassland supports much of the bird interest within the Site, including high densities of breeding skylark, and territories of grey partridge and corn bunting. A runway traverses much of the length of the Site (from east to west), with service roads and tracks radiating from this area. This habitat was used as a nest location by ringed plover. A total of 79 buildings were present on-site, comprising hangers, operation buildings and derelict structures. These buildings were used for nesting only by colonies of feral pigeon. The small, scattered areas of scrub present within the Study Area were utilised as breeding sites by dunnock, linnet and song thrush. House sparrow also nested within these thickets, as well as ubiquitous species such as robin, blackcap and blackbird. The arable farmland present within the 100m buffer was used for nesting by skylark, and in the adjacent hedgerows by linnet and whitethroat.

Incidental records

3.1.10 A further 37 species were recorded within the Site during the breeding bird surveys (and other ecology surveys carried out) in 2020 for which no evidence of breeding/ holding territory was obtained, a full list of which is provided in **Table E1** in **Appendix E**, together with their conservation status. Of these, there is potentially suitable breeding habitat within the Site and 100m buffer area for the following species:

- Buildings and other manmade structures: house martin, pied wagtail, swift, jackdaw, starling and black redstart;
- Hedgerows, scrub and trees: collared dove, garden warbler, green woodpecker, great spotted woodpecker, house martin, jackdaw, long-tailed tit, magpie, pheasant, ring-necked parakeet, rook and starling; and

- Arable farmland: red-legged partridge, reed bunting and yellow wagtail.

3.2 Breeding barn owl survey

3.2.1 The timings and weather conditions during the survey visits are provided in **Table D2** in **Appendix D**. There were no observations made throughout the 2020 survey season to suggest that barn owl was breeding within the Site or in the local vicinity. No birds were seen (or heard) during the follow up barn owl nesting confirmation survey of buildings 46 and 52 on 23 June 2020. There were however, two sightings of barn owl obtained during other (non-bird) ecology site visits in 2020 (on 27 April and 1 July), though neither was considered to relate to birds breeding within the Site or close by, and likely involved hunting birds derived from nest sites further afield.

3.3 Breeding short-eared owl survey

3.3.1 Visit 1 of the survey was completed, the timings and weather conditions of which are provided in **Table D3** in **Appendix D**. A partial Visit 2 was undertaken to further validate the findings from Visit 1. No evidence for the presence of short-eared owl was noted on any of the visits, and therefore in accordance with the methodology guidance[8], no further visits were deemed necessary, and it was assumed that the species was not breeding on-site in 2020.

4. Key Species Summary

4.1 Generic breeding bird survey

4.1.1 Results from the Generic Breeding Bird Survey indicate that the Site supports a relatively limited diversity of breeding bird species, primarily associated with the grassland and patches of scrub. Of these, the grassland supports high densities of skylark and potentially important numbers of grey partridge and corn bunting. A single ringed plover territory was located on the hard standing of the runway. The importance of the Site to these species is discussed in the remainder of **Section 4.1**. The remaining species noted as breeding or holding territory within the Site are common and widespread in Kent and whose numbers on-site are likely to represent a very low proportion of their respective county populations[7].

Skylark

4.1.2 Skylark is a Species of Principal Importance (SPI) and is BoCC Red listed due to the long-term decline in its breeding population in the UK[10]. Numbers have declined in the UK by 17% over the 1995-2018 period, including a 25% decline in the South East of England Region (which includes Kent). Numbers appear to have stabilised in recent years with no discernible change in the UK between 2008 and 2018[13]. The UK population was estimated to be 1.5 million pairs in 2016[14]. Skylark is described as a widespread and common but decreasing resident in Kent[15] and is therefore listed as a species of conservation concern in the county (KRDB2). The population in Kent has declined from 30,000-40,000 territories during 1988-1994 to an estimated 20,000-28,000 territories during 2008-2013[7].

4.1.3 A total of 78 territories were located within the Study Area in 2020, representing 0.3-0.4% of the estimated county population. The majority of territories were recorded in semi-improved, neutral grassland within the boundary of the airfield. The density of skylark territories can vary greatly across different habitat types, with agricultural land (depending on the crop type), supporting densities of 0.4 to 1.1 territories per hectare[16]. Similar densities were recorded on the open grassland and farmland within the Study Area. With approximately 190 hectares (62%) of the Study Area covered by undisturbed, semi-improved grassland, this area is clearly of conservation value to the local skylark population.

Grey partridge

4.1.4 Grey partridge is a SPI and is BoCC Red listed due to the long-term decline in its breeding population in the UK[10]. Numbers have declined in the UK by 64% over the 1995-2018 period and by 34% from 2008-2018[13]. The UK population was estimated to be 37,000 pairs in 2016[14]. Grey partridge is described as a once widespread species in Kent, now much declined and found mainly in coastal areas[15]. The population in Kent has declined from 2,000-4,000 pairs during 1988-1994 to an estimated 600-1,200 territories during 2008-13 and is now very much concentrated in Thanet[7]. East Kent is considered a stronghold for grey partridge within the county, with regular high counts

[13] Harris, S J., Massimino, D., Balmer, D. E., Eaton, M. A., Noble, D. G., Pearce-Higgins, J. W., Woodcock, P. & Gillings, S. (2020). The Breeding Bird Survey 2019. BTO Research Report 726. British Trust for Ornithology, Thetford.
[14] Woodward, I., Aebischer, N., Burnell, D., Eaton, M., Frost, T., Hall, C., Stroud, D. A. & Noble, D. (2020). Population estimates of birds in Great Britain and the United Kingdom. British Birds 113: 69–104.
[15] Privett, K. [ed] (2016). 2014 Kent Bird Report. Kent Ornithological Society.
[16] Stubbe, S. T. (2001). Territory density of the Skylark (Alauda arvensis) in relation to field vegetation in central Germany. Journal of Ornithology, 142(2): 184 - 194.

coming from the nearby Sandwich Bay Bird Observatory recording area[17], although widespread releases by the shooting industry makes assessing the true status of this species difficult[18].

4.1.5 The three pairs located within the Study Area in 2020 represent between 0.25% and 0.50% of the estimated county population in 2008-2013. However, given the likely continued decline of this species in Kent, the Site may now hold numbers approaching 1% of the county population.

Corn bunting

4.1.6 Corn bunting is a SPI and is BoCC Red listed due to the long-term decline in its breeding population in the UK[10]. Numbers have declined in the UK by 30% over the 1995-2018 period, including a 46% decline in the South East of England Region (which includes Kent)[13]. Numbers appear to have stabilised in recent years with no discernible change in the UK between 2008 and 2018[13]. The UK population was estimated to be 9,050–13,000 pairs in 2016[14]. Corn bunting is described as a widespread but decreasing resident in the south, east and north of Kent[15] and is therefore listed as a species of conservation concern in Kent[11]. The population in Kent has declined from 3,000-4,000 territories during 1988-1994 to an estimated 400-600 territories during 2008-13 and is strongly associated with arable farmland, particularly fields of wheat and barley in coastal areas[7].

4.1.7 The nine territories located within the Study Area in 2020 represent 1.5-2.3% of the estimated county population and are therefore clearly of importance at a county level.

Ringed plover

4.1.8 Ringed plover is a BoCC Red list species due to recent and historical population declines in the breeding population[10.] The UK breeding population was estimated at 5,250–5,600 pairs during the last national census for the species in 2007[14]. In Kent, much of the population was located along the north coast and at Dungeness in 2007 and has declined from 180-240 pairs during 1988-1994 to 120-140 pairs during 2008-13[7]. Undisturbed coastal, sandy and shingle beaches are a principle requirement for nesting by this species, a habitat replicated by the runways/access roads within the Site boundary. Nesting ringed plover are highly sensitive to disturbance due to recreational activities, a principal reason for their decline in breeding numbers in Kent[7]. Nesting inland is uncommon in Kent, but does occur occasionally, though the species has largely failed to take advantage of this available inland habitat in recent years[7.]

4.1.9 The single pair located within the Study Area in 2020 represents between 0.71 and 0.83% of the estimated county population in 2008-13. However, given the likely continued decline of this species in Kent, the Site may now hold numbers approaching 1% of the county population.

4.2 Breeding barn owl and short-eared owl

4.2.1 Results from the survey provided no evidence to indicate that either barn owl or short-eared owl breed within the Site on a regular basis. Two buildings (B46 and B52) do, however, continue to offer the potential to be occupied by breeding or roosting barn owl in future.

[17] Privett, K. [ed] (2017). *2015 Kent Bird Report.* Kent Ornithological Society
[18] Game and Wildlife Conservation Trust. (2007). *Guidelines for re-establishing grey partridges through releasing*. Game and Wildlife Conservation Trust.

5. Conclusion

5.1.1 Results from the breeding bird surveys undertaken in 2020 indicate that the Site supports a breeding bird community comprised of predominantly common and widespread species, typical of the area and habitats present (principally grassland). The Site does however support numbers of corn bunting that are likely to be of importance in terms of the county (Kent) population, and locally important numbers of breeding ringed plover, skylark and grey partridge.

Appendix A
Species Names

BTO species code	Common name	Scientific name
BO	Barn owl	*Tyto alba*
BX	Black redstart	*Phoenicurus ochruros*
B.	Blackbird	*Turdus merula*
BC	Blackcap	*Sylvia atricapilla*
BH	Black-headed gull	*Chroicocephalus ridibundus*
BT	Blue tit	*Cyanistes caeruleus*
BZ	Buzzard	*Buteo*
C.	Carrion crow	*Corvus corone*
CH	Chaffinch	*Fringilla coelebs*
CC	Chiffchaff	*Phylloscopus collybita*
CD	Collared dove	*Streptopelia decaocto*
CA	Cormorant	*Phalacrocorax carbo*
CB	Corn bunting	*Miliaria calandra*
D.	Dunnock	*Prunella modularis*
FP	Feral pigeon	*Columba livia*
FF	Fieldfare	*Turdus pilaris*
GW	Garden warbler	*Sylvia borin*
GO	Goldfinch	*Carduelis carduelis*
GS	Great spotted woodpecker	*Dendrocopos major*
GT	Great tit	*Parus major*
GE	Green sandpiper	*Tringa ochropus*
G.	Green woodpecker	*Picus viridis*
GR	Greenfinch	*Chloris chloris*
P.	Grey partridge	*Perdix perdix*
HG	Herring gull	*Larus argentatus*
HM	House martin	*Delichon urbicum*
HS	House sparrow	*Passer domesticus*

BTO species code	Common name	Scientific name
JD	Jackdaw	*Corvus monedula*
K.	Kestrel	*Falco tinnunculus*
LB	Lesser black-backed gull	*Larus fuscus*
LW	Lesser whitethroat	*Sylvia curruca*
LI	Linnet	*Carduelis cannabina*
LO	Little owl	*Athene noctua*
LT	Long-tailed tit	*Aegithalos caudatus*
MG	Magpie	*Pica*
MR	Marsh harrier	*Circus aeruginosus*
MW	Marsh warbler	*Acrocephalus palustris*
MP	Meadow pipit	*Anthus pratensis*
MU	Mediterranean gull	*Larus melanocephalus*
PE	Peregrine	*Falco peregrinus*
PH	Pheasant	*Phasianus colchicus*
PW	Pied wagtail	*Motacilla alba*
RN	Raven	*Corvus corax*
RL	Red-legged partridge	*Alectoris rufa*
RT	Redstart	*Phoenicurus phoenicurus*
RB	Reed bunting	*Emberiza schoeniclus*
RP	Ringed plover	*Charadrius hiaticula*
RI	Ring-necked parakeet	*Psittacula krameri*
R.	Robin	*Erithacus rubecula*
RO	Rook	*Corvus frugilegus*
SU	Shelduck	*Tadorna tadorna*
SE	Short-eared owl	*Asio flammeus*
S.	Skylark	*Alauda arvensis*
ST	Song thrush	*Turdus philomelos*
SG	Starling	*Sturnus vulgaris*
SD	Stock dove	*Columba oenas*
SC	Stonechat	*Saxicola torquatus*

BTO species code	Common name	Scientific name
SL	Swallow	*Hirundo rustica*
SI	Swift	*Apus*
W.	Wheatear	*Oenanthe oenanthe*
WM	Whimbrel	*Numenius phaeopus*
WH	Whitethroat	*Sylvia communis*
WP	Wood Pigeon	*Columba palumbus*
WR	Wren	*Troglodytes*
YW	Yellow wagtail	*Motacilla flava*

Appendix B
Relevant Legislation and Policy

Ramsar Sites

Ramsar sites are wetlands of international importance designated under the Ramsar Convention. Sites proposed for selection are advised by the UK statutory nature conservation agencies, or the relevant administration in the case of Overseas Territories and Crown Dependencies, co-ordinated through JNCC. In selecting sites, the relevant authorities are guided by the Criteria set out in the Convention. The Criteria pertaining specifically to birds are as follows:

- Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds; and
- Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

In the UK, the first Ramsar sites were designated in 1976 since which, many more have been designated. The initial emphasis was on selecting sites of importance to waterbirds within the UK, and consequently many Ramsar sites are also Special Protection Areas (SPAs). However, greater attention is now being directed towards non-bird features which are increasingly being taken into account, both in the selection of new sites and when reviewing existing sites.

Wildlife and Countryside Act 1981 (as amended)

With certain exceptions[19], all wild birds, their nests and eggs are protected by section 1 of the *Wildlife and Countryside Act 1981* (as amended)[4]. Therefore, it is an offence, *inter alia*, to:

- Intentionally kill, injure or take any wild bird;
- Intentionally take, damage or destroy the nest of any wild bird while it is in use or being built; or
- Intentionally take or destroy the egg of any wild bird.

These offences do not apply to hunting of birds listed in Schedule 2 of the Act subject to various controls.

Bird species listed on Schedule 1 of the Act receive further protection, thus for these species it is also an offence to:

- Intentionally or recklessly disturb any bird while it is nest building, or is at a nest containing eggs or young; or
- Intentionally or recklessly disturb the dependent young of any such bird.

Natural Environment and Rural Communities Act 2006

Section 40 of the *Natural Environment and Rural Communities (NERC) Act 2006*[9] places duties on public bodies to have regard to the conservation of biodiversity in the exercise of their normal functions. In particular, Section 41 of the NERC Act requires the Secretary of State to publish a list of species which are of Principal Importance for conservation in the UK. This list is largely derived from the 'Priority Species' listed under the former UK Biodiversity Action Plan (BAP), which continue to be regarded as Priority Species under

[19] Some species, such as game birds, are exempt in certain circumstances.

the subsequent country-level biodiversity strategies. The Section 41 list replaces the list published by Defra in 2002 under Section 74 of the *Countryside and Rights of Way (CRoW) Act 2000*[20].

Birds of Conservation Concern: Red List birds

Red and Amber list bird are those listed as being of high or medium conservation concern (respectively) in Birds of Conservation Concern (BoCC) 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man[10.] Red list species are those that are Globally Threatened according to IUCN criteria; and/or those whose population or range has declined rapidly in recent years; and/or those that have declined historically and not shown a substantial recent recovery.

[20] Parliament of the United Kingdom (2000). *Countryside and Rights of Way Act 2000.* (Online) Available at: https://www.legislation.gov.uk/ukpga/2000/37/contents (Accessed February 2021).

Appendix C
Territory Mapping Principles

Territory-mapping principles **the number of territorial clusters have been defined from maps based on a six-visit survey programme and adapted from criteria outlined in Amar *et al.* (2006)[3]:**

- The minimum number of visit registrations used to form a territory is one, if the observation allows confirmation of the presence of an active nest site (food carrying, nest building, begging chicks);
- Where the species is a songbird, alone and in song, two registrations can stand as a territory. Two singing individuals recorded simultaneously would be treated as two territories;
- A lone bird alarm calling, or other vocalisations thought to have strong territorial significance would require two registrations to be acceptable as a territory;
- The presence of an occupied nest on just one visit, with no other registrations, would be acceptable as a territory;
- A lone songbird not in song would not count as a territory, regardless of whether it is located toward the middle of the survey area or near the edges;
- A territory would not be counted where there is just a single registration of a bird in mid-flight;
- The presence of a family on a single visit (juvenile birds with attendant parents) would not be permitted as a territory, since they may have moved into the area from outside the survey area;
- Two registrations of a lone pair would be permitted as a territory, provided that the birds were not in mid-flight. In instances involving pairs of birds in flight, territories would only be permitted when the pair was recorded taking off from a fixed point within the plot, e.g. a tree or the ground (but excluded when they have been seen in mid-flight);
- For certain species that are colonial, or occur in large groups where it may be hard to define separate individual territories e.g. wood pigeon, feral pigeon, rook and jackdaw, such species will be recorded as 'present' or 'not recorded'; and
- Low density species seen just once, and not in song would NOT be permitted as a territory (e.g., barn owl, kestrel and sparrowhawk), regardless of whether the bird is in flight or perched. There needs to be a minimum of two visit registrations for these species to count.

Once territory circles have been identified and drawn around groups of registrations, there is the issue of registrations straddling the survey area boundary. Where a territory crosses the survey area boundary, the number of registrations either side of the boundary would be counted: where there are more within the survey area than outside, the territory would be included in the total count for the survey area, and where there were fewer it would be excluded. In cases where the number of registrations either side of the boundary is equal, the territory would be included in the survey area total.

Appendix D
Survey Visit Details

Table D.1 Generic Breeding Bird Survey: Survey Visit Details

Visit No.	Surveyor(s)	Date	Time	Weather conditions
1	Conor MacKenzie, Sibrand Rinzema and Rob Werran	03/04/2020	07:30-12:15	Temperature (8°C), Cloud Cover (2/8 Oktas), Visibility (>3km), Wind (north-west, Beaufort 2), Precipitation (none)
2	Conor MacKenzie, Mark Linsley and Rob Werran	23/04/2020	07:00-11:30	Temperature (12°C), Cloud Cover (0/8 Oktas), Visibility (>3km), Wind (north-east, Beaufort 2), Precipitation (none)
3	Conor MacKenzie, Sibrand Rinzema and Rob Werran	29/04/2020 (Runway)	07:00-11:30	Temperature (9°C), Cloud Cover (3/8 Oktas), Visibility (>3km), Wind (south west, Beaufort 2), Precipitation (none)
		01/05/2020 (Buffer Zone)	07:30- 09:30	Temperature (13°C), Cloud Cover (5/8 Oktas), Visibility (>3km), Wind (west, Beaufort 3), Precipitation (none)
4	Conor MacKenzie and Sibrand Rinzema	11/05/2020 (Buffer)	07:00-09:00	Temperature (8°C), Cloud Cover (7/8 Oktas), Visibility (>3km), Wind (north-east, Beaufort 2), Precipitation (light rain shower)
		13/05/2020 (Runway)	07:00-10:45	Temperature (8°C), Cloud Cover (7/8 Oktas), Visibility (>3km), Wind (north-east, Beaufort 4), Precipitation (none)
5	Conor MacKenzie and Sibrand Rinzema	26/05/2020 (Buffer)	07:00-10:30	Temperature (19°C), Cloud Cover (2/8 Oktas), Visibility (>3km), Wind (north-west, Beaufort 2), Precipitation (none)
		28/05/2020 (Runway)	07:00-11:15	Temperature (18°C), Cloud Cover (0/8 Oktas), Visibility (>3km), Wind (north-east, Beaufort 3), Precipitation (none)
6	Conor MacKenzie and Sibrand Rinzema	08/06/2019 (Buffer)	07:00-10:30	Temperature (11°C), Cloud Cover (8/8 Oktas), Visibility (>3km), Wind (south, Beaufort 1), Precipitation (rain showers)
		10/06/2020 (Runway)	07:00-10:45	Temperature (15°C), Cloud Cover (7/8 Oktas), Visibility (>3km), Wind (north, Beaufort 2), Precipitation (none)

Table D.2 Breeding Barn Owl Survey: Survey Visit Details

Survey visit type	Surveyor(s)	Date	Time	Weather conditions
External/ internal building inspection	Jon Darcy and Tim Bradford	13 March 2020	11:30-14:30	Not applicable
Nesting confirmation survey	Rob Werran and Conor Mackenzie	23 June 2020	19:30-23:30	Temperature (18°C), Cloud Cover (3/8 Oktas), Visibility (>3km), Wind (south-west, Beaufort 2), Precipitation (none)

Table D.3 Breeding Short-eared Owl Survey: Survey Visit Details

Visit No.	Surveyor(s)	VP	Date	Time	Weather conditions
1	Tony Swandale	2	08/04/2020	19:41 – 21:41	Temperature (12°C), Cloud Cover (3/8 Oktas), Visibility (>3km), Wind (north-west, Beaufort 1), Precipitation (none)
1	Tony Swandale	1	09/04/2020	04:10 – 06:30	Temperature (8°C), Cloud Cover (2/8 Oktas), Visibility (>3km), Wind (north-west, Beaufort 1), Precipitation (none)
2	Tony Swandale	2	14/04/2020	04:00 – 06:20	Temperature (5°C), Cloud Cover (3/8 Oktas), Visibility (>3km), Wind (north-west, Beaufort 2), Precipitation (none)

Appendix E
Incidental Records

Table E.1 Incidental records within the Study Area.

BTO code	Species	SPI	BOCC	Sch 1
BH	Black-headed gull		Amber	
BO	Barn owl		Green	✓
BX	Black redstart		Red	✓
BZ	Buzzard		Green	
CA	Cormorant		Green	
CD	Collared dove		Green	
CU	Curlew	✓	Red	
FF	Fieldfare		Red	✓
GW	Garden Warbler			
G.	Green woodpecker		Green	
GE	Green sandpiper		Amber	✓
GR	Greenfinch		Green	
GS	Great spotted woodpecker		Green	
HG	Herring gull	✓	Red	
HM	House martin		Amber	
JD	Jackdaw		Green	
LB	Lesser Black-backed gull		Amber	
LT	Long-tailed tit		Green	
MG	Magpie		Green	
MR	Marsh harrier		Amber	✓
MW	Marsh warbler	✓	Red	✓
MU	Mediterranean gull		Amber	✓
PE	Peregrine		Green	✓
PH	Pheasant		Green	

BTO code	Species	SPI	BOCC	Sch 1
PW	Pied wagtail		Green	
RB	Reed bunting	✓	Amber	
RI	Ring necked parakeet		Green	
RL	Red-legged partridge		Green	
RN	Raven		Green	
RO	Rook		Green	
RT	Redstart		Amber	
SC	Stonechat		Green	
SG	Starling	✓	Red	
SI	Swift		Amber	
SU	Shelduck		Amber	
W.	Wheatear		Green	
WM	Whimbrel		Red	
YW	Yellow wagtail	✓	Red	

Appendix F
Figures

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168000 167000 166000 165000 164000 163000

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Two Chimneys House
Park Rd
Shottendane Rd
B2050
Woodchurch Rd
Coldblows Grovelodge
Flete
Vincent Farmhouse
Fleete Rd
Lydden
Park La
Acol Hill
Crispe Rd
The St
Ladds Cottages
Woodchurch
Queendown Farm Cottage
Manston Rd
Fleete Court Farm
Haine Rd
A256
Acol
Cheesemans Farmhouse
The Coach House
Coldswood Farm
Haine
Preston Farm Cottages
Plumstone Rd
Pouces Nursery
Isle of Thanet
Oast Cottages
Manston Rd
Holmestroft
Cleve Court Farm
Alland Grange
Rose Farm
B2190
Spratling St
Spratling Court Farm
B2050
Manston
Manston Golf Centre
Staner Hill
Mount Pleasant
Telegraph Hill
A299
Hengist Way
Ozengell Farmhouse
Marsh Farm
Boxlees Hill
The Mill House
Thorne Hill
Canterbury Rd West
Haine Rd
Canterbury Rd East
Hazeldene Farm
Way Hill
Tothill St
Foxborough La
The Lanes
Grinsell Hill
Red Cottages
Thorne Farm
The Freehold
Monkton Rd
Minster
Thorne Cottages
Sevenscore
Hengist Way
Forstal Rd
A299
Cliffs End Rd
Sandwich Rd
Little Cliffsend Farm
Durlock
Minster
Cliffs End
Cottington Rd
A256
Richborough Way
Cottington Hill
Clapper Hill
St Augustine's Golf Course
Sandwich Rd
Pegwell Bay
Ebbsfleet Farm Cottages
Pegwell Bay Country Park

Key

- Order Limits (the Site)
- Runway
- Study Area

0 200 400 600 800 1,000 1,200 m

Scale at A3: 1:20,000

Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 2.1
Location of the Site and Study Area

January 2021

wood.

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N

B38

B37

B22

B23

B21

VP2

B46

VP1

B47

B52

Key

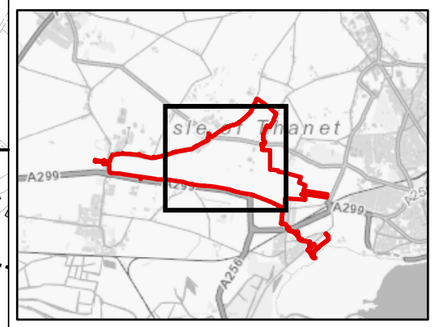
Order Limits (the Site)

Runway

Study Area

Buildings

Vantage Point



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Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 2.2
Breeding Barn Owl Survey, vantage points and buildings

January 2021

wood.

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VP1

VP2

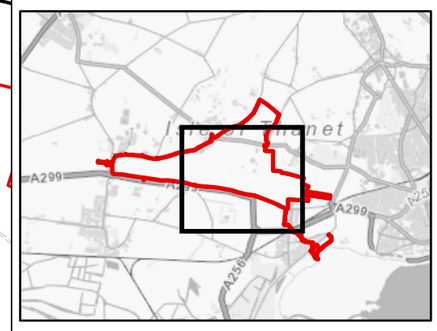
Key

Order Limits (the Site)

Runway

Study Area

Vantage Point



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Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 2.3
Breeding Short-eared Owl Survey, vantage points

January 2021

wood.

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N

Key

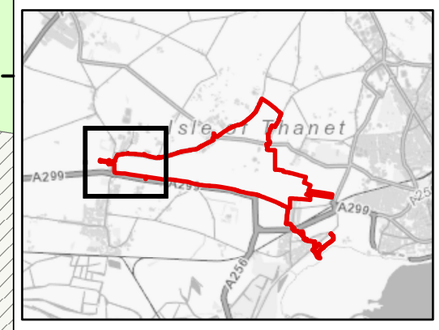
Order Limits (the Site)

Runway

Study Area

Species Key

CB Corn bunting
D. Dunnock
HS House sparrow
LI Linnet
P. Grey partridge
RP Ringed plover
S. Skylark
ST Song thrush



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Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.1
Territory locations for SPA and BoCC red listed species

January 2021

wood.

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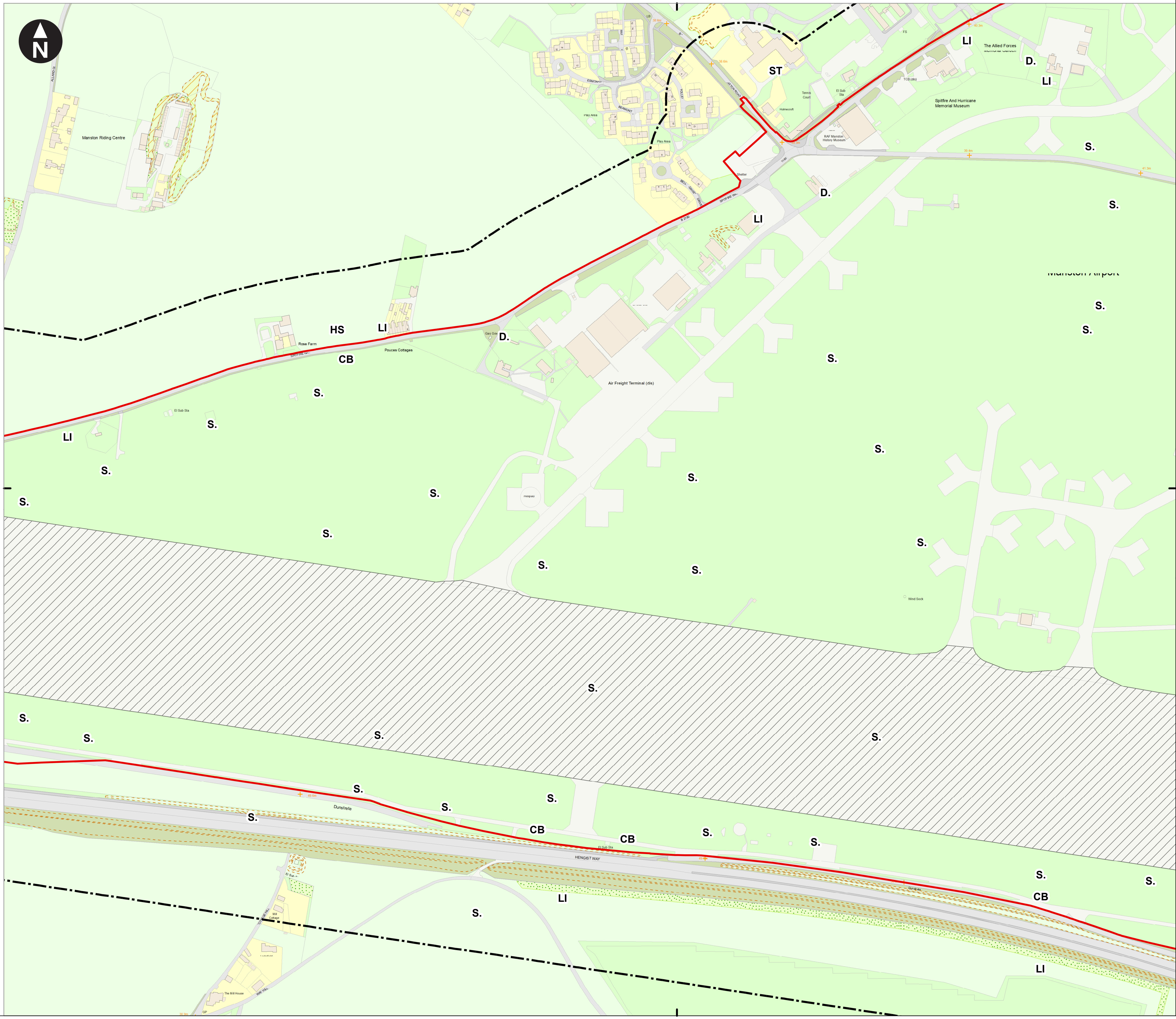
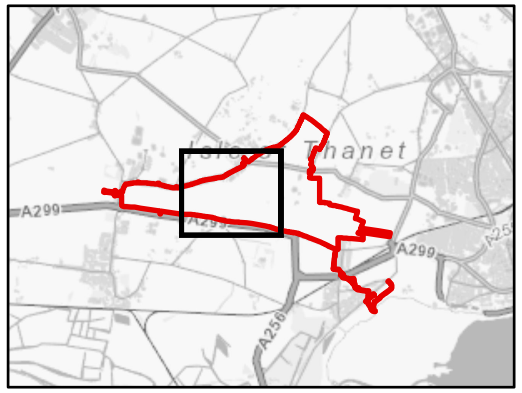


Key

- Order Limits (the Site)
- Runway
- Study Area

Species Key

CB	Corn bunting
D.	Dunnock
HS	House sparrow
LI	Linnet
P.	Grey partridge
RP	Ringed plover
S.	Skylark
ST	Song thrush



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Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.1
Territory locations for SPA and BoCC red listed species

January 2021

wood.

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N

Defence Fire Training and Development Centre

Army Reserve Centre

Manston Airport

Spitfire And Hurricane

The Allied Forces Memorial Garden

Manston Court

Key

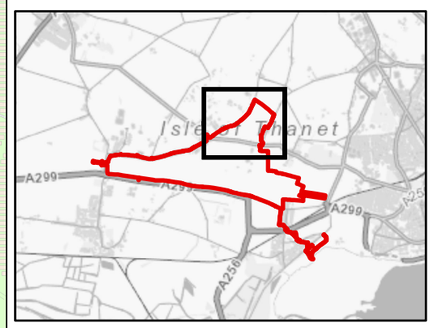
Order Limits (the Site)

Runway

Study Area

Species Key

CB Corn bunting
D. Dunnock
HS House sparrow
LI Linnet
P. Grey partridge
RP Ringed plover
S. Skylark
ST Song thrush



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Scale at A3: 1:5,000

Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.1
Territory locations for SPA and BoCC red listed species

January 2021

wood.

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Key

▭ Order Limits (the Site)

▨ Runway

-·- Study Area

Species Key

CB	Corn bunting
D.	Dunnock
HS	House sparrow
LI	Linnet
P.	Grey partridge
RP	Ringed plover
S.	Skylark
ST	Song thrush

0 100 200 300 m

Scale at A3: 1:5,000

Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.1
Territory locations for SPA and BoCC red listed species

January 2021

wood.

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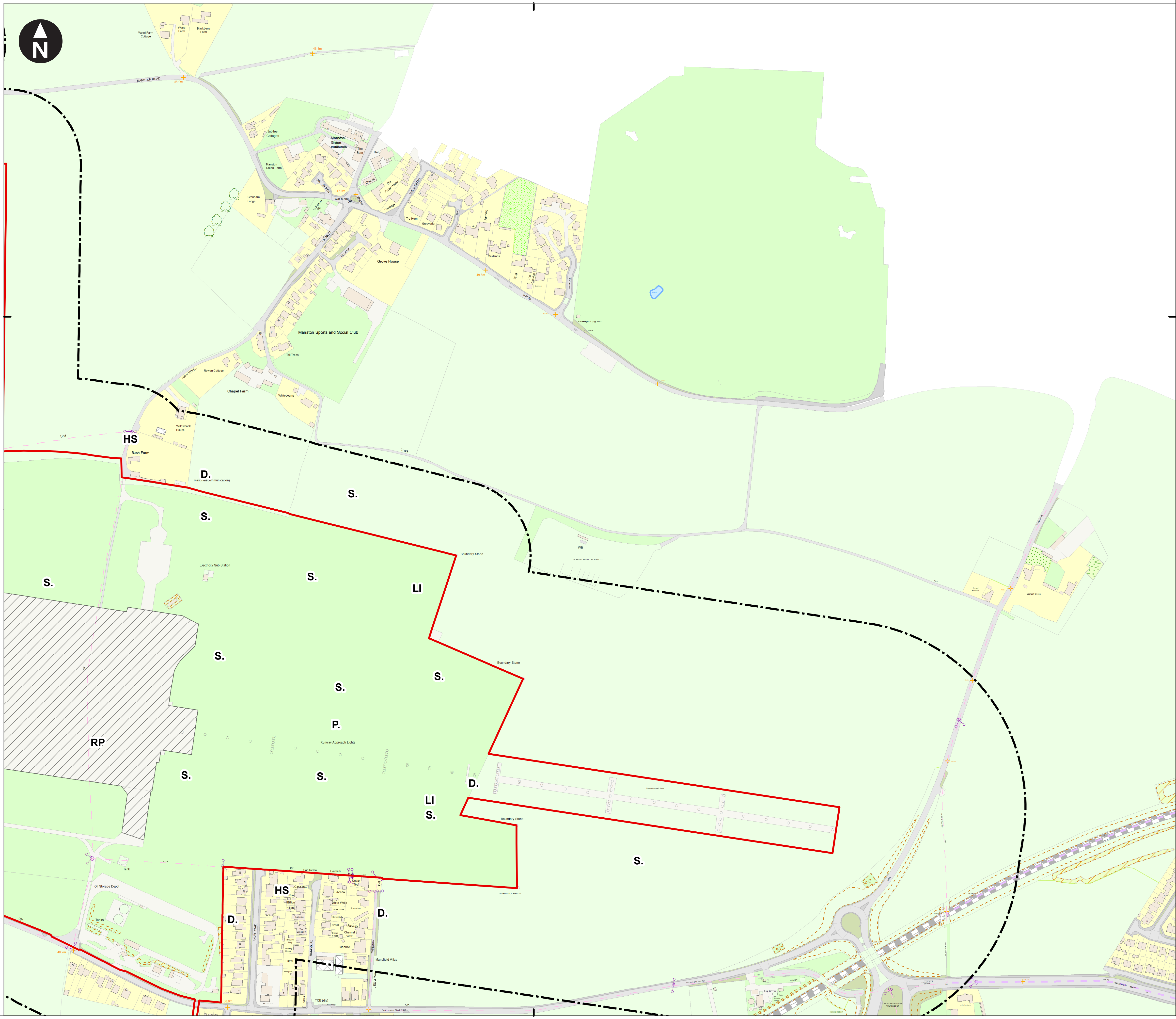
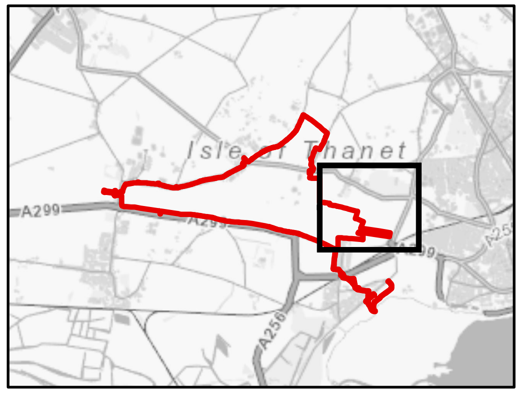


Key

- Order Limits (the Site)
- Runway
- Study Area

Species Key

CB	Corn bunting
D.	Dunnock
HS	House sparrow
LI	Linnet
P.	Grey partridge
RP	Ringed plover
S.	Skylark
ST	Song thrush



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Scale at A3: 1:5,000

Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.1
Territory locations for SPA and BoCC red listed species

January 2021

wood.

631000

632000

166000

N

Key

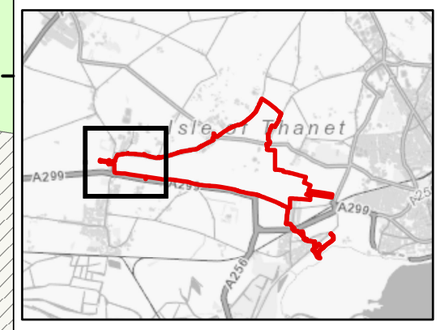
Order Limits (the Site)

Runway

Study Area

Species Key

B. Blackbird
BC Blackcap
BT Blue tit
C. Carrion crow
CC Chiff chaff
CH Chaffinch
FP Feral pigeon
GO Goldfinch
GT Great tit
K. Kestrel
LO Little owl
LW Lesser whitethroat
MG Magpie
MP Meadow pipit
R. Robin
SL Swallow
WH Whitethroat
WP Woodpigeon
WR Wren



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Scale at A3: 1:5,000

Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.2
Territory locations of other species

January 2021

wood.

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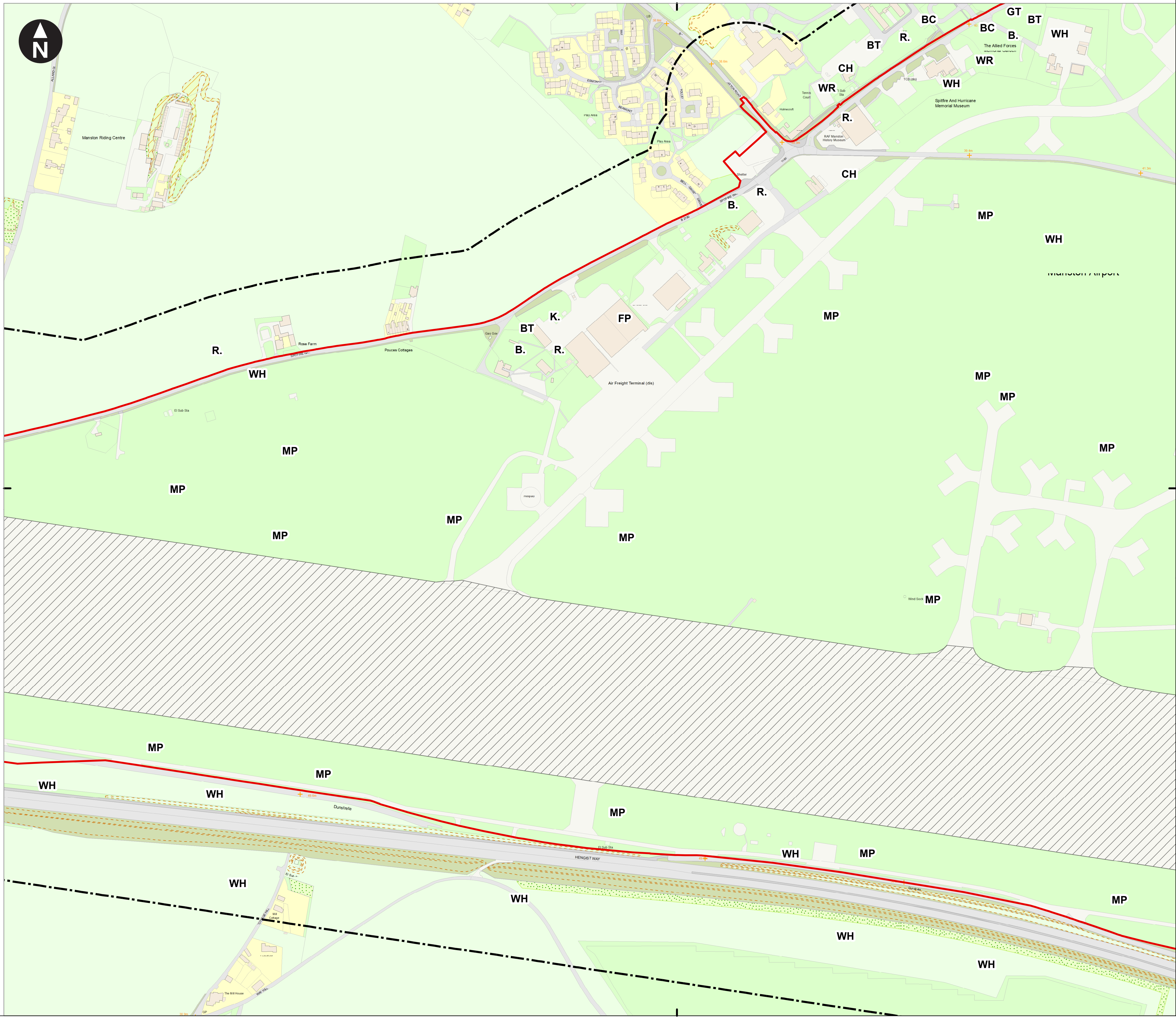


Key

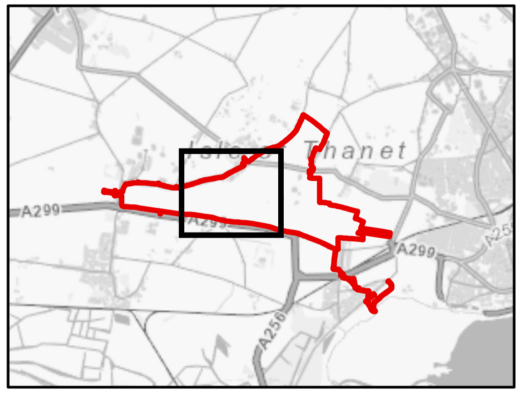
Order Limits (the Site)

Runway

Study Area

Species Key

- **B.** Blackbird
- **BC** Blackcap
- **BT** Blue tit
- **C.** Carrion crow
- **CC** Chiff chaff
- **CH** Chaffinch
- **FP** Feral pigeon
- **GO** Goldfinch
- **GT** Great tit
- **K.** Kestrel
- **LO** Little owl
- **LW** Lesser whitethroat
- **MG** Magpie
- **MP** Meadow pipit
- **R.** Robin
- **SL** Swallow
- **WH** Whitethroat
- **WP** Woodpigeon
- **WR** Wren



0 100 200 300 m

Scale at A3: 1:5,000

Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.2
Territory locations of other species

January 2021

wood.

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Defence Fire Training and Development Centre

Army Reserve Centre

Manston Airport

The Allied Forces Memorial Garden

Spitfire And Hurricane

Manston Court

Key

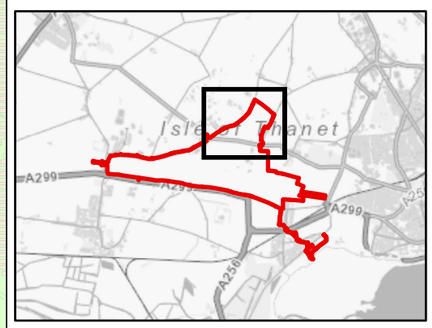
Order Limits (the Site)

Runway

Study Area

Species Key

B. Blackbird
BC Blackcap
BT Blue tit
C. Carrion crow
CC Chiff chaff
CH Chaffinch
FP Feral pigeon
GO Goldfinch
GT Great tit
K. Kestrel
LO Little owl
LW Lesser whitethroat
MG Magpie
MP Meadow pipit
R. Robin
SL Swallow
WH Whitethroat
WP Woodpigeon
WR Wren



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Scale at A3: 1:5,000

Client

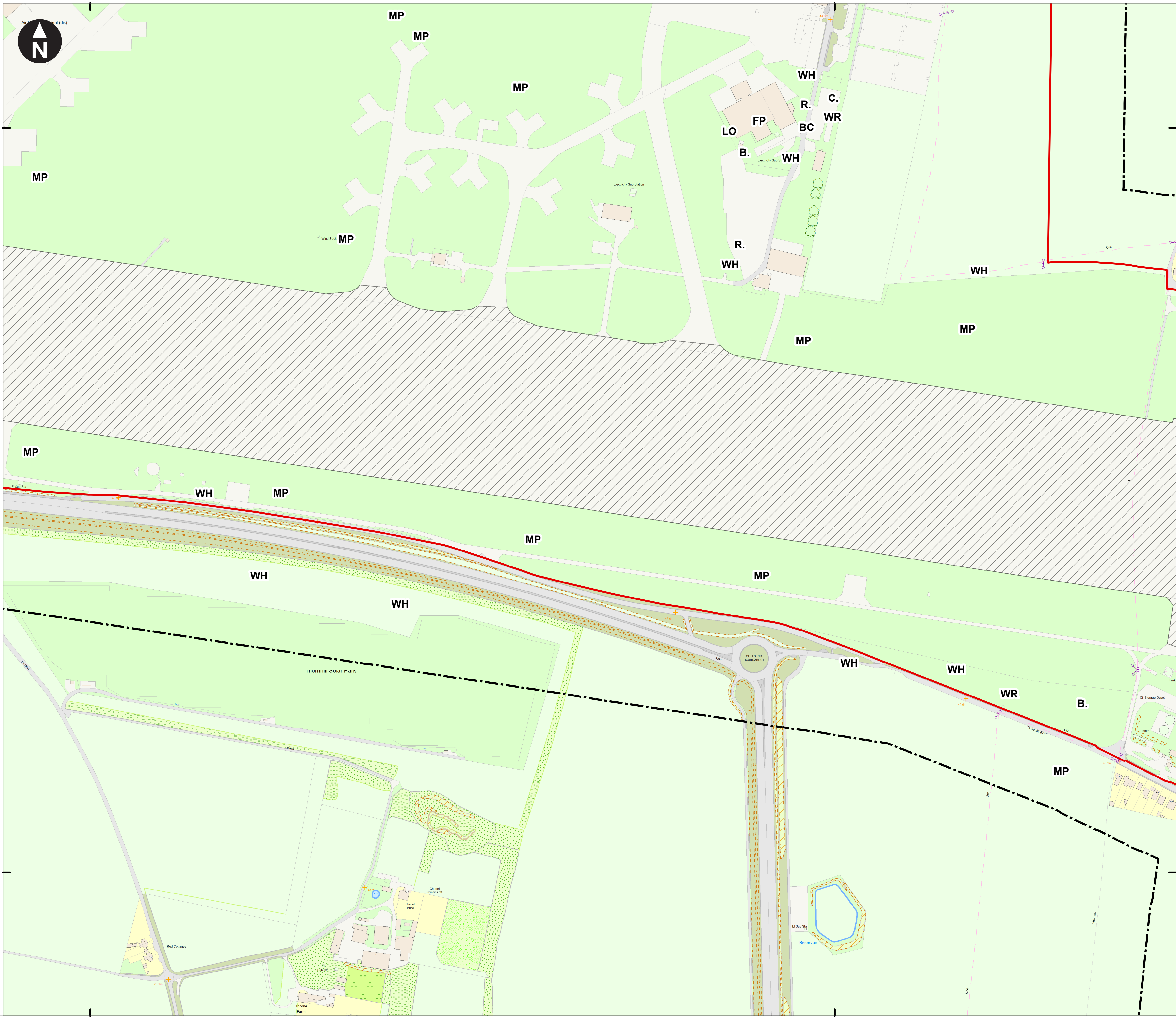
RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.2
Territory locations of other species

January 2021

wood.

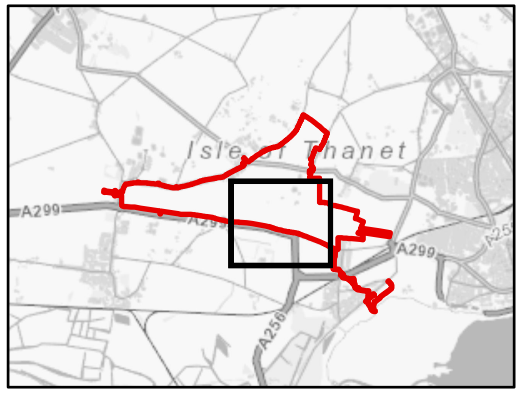


Key

- Order Limits (the Site)
- Runway
- Study Area

Species Key

B.	Blackbird
BC	Blackcap
BT	Blue tit
C.	Carrion crow
CC	Chiff chaff
CH	Chaffinch
FP	Feral pigeon
GO	Goldfinch
GT	Great tit
K.	Kestrel
LO	Little owl
LW	Lesser whitethroat
MG	Magpie
MP	Meadow pipit
R.	Robin
SL	Swallow
WH	Whitethroat
WP	Woodpigeon
WR	Wren



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Scale at A3: 1:5,000

Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.2
Territory locations of other species

January 2021

wood.

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N

CH
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B.
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WP
B.
B.
R.
MP
MG

Manston Sports and Social Club
Grove House
Chapel Farm
Oil Storage Depot
Runway Approach Lights
Boundary Stone
Boundary Stone
Boundary Stone

Key

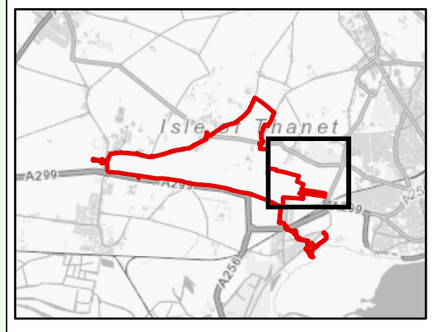
Order Limits (the Site)

Runway

Study Area

Species Key

B. Blackbird
BC Blackcap
BT Blue tit
C. Carrion crow
CC Chiff chaff
CH Chaffinch
FP Feral pigeon
GO Goldfinch
GT Great tit
K. Kestrel
LO Little owl
LW Lesser whitethroat
MG Magpie
MP Meadow pipit
R. Robin
SL Swallow
WH Whitethroat
WP Woodpigeon
WR Wren



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Scale at A3: 1:5,000

Client

RSP

Manston Airport DCO
Breeding Bird Report 2020

Figure 3.2
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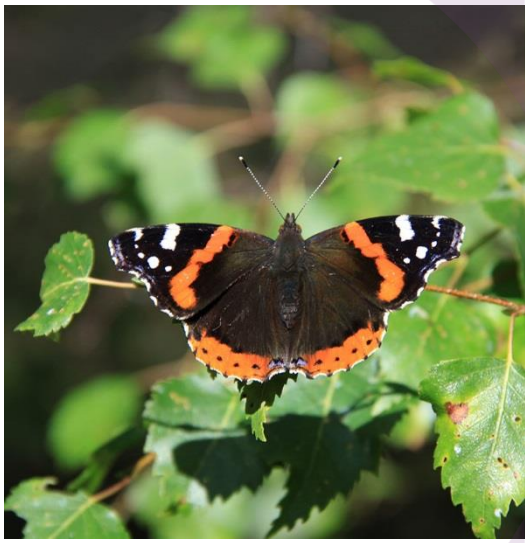
RiverOak Strategic Partners Ltd

Manston Airport

Bat Survey Report



Wood Group UK Limited – April 2021

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Document revisions

No.	Details	Date
1	Report	April 2021

Contents

1. Introduction

1.1 Project background

1.1.1 RiverOak Strategic Partners Ltd has commissioned Wood PLC. (hereafter referred to as 'Wood') to discharge condition 12 of the Development Consent Order (DCO) for the redevelopment of an area of approximately 296 hectares (ha) at Manston Airport, Kent (hereinafter referred to as 'the Site'; central National Grid Reference TR 330 658; as shown in **Figure 1.1**, **Appendix A**). Condition 12 states:

> *"No part of the authorised development is to commence until for that part final preconstruction survey work has been carried out to establish whether European or nationally protected species are present on any of the land affected or likely to be affected by any part of the relevant works, or in any of the trees and shrubs to be lopped or felled as part of the relevant works."*

1.1.2 The Site is located in north-east Kent, approximately 1.1 kilometres (km) west of Manston. The DCO sets out proposals for the demolition of buildings and development to deliver an area for cargo freight operations able to handle at least 10,000 movements per year, facilities for other aviation-related development including a passenger terminal and associated facilities, an aircraft teardown and recycling facility, a flight training school, a base for at least one passenger carrier, a fixed base operation for executive travel, and business facilities for aviation related organisations.

1.1.3 Since Wood's appointment, following an Order of the High Court made on 15 February 2021, the decision of the Secretary of State dated 9 July 2020 to grant the application for development consent for the proposed re-development of Manston Airport has been quashed. The Secretary of State must now redetermine the application. Notwithstanding this, the purpose of this report has not changed.

1.2 Purpose of this report

1.2.1 This report details survey work undertaken to establish the status of bats using the Site. It updates and expands on survey work completed by Babec Ecological Consultants Ltd in 2017 (Babec, 2017a and 2017b). The aims of this document are to:

- Outline the legislative protection given to bats in the UK;
- Detail existing bat records and locally designated sites of relevance to bats;
- Identify habitats and features within the Site that have the suitability to be used by bats; and
- Summarise the findings of the bat surveys and report on the presence and status of bat species using the Site.

1.2.2 It will be used to discharge Condition 12 of the DCO.

2. Methods

2.1 Survey design

2.1.1 A variety of methods have been used to assess the use of the Site by bats, in line with best practice guidelines, interpreted using professional experience. The Bat Conservation Trust (BCT) third edition of Good Practice Guidelines (2016) was the main source of guidance. The Bat Mitigation Guidelines (2004), Bat Workers' Manual (2004) and Bat Tree Habitat Key (2018) provide further guidance that has been taken into account when designing the survey methods and programme of survey work.

2.1.2 Due to concerns regarding the potential spread of COVID-19 to wild mammals, all survey work with the potential to bring surveyors into close contact with bats proceeded only with enhanced precautions and in line with published guidance from Defra (2020) and Nuñez (2020). This was predominantly relevant during internal building inspections and potential roost feature (PRF) inspections of trees.

2.1.3 The remainder of **Section 2** describes the following survey methods that have been applied in 2019 and 2020.

- Desktop study;
- Roost identification: built structures:
  - External inspection;
  - Internal inspection;
  - Emergence and re-entry survey; and
  - Hibernation monitoring.
- Roost identification: trees:
  - Ground level roost assessment; and
  - PRF inspection.
- Bat activity:
  - Manual transects; and
  - Automated monitoring.

2.1.4 This section then goes on to describe:

- The methods used throughout field survey work to aid with species identification;
- How environmental conditions were considered in survey design and recorded during field survey work; and
- The personnel responsible for applying survey methods.

2.2 Desktop study

Species records

2.2.1 To inform the survey design and provide local context records of bat activity were requested from Kent and Medway Biological Records Centre (KMBRC) for the Site and all areas within 5 km of the boundaries in August 2020. A 5 km buffer was adopted for bats as they are a highly mobile species group and may commute several kilometres between roost and foraging grounds.

Stone Hill Park Environmental Statement

2.2.2 Ecology reports were produced by WSP in 2016 as part of an Environmental Statement for a previous application for the Site (Stone Hill Park)[1]. These reports were reviewed for background information relevant to bats.

Babec report

2.2.3 Reports detailing survey work carried out by Babec (2017a and 2017b) have been reviewed. The Babec survey effort was focussed entirely within and across the whole Site and included survey work carried out in 2017. The survey work involved:

- Roost identification in built structures (external and internal inspections); and
- Activity survey (manual transects and automated monitoring, monthly from August 2017 to October 2017).

Department for Transport

2.2.4 Manston Airport was subject to survey work for bats in 2019 by Mott MacDonald, working on behalf of the Department for Transport. The survey work involved a visit to all the buildings assessed by Babec in 2017 to provide low or negligible potential suitability to support roosting bats. The results of the 2019 survey work were reviewed for any evidence of roosting bats in structures not previously highlighted as supporting such.

2.3 Roost identification: built structures

Overview

2.3.1 This exercise aimed to update the initial assessment made by Babec (2017a) and identify any changes in building condition or suitability to support roosting bats. The survey also included those structures where access had not been available in 2017 and included follow on methods to establish the use of structures by roosting bats.

2.3.2 The built structures assessed are noted within Table B.1 (see **Appendix B**). This table further indicates which survey methods have been applied at each structure and the date on which the surveys were undertaken. The methods adopted at each building were selected based on those that were deemed most appropriate, considering initial survey results and the suitability and type of potential roost features present. Building reference numbers are provided in **Figure 2.1** (**Appendix**

[1] Thanet District Council Planning reference OL/TH/18/0660, https://planning.thanet.gov.uk/online-applications/simpleSearchResults.do?action=firstPage accessed 03/02/2021

A). The reference numbers used follow Babec (2017a), as far as possible, to maintain consistency and avoid confusion.

External inspection

2.3.3 A visual inspection of the exterior of all built structures identified within the Site was made between January 2019 and October 2020. In assessing suitability to support roosting bats, the initial external inspections considered the following factors:

- The presence of PRFs such as roof voids, soffit boxes with access gaps, spaces between roof tiles and lining felt or boarding, and gaps under bargeboards, roof tiles, hanging tiles, lead flashing and weatherboarding;
- Expected levels of artificial lighting around suitable roost entrances;
- Expected levels of disturbance to any suitable roosts; and
- Quality of adjoining or connecting habitat for roosting bats at the site of the structure, and the potential for bat foraging and commuting routes in the immediate surrounding area.

2.3.4 Taking account of these factors, each structure was then categorised according to the level of potential suitability for it to support roosting bats. Where the building could not be assessed sufficiently for it to confidently placed into one of these categories (for example due to access restrictions), a conservative assumption was made regarding the level of potential suitability and the structure was placed into the highest likely category based on the data that could be gathered.

- **Confirmed roosts** – where it was possible to determine that the structure supports a PRF that is used or has been used by bats (this category includes structures identified by historical survey work as supporting roosting bats, even if the current surveys found no evidence of this). Any structure confirmed to support roosting bats during subsequent survey work was also moved into this category;
- **Possible roosts** – where there was some evidence that bats may use a PRF within the structure, but such evidence was not conclusive. Structures were also moved into this category following subsequent survey work, as appropriate;
- **High suitability** – a structure with one or more PRFs that are obviously suitable for use by large numbers of bats on a regular basis and suitability for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat;
- **Moderate suitability** – a structure with one or more PRFs that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat, but that are unlikely to support a roost type of high conservation status[2];
- **Low suitability** – a structure with one or more PRFs that could be used by individual bats opportunistically. PRFs do not provide sufficient space, shelter, protection, conditions and/or surrounding habitat to be used on a regular basis or by large numbers of bats; and
- **Negligible suitability** – structures with negligible features likely to be used by roosting bats.

2.3.5 In addition, the exteriors of buildings near suitable roost entrances (e.g., gaps under soffits and hanging tiles) were examined using binoculars and a powerful torch to look for signs of bats. Where safe to do so, this included use of a ladder and Ridgid SeeSnake narrow-bore endoscope to inspect external PRFs.

[2] As defined in the *Bat Mitigation Guidelines* (Mitchell-Jones, 2004).

2.3.6 The structures were categorised according to their suitability to support bat roosts throughout the year, with the highest level of suitability assigned. For example, if a building had high suitability to support a summer roost and low suitability to support a winter roost it would be categorised, overall, as being of high suitability. In occasional cases, an additional category was assigned:

- Winter only roost suitability – where a structure was deemed to have suitability to support a winter roost, but had negligible suitability to be used in summer; and
- Night/feeding roost suitability only – this may be applied to structures in the low suitability category, where the structure is considered suitable to temporarily support a night-time bat roost or a feeding perch, but there is negligible suitability for bats to use the structure for roosting during the daytime.

2.3.7 Weather conditions and reduced bat activity over winter may reduce evidence of bats at roost sites, for example by washing away droppings from around the external entrance of a roost. As such, external inspections were repeated for individual buildings on an *ad hoc* basis immediately in advance of dusk emergence surveys taking place (see **Section 2.3** '*Emergence survey*').

Internal inspection

2.3.8 The interiors of buildings and roof voids offering potential suitability to support roosting bats were examined between January 2019 and October 2020 where access was permitted and could be safely achieved. During this inspection, a high-power focused-beam lamp was used to search for any roosting or hibernating bats, or evidence of bats such as droppings, urine stains, discarded insect remains, or scratching, staining and lack of cobwebbing across suitable bat access points. A Ridgid SeeSnake narrow-bore endoscope was also used for inspection of narrow crevices, as required.

Emergence and re-entry survey

2.3.9 Buildings were visited at dusk to monitor bat emergence from features which were assessed as having potential suitability to support bat roosts, based on previous survey work completed in 2017 and 2019 to 2020. The level of potential suitability a structure was considered to have following the inspections determined the minimum level of survey effort applied during emergence and re-entry surveys, as follows:

- **High suitability** – a minimum of three survey visits;
- **Moderate suitability** – a minimum of two survey; and
- **Low suitability** – a minimum of one survey visit.

2.3.10 Each emergence survey visit began at least 15 minutes prior to sunset and ended at least 90 minutes after sunset, and each re-entry survey visit commenced at least 120 minutes prior to sunrise and ceased 15 minutes after sunrise. This timing encompassed the typical emergence and re-entry periods for UK bat species. Where multiple survey visits were undertaken at a structure, these were spaced out to sample different parts of the survey period, with a minimum of two weeks between visits.

2.3.11 During dusk emergence survey visits surveyors remained static and visually fixed on the PRFs that they were monitoring. During dawn re-entry surveys, however, surveyors had some freedom to move around the structure in response to bat activity, realising opportunities for tracking individuals back to roost sites if such arose. This method is particularly useful for pinpointing small roosts and roosts in structures with low potential, as even a single bat will often display 'swarming' behaviour near the roost entrance before entry. Dawn re-entry survey visits of structures in close

proximity and with low roost potential were specifically designed to allow surveyors to move around in this way. Short transect routes (refer to **Figure 2.2**, **Appendix A**), with a maximum walked circuit time of 10 minutes, were used to search for bat activity and identify re-entry to roosts. This method was adopted to aid roost identification where the number of low potential PRFs make it impractical for each individual one to be monitored using static survey teams. The re-entry survey visits were undertaken during mid-summer, to coincide with the period when juvenile bats were starting to fly, and their less experienced flight skills may make them and their roosts more obvious to surveyors.

2.3.12 Bat activity was recorded using a combination of visual observation and aural full spectrum or Elekon BatLogger M frequency division bat detectors. This enabled bats' ultrasonic calls to be heard. All bat calls were recorded digitally using the in-built recording feature. Calls were subsequently analysed using BatExplorer software to aid species identification (see **Section 2.5** '*Acoustic recordings*').

2.3.13 Canon XA20 and Canon XA30 video cameras with infrared capabilities, accompanied by separate powerful infrared light sources, were used to aid surveyors during emergence survey visits. On occasion, specific PRFs were monitored using standalone cameras and infrared light sources. Where this was the case, video recordings were later fully reviewed in real time by an ecologist to check for any bat emergence that may have been recorded.

Supplementary monitoring

2.3.14 In order to follow up on some preliminary findings reported by Mott MacDonald (2019) (see paragraph 3.1.10) and provide supplementary data regarding the use of B55 throughout the night, two automated bat detectors (Elekon Batlogger A+) were deployed internally during June and July 2020. The detectors were in place for seven days and set to record any bat calls continuously from 30 minutes before sunset to 30 minutes after sunrise.

Hibernation monitoring

2.3.15 Structures that were identified as having potential suitability to support hibernating bat roosts (see **Figure 2.2**, **Appendix A** for locations) were subject to the following survey methods during winter 2019 and/or 2020:

- Inspection visits; and
- Up to 14 days of acoustic monitoring.

2.3.16 This survey approach primarily focussed on structures that were considered likely to offer stable conditions throughout the winter period (e.g., those that were all or partially underground).

2.3.17 Where access to the interior of the structure was achievable, it was subject to a specific search for hibernating bats. Any crevices found during these surveys were inspected using a Ridgid SeeSnake narrow-bore endoscope and a high-power focused-beam torch. **Table 2.1** indicates those buildings that were subject to this survey method.

Table 2.1 Dates of hibernation inspection visits

Structure reference	Dates of internal inspection for hibernating bats		
B1	Not accessible		
B5	21/01/20	11/02/20	13/03/20

Structure reference	Dates of internal inspection for hibernating bats			
B8	17/01/19	21/01/20	11/02/20	13/03/20
B16	17/01/19	21/01/20	11/02/20	13/03/20
B18	17/01/19	21/01/20	11/02/20	13/03/20
B33	18/01/19	21/01/20	11/02/20	13/03/20
B39	18/01/19	Access permission withdrawn – no further inspections.		
B62	31/01/19	21/02/19		

2.3.18 An automated bat detector (Elekon Batlogger A+) was deployed within each accessible structure recording for up to 14 days per month between January and March 2019 and/or January and March 2020 (see **Table 2.2**). These were set to record any bat calls continuously from 30 minutes before sunset to 30 minutes after sunrise.

Table 2.2 Dates of automated monitoring in potential hibernacula

Structure reference	Monitoring period 1	Monitoring period 2
B1	31/01/19 - 06/02/19	21/02/19 - 27/02/19
B5	21/01/20 - 27/01/20	11/02/20 - 17/02/20
B8	17/01/19 - 23/01/19	11/02/20 - 17/02/20
B18	17/01/19 - 23/01/19	11/02/20 - 17/02/20
B33	Installed 18/01/19, but then stolen from the Site, so no data was collected.	No further monitoring.
B62	31/01/19 - 06/02/19	21/02/19 - 27/02/19

Survey limitations

2.3.19 Of those structures requiring internal inspection and/or hibernation monitoring, B1, B43 and B56 could not be accessed internally. This was due to:

- B1 - building is below ground and unsafe to access. An automated bat detector (Elekon Batlogger A+) was left in the only visible entrance which was an above ground structure;
- B43 - sealed building with locks to which keys could not be obtained; and
- B56 – not safe to enter due to presence of electrical equipment.

2.3.20 An automatic bat detector was left in B33 in January 2019 but was subsequently stolen. A lack of secure places in this building meant the decision was taken not to install a replacement.

2.3.21 Building B39 was subject to an initial internal inspection but could not be followed up with subsequent hibernation monitoring due to access permission being withdrawn and the buildings becoming illegally occupied.

2.3.22 Full details of the limitations affecting access to each structure are provided in **Table B.1** (**Appendix B)**.

2.4 Roost identification: trees

Overview

2.4.1 An initial assessment was made by Wood in 2017, with a visit in 2020 undertaken to identify any changes in tree condition or suitability to support roosting bats. The inspection also included follow on survey methods to establish the use of trees by roosting bats.

2.4.2 **Table B.2** (**Appendix B)** lists the trees assessed and indicates which methods have been applied at each tree alongside the date on which the surveys were undertaken. The methods adopted at each tree were selected based on those that were deemed most appropriate, considering initial survey results and the suitability and type of PRFs present. Tree reference numbers and survey locations are provided in **Figure 2.3** (see **Appendix A**).

Ground level roost assessment

2.4.3 All trees within the Site, as well as a 30 m radius around this footprint, were assessed for their suitability to support roosting bats (see **Figure 2.3**, **Appendix A**). The trees were inspected from ground level using close focussing binoculars and a powerful light source to search for PRFs such as the following: rot holes; knot holes; tear outs; flush cuts; hazard beams; wounds; cankers; and other cavities, splits or lifting bark[3]. This survey was carried out during late-autumn-early spring months, which is the optimal period for ground level visual assessments due to the reduction in foliage during winter, allowing increased visibility of features higher up in the tree. Where PRFs were identified, the following details were recorded:

- Grid reference;
- Tree species;
- Tree diameter at breast height (DBH);
- Tree height (measured using a clinometer);
- Number and type of PRFs;
- Approximate height of PRFs, and whether they were on the stem or a limb; and
- Aspect that the PRFs were facing.

2.4.4 Each tree was assigned a unique reference number and a photograph was taken to aid later re-identification of individual trees. Based on the assessment, each tree was assigned a category in accordance with its level of potential suitability to support bat roosts, in line with categories adopted for built structures (see paragraph 2.3.4).

2.4.5 In some instances, land access restricted a full visual assessment being completed, such that two or more trees were assessed as a group rather than individually and assigned an indicative level of potential suitability to support bat roosts (see '*Survey limitations*'). An "x" prefix on the reference number has been used to indicate tree groups, rather than individual trees.

[3] Note these are aboricultural terms for such features.

PRF inspection

2.4.6 Trees categorised as providing a moderate or high level of bat roost potential during the ground level roost assessment were taken forward for PRF inspection. Any PRFs occurring up to 2 m from ground level were inspected either from ground level or using a ladder. PRFs above this height were accessed using rope and harness climbing techniques. All PRF inspections were undertaken by an appropriately licensed bat worker using an endoscope and torch in July 2020. For all trees that were still categorised as providing a moderate or high level of bat roost potential after in initial inspection, a second visit was undertaken in October 2020.

2.4.7 PRF inspections updated the ground level visual assessments and recorded additional characteristics of each feature, including approximate internal cavity dimensions and the type of bat roost the feature had suitability to support (i.e., maternity, transitional, summer and/or hibernation). Any bats, or evidence of bat occupation (including staining, smoothing of bark and droppings) was recorded, and a photograph of each PRF was taken for reference and to aid future re-identification of individual features if such were required.

Survey limitations

2.4.8 Three hedgerow sections at the Site (tree references; x011, x035B and x038, also indicated in **Figure 2.3**) could not be adequately assessed on all aspects due to restricted visual access caused by hedgerow width and dense scrubby undergrowth (tree reference, x038) and due to no land ownership permission (x011 and x035B).

2.4.9 In addition, three areas, outside the Site, although contiguous with the Site boundary, could not be adequately assessed on all aspects due to no land ownership permission, as follows:

- Area 1. Private garden (0.004 ha, NGR: TR 34262 66670), containing one poplar and 11 ivy clad sycamores, (tree references; TR005 and x006 respectively);
- Area 2. Landscaped garden (0.55 ha, central NGR TR 34457 65798), containing one field maple and 20 mixed broadleaf and conifer trees (tree references TR032A and x032B); and
- Area 3. Dilapidated house in enclosed grounds (0.38 ha, central NGR TR 34159 66250), containing 10 ivy clad trees (tree reference x037).

2.4.10 Three trees (TR005, TR032A, x035B) were not subject to a PRF inspection due to restricted land access permission.

2.5 Bat activity

Overview

2.5.1 This exercise aimed to expand on the partial season of bat activity survey work undertaken by Babec (2017b). The 2017 survey collected bat activity data from the second part of the season (August 2017 to October 2017), while the current survey collected bat activity data from the first part of the season (April 2017 to July 2017). Given that the 2017 and 2020 bat activity surveys combined are intended to represent a complete dataset of a full season of bat activity, results from the 2017 bat activity survey work are discussed alongside the 2020 survey results (see **Section 3.4**).

2.5.2 **Table B.3** (**Appendix B**) indicates the date on which bat activity surveys were carried out, and **Figure 2.4** (**Appendix A**) shows activity survey locations. The following sections provide details of the survey methods adopted.

Manual transects

2.5.3 The main areas of suitable bat foraging habitat in the Site were divided into four transects (see **Figure 2.4**), designed to incorporate potential bat flightlines and sample the range of habitat types present. Each transect was approximately equal in length at around 3-4 km and followed the same transect routes as used by Babec in 2017.

2.5.4 During each survey visit, the surveyor walked at least two circuits of the transect from sunset until three hours after sunset. The following was recorded as part of the survey: the number of bat passes of each species heard and the type of activity heard (e.g., foraging, social calls). While walking along the transect route, surveyors watched for bat activity (light levels permitting) and monitored bat calls using Elekon BatLogger M detectors, with later analysis of sound recordings using methods similar to those employed during the emergence survey work (see **Section 2.3** '*Emergence survey*'). For the purpose of this assessment, a "pass" is defined as the sequence of calls[4] a bat makes as it flies past, typically getting louder then softer as the distance between bat and surveyor changes.

2.5.5 Each of the transects was visited once a month from April 2020 to July 2020 at dusk. During July, the survey was repeated at dawn immediately following the dusk visit. Within each month, all transects were surveyed simultaneously. The starting point of the transect was randomly varied between visits to enable sampling of different parts of the transects at differing periods of time after sunset, and on occasion the route was walked in reverse.

Automated monitoring

2.5.6 In order to monitor bat activity throughout the night, automated detectors (Elekon BatLogger A+) were deployed to record bat calls continuously from 30 minutes before sunset to 30 minutes after sunrise for a minimum of five nights per month at each location, April 2020 to July 2020 inclusive. A total of eight monitoring locations were used. Four units were used, being rotated twice a month to cover all locations. Monitoring locations replicated those used by Babec in 2017, as shown in **Figure 2.4** (**Appendix A**).

2.5.7 Five consecutive nights of data per month from each recording location was analysed using BatExplorer software to identify bat species (where practicable), or to genus/species group where the characteristics of the call were common to more than one species (see **Section 2.6** '*Acoustic analysis*'). Where units had been recording over more than five nights, the dates for analysis were chosen as the five consecutive nights with the highest number of registrations recorded across all units. By selecting the dates for analysis in this way, it is assumed that nights with the best possible conditions for bat activity during the recording period were being chosen. The dates from which data are presented in this report are provided in **Table B.4** (**Appendix B**).

2.5.8 In order to allow for comparison across the Site, the total numbers of bat files recorded were converted into an average number per night of recording (of those dates analysed).

Survey limitations

2.5.9 Despite every effort made to obtain five consecutive nights of data per month for each recording location, this was not possible for all months at all locations due to technical failure of the automated detector. The dates where recording was successful are shown in **Table B.4** (**Appendix B**). This primarily applied to locations 1b and 2b in April 2020, location 4a in May 2020 and location 1a in August 2017.

[4] Bat "calls" are the individual clicks made by bats as they echolocate.

2.6 Acoustic analysis

2.6.1 Analysis of bat recordings was carried out with reference to Russ (2012) to aid species identification. Where records from the bat detector surveys (dusk emergence, manual transects and automated monitoring) were not identified to species level during the sound analysis process due to the overlapping call parameters of some species, records were identified to genus/species group, with the following groups used:

- Common pipistrelle/soprano pipistrelle;
- Common pipistrelle/Nathusius' pipistrelle;
- *Plecotus* sp. (brown or grey long-eared bat);
- *Myotis* sp. (bat species in the genus *Myotis*);
- *Nyctalus* sp. (noctule or Leisler's bat);
- Noctule/Leisler's bat/serotine; and
- Bat sp. (calls that could not be ascribed to a species group).

2.6.2 Scientific names for species are given in **Appendix C.**

2.6.3 The majority of recordings of bats in the genus *Myotis* were grouped together, as these species in particular have widely overlapping call parameters. Similarly, it is very difficult to distinguish between the two British species of long-eared bats through flight observations and sound recordings alone, therefore recordings were grouped as long-eared bats rather than identified to species.

2.7 Environmental conditions

2.7.1 Internal inspections of buildings with the suitability to support hibernating bats were timed, as far as possible, to coincide with periods of prolonged cold weather to maximise the chances of encountering bats.

2.7.2 All active bat surveys (e.g., emergence, re-entry and manual transects) were undertaken when there was little or no rain, no excessive wind and the temperature was above 10°C as, in these weather conditions, bats are unlikely to be deterred from flying. Temperature, humidity, cloud cover and rainfall levels were recorded by the surveyors during each survey session. Any other environmental conditions that may affect bat activity, such as high noise or artificial light levels, were also noted. Full details of weather conditions experienced during survey work are provided in **Tables B.5** and **B.6** (**Appendix B**).

2.7.3 The dawn activity manual transect was undertaken within the peak summer month of July, when bats are most likely to remain active throughout the night. This avoided the periods of spring and autumn when bats are more likely to return to roost early and not emerge again prior to sunrise.

2.8 Personnel

2.8.1 All survey work was led and organised by Tim Bradford MCIEEM. Tim is registered under Natural England Class Licence 2 (registration no. 2015-12885-CLS-CLS) and has over 13 years' experience in ecological consultancy and bat survey. Tim was assisted by Wood ecologists and associates; details of whom are provided in **Table B.7** (**Appendix B**).

3. Results

3.1 Desktop study

Species records

3.1.1 Nine species of bat have been recorded, including five roosting species, within 5 km of the Site between 2010 and 2020. Records provided by KMBRC (2020) are summarised in **Table 3.1** and presented in **Figure 3.1** (**Appendix D**). Estimated distances given refer to the distance from the record to the boundary of the Site.

Table 3.1 Records of bats within 5 km of the Site (KMBRC, 2020)

Species	No. of non-roost records	No. of roost records	Date range of records	Distance (m) and direction of the closest record from the Site
Common pipistrelle	136	5	2010-2019	On the Site
Common/soprano pipistrelle/*Pipistrellus* sp.	23	3	2012-2016	801 N
Soprano pipistrelle	48	9	2010-2019	1,368 S
Nathusius' pipistrelle	4	0	2010-2018	903 E
Brown long eared bat	1	9	2010-2018	1,467 S
Daubenton's bat	1	1	2016	2,474 N
Natterer's bat	0	15	2010-2018	2,474 N
Noctule	3	0	2016	2,388 N
Leisler's bat	1	0	2016	2,640 S
Serotine	1	0	2016	2,640 S

Stone Hill Park Environmental Statement

3.1.2 Between 2014 and 2016, to inform the ecology chapter of the Stone Hill Park Environmental Statement, WSP undertook:

- External and internal inspections of buildings (WSP 2016a & 2016b);
- Hibernation survey of buildings (WSP 2016c);
- Emergence and re-entry survey work (WSP 2016d); and
- Bat activity survey including manual transect and automated monitoring (WSP 2016e).

3.1.3 No evidence of bats was found during the initial external inspections; but follow up internal inspections identified pipistrelle droppings in B16, B41 and B54, and brown long-eared bat droppings in B33. Survey work between January and March 2016 also found a hibernating brown long eared bat in B33.

3.1.4 During the emergence and re-entry survey work common pipistrelle were seen emerging from B28 in July 2016 and August 2016. A maximum of three bats were seen emerging (August 2016), although some were assigned to the *Pipistrellus* genus rather than being identified to species level.

3.1.5 The bat activity survey work, including both the manual transect survey and the automated monitoring, was undertaken in September 2015. This indicated a low level of bat activity, with the following species recorded:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- Noctule; and
- Serotine.

Babec report

Roost identification survey

3.1.6 The bat roost identification survey work carried out by Babec included a single visit to each built structure between August and October 2017, to complete an external and internal inspection. A ground level roost assessment of trees on the Site was carried out during the same time period.

3.1.7 In summary, 71 built structures were assessed, of which four showed evidence of use by roosting bats (see **Table 3.2**). This included evidence of at least three roosting bat species: *Pipistrellus* sp, *Myotis* sp. and *Plecotus* sp. B33 and B54 were also reported by Babec to support roosts, although this was based on the findings of WSP survey work in 2015/16.

Table 3.2 Evidence of roosting bats in built structures on the Site, recorded by Babec in 2017 (Babec 2017a)

Built structure reference	Inspection results
B8	Approximately 25 old bat droppings (possibly from brown long eared bat and a *Myotis* sp.) found adjacent to the northern internal wall.
B16	Three bat droppings were recorded scattered within the roof void (most likely from brown long eared bat).
B17	Approximately 40 mixed age droppings (most likely from brown long eared bat) mainly scattered alongside the eastern and western walls. The absence of feeding remains, and restricted roosting features above most of the droppings indicates the most likely use of this building as a night roost.
B41	Approximately 30 suspected bat droppings (most likely *Pipistrellus* sp.) scattered under the roof apex within the roof void.

Bat activity survey

3.1.8 The bat activity survey work carried out by Babec included a once monthly visit at dusk to survey four manual transects in August, September and October 2017. Automated monitoring of eight

locations on the Site was undertaken during the same period, for five nights per month. This survey work broadly followed the methods used in the current survey, as set out in **Section 2.5**.

3.1.9 The Babec bat activity survey work (Babec 2017b) represents a partial season of bat activity data (August to October 2017), which has been expanded upon in 2020 to provide a dataset representing a full season (by including April to July 2020). As such, results from the 2017 bat activity survey work are discussed alongside the 2020 survey results (see **Section 3.4**).

Department for Transport

3.1.10 The Mott MacDonald survey report (2019) highlighted B55 as containing moth wings and suggested that the structure may be used as a bat feeding roost. No other structures were highlighted as potential bat roosts as part of this survey.

3.2 Roost identification: built structures

Overview

3.2.1 Full results of the survey work designed to identify roosting bats within buildings on the Site are provided in **Appendix B** and **Appendix E**. **Table E.1** (**Appendix E**) presents the results of the internal and external building inspections and the potential roost suitability status applied to each building. **Table E.2** (**Appendix E**) describes the results of the dusk emergence and pre-dawn re-entry surveys work, and **Table B.5** (**Appendix B**) details the weather conditions recorded during active bat detector survey work. **Figure 2.2** (**Appendix A**) shows the potential roost suitability status category of each building, while **Figure 3.2** (**Appendix E**) presents all confirmed bat roosts identified.

3.2.2 A summary of the categories assigned to those buildings assessed as having the suitability to support roosting bats is provided in **Table 3.3**. The survey results on which this assessment is based are provided in the following sections.

Table 3.3 Summary of potential roost suitability categories assigned to built structures supporting PRFs on the Site

Buildings supporting confirmed bat roosts	Buildings with high potential suitability to support bat roosts	Buildings with moderate potential suitability to support bat roosts	Buildings with low potential suitability to support bat roosts	Buildings with negligible potential suitability to support bat roosts
B8, B16, B28, B41	B1, B17, B33, B43, B54	B5, B18, B28, B29, B39, B53	B2, B3, B6, B7, B11, B14, B15, B22, B25, B27, B34, B40, B44, B45, B46, B47, B50, B52, B56, B61, B62, B63, B64, B66	B4, B9, B10, B12, B13, B19, B20, B21, B23, B24, B26, B30, B31, B32, B35, B36, B37, B38, B42, B48, B49, B51, B55, B57, B58, B59, B60, B65, B67, B68, B69, B70, B71
Total: 4	**Total: 5**	**Total: 6**	**Total: 24**	**Total: 33**

Buildings potentially suitable to support bat roosts

3.2.3 The external inspections identified 39 structures within the Site with the potential suitability to support roosting bats. A further 33 structures were categorised as having negligible suitability to support roosting bats, and as such were scoped out of any further assessment.

3.2.4 Overall, 55% (39) of the built structures in the Site have the suitability to support roosting bats. All fall within areas providing moderate or low-quality habitat for foraging and commuting bats. This is a result of the surrounding habitat being very open, dominated by improved grassland with high levels of artificial lighting around structures and with few hedgerows or treelines providing connectivity to high quality habitats in the wider landscape.

3.2.5 No bat calls were recorded from inside B55 during the supplementary monitoring exercise, which concurs with the overall assessment of this structure as providing negligible potential to support roosting bats. It was concluded that the moth wings identified during the 2019 survey by Mott MacDonald (see paragraph 3.1.10) were likely to have been dropped by another animal (e.g., spiders will sometimes leave feeding remains of this type).

Buildings supporting confirmed bat roosts

3.2.6 No direct observations of bats were recorded during the building inspections; however, the following evidence of bat use was present:

- Two structures from which less than 10 bat droppings were identified (B8, B16); and
- One structure from which approximately 80-90 bat droppings were identified (B41).

Table 3.4 summarises these findings, with full results provided in **Table E.1** (**Appendix E**).

Table 3.4 Evidence from inspection surveys confirming the species roosting in built structures

Structure reference	Direct observations of roosting bats	Evidence of roosting bats
B8	None	<10 bat sp. droppings
B16	None	<10 *Pipistrellus* sp. droppings
B41	None	80-90 *Plecotus* sp. droppings

3.2.7 A single structure was confirmed to support a bat roost during emergence and re-entry survey. This was B28, from which three bats emerged on 2 June 2020. One of these was identified as common pipistrelle but the other two could not be identified to species.

3.2.8 No bats emerged from or re-entered the three structures (B8, B16 and B41) that showed evidence of bat use during the internal inspection (see **Table 3.4**). Similarly, no evidence of bat presence, emerging or re-entering bats were recorded using B17, which also showed evidence of roosting bats in 2017 (see **Table 3.2**); or B33 or B54 which showed evidence of roosting bats in 2015/16 (see **Section 3.1**).

General activity

3.2.9 During the emergence and re-entry surveys, at least eight species were recorded within the Site:

- Common pipistrelle;

- Soprano pipistrelle;
- Nathusius' pipistrelle;
- *Plecotus* sp.;
- *Myotis sp.*;
- Noctule;
- Leisler's bat; and
- Serotine.

3.2.10 Common pipistrelle was regularly recorded within the Site, and was the only species recorded within 30 minutes of sunset, indicating that they are likely to roost in proximity to the Site. The remaining species listed were recorded less frequently and always more than 30 minutes after sunset or before sunrise.

Hibernation monitoring

3.2.11 No bats nor evidence of bat presence was identified during any of the hibernation monitoring survey work. No bat calls were recorded on the automated bat detectors deployed inside the structures over the winter period.

3.3 Roost identification: trees

Overview

3.3.1 Full results of the survey work designed to identify roosting bats within trees are provided in this section. **Figure 2.3** (**Appendix A**) presents the location of tree reference numbers and their suitability to support roosting bats.

3.3.2 A summary of the survey results is provided in **Table 3.5**. A description of these is also provided in the following sections.

Table 3.5 Level of potential suitability for trees to support roosting bats

Suitability to support roosting bats	Trees	Total no. in category
Confirmed roost	None recorded	0
High	TR005*, TR016, TR032A*, x035B*	4
Moderate	TR015, TR018, TR021	3
Low	TR002, TR003, TR004, TR007, TR008, TR009, x011*, TR012, TR013, TR014, TR017, TR019, TR020, TR022, TR023, TR024, TR025, TR026, TR027, TR028, TR029, TR030, TR031, TR033A/33B, TR034, TR035A, TR036	27
Unknown	X006*, x032B*, x037*, x038*	4

Notes. *indicates trees and tree groups that could not be fully assessed due to access restrictions. "x" prefix indicates two or more trees that has been assessed as a group rather than individually.

Ground level roost assessment

3.3.3 The ground level visual assessment identified 38 trees/tree groups that supported PRFs. This included two hedgerows with trees that could not be fully assessed visually but had the suitability to support PRFs with low (x011) and high (x035B) potential based on the type and size. Hedgerow section (x035B), located along the north eastern Site boundary, contained a large conifer tree and 19 smaller trees and which were of a suitable size to support moderate and high PRFs.

3.3.4 Seventeen trees/tree groups were initially assessed as offering moderate or high potential suitability to support roosting bats, although 10 were re-categorised following the detailed PRF inspection (see "*PRF inspection*"). Seventeen trees were scoped out of any further assessment as a result of the ground level visual assessment concluding that they offered negligible or low suitability to support roosting bats. A further four tree groups could not be assessed due to access restrictions.

PRF inspection

3.3.5 A total of 14 trees were subject to an initial PRF inspection, following which four trees (TR015, TR016, TR018, TR021) were still assessed as providing moderate or high roost suitability for roosting bats and subject to a second PRF inspection. The remaining 10 trees were reassessed as providing low suitability for roosting bats. No evidence of roosting bats was identified during the inspections.

3.3.6 Three trees offering high bat roosting potential (TR005, TR032A, x035B) were not subject to a PRF inspection due to restricted land access permission.

3.4 Bat Activity

Manual transects

Overview

3.4.1 The results from the manual transect survey are provided in **Table 3.6** and details of weather conditions during active detector survey visits in **Table B.5 (Appendix B)**. The number of passes of each species recorded on each section of each transect is shown in **Figure 3.3 (Appendix D)**, with proportions of passes allocated by species on each location presented in **Figure 3.4 (Appendix D)**.

3.4.2 At least six species were confirmed to be using the Site during the manual transect survey work:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- *Plecotus* sp.;
- *Myotis* sp.;
- Serotine; and
- Noctule/serotine/Leisler's bat (NSL).

3.4.3 **Table 3.6** presents the number of bat passes by each species recorded on each transect in 2017 and 2020. In order to provide a means of comparison, an average number of passes per hour of each species has been calculated. It should be noted that these figures are intended to give an

indication of relative levels of bat activity on each transect and do not represent actual numbers of bats. A single bat may pass the surveyor several times, with each pass counted separately. Equally, the same bat may pass over more than one transect in a single evening, therefore being recorded by more than one surveyor on the same date.

Table 3.6 Summary of 2017 (August to October) and 2020 (April to July) manual transect survey results

Transect reference	Total no. of passes per species (Average no. of passes per hour)									
	CP	**SP**	**NP**	**CP/SP**	**CP/NP**	**LE**	**M**	**S**	**NSL**	**Total**
AT1	143 (6.0)	15 (0.6)	1 (<0.1)	1 (<0.1)	0 (0)	3 (0.1)	2 (0.1)	0 (0)	1 (<0.1)	166 (6.9)
AT2	29 (1.2)	0 (0.0)	0 (0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.1)	0 (0.0)	31 (1.3)
AT3	106 (4.4)	9 (0.4)	0 (0))	0 (0.0)	0 (0.0)	0 (0.0)	1 (<0.1)	0 (0.0)	0 (0.0)	116 (4.8)
AT4	53 (2.2)	4 (0.2)	0 (0)	4 (0.2)	1 (<0.1)	1 (<0.1)	4 (0.2)	1 (<0.1)	1 (<0.1)	69 (2.9)
Total	333 (13.8)	26 (1.2)	1 (<0.1)	5 (0.2)	1 (<0.1)	4 (0.2)	7 (0.3)	3 (0.1)	2 (0.1)	382 (15.9)

Notes. CP = common pipistrelle; SP = soprano pipistrelle; NP= Nathusius' pipistrelle; CP/SP = common pipistrelle/soprano pipistrelle.; CP/NP = common pipistrelle/Nathusius' pipistrelle; LE= *Plecotus* sp.; M = *Myotis* sp.; S = serotine; NSL = noctule/serotine/Leisler's bat. Based on 24 hours of recording per transect.

3.4.4 Overall, during the combined April to July and August to October survey periods, there was an average of 15.9 bat passes per hour recorded across all transects, for all species: 13.8 common pipistrelle passes per hour, and 2.1 passes per hour by other species. Activity levels were relatively low on all parts of the Site. The highest level of activity was recorded in the north (AT1) and east (AT3) of the Site with 6.9 and 4.8 passes per hour respectively. A comparison of activity levels across all transects is displayed in **Chart 3.1**.

3.4.5 Higher levels of bat activity on the Site were, in general, associated with treelines and edge habitats (see **Figure 3.3**, **Appendix E**). These higher levels of activity also correspond with those locations where common pipistrelle was recorded at the highest levels. If the data associated with this species is excluded, the highest levels of bat activity (0.6 passes per hour) were associated with soprano pipistrelle in the north of the Site (AT1).

3.4.6 Generally, bat activity levels across the Site were low during all months with a maximum of 19.7 passes per hour recorded on AT3 in August, this pattern was reflected on AT4 (8.7 passes per hour). However, the highest levels of bat activity recorded on AT1 was in September (17.3 passes per hour) and AT2 in October (6.0 passes per hour) (see **Chart 3.2**).

Chart 3.1 Average number of bat passes per hour, recorded across all manual transect survey work in 2017 and 2020, by species

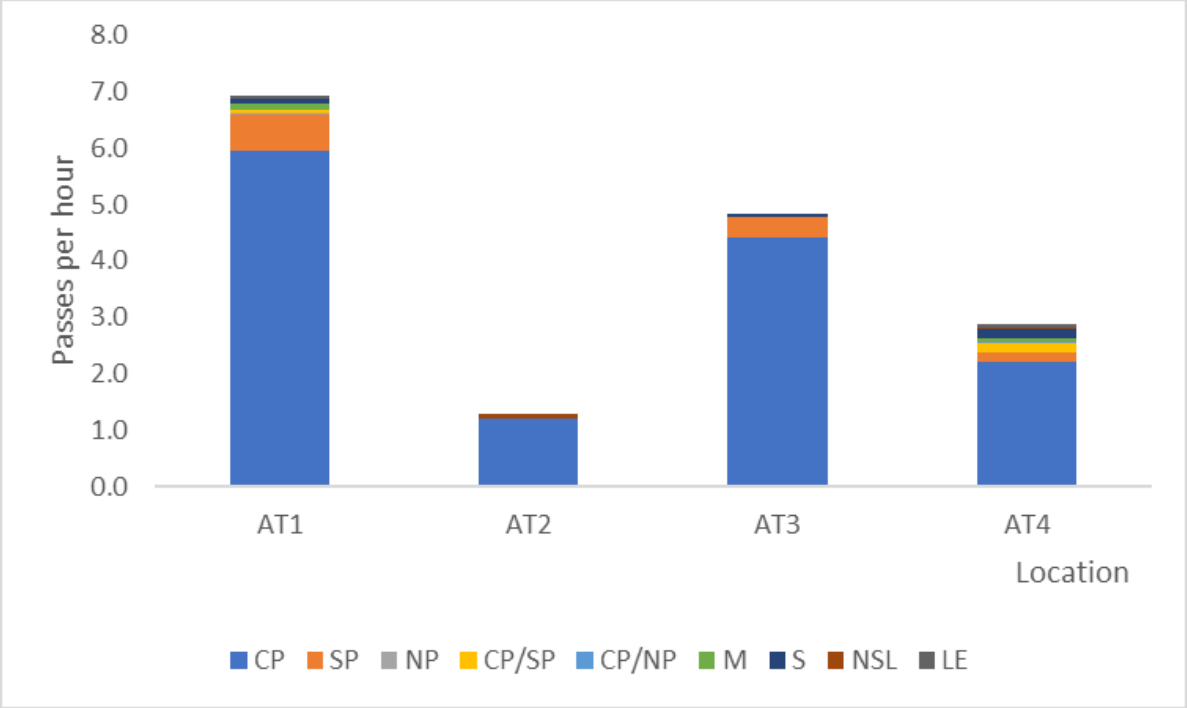
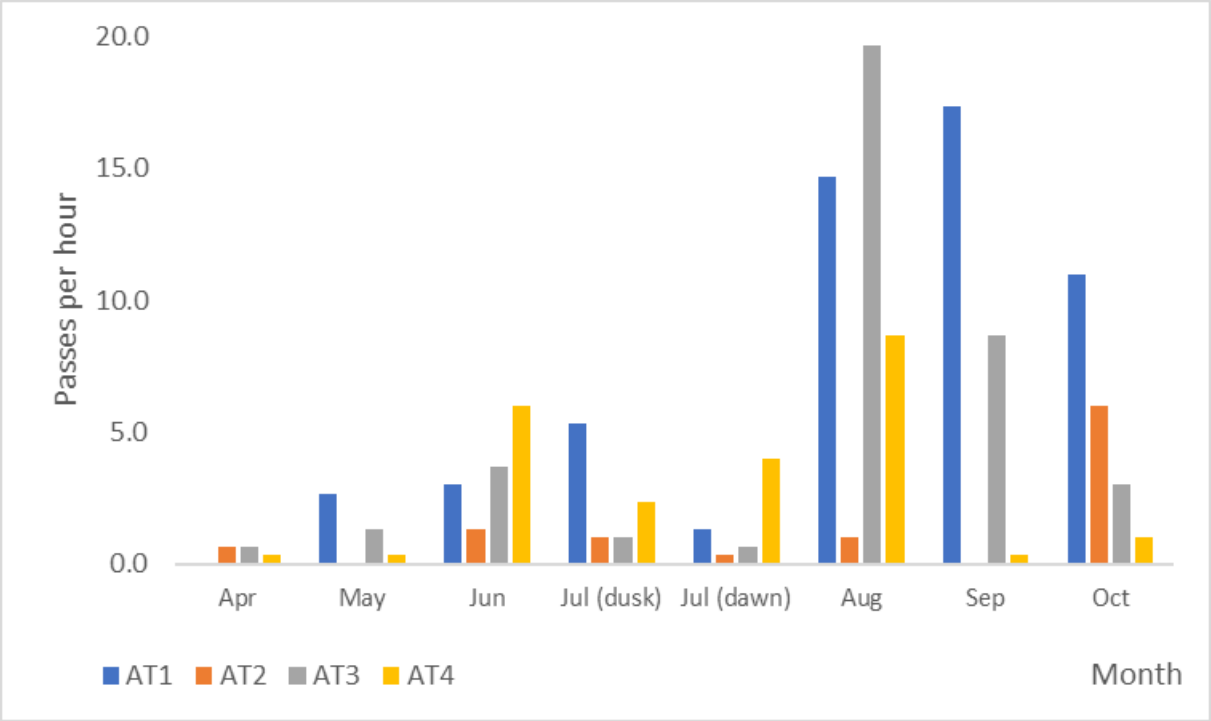


Chart 3.2 Average number of bat passes per hour (all species), recorded across all manual transect survey work in 2017 and 2020, by month



Common pipistrelle

3.4.7 By far the most frequently encountered species on all transects was common pipistrelle, with passes by this species accounting for 86.6% of all bat passes. This is in addition to 1.3% that could not be assigned to one or the other due to overlapping call parameters with soprano pipistrelle or 0.3% with Nathusius' pipistrelle. On average, there were 13.8 common pipistrelle passes per hour recorded across all transects.

3.4.8 This species was recorded foraging across most parts of the Site, with a particular focus of activity along treelines and hedgerows. Of the passes recorded for this species, at least 23% were recorded as clearly foraging in 2020 (with audible 'feeding buzzes' heard). Surveyors recorded 44% of foraging calls on AT4, 40% on AT3, 12% on AT1 with the remaining 4% on AT2. Common pipistrelle was regularly recorded across much of the Site within 30 minutes of sunset indicating the likely presence of roosts close by. Most notably, this species was recorded at sunset at transect AT2 and AT4 in May and on transect AT3 in June 2020.

3.4.9 The temporal pattern of common pipistrelle follows that noted for all bat activity across the season, with highest levels occurring in August 2017 (40.0 passes per hour across the Site).

Soprano pipistrelle

3.4.10 Passes by soprano pipistrelle were recorded in all months except for May and June 2020, on all transects except for AT2, and accounted for 7.3% of all bat passes recorded during manual transect work. Soprano pipistrelle was not recorded within 30 minutes of sunset or sunrise in 2020. This suggests that the individuals travelled from roosts that are not located on or close to the Site. Foraging activity was noted on AT3 and AT4.

Nathusius' pipistrelle

3.4.11 A single pass (0.3% of all calls) of Nathusius' pipistrelle was heard, this was on AT1 in October 2017; in addition, there was one call recorded on AT4 in June 2020 which could have been either Nathusius' or common pipistrelle due to overlapping call parameters. No foraging activity was recorded from this species.

Plecotus sp.

3.4.12 Two *Plecotus* species calls (0.5% of all calls) were heard, one each in August 2017 (AT4) and September 2017 (AT1). No foraging activity has been recorded for this species group.

Myotis sp.

3.4.13 *Myotis* sp. was recorded four times on the Site, accounting for 1.0% of all bat passes recorded. All of these passes were recorded on transects AT1 (one at dusk, two at dawn) and AT4 (one at dawn) in July 2020. The passes were over 30 minutes after sunset or before sunrise indicating they were not roosting close to the Site. None of the calls were foraging calls.

Serotine

3.4.14 Serotine averaged 0.3 passes per hour on the Site, and was recorded on transects AT1 in June 2020, AT4 in July and AT3 in August 2017. This species accounts for 1.8% of all bat passes recorded during manual transect work. Serotine was not recorded within 30 minutes of sunset or sunrise in 2020. This suggests that the individuals travelled from roosts which are not in the proximity to the Site. Additional serotine bat activity may have been recorded in the noctule/serotine/Leisler's category, where recordings could not be identified to species, and thus might be underestimated.

Only 3 recordings were, however, made in this category and taking these into account would result in only a marginal increase in activity levels. Serotine foraging activity was noted on AT4.

Noctule/serotine/Leisler's bat

3.4.15 Ambiguous noctule/serotine/Leisler's bat calls were recorded just twice, commuting through the Site and accounting for 0.8% of all bat passes recorded. Passes were recorded on transects AT2 in June 2020, and AT2 and AT4 in July 2020. These passes were over 30 minutes from sunset indicating the bat(s) had not been roosting close to the Site. No foraging activity was noted for this species group.

Automated monitoring

Overview

3.4.16 A summary of the results from the automated monitoring is presented in **Table 3.7**, and weather conditions during the recording sessions are presented in **Table B.6** (**Appendix B**). Proportions of bat passes per night allocated to each species at each location are shown in **Figure 3.4** (**Appendix E**).

3.4.17 At least eight species were confirmed to be using the Site during the 2017 (August to October) and 2020 (April to July) automated monitoring survey work:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- *Plecotus* sp.;
- *Myotis* sp.;
- Noctule;
- Leisler's bat; and
- Serotine.

3.4.18 **Table 3.7** summarises the results of the automated monitoring survey work with respect to the number of bat passes by each species recorded on each transect. In order to provide a means of comparison, an average number of files per night of each species has been calculated. It should be noted that these figures are intended to give an indication of relative levels of bat activity at each location and do not represent actual numbers of bats.

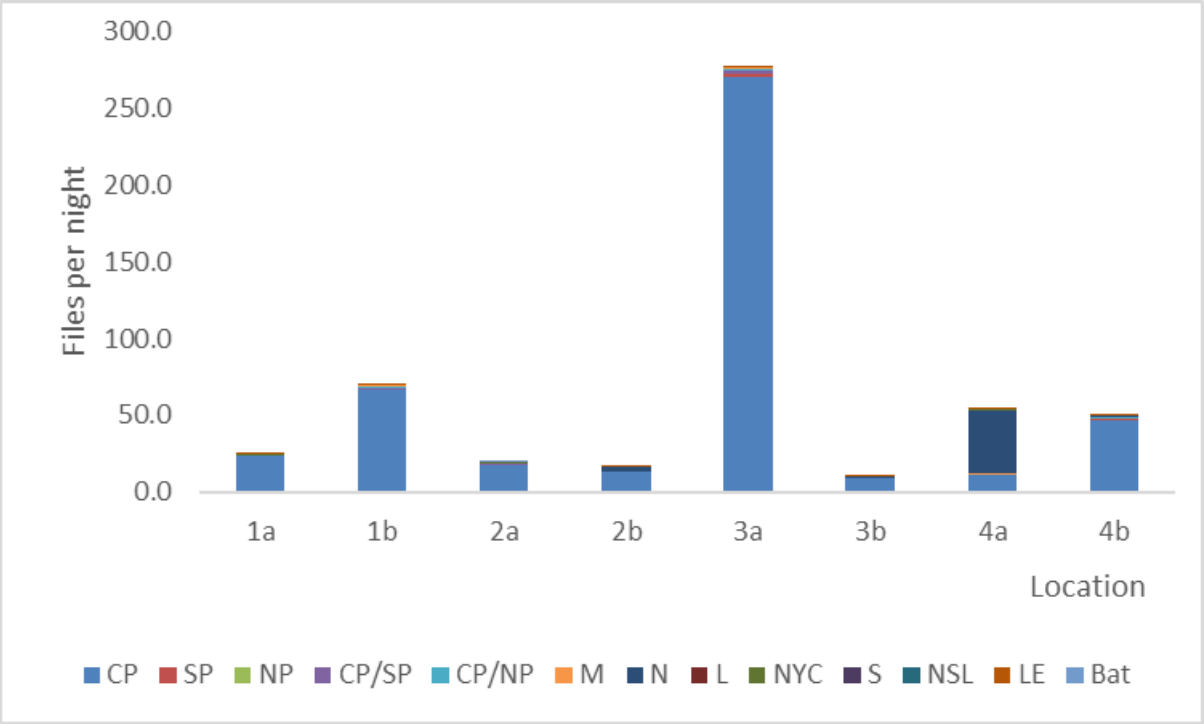
Table 3.7 Summary of 2017 (August to October) and 2020 (April to July) automated monitoring survey results

		Total no. of files per species (average no. of files per night)													
Location ref.	**No. of nights' data**	**CP**	**SP**	**NP**	**CP/SP**	**CP/NP**	**LE**	**M**	**N**	**L**	**NYC**	**S**	**NSL**	**Bat**	**Total**
1a	32	745 (23.3)	4 (0.1)	9 (0.3)	4 (0.1)	4 (0.1)	5 (0.2)	6 (0.2)	2 (0.1)	0 (0.0)	1 (<0.1)	2 (0.1)	0 (0.0)	0 (0.0)	782 (24.4)
1b	29	1,931 (66.6)	11 (0.4)	2 (0.1)	14 (0.5)	32 (1.1)	8 (0.3)	21 (0.7)	5 (0.2)	0 (0.0)	0 (0.0)	2 (0.1)	3 (0.1)	0 (0.0)	2,029 (70)
2a	35	600 (17.1)	19 (0.5)	8 (0.2)	8 (0.2)	3 (0.1)	5 (0.1)	8 (0.2)	15 (0.4)	0 (0.0)	4 (0.1)	5 (0.1)	10 (0.3)	4 (0.1)	689 (19.7)
2b	30	395 (13.2)	6 (0.2)	1 (<0.1)	1 (<0.1)	1 (<0.1)	1 (<0.1)	0 (0.0)	78 (2.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	483 (16.1)
3a	35	9,451 (270.0)	86 (2.5)	6 (0.2)	76 (2.2)	11 (0.3)	7 (0.2)	47 (1.3)	10 (0.3)	0 (0.0)	2 (0.1)	8 (0.2)	3 (0.1)	0 (0.0)	9,707 (277.3)
3b	35	300 (8.6)	11 (0.3)	3 (0.1)	4 (0.1)	5 (0.1)	4 (0.1)	4 (0.1)	10 (0.3)	0 (0.0)	4 (0.1)	0 (0.0)	7 (0.2)	0 (0.0)	352 (10.1)
4a	35	379 (10.8)	13 (0.4)	3 (0.1)	4 (0.1)	7 (0.2)	5 (0.1)	5 (0.1)	1,440 (41.1)	1 (<0.1)	43 (1.2)	2 (0.1)	1 (<0.1)	0 (0.0)	1,903 (54.4)
4b	33	1,531 (46.4)	29 (0.9)	8 (0.2)	16 (0.5)	9 (0.3)	8 (0.2)	21 (0.6)	31 (0.9)	0 (0.0)	3 (0.1)	0 (0.0)	11 (0.3)	0 (0.0)	1,667 (50.5)
Total	264	15,332 (58.1)	179 (0.7)	40 (0.2)	127 (0.5)	72 (0.3)	43 (0.2)	112 (0.4)	1591 (6.0)	1 (<0.1)	57 (0.2)	19 (0.1)	35 (0.1)	4 (<0.1)	17,612 (66.7)

Notes. CP = common pipistrelle; SP = soprano pipistrelle; NP = Nathusius' pipistrelle; CP/SP = common pipistrelle/soprano pipistrelle.; CP/NP = common pipistrelle/Nathusius' pipistrelle.; LE = *Plecotus* sp.; M = *Myotis* sp.; N = noctule; L = Leisler's bat; NYC = *Nyctalus* sp.; S = serotine; NSL = noctule/serotine/Leisler's bat; and Bat =unidentified bat species.

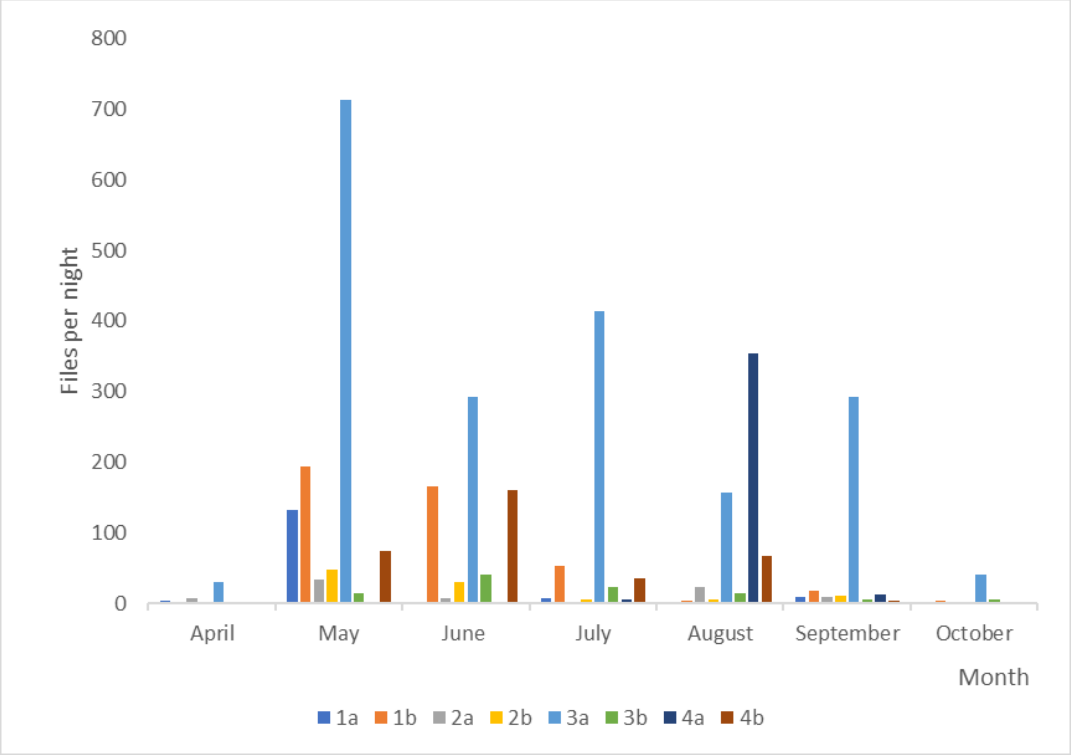
3.4.19 Overall, there was an average of 66.7 bat files per night recorded across all transects for all species. There was greatest activity at location 3a, with an average of 277.3 files per night recorded. Within each transect, there were large variations in activity recorded at each monitoring location (e.g., 10.1 files per night overall at 3b and 277.3 files per night overall at 3a). Such variation was associated with habitat type, with higher levels of activity detected in locations along treelines and hedgerows exposed to lower levels of artificial lighting. The lowest level of bat activity was associated with well-lit and open grassland habitats, particularly at locations 2a, 2b and 3b. A comparison of activity levels across the main survey areas is displayed in **Chart 3.3**.

Chart 3.3 Average number of bat files per night, recorded across all automated monitoring survey work, by species



3.4.20 As with the activity transects, bat activity levels recorded during automated monitoring were lowest during April 2020, with an average of 48.2 files per night across all survey areas. The highest levels of bat activity recorded during the automated monitoring, however, were recorded during May 2020 (1,213.8 files per night). This overall pattern was particularly driven by the more frequently recorded common pipistrelle and is not true when considering all species individually. A comparison of activity levels across each month is displayed in **Chart 3.4**.

Chart 3.4 Average number of bat files per night, recorded across all automated monitoring survey work, by month



Common pipistrelle

3.4.21 This species was by far the most frequently recorded during the automated monitoring survey work at all locations, accounting for 87.1% of all bat files recorded. This is in addition to 0.7% that could not be assigned to species due to overlapping call parameters with soprano pipistrelle or 0.4% with Nathusius' pipistrelle. Activity levels ranged from an average of 8.6 files per night in the open grassland habitat at location 3b, to 270 files per night along the hedgerow at location 3a.

Soprano pipistrelle

3.4.22 Soprano pipistrelle was recorded at relatively low levels across all monitoring locations (see **Chart 3.5**). The highest levels of soprano pipistrelle activity were recorded from locations 3a (2.5 files per night). This location was associated with a hedgerow and a treeline.

3.4.23 The highest monthly levels of soprano pipistrelle (14.6 files per night) activity were recorded during September 2017 and do not follow the general temporal trend for all species recorded during the automated monitoring surveys.

Nathusius' pipistrelle

3.4.24 Nathusius' pipistrelle was recorded at low levels across all monitoring locations (see **Chart 3.5**). The highest levels of Nathusius' pipistrelle activity were recorded from location 1a (0.3 files per night): location 1a being an area of scattered trees and scrub surrounded by rough grassland.

3.4.25 The highest monthly levels of Nathusius' pipistrelle (2.5 files per night) activity were recorded during April 2020 and did not follow the general temporal trend for all species recorded during the automated monitoring surveys.

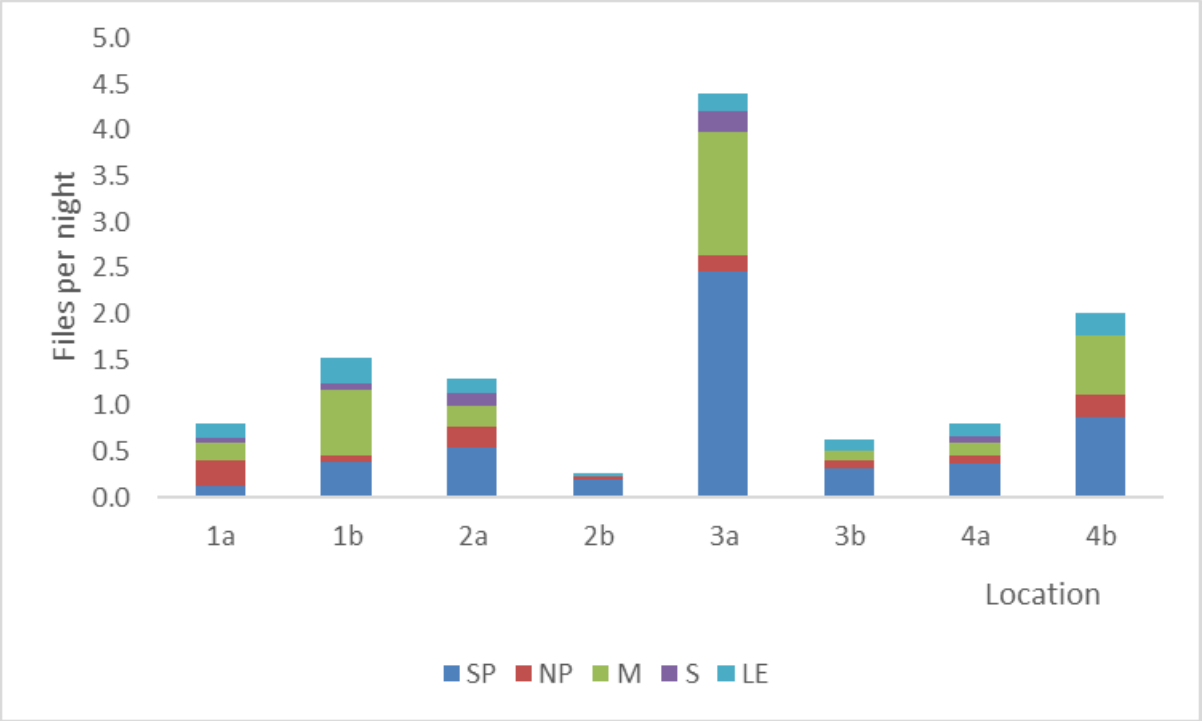
Myotis sp. and *Plecotus* sp.

3.4.26 When considering only the quieter calling bat species (*Myotis* sp. and long-eared bats), the highest level of *Myotis* sp. activity occurred at location 3a (1.3 files per night) following the general trend for all species. The highest level of long eared activity occurred at location 1b (0.3 files per night), an area of buildings with low levels of artificial lighting surrounded by rough grassland.

3.4.27 These species account for only 0.9% of all files recorded (0.6% *Myotis* sp., 0.2% long-eared bat). *Myotis* sp. was recorded across all monitoring locations, with the exception of location 2b, which is an area of well-lit buildings and hardstanding adjacent to a main road (B2050 Manston Road). Long-eared bat activity was recorded at all monitoring locations. **Chart 3.5** shows the distribution of files associated with these species recorded in the Site.

3.4.28 The temporal pattern for *Myotis* sp. and long-eared activity did not follow the general pattern of all species recorded during the automated monitoring surveys, with the highest levels of *Myotis* sp. recorded in October 2017 (8.8 files per night) and long-eared in September (3.6 files per night). Long-eared bat activity was not recorded in April and June 2020, with the lowest levels of *Myotis* sp. activity recorded in July 2020 (0.4 files per night).

Chart 3.5 Average number of *Myotis* sp., long-eared bats, serotine, soprano pipistrelle and Nathusius' pipistrelle files per night, recorded across all automated monitoring survey work



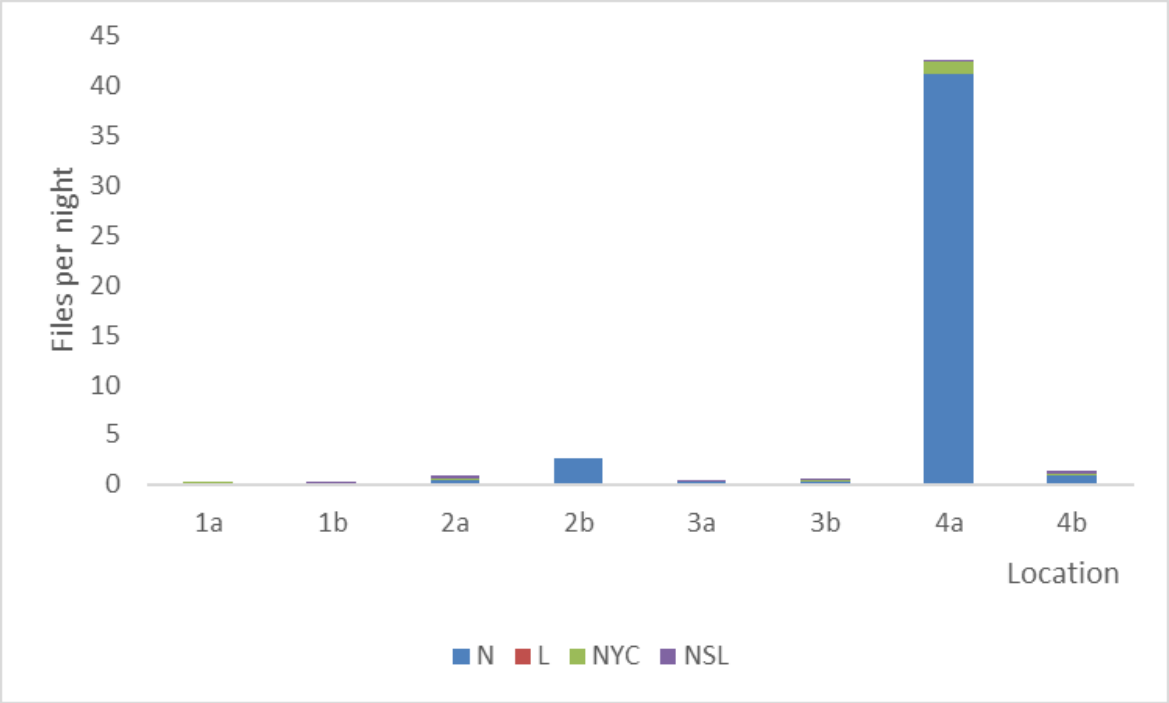
Nyctalus sp.

3.4.29 Following the *Pipistrellus* species of bats, the highest levels of bat activity (6.0 files per night) were associated with *Nyctalus* sp. (including noctule, Leisler's bat and calls identified as *Nyctalus* sp. and NSL due to overlapping call parameters). This species group accounted for 9.6% of all files recorded (9.0% confirmed noctule; <0.1% confirmed Leisler's bat; 0.3% *Nyctalus* sp. and 0.2% recorded as NSL).

3.4.30 The highest levels of *Nyctalus* sp. activity occurred at location 4a (41.1 files per night). As shown in **Chart 3.6**, *Nyctalus* sp. activity overall was lower across the rest of the Site (0.1-2.6 files per night). Location 4a is a fence line adjacent to large open areas of rough grassland and arable farmland.

The highest levels of confirmed noctule activity were recorded in August 2017 (293.2 files per night). Confirmed Leisler's bat was represented by a single file recorded during July 2020 at location 4a. NSL files were recorded across all months with highest levels of activity in August 2017 (10.4 files per night).

Chart 3.6 Average number of *Nyctalus* sp. and NSL files per night, recorded across all automated monitoring survey work



Serotine

3.4.31 Serotine was recorded at low levels on the Site during the automated monitoring work (accounting for 0.1% of files). This species was recorded at all monitoring locations except 2b, 3b and 4b, with the highest levels of activity of 0.2 files per night recorded at location 3a (see **Chart 3.5**). Across the Site, serotine activity levels were highest in July 2020 (1.2 files per night) and this species was not recorded in April 2020, May 2020 or October 2017.

4. Summary

4.1 Overview

4.1.1 The survey results indicate that at least eight species of bat occur within the Site, as detailed in **Table 4.1**. There is also some very low potential for grey long-eared bat to occur within the Site; however, there are no confirmed records of this species being resident in Kent. It is, therefore, unlikely that this very rare species occurs in the Study Site, and it is assumed all long-eared bat records collected during the survey work relate to brown long-eared bats. Further species in the genus Myotis are also very unlikely to occur on the Site, given that they tend to be closely associated with woodland habitat that is absent from Manston Airport (i.e., Alcathoe bat, whiskered bat, Brandt's bat and Bechstein's bat). In addition, Alcathoe bat and Brandt's bat are known only from a small number of discreet locations in Kent, all of which are in the west of the county.

4.1.2 Much of the Site provides relatively low-quality habitat for foraging and commuting bats, being very open and exposed, dominated by improved grassland with high levels of artificial lighting around structures. Moderate quality foraging and commuting habitat for bats is present in patches across the Site, however, as well as along its borders, where there are some treelines, hedgerows and unlit structures. Overall, bat activity levels on the Site were relatively low, reflecting the open nature of the terrain, which causes the Site to experience generally cooler and windier weather than the surrounding landscape. Although the larger bat species, particularly noctule, used the open grassland habitat for foraging, the majority of bat activity on the Site was associated with the treelines and hedgerow habitats.

4.1.3 The Site contains 39 built structures with the suitability to support roosting bats: four of which have been confirmed to support a small number of roosting bats during the current survey work, and another three that were previously confirmed to support evidence of bat occupation in 2014-2017. At least two species were confirmed to make use of structures on the Site: *Pipistrellus* sp. and *Plectous* sp.; with one hibernaculum identified but no maternity roosts. All roosts on the Site appear to be occupied only intermittently, and not in every year of survey, and are predominantly of low conservation significance.

4.1.4 There are 38 trees/tree groups on the Site with the suitability to support roosting bats, none of which were confirmed to support bat roosts. Bats are highly mobile; many species regularly switch roosts and therefore bats may use any suitable PRF, including those not occupied during the current survey period, if only transiently.

4.1.5 Details of the legal protection afforded to bats is given in **Appendix F**.

Summary by species

4.1.6 **Table 4.1** provides a summary of the bat species recorded within, or potentially occurring within, the Site, and a summary of the data that support this assessment.

Table 4.1 Bat species recorded within/potentially occurring within the Site

Species	Contextual and desk study information[5,6]	Roosting status on the Site[7]	Activity recorded on the Site
Common pipistrelle	British population estimate is 3,040,000; widespread across England. Status in Kent: common. The most frequently recorded species within 5 km of the Site, with the nearest desk study record occurring on the Site itself.	**One built structure**, B28, was confirmed to support a roost, with a maximum count of three bats emerging. A further **three structures** have shown evidence of supporting *Pipistrellus* sp. roosts since 2016, however, the exact species could not be determined. This was indicated by: • <10 droppings in 2020 (B16); • c.30 droppings in 2017 (B41); and • an unspecified quantity of droppings in 2016 (B54). All roosts recorded represent individual bats or small number of a common species (not a maternity site) and are, therefore, of **low conservation significance**.	The species with the highest levels of foraging and commuting recorded across all areas of the Site throughout the survey season. Activity most heavily focussed along treelines and edge habitats, particularly at automated monitoring location 3a.
Soprano pipistrelle	British population estimate is 4,670,000; widespread across England. Status in Kent: common. The second most frequently recorded species within 5 km of the Site, with the nearest desk study record occurring 1.37 km to the south of the Site.	No confirmed soprano pipistrelle roosts were identified. A further **three structures** have shown evidence of supporting *Pipistrellus* sp. roosts since 2016, however, the exact species could not be determined. This was indicated by: • <10 droppings in 2020 (B16); • c.30 droppings in 2017 (B41); and an unspecified quantity of droppings in 2016 (B54). All roosts recorded represent individual bats or small number of a common species (not a maternity site) and are, therefore, of **low conservation significance**.	Low levels of activity recorded across all automated monitoring locations in the Site and recorded on all activity transects, except for AT2. Activity recorded was highest in August and October on transects and September on the automated monitoring.

[5] National population estimates taken from: Mathews *et al.* (2018).
[6] County status taken from: Young *et al.* (2015).
[7] Roost conservation significance taken from: Mitchell-Jones (2004).

Species	Contextual and desk study information[5,6]	Roosting status on the Site[7]	Activity recorded on the Site
Nathusius' pipistrelle	British population estimate not available; widespread across the southeast of England, although known distribution elsewhere in the country is patchy. Status in Kent: scarce, often migrant. Four desk study records occur within 5km of the Site, none of which represent known roosts. The nearest was approximately 0.9 km east of the Site.	No roosts identified.	Low levels of activity recorded at all automated monitoring locations. Only recorded during transects on AT1 and possibly AT4 (call indistinguishable from common pipistrelle); recorded at all automatic monitoring locations. Activity recorded by automatic monitoring was highest in April.
Brown long-eared bat	British population estimate is 934,000; widespread across England. Status in Kent: common. A single desk study record of an active bat was returned by the desk study, along with 9 records of roosts. The nearest record was 1.47 km to the south.	**Five built structures** showed evidence of use as a roost, as indicated by: • c.25 droppings in 2017 (B8); • 3 droppings in 2017 (B16); • c.40 droppings in 2017 (B17); • an unspecified quantity of droppings and a single hibernating bat in 2016 (B33); and • c.80-90 droppings in 2020 (B41). B8, B16, B17 and B41 represent individual bats or small number of a common species (not a maternity site) and are, therefore, of **low conservation significance**. B33 represents a hibernation roost for a small number of common species and is, therefore, of **low-moderate conservation significance**.	Very low levels of activity recorded across all automated monitoring locations in the Site and only recorded on half of activity transects. Activity recorded by automatic monitoring was highest in September. This low level of activity is typical for the species, which has very quiet echolocation calls that are usually only detectable by aural detectors within close range (approximately 5 m). As such, the actual level of brown long-eared bat activity is likely to be under-represented in the survey results (particularly in relation to the very loud calling *Pipistrellus* and *Nyctalus* species).
Daubenton's bat	British population estimate is 1,030,000; widespread across England. Status in Kent: common near water. A single desk study record occurs within 5 km of the Site, this is a roost record 2.47 km to the north.	**One built structure**, B8, showed evidence of use as a roost by *Myotis* sp. (species not confirmed), as indicated by c.25 droppings in 2017. If this roost is Daubenton's bat it represents an individual bat or a small number of a common species (not a maternity site) and is, therefore, of **low conservation significance**.	Low levels of *Myotis* sp. activity recorded across all automated monitoring locations in the Site. During activity transects only recorded on half of the transects. Activity recorded by automatic monitoring was highest in October. The level of activity is likely to be under-represented due to the quiet calls of these species.

Species	Contextual and desk study information[5,6]	Roosting status on the Site[7]	Activity recorded on the Site
Natterer's bat	British population estimate is 414,000-973,000; widespread across most of England. Status in Kent: scarce. All of the desk study records from within 5 km of the Site are from a single hibernation site that is monitored annually by the Kent Bat Group, 2.47 km north of the Site.	**One built structure**, B8, showed evidence of use as a roost by *Myotis* sp. (species not confirmed), as indicated by c.25 droppings in 2017. If this roost is Natterer's bat it represents an individual bat or a small number of a rarer species (not a maternity site) and is, therefore, of **low-moderate conservation significance**.	Low levels of *Myotis* sp. activity recorded across all automated monitoring locations in the Site. During activity transects only recorded on half of the transects. Activity recorded by automatic monitoring was highest in October. The level of activity is likely to be under-represented due to the quiet calls of these species.
Noctule	British population estimate is not available; English population estimate is 565,000; widespread across most of England. Status in Kent: generally uncommon, declining. Recorded infrequently (three records) within 5 km of the Site. The nearest record occurs 2.39 km north of the Site.	No roosts identified.	Low levels of activity recorded across all automated monitoring locations in the Site, with particularly high levels at location 4a, associated with open grassland habitat. Not recorded as a separate species (as opposed to noctule/setotine/Leislers' bat) during activity transects, despite this species being one of the loudest and most easily detected using acoustic methods. Activity recorded by automatic monitoring was highest in August.
Leisler's bat	British population estimate not available; widespread across parts of southern England and the Midlands, although known distribution is patchy. Status in Kent: scarce, may be under-recorded. Recorded once within 5 km of the Site. The record occurs 2.64 km to the south of the Site.	No roosts identified.	Very low levels of activity recorded across the Site. Only recorded at location 4a and not recorded as a separate species (as opposed to noctule/setotine/Leislers' bat) during activity transects. Activity was only recorded by automatic monitoring in July .
Serotine	British population estimate is 136,000; widespread across southern England. Status in Kent: widespread but declining. Recorded once within 5 km of the Site. The record occurs approximately 2.64 km to the south of the Site.	No roosts identified.	Low levels of activity recorded at all automated monitoring locations except for 2b and 4b. Recorded on all activity transects except AT2. Activity recorded by automatic monitoring was highest in July.

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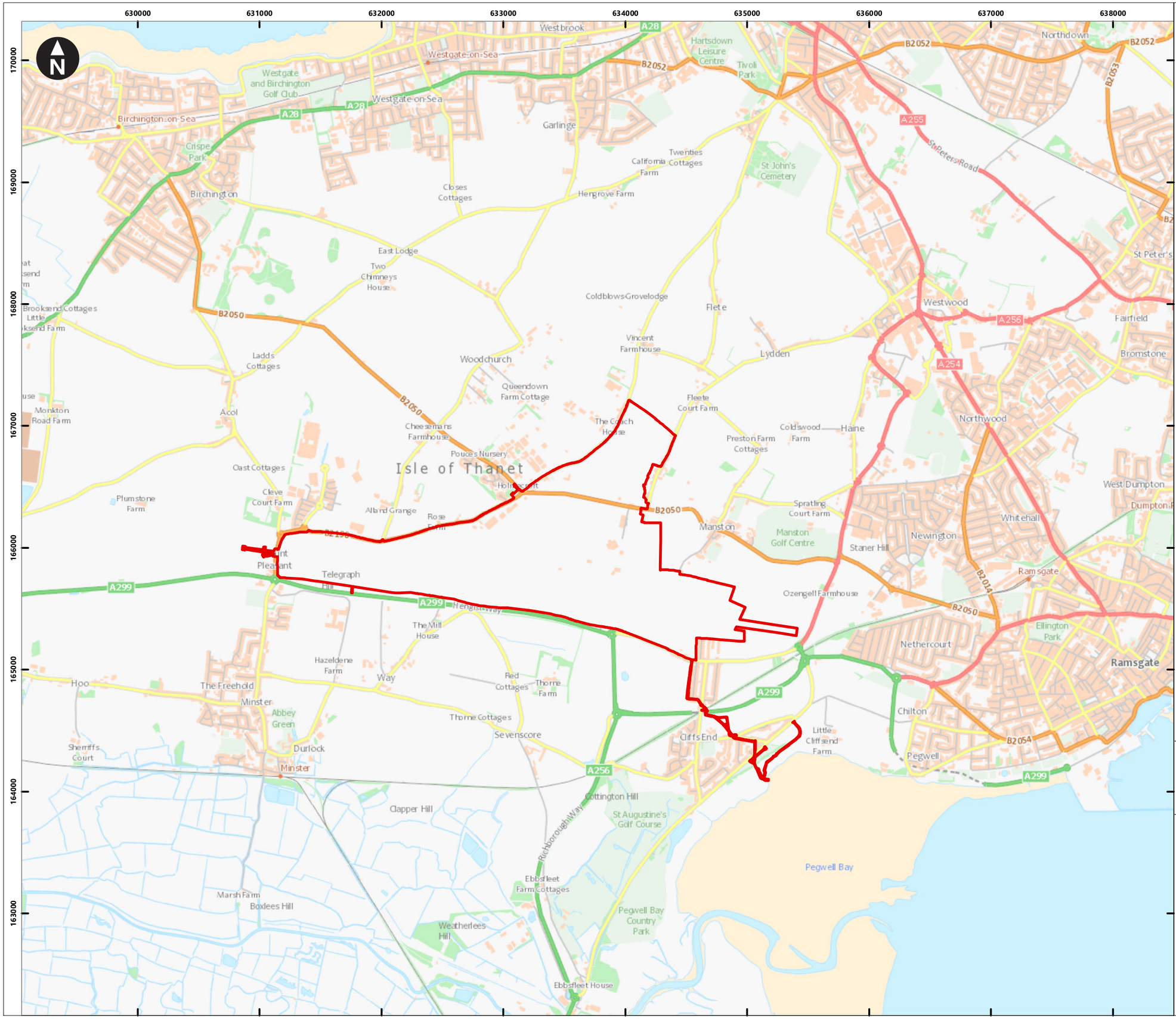
Appendix A
Figures Relating to Application of Survey Methods



Key

Order Limits

0 500 1,000 1,500 m

Scale at A3: 1:30,000

Client

RSP

Manston Airport DCO
Bat Survey Report

Figure 2.1
The site

February 2021

wood.

40820-Lon230

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632000

166000

B1

B2

B3

B4

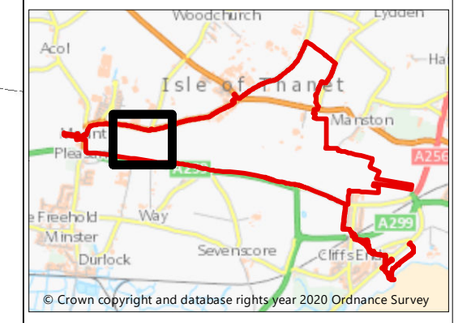
B5

Key

Order Limits

Suitability of buildings to support roosting bats

- Confirmed roost
- High
- Moderate
- Low
- Negligible



0 50 100 150 m

Scale at A3: 1:2,500

Client

RSP

Manston Airport DCO
Bat Survey Report

Figure 2.2 a
Building references and roost suitability status

Page 1 of 5

March 2021

wood.

40820-Lon231b

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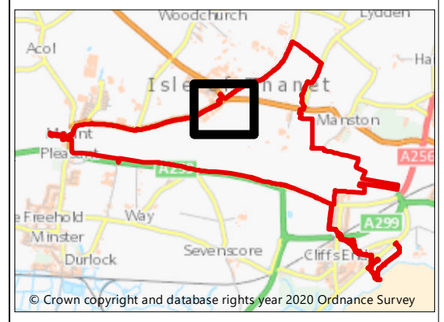
B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 B16 B17 B18 B19 B20 B21 B22 B23 B24 B25 B26 B27 B28

Key

Order Limits

Suitability of buildings to support roosting bats

- Confirmed roost
- High
- Moderate
- Low
- Negligible



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Scale at A3: 1:2,500

Client

RSP

Manston Airport DCO
Bat Survey Report

Figure 2.2 b
Building references and roost suitability status

Page 2 of 5

March 2021

wood.

40820-Lon231b

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B41

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B43

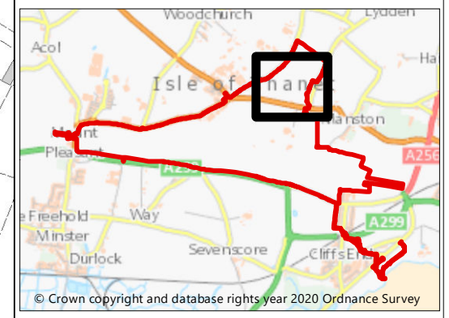
B44

Key

Order Limits

Suitability of buildings to support roosting bats

- Confirmed roost
- High
- Moderate
- Low
- Negligible



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Scale at A3: 1:3,000

Client

RSP

Manston Airport DCO
Bat Survey Report

Figure 2.2 c
Building references and roost suitability status

March 2021

wood.

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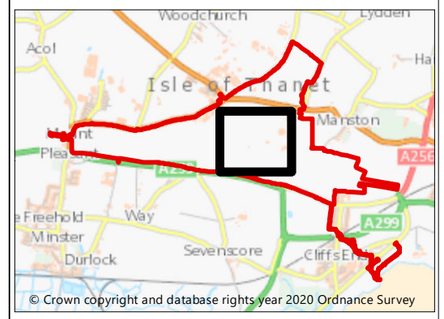
Key

Order Limits

Suitability of buildings to support roosting bats

- Confirmed roost
- High
- Moderate
- Low
- Negligible



0 50 100 150 m

Scale at A3: 1:3,000

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RSP

Manston Airport DCO
Bat Survey Report

Figure 2.2 d
Building references and roost suitability status

March 2021

wood.

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B69

B70

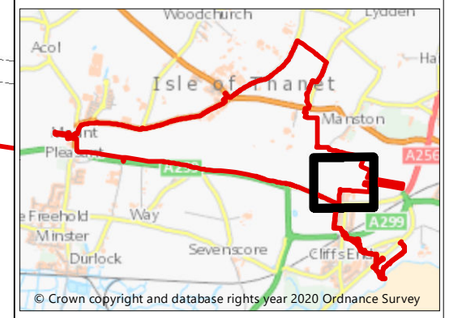
B71

Key

Order Limits

Suitability of buildings to support roosting bats

- Confirmed roost
- High
- Moderate
- Low
- Negligible



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Scale at A3: 1:2,500

Client

RSP

Manston Airport DCO
Bat Survey Report

Figure 2.2 e
Building references and roost suitability status

March 2021

wood.

40820-Lon231b

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TR026
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TR019
TR036
TR005
TR008
TR007
TR003
TR004
TR002
TR016
TR017
TR001
x38
TR031
x35B
TR035A
TR034
TR033
TR032A

Key

Order Limits

Trees with suitability for roosting bats

- High
- Moderate
- Low
- Negligible

Hedge with suitability for roosting bats

- High
- Low
- Negligible

Off-site areas containing trees with suitability to support additional PRFs

- 1 Private garden
- 2 Landscaped garden
- 3 Unmanaged grounds

0 200 400 600 800 m

Scale at A3: 1:15,000

Client

RSP

Manston Airport DCO
Bat Survey Report

Figure 2.3
Tree references and roost suitability status

February 2021

wood.

40820-Lon232a

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633000
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635000
167000
166000
165000
164000
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1b
1a
2b
2a
4a
4b
3a
3b
Key
Order Limits
Bat activity transects
Transect 1
Transect 2
Transect 3
Transect 4
Location of static monitoring device
0 200 400 600 800 m
Scale at A3: 1:15,000

Client
RSP
Manston Airport DCO
Bat Survey Report
Figure 2.4
Activity transects and static monitoring locations
February 2021
wood.
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Appendix B
Tables Relating to Application of Survey Methods

Table B.2 Built structure roost identification – application of methods and survey dates

Structure ref. (Figure 2.2)	External ground level inspection dates	External PRF inspection dates	Internal inspection dates	Dusk emergence dates	Dawn re-entry transect dates	Access/ survey limitations
B1	17/01/2019	17/01/2019	-	21/08/2019	-	A below ground bunker designed to be accessed using a ladder- now no human access
B2	21/01/2020	21/01/2020	-	-	05/08/2020	-
B3	21/01/2020	21/01/2020	-	-	05/08/2020	-
B5	21/01/2020	21/01/2020	21/01/2020, 11/02/2020, 13/03/2020	04/09/2019, 22/06/2020	-	-
B6	21/01/2020	21/01/2020	-	-	05/08/2020	-
B7	21/01/2020	21/01/2020	21/01/2020	-	05/08/2020	-
B8	17/01/2019	17/01/2019	17/01/2019, 21/01/2020, 11/02/2020, 13/03/2020	22/08/2019, 18/05/2020, 11/06/2020	-	-
B11	21/01/2020	21/01/2020	-	-	05/08/2020	-
B12	21/01/2020	21/01/2020	21/01/2020			
B13	21/01/2020	21/01/2020				
B14	17/01/2019	17/01/2019	-	-	05/08/2020	-
B15	17/01/2019	17/01/2019	-	-	05/08/2020	-
B16	17/01/2019	17/01/2019	17/01/2019, 21/01/2020, 11/02/2020, 13/03/2020	05/09/2019, 21/05/2020, 01/07/2020	-	-
B17	17/01/2019	17/01/2019	-	11/09/2019, 19/05/2020, 16/06/2020	-	-
B18	17/01/2019	17/01/2019	17/01/2019, 21/01/2020, 11/02/2020, 13/03/2020	20/05/2020, 15/06/2020	-	-
B22	21/01/2020	21/01/2020	-	-	05/08/2020	-

Structure ref. (Figure 2.2)	External ground level inspection dates	External PRF inspection dates	Internal inspection dates	Dusk emergence dates	Dawn re-entry transect dates	Access/ survey limitations
B23	21/01/2020	21/01/2020				
B24	21/01/2020	21/01/2020				
B25	21/01/2020	21/01/2020	-	-	05/08/2020	-
B26	21/01/2020	21/01/2020				
B27	21/01/2020	21/01/2020	-	-	05/08/2020	-
B28	21/01/2020	21/01/2020	-	12/09/2019, 02/06/2020, 29/06/2020	-	-
B29	21/01/2020	21/01/2020	-	21/08/2019, 18/06/2020	-	-
B30	26/10/2020	26/10/2020				
B31	26/10/2020	26/10/2020				
B32	26/10/2020	26/10/2020				
B33	18/01/2019	18/01/2019	18/01/2019, 21/01/2020, 11/02/2020, 13/03/2020	29/08/2019, 21/05/2020, 23/06/2020	-	Structure in the middle of an open area and not secure. Surveyors unable to leave an automated bat detector
B34	26/10/2020	26/10/2020	-	-	05/08/2020	-
B35	26/10/2020	26/10/2020				
B36	26/10/2020	26/10/2020				
B37	26/10/2020	26/10/2020				
B38	26/10/2020	26/10/2020				
B39	18/01/2019	18/01/2019	18/01/2019	20/08/2019, 01/06/2020	-	The area near this building was illegally occupied through winter 2019 2020. Structure not safe to access after first visit.
B40	22/01/2020	22/01/2020	-	20/08/2019	-	-
B41	18/01/2019	18/01/2019	18/01/2019, 21/01/2020, 11/02/2020, 13/03/2020	18/05/2020, 02/06/2020, 02/07/2020	-	-

Structure ref. (Figure 2.2)	External ground level inspection dates	External PRF inspection dates	Internal inspection dates	Dusk emergence dates	Dawn re-entry transect dates	Access/ survey limitations
B43	17/01/2019	17/01/2019	-	29/08/2019, 26/05/2020, 24/06/2020	-	Attempts to find the keys were made but it was unclear who owned the building. The surveyors could not access the inside.
B44	22/01/2020	22/01/2020	-	-	05/08/2020	-
B45	22/01/2020	22/01/2020	-	-	05/08/2020	-
B46	22/01/2020	22/01/2020	-	-	05/08/2020	-
B47	22/01/2020	22/01/2020	-	-	05/08/2020	-
B48	11/02/2020	11/02/2020				
B49	11/02/2020	11/02/2020				
B50	11/02/2020	11/02/2020	-	-	05/08/2020	-
B51	11/02/2020	11/02/2020				
B52	11/02/2020	11/02/2020	-	-	05/08/2020	-
B53	11/02/2020	11/02/2020	-	03/09/2019, 25/06/2020	-	-
B54	17/01/2019	17/01/2019	17/01/2019	09/06/2020, 01/07/2020, 21/07/2020	-	-
B55	18/01/2019	18/01/2019				
B56	17/01/2019	17/01/2019	-	20/08/2019	-	Structure not safe to access as it contained high voltage electrical equipment.
B57	13/03/2020	13/03/2020				
B58	13/03/2020	13/03/2020				
B59	13/03/2020	13/03/2020				
B60	13/03/2020	13/03/2020				
B61	21/01/2020	21/01/2020	21/01/2020	-	27/08/2020	-
B62	13/03/2020	13/03/2020	-	-	27/08/2020	-
B63	13/03/2020	13/03/2020	-	-	27/08/2020	-

Structure ref. (Figure 2.2)	External ground level inspection dates	External PRF inspection dates	Internal inspection dates	Dusk emergence dates	Dawn re-entry transect dates	Access/ survey limitations
B64	13/03/2020	13/03/2020	-	-	27/08/2020	-
B65	13/03/2020	13/03/2020				
B66	13/03/2020	13/03/2020	-	-	27/08/2020	-
B67	13/03/2020	13/03/2020				
B68	13/03/2020	13/03/2020				
B69	13/03/2020	13/03/2020				
B70	13/03/2020	13/03/2020				
B71	13/03/2020	13/03/2020				

Table B.3 Tree roost identification – methods and survey dates

Tree ref. (Figure 2.3)	Ground level roost assessment (initial) date	Ground level roost assessment update	First PRF inspection date	Second PRF inspection date
TR001	28/11/2017	13/07/2020	-	-
TR002	28/11/2017	13/07/2020	13/07/2020	-
TR003	28/11/2017	13/07/2020	-	-
TR004	28/11/2017	13/07/2020	13/07/2020	-
TR005	28/11/2017	13/07/2020	-	-
x006	28/11/2017	13/07/2020	-	-
TR007	28/11/2017	13/07/2020	-	-
TR008	28/11/2017	13/07/2020	-	-
TR009	28/11/2017	13/07/2020	-	-
TR010	28/11/2017	13/07/2020	-	-
x011	28/11/2017	13/07/2020	-	-
Tr012	28/11/2017	13/07/2020	-	-
TR013	28/11/2017	13/07/2020	13/07/2020	-
TR014	28/11/2017	13/07/2020	-	-
TR015	28/11/2017	13/07/2020	13/07/2020	06/10/2020
TR016	28/11/2017	13/07/2020	13/07/2020	06/10/2020
TR017	28/11/2017	13/07/2020	13/07/2020	-

Tree ref. (Figure 2.3)	Ground level roost assessment (initial) date	Ground level roost assessment update	First PRF inspection date	Second PRF inspection date
TR018	28/11/2017	13/07/2020	13/07/2020	06/10/2020
TR019	28/11/2017	13/07/2020	-	-
TR020	28/11/2017	13/07/2020	-	-
TR021	28/11/2017	13/07/2020	13/07/2020	06/10/2020
TR022	28/11/2017	13/07/2020	-	-
TR023	28/11/2017	13/07/2020	13/07/2020	-
TR024	28/11/2017	13/07/2020	13/07/2020	-
TR025	28/11/2017	13/07/2020	-	-
TR026	28/11/2017	13/07/2020	13/07/2020	-
TR027	28/11/2017	13/07/2020	13/07/2020	-
TR028	28/11/2017	13/07/2020	13/07/2020	-
TR029	28/11/2017	13/07/2020	-	-
TR030	28/11/2017	13/07/2020	13/07/2020	-
TR031	28/11/2017	13/07/2020	-	-
TR032A	28/11/2017	13/07/2020	-	-
x032B	28/11/2017	13/07/2020	-	-
TR033A	28/11/2017	13/07/2020	-	-
TR033B	28/11/2017	13/07/2020	-	-
TR034	28/11/2017	13/07/2020	-	-
TR035A	28/11/2017	13/07/2020	-	-
x035B	28/11/2017	13/07/2020	-	-
TR036	28/11/2017	13/07/2020	-	-
x037	28/11/2017	13/07/2020	-	-
x038	28/11/2017	13/07/2020	-	-

Notes. "x" prefix indicates two or more trees.

Table B.4 Manual transect survey dates (refer to Figure 2.4, Appendix A, for locations)

Transect no.	Month							
	April	May	June	July (Dusk)	July (Dawn)	August	September	October
AT1	27/04/2020	27/05/2020	18/06/2020	20/07/2020	21/07/2020	22/08/2017	14/09/2017	17/10/2017
AT2	27/04/2020	27/05/2020	18/06/2020	20/07/2020	21/07/2020	22/08/2017	14/09/2017	17/10/2017
AT3	27/04/2020	27/05/2020	18/06/2020	20/07/2020	21/07/2020	21/08/2017	13/09/2017	18/10/2017
AT4	27/04/2020	27/05/2020	18/06/2020	20/07/2020	21/07/2020	21/08/2017	13/09/2017	18/10/2017

Table B.5 Automated monitoring survey dates subject to analysis (refer to Figure 2.4, Appendix A, for locations)

Location	Dates (total number of nights analysed)						
	April	May	June	July	August	September	October
1a	23/04/20 to 27/04/20 (5)	16/05/20 to 20/05/20 (5)	26/06/20 to 30/06/20 (5)	09/07/20 to 12/07/20 & 14/07/20 (4)	22/08/17 to 24/08/17 (3)	13/09/17 to 17/09/17 (5)	18/10/17 to 22/10/17 (5)
1b	None (technical fault)	21/05/20 to 25/05/20 (5)	02/06/20 to 05/06/20 (4)	22/07/20 to 27/07/20 (5)	29/08/17 to 02/09/17 (5)	18/09/17 to 22/09/17 (5)	10/10/17 to 14/10/17 (5)
2a	23/04/20 to 27/04/20 (5)	16/05/20 to 20/05/20 (5)	26/06/20 to 30/06/20 (5)	09/07/20 to 13/07/20 (5)	22/08/17 to 26/08/17 (5)	13/09/17 to 17/09/17 (5)	18/10/17 to 22/10/17 (5)
2b	None (technical fault)	21/05/20 to 25/05/20 (5)	01/06/20 to 05/06/20 (5)	22/07/20 to 27/07/20 (5)	29/08/17 to 02/09/17 (5)	18/09/17 to 22/09/17 (5)	10/10/17 to 14/10/17 (5)
3a	15/04/20 to 19/04/20 (5)	21/05/20 to 27/05/20 (5)	01/06/20 to 05/06/20 (5)	22/07/20 to 27/07/20 (5)	22/08/17 to 24/08/17 (3)	13/09/17 to 17/09/17 (5)	18/10/17 to 22/10/17 (5)

Location	Dates (total number of nights analysed)						
	April	**May**	**June**	**July**	**August**	**September**	**October**
3b	23/04/20 to 27/04/20 (5)	16/05/20 to 20/05/20 (5)	26/06/20 to 30/06/20 (5)	09/07/20 to 14/07/20 (5)	29/08/17 to 02/09/17 (5)	18/09/17 to 22/09/17 (5)	10/10/17 to 14/10/17 (5)
4a	14/04/20 to 17/04/20 (4)	None (technical fault)	01/06/20 to 05/06/20 (5)	09/07/20 to 13/07/20 (5)	22/08/17 to 26/08/17 (5)	13/09/17 to 17/09/17 (5)	18/10/17 to 22/10/17 (5)
4b	23/04/20 to 28/04/20 (6)	16/05/20 to 20/05/20 (5)	26/06/20 to 30/06/20 (5)	22/07/20 to 24/07/20 (3)	29/08/17 to 02/09/17 (5)	18/09/17 to 22/09/17 (5)	10/10/17 to 14/10/17 (5)

Table B.5 Weather conditions during active bat survey work (collected from the Site)

Date	Survey type	Sunset/ sunrise time	Survey times	Temperature (start-end °C)	Relative humidity (start-end %)	Rainfall	Cloud cover (start-end %)	Wind Speed	Moon phase	Moon visible
21/08/2017	Activity	20:05	20:05-23:05	18-17	92-93	none	100-100	calm	Waning crescent	not visible
22/08/2017	Activity	20:03	20:03-23.03	18-16	96-96	none	100-100	light	Waning crescent	not visible
13/09/2017	Activity	19:15	19:15-22:15	12-10	92-84	none	30-30	light	First quarter	visible
14/09/2017	Activity	19:12	19:12-22:12	13-10	76-78	shower*	30-30	light	First quarter	visible
17/10/2017	Activity	17:58	17:58-20:58	12-7	79-95	none	60-60	calm	Waning crescent	not visible
18/10/2017	Activity	17:56	17:56-20:56	15-14	98-99	none	30-30	calm	Waning crescent	not visible

Date	Survey type	Sunset/ sunrise time	Survey times	Temperature (start-end °C)	Relative humidity (start-end %)	Rainfall	Cloud cover (start-end %)	Wind Speed	Moon phase	Moon visible
20/08/2019	Dusk emergence	20:06	19:51-22:06	18-14	60-73	none	10-10	calm	Last Quarter	visible
21/08/2019	Dusk emergence	20:04	19:50-22:05	18-13	45-78	none	5-20	calm	Last Quarter	visible
22/08/2019	Dusk emergence	20:02	19:57-22:12	19-19	83-88	none	50-50	light	Last Quarter	not visible
29/08/2019	Dusk emergence	19:47	19:33-21:48	18-16	62-74	none	10-90	light	New Moon	visible
03/09/2019	Dusk emergence	19:36	19:21-21:36	20-17	55-79	none	0-0	light	Waxing Crescent	visible
04/09/2019	Dusk emergence	19:34	19:19-21:34	17-14	45-65	none	20-20	light	Waxing Crescent	visible
05/09/2019	Dusk emergence	19:32	19:17-21:32	16-13	37-52	none	0-0	calm	First Quarter	visible
11/09/2019	Dusk emergence	19:18	19:03-21:18	18-17	85-92	none	50-80	calm	Waxing Gibbous	not visible
12/09/2019	Dusk emergence	19:16	19:01-21:16	19-17	75-85	none	30-20	light	Full Moon	visible
27/04/2020	Activity	20:11	20:11-22:55	11.5-10	57-67	none	100-100	calm	Waxing Crescent	not visible
18/05/2020	Dusk emergence	20:44	20:14-22:44	17-14	62-69	none	60-60	light	Waning Crescent	not visible
19/05/2020	Dusk emergence	20:46	20:16-22:46	22-14	90-90	none	0-0	light	Waning Crescent	visible

Date	Survey type	Sunset/ sunrise time	Survey times	Temperature (start-end °C)	Relative humidity (start-end %)	Rainfall	Cloud cover (start-end %)	Wind Speed	Moon phase	Moon visible
20/05/2020	Dusk emergence	20:47	20:17-22:47	19-16	57-82	none	20-20	calm	New Moon	visible
21/05/2020	Dusk emergence	20:48	20:18-22:48	20-16	44-53	none	20-20	calm	New Moon	visible
26/05/2020	Dusk emergence	20:55	20:25-22:55	15-13	66-82	none	30-30	light	Waxing Gibbous	visible
27/05/2020	Activity	20:56	20:56-23:46	13-13	70-54	none	30-30	light	Waxing Gibbous	visible
01/06/2020	Dusk emergence	21:02	20:32-23:02	17-12	54-76	none	10-10	light	Waxing Gibbous	visible
02/06/2020	Dusk emergence	21:03	20:33-23:03	15-13	57-69	none	20-20	light	Waxing Gibbous	visible
04/06/2020	Dusk emergence	21:05	20:35-23:05	11-10	92-84	occasional shower	90-90	light	Full Moon	not visible
09/06/2020	Dusk emergence	21:09	20:39-23:09	12-11	54-59	none	30-30	calm	Waning Gibbous	visible
11/06/2020	Dusk emergence	21:10	20:40-23:10	17-15	72-78	occasional shower	100-100	calm	Waning Gibbous	not visible
15/06/2020	Dusk emergence	21:13	20:43-23:13	23-13	57-82	none	20-20	calm	Waning Crescent	visible
16/06/2020	Dusk emergence	21:13	20:43-23:13	17-14	83-88	none	10-10	light	Waning Crescent	visible
18/06/2020	Dusk emergence	21:14	20:44-23:14	17-13	78-89	none	5-5	light	Waning Crescent	not visible

Date	Survey type	Sunset/ sunrise time	Survey times	Temperature (start-end °C)	Relative humidity (start-end %)	Rainfall	Cloud cover (start-end %)	Wind Speed	Moon phase	Moon visible
18/06/2020	Activity	21:14	21:14-00:14	15-13	82-92	none	10-10	light	Waning Crescent	visible
22/06/2020	Dusk emergence	21:15	20:45-23:15	17-13	68-88	none	0-0	light	New Moon	visible
23/06/2020	Dusk emergence	21:15	20:45-23:15	18-17	50-50	none	70-70	light	Waxing Crescent	not visible
24/06/2020	Dusk emergence	21:15	20:45-23:15	22-22	56-54	none	60-60	light	Waxing Crescent	Not visible
25/06/2020	Dusk emergence	21:15	20:45-23:15	24-20	70-90	none	0-0	light	Waxing Crescent	visible
29/06/2020	Dusk emergence	21:14	20:44-23:14	16-15	65-75	none	60-60	light	First Quarter	not visible
01/07/2020	Dusk emergence	21:13	20:43-23:13	12-12	73-85	none	40-40	light	Waxing Gibbous	visible
02/07/2020	Dusk emergence	21:13	20:43-23:13	16-14	90-91	none	40-30	calm	Waxing Gibbous	not visible
20/07/2020	Activity	20:58	20:58-23:58	17-15	69-82	none	20-20	light	New Moon	not visible
21/07/2020	Activity	05:04	02:04-05:04	13-11	74-92	none	0-0	Calm	New Moon	not visible
21/07/2020	Dusk emergence	20:57	20:27-22:57	17-15	57-54	none	20-20	light	New Moon	visible
21/07/2020	Activity	05:04	02:04-05:04	13-11	74-92	none	0-0	calm	New Moon	not visible

Date	Survey type	Sunset/ sunrise time	Survey times	Temperature (start-end °C)	Relative humidity (start-end %)	Rainfall	Cloud cover (start-end %)	Wind Speed	Moon phase	Moon visible
05/08/2020	Dawn re-entry	05:25	03:25-05:40	16-16	78-82	none	40-40	light	Waning gibbous	visible
27/08/2020	Dawn re-entry	06:00	04:00-06:15	15-15	79-74	none	50-50	light	Waxing gibbous	not visible

Table B.6 Weather conditions during automated bat survey work (source: www.timeanddate.com)

Date	Sunset/ sunrise time	Temperature (°C, min-max)	Wind speed (km/h, min-max)	Rainfall
22/08/2017	20:01-05:53	16-18	13-19	None
23/08/2017	19:59-05:54	13-19	17-18	None
24/08/2017	19:57-05:56	12-18	15-16	None
25/08/2017	19:55-05:57	14-19	7-15	None
26/08/2017	19:53-05:59	15-19	5-6	None
29/08/2017	19:46-06:04	15-18	12-24	None
30/08/2017	19:44-06:05	10-12	15-16	None
31/08/2017	19:42-06:07	11-16	12-12	None
01/09/2017	19:40-06:08	11-17	13-22	None
02/09/2017	19:37-06:10	12-16	8-11	None
13/09/2017	19:13-06:27	8-13	16-19	None
14/09/2017	19:10-06:29	8-15	16-24	None
15/09/2017	19:08-06:31	9-14	16-19	None
16/09/2017	19:06-06:32	8-12	15-17	None
17/09/2017	19:03-06:34	10-14	16-22	None
18/09/2017	19:01-06:35	9-12	17-22	None
19/09/2017	18:59-06:37	10-14	12-17	None
20/09/2017	18:56-06:39	14-15	17-23	None
21/09/2017	18:54-06:40	11-16	17-19	None
22/09/2017	18:52-06:42	12-15	12-16	None
10/10/2017	18:11-07:11	14-15	27-32	None
11/10/2017	18:09-07:13	10-16	18-31	None
12/10/2017	18:07-07:14	13-14	19-24	None
13/10/2017	18:05-07:16	14-15	20-24	None
14/10/2017	18:03-07:18	14-16	9-13	None
18/10/2017	17:54-07:25	14-15	8-8	None
19/10/2017	17:52-07:26	13-16	32-38	None
20/10/2017	17:50-07:28	12-15	30-34	None
21/10/2017	17:48-07:30	10-12	25-41	None

Date	Sunset/ sunrise time	Temperature (°C, min-max)	Wind speed (km/h, min-max)	Rainfall
22/10/2017	17:46-07:31	8-11	16-19	None
17/01/2019	16:18-07:50	1-5	18-33	None
18/01/2019	16:19-07:49	-1 -6	18-30	None
19/01/2019	16:21-07:48	2-4	20-28	None
20/01/2019	16:22-07:47	-2-5	16-17	None
21/01/2019	16:24-07:45	-1-5	15-21	None
22/01/2019	16:26-07:44	0-3	9-37	None
23/01/2019	16:27-07:43	0-2	26-32	None
24/01/2019	16:29-07:42	-2-2	12-21	None
25/01/2019	16:31-07:41	1-9	8-20	None
26/01/2019	16:33-07:39	6-8	20-35	None
27/01/2019	16:34-07:38	3-7	23-34	None
31/01/2019	16:42-07:32	-3-4	13-44	None
01/02/2019	16:43-07:31	1-4	17-36	None
02/02/2019	16:45-07:29	1-4	31-34	None
03/02/2019	16:47-07:27	-1-6	15-32	None
04/02/2019	16:49-07:26	4-6	22-44	None
05/02/2019	16:51-07:24	4-7	17-29	None
06/02/2019	16:52-07:22	6-8	10-24	None
21/02/2019	17:20-06:54	7-9	15-18	None
22/02/2019	17:21-06:52	4-10	6-19	None
23/02/2019	17:23-06:50	5-12	9-15	None
24/02/2019	17:25-06:48	5-14	5-13	None
25/02/2019	17:27-06:46	5-16	9-17	None
26/02/2019	17:28-06:44	5-16	11-15	None
27/02/2019	17:30-06:42	8-12	10-16	None
11/02/2020	17:01-07:14	4-8	31-39	None
12/02/2020	17:03-07:12	2-8	18-26	None
13/02/2020	17:05-07:10	6-8	19-44	None
14/02/2020	17:06-07:08	3-9	10-28	None

Date	Sunset/ sunrise time	Temperature (°C, min-max)	Wind speed (km/h, min-max)	Rainfall
15/02/2020	17:08-07:07	9-11	27-61	None
16/02/2020	17:10-07:05	7-12	30-60	None
17/02/2020	17:12-07:03	5-9	28-38	None
15/04/2020	19:52-05:56	5-8	2-9	None
16/04/2020	19:53-05:54	9-10	6-12	None
17/04/2020	19:55-05:52	8	8-18	Rain showers
18/04/2020	19:56-05:50	7-8	2-10	None
19/04/2020	19:58-05:48	9-10	8-15	None
23/04/2020	20:05-05:40	7-10	3-7	None
24/04/2020	20:06-05:38	7-9	7-10	None
25/04/2020	20:08-05:36	4-7	3-6	None
26/04/2020	20:10-05:34	6-8	7-9	None
27/04/2020	20:11-05:32	9	6-14	Rain
16/05/2020	20:41-05:00	8-12	5-8	None
17/05/2020	20:43-04:58	10-14	7-10	None
18/05/2020	20:44-04:57	11-15	7-13	None
19/05/2020	20:46-04:56	12-16	6-9	None
21/05/2020	20:48-04:54	13-18	4-28	None
22/05/2020	20:49-04:53	13-14	26-30	None
23/05/2020	20:51-04:52	11-14	19-33	None
24/05/2020	20:52-04:51	9-15	2-13	None
25/05/2020	20:53-04:50	10-16	0-9	None
01/06/2020	21:02-04:43	12-17	8-11	None
02/06/2020	21:03-04:42	12-22	6-7.5	None
03/06/2020	21:04-04:42	11-15	3-14.9	None
04/06/2020	21:05-04:41	10-14	8-14.9	None
05/06/2020	21:05-04:41	10-14	9-13	Light rain
26/06/2020	21:15-04:40	15-21	7-12	None
27/06/2020	21:14-04:40	14-17	14-17	None
28/06/2020	21:14-04:41	13-15	10-18	None

Date	Sunset/ sunrise time	Temperature (°C, min-max)	Wind speed (km/h, min-max)	Rainfall
29/06/2020	21:14-04:41	12-15	7-18	None
30/06/2020	21:14-04:42	16-17	9-14	None
09/07/2020	21:09-04:49	15-18	13-22	None
10/07/2020	21:08-04:50	8-16	6-13	None
11/07/2020	21:07-04:51	7-15	2-9	None
12/07/2020	21:07-04:52	8-14	6-13	None
13/07/2020	21:06-04:53	15-18	6-17	Rain showers
22/07/2020	20:56-05:06	13-16	7-12	None
23/07/2020	20:54-05:07	15-18	8-13	None
24/07/2020	20:53-05:08	16-18	8-12	None
25/07/2020	20:51-05:10	14-17	8-12	None
26/07/2020	20:50-05:11	15-17	8-13	None
27/07/2020	20:49-05:13	12-18	9-18	None

Notes. This weather data is intended to be indicative, and to provide some context for local weather systems during the automated monitoring period. Data were collected from www.timeanddate.com

Table B.7 Personnel involved in bat survey work

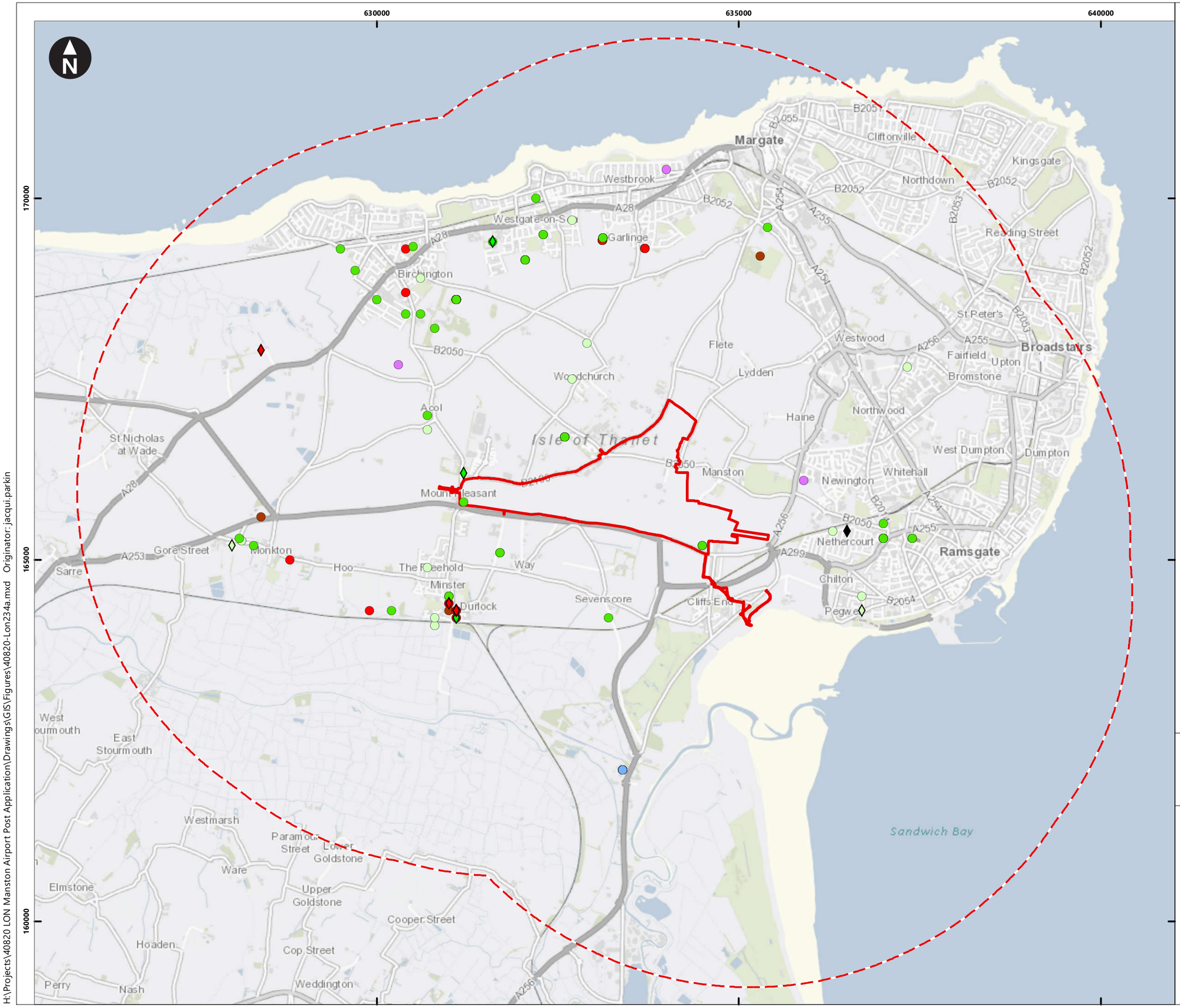
Surveyor Name	Position	Qualifications and Experience
Overall survey lead		
Tim Bradford	Principal consultant	BSc (hons), MSc. CIEEM. 13 years in ecological consultancy. Natural England bat survey licence holder for 8 years. Class 2 licence registration No: 2015-12885-CLS-CLS
Additional licensed surveyors		
Katheryn Leggat	Associate director	BSc (hons), MSc. MCIEEM. 14 years working in ecological consultancy. Natural England bat survey licence holder for 11 years. Class 4 licence registration no. 2015-14084-CLS-CLS
Rachel Bamford	Senior consultant	BSc (hons), MSc. GradCIEEM. 6.5 years working in ecological consultancy. Natural England bat survey licence holder for 4.5 years. Class 1 licence registration no. 2015-19249-CLS-CLS
Kelly Jones	Senior consultant	BSc (hons), MSc. GradCIEEM. 8 years working in ecological consultancy. Natural England bat survey licence holder for 3 years. Class 4 licence registration no. 2020-45091-CLS-CLS

Surveyor Name	Position	Qualifications and Experience
Fiona Cargill	Consultant	BSc (hons), MSc. 5 years working in ecological consultancy. Natural England roost visitor and bat survey licence holder for 2 years. Class 2 licence registration No: 2018-33646-CLS-CLS
Jon D'Arcy	Consultant	BSc (hons). 7 years working in ecological consultancy. Natural England and Natural Resources Wales class 2 bat licence holder for 7 years. Class 2 licence registration no. 2018-37285-CLS-CLS
Brett Lewis	Associate	BSc (Hons), MSc, PhD. MCIEEM. 20 years working in ecological consultancy. Class 2 licence registration no. 2015-15513-CLS-CLS
Additional surveyors		
Sarah Allman	Senior consultant	BSc (Hons), MSc. MCIEEM. 6 years working in ecological consultancy
Luke Burgess	Consultant	BSc (hons), MSc. 5 years working in ecological consultancy
Robert Werran	Consultant	BSc (hons). 3 years working in ecological consultancy
Rebecca Carter	Assistant consultant	BSc (hons). 3.5 years working in ecological consultancy
Finn Goddard	Assistant consultant	BSc (hons), MSc. Qualifying CIEEM. 3 years in ecological consultancy
Veerle Herzberg	Assistant consultant	BSc. 1 year working in ecological consultancy
Emily Thomson	Assistant consultant	BSc, MSc. Student CIEEM. 1 year working in ecological consultancy
Laura Villar	Assistant consultant	BSc (hons), MSc. 3.5 years working in ecological consultancy
Jack Wheeler	Assistant consultant	BSc (hons), MSc. Qualifying CIEEM. 2.5 years working in ecological consultancy
Jim Labisko	Associate	BSc (hons), PhD. 10 years working in ecological consultancy

Appendix C
Scientific Names of Species Referred to in this Document

Common/English Name	Latin/Scientific Name
Bats	
Alcathoe's bat	*Myotis alcathoe*
Bechstein's bat	*Myotis bechsteinii*
Brandt's bat	*Myotis brantii*
Brown long-eared bat	*Plecotus auritus*
Common pipistrelle	*Pipistrellus*
Daubenton's bat	*Myotis daubentonii*
Grey long-eared bat	*Plecotus austriacus*
Leisler's bat	*Nyctalus leisleri*
Nathusius' pipistrelle	*Pipistrellus nathusii*
Natterer's bat	*Myotis nattereri*
Noctule	*Nyctalus noctula*
Serotine	*Eptesicus serotinus*
Soprano pipistrelle	*Pipistrellus pygmaeus*
Whiskered bat	*Myotis mystacinus*
Trees/Plants	
Field maple	*Acer campestre*
Ivy	*Hedera helix*
Sycamore	*Acer pseudoplatanus*
White poplar	*Populus alba*

Appendix D
Figures Relating to Survey Results



Key

Order Limits

5km search area

Non-roost Record

- Unidentified bat
- Brown long eared bat
- Common pipistrelle
- Daubenton's bat
- Leisler's bat
- Long-eared sp.
- Myotis sp.
- Nathusius' pipistrelle
- Natterer's bat
- Noctule
- Pipistrellus sp.
- Serotine
- Soprano pipistrelle

Roost Record

- Unidentified bat
- Common pipistrelle
- Soprano pipistrelle
- Pipistrellus sp.

0 1,000 2,000 3,000 m

Scale at A3: 1:50,000

Client

RSP

Manston Airport DCO
Bat Survey Report

Figure 3.1
Records of bat activity within 5km (from KMBRC)

February 2021

wood.

40820-Lon234a

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631000
632000
633000
634000
635000
167000
166000
165000
164000
N
B33
B41
B16
B17
B8
B54
Key
Order Limits
Confirmed roost
0 200 400 600 800 m
Scale at A3: 1:15,000

Client
RSP
Manston Airport DCO
Bat Survey Report
Figure 3.2
Overview of all confirmed bat roosts in built structures and trees
February 2021
wood.
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40820-Lon235

631000
632000
633000
634000
635000
167000
166000
165000
164000

N

Key

Order Limits

Passes per hour

0 - 2

2 - 4

4 - 6

6 - 8

0 200 400 600 800 m

Scale at A3: 1:15,000

Client

RSP

Manston Airport DCO
Bat Survey Report

Figure 3.3
Bat activity levels and foraging recorded across the Site during activity transect survey work (all species and months)

March 2021

wood.

40820-Lon236

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631000
632000
633000
634000
635000
167000
166000
165000
164000
N
1a
1b
2a
2b
3a
3b
4a
4b
0
200
400
600
800 m
Scale at A3: 1:15,000

Key

- Order Limits
- Common pipistrelle
- Soprano pipistrelle
- Nathusius' pipistrelle
- Common pipistrelle / Soprano pipistrelle
- Common pipistrelle / Nathusius' pipistrelle
- Myotis sp.
- Noctule
- Leisler's bat
- Nyctalus sp.
- Serotine
- Noctule/Serotine/Leisler's bat
- Plecotus sp.
- Serotine/Plecotus sp.

Client

RSP

Manston Airport DCO
Bat Survey Report

Figure 3.4
Proportion of files, by species, recorded at each passive automated monitoring location (all months)

March 2021

wood.

40820-Lon237b

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Appendix E
Tables Relating to Survey Results

Throughout the survey results tables, the following species codes have been used:

- CP = common pipistrelle;
- SP = soprano pipistrelle;
- CP/SP = common pipistrelle/soprano pipistrelle.;
- CP/NP = common pipistrelle/Nathusius' pipistrelle;
- LE = *Plecotus* sp.;
- M = *Myotis* sp.;
- N = noctule;
- L = Leisler's bat;
- S = serotine;
- NSL = noctule/serotine/Leisler's bat; and
- BAT = unidentified bat species.

Table E.1 Built structure assessment results (blue rows indicate confirmed roosts)

Structure ref. (Figure 2.2)	Structure type	Description	Access points/ PRFs	Evidence of bats	Level of bat roost potential assigned
B1	Bunker	Above ground low brick ventilation shaft and access point. 5m drop to main bunker	Access and ventilation shafts	Unable to access	Low
B2	Outbuilding	Small single story brick building with a concrete flat roof.	Slight gaps at soffits	None recorded	Low
B3	Outbuilding	Small single story brick building with a concrete flat roof.	Slight gaps at soffits	None recorded	Low
B4	Outbuilding	Small single story brick building with a concrete flat roof.	Gaps at soffit and broken window; no likely roosting spaces inside	None recorded	
B5	Outbuilding	Small single story brick building with a concrete flat roof.	Gaps at soffit and broken window; no likely roosting spaces inside	None recorded	Moderate
B6	Pre-fabricated building	Single storey prefabricated building. Building is in a poor condition and damp inside.	Missing wall panels at the top of the building exposing roof space.	None recorded	Low
B7	Portakabin	Single storey prefabricated building. Building is in a poor condition and damp inside	Damaged wall panels low down.	None recorded	Low
B8	Building	Brick single storey structure with no windows and no obvious access. Internally open to the concrete roof and rooms were interconnected with gaps above the door	None recorded	17/01/2019 Droppings found in corner of room (potentially BLE) See Babec 2017 for additional evidence	Confirmed roost

Structure ref. (Figure 2.2)	Structure type	Description	Access points/ PRFs	Evidence of bats	Level of bat roost potential assigned
B9	Workshop building	Corrugated metal two storey structure with a pitched metal roof.	None recorded	None	Negligible
B10	Building	Single storey breeze block structure with a flat felt roof	None recorded	None	Negligible
B11	Warehouse building	Large 2-3 storey metal structure, open on the inside.	Joints in metal around doors	None recorded	Low
B12	Warehouse building	Large 2-3 storey metal structure, open on the inside. The inside is well illuminated via skylights.	Joints in metal around doors	None recorded	Negligible
B13	Security building	Small plastic building	None	None recorded	Negligible
B14	MOD fire station	Large metal and breeze block building.	Air vent gaps in the walls	None recorded	Low
B15	Building	Ancillary building to B14, single storey breeze block structure with a flat roof.	Missing soffit providing access to the roof space.	None recorded	Low
B16	Building	Pre-fabricated single storey building with a metal shipping container extending to the rear (north-west). Water leaking through part, and a bramble plant growing through a hole in the floor. Ground floor well lit. Roof with trussed rafter construction and bitumen felt lining, fibreglass insulation	None recorded	17/01/2019 Droppings found in loft space (CP/SP/NP) See Babec 2017 for additional evidence	Confirmed roost
B17	Warehouse building	A large metal and brick structure	Gaps around the main entrance and under facias	None recorded 2019-20, 40 long eared droppings found	Confirmed roost

Structure ref. (Figure 2.2)	Structure type	Description	Access points/ PRFs	Evidence of bats	Level of bat roost potential assigned
				along eastern elevation in 2017 (Babec 2017)	
B18	Bunker	Short structure constructed from brick and concrete, heavily overgrown outside with brambles. At either end the entrances were open, allowing a strong draft through	Two open doorways. Cracks throughout brickwork	None recorded	Moderate
B19	Outbuilding	Small, corrugated metal building with a flat corrugated metal roof	Gaps in the sheeting, but no roosting opportunities inside or outside the building	None recorded	Negligible
B20	Outbuilding	Wooden shed with flat felt roof	Vent and doorway provide access inside	None recorded	Negligible
B21	Warehouse – Polar Helicopters training	A large metal warehouse used as a base for Polar Helicopters	None recorded	None recorded	Negligible
B22	Nissen huts- workshops	Two Nissen style huts joined together; brick built with an arched metal upper wall/roof.	Gaps around the doors and walls where the metal joins the brick.	None recorded	Low
B23	Workshop	A small wooden structure with a flat roof	The doors were open at the time of the survey and the building is in a general poor state of repair	None recorded	Low
B24	Radar building	A single story brick building with a radar receiver on the roof	Vents on the door and walls, though no roosting features were found inside or outside the building.	None recorded	Negligible
B25	RAF Manston History Museum	Breeze block building with a corrugated metal roof. Used as a museum.	Gaps under wooden soffits	None recorded	Low

Structure ref. (Figure 2.2)	Structure type	Description	Access points/ PRFs	Evidence of bats	Level of bat roost potential assigned
B26	Outbuilding	A small brick building with a flat felt roof	None recorded	None recorded	Negligible
B27	Spitfire and Hurricane Memorial Museum	A brick building with a sheet metal roof. On the eastern elevation is a brick and wood extension housing the cafe	Gaps in the brickwork and under wooden facia boards	None recorded	Low
B28	Air traffic control	A rendered and concrete clad building with a flat roof and view tower at the top	Gaps between the cladding and the wall.	None recorded during 2020 bat building surveys. See emergence survey results (**section 3.2**)	Confirmed roost
B29	Air traffic engineering building	Single storey brick building with a cement tiled roof	Gaps in bargeboards and soffits. Gaps under tiles	None recorded	Moderate
B30/31	Portakabin	Single storey prefabricated building with a flat metal roof	None recorded	None recorded	Negligible
B32	Workshop	Single storey pebbledash rendered building with a metal roof	None recorded	None recorded	Negligible
B33	Bunker	Below-ground structure with six rooms/chambers. South chamber has ladder present leading to a second access point	Two access shafts. Broken plasterboard on walls.	None recorded during 2020 bat building surveys. See Babec (2017)	Confirmed roost
B34	Outbuilding	Single storey pebbledash rendered building with a pitched corrugated asbestos roof	Wall vents	None recorded	Low
B35	Outbuilding	A small brick building with a flat felt roof	None recorded	None recorded	Negligible

Structure ref. (Figure 2.2)	Structure type	Description	Access points/ PRFs	Evidence of bats	Level of bat roost potential assigned
B36	Metal tower and ancillary building	A tall tower with a prefabricated metal building adjacent	None recorded	None recorded	Negligible
B37	Substation building	Brick structure with a flat moulded plastic roof	None recorded	None recorded	Negligible
B38	Substation building	Brick structure with a flat moulded plastic roof	None recorded	None recorded	Negligible
B39	Building	Brick building with a plasterboard lined asbestos roof	Open door. Gaps between ceiling and walls. Gaps in plasterboard. Gap under floor	None recorded	Moderate
B40	Building	A single storey, cement rendered structure with a flat roof.	Gaps in the wall mortar and under the facia.	None recorded	Low
B41	Building	Single storey prefabricated building with multiple lit rooms. Loft space along entire length of building. Trussed rafter construction with bitumen lining and insulation on floor	None recorded	Dropping found in room on North side, kitchen and in loft near eastern hatch (BAT) See Babec 2017 for additional evidence	Confirmed roost
B43	Building	Single storey brick building with a pitched tiled roof.	Gaps under the soffits and roof tiles.	None recorded	High
B44	Building; Passenger terminal	Breeze block and timber building with metal and felt sections of roof. Inside the main hall is bright, but there were darker rooms off this and a roof void.	Gaps in facia boarding	None recorded	Low

Structure ref. (Figure 2.2)	Structure type	Description	Access points/ PRFs	Evidence of bats	Level of bat roost potential assigned
B45	Nissen hut workshop	A large Nissen style hut with breeze block walls and arched metal walls and roof.	Gaps around the doors	None recorded	Low
B46	Workshop	A large workshop for aeroplane machinery, constructed from metal and corrugated asbestos. Parts of the building moved to allow access for aeroplanes	Gaps in the cladding, especially where the building could mover (north-west elevation).	None recorded	Low
B47	Outbuilding	Small brick building with a flat felt roof.	Gaps in the facia boarding.	None recorded	Low
B48	Portakabin	Prefabricated single storey building.	None recorded	None recorded	Negligible
B49	Beacon building	Single storey brick building with a flat felt roof. A becon/aerial array is mounted on top.	None recorded	None recorded	Negligible
B50	Air traffic control building	Single storey concrete building with metal control tower on the roof.	Gaps in facia boards	None recorded	Low
B51	Outbuilding	Single storey metal building with a flat roof.	None recorded	None recorded	Negligible
B52	Fire station	A two storey breezeblock building with a flat roof. The southern elevation (facing the runway) was completely open.	Gaps under facias	None recorded	Low
B53	Outbuilding	A small brick building with a pitched, tiled roof.	Gaps in the facias	None recorded	Moderate

Structure ref. (Figure 2.2)	Structure type	Description	Access points/ PRFs	Evidence of bats	Level of bat roost potential assigned
B54	Building	Single storey wood building. Occupied and well-lit on ground floor. Wood trussed rafters in the loft space with bitumen felt lined roof. Loft space well insulated. Rafters tight with no obvious roosting points.	None recorded	None recorded during 2020 bat building surveys. Pipistrelle droppings recorded in 2017 (Babec 2017)	Confirmed roost
B55	Hangar	Large metal building used by a flying school.	None recorded	None recorded	Negligible
B56	Building	Single story brick structure with no windows. Contains electrical equipment.	Gap in corrugated asbestos roof on East side	Unable to access	Low
B57	Outbuilding	Small building with uPVC cladding.	None recorded	None recorded	Negligible
B58	Water tank	Small metal tank.	None recorded	None recorded	Negligible
B59	Garage	Single storey building with a pitched felt roof.	None recorded	None recorded	Negligible
B60	Outbuilding	Breezeblock building with a pitched corrugated metal roof.	None recorded	None recorded	Negligible
B61	Workshop	Corrugated asbestos-clad building with a pitched roof.	Gaps in the cladding and under ridge tiles. The building was in regular use and there were few roosting opportunities.	None recorded	Low
B62	Office building	Single storey brick building with pitched tiled roof	Gaps between tiles.	None recorded	Low
B63	Storage building	Single storey rendered building with a bitumen felt roof.	Gaps under facias, window vents.	None recorded	Low

Structure ref. (Figure 2.2)	Structure type	Description	Access points/ PRFs	Evidence of bats	Level of bat roost potential assigned
B64	Outbuilding	Single storey brick building built from breeze blocks with a flat felt roof.	Gaps under facia boards.	None recorded	Low
B65	Outbuilding	Small wooden outbuilding with a flat felt roof	None recorded	None recorded	Negligible
B66	**Demolished**				
B67	Storage tank	A large metal tank for storage of oil.	None recorded	None recorded	Negligible
B68	Storage tank	A large metal tank for storage of oil.	None recorded	None recorded	Negligible
B69	Portakabin	A small, prefabricated building with a flat felt roof	None recorded	None recorded	Negligible
B70	Outbuilding	Wooden shed with a felt roof	None recorded	None recorded	Negligible
B71	Outbuilding	Breeze block storage building, with a flat felt roof.	None recorded	None recorded	Negligible

Table E.2 Dusk emergence and dawn re-entry survey results for built structures (blue rows indicate confirmed roosts)

Structure ref. (Figure 2.2)	Emergence survey results	Re-entry survey results	General notes on bat activity nearby during survey work, including earliest/latest timings of bat registrations
B1	No bat emergence recorded	Survey method not adopted	CP recorded 77 mins after sunset
B2	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B3	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B5	No bat emergence recorded	Survey method not adopted	CP/SP recorded 47 mins after sunset

Structure ref. (Figure 2.2)	Emergence survey results	Re-entry survey results	General notes on bat activity nearby during survey work, including earliest/latest timings of bat registrations
B6	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B7	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B8	No bat emergence recorded	Survey method not adopted	CP recorded 17 mins after sunset
B11	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B14	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B15	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B16	No bat emergence recorded	Survey method not adopted	CP recorded 22 mins after sunset SP recorded 35 mins after sunset
B17	No bat emergence recorded	Survey method not adopted	CP recorded 24 mins after sunset SP recorded 46 mins after sunset
B18	No bat emergence recorded	Survey method not adopted	CP recorded 29 mins after sunset
B22	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B25	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B27	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B28	**02/06/2020** (Sunset 21:03) 2 x BAT emerged from under fascia at south-east corner 33 mins after sunset 1 x CP potential emergence from West aspect 32 mins after sunset **29/06/2020** (Sunset 21:14) 1 x CP potential emergence from East aspect 33 mins after sunset	Survey method not adopted	CP recorded 31 mins after sunset CP/SP recorded 54 mins after sunset

Structure ref. (Figure 2.2)	Emergence survey results	Re-entry survey results	General notes on bat activity nearby during survey work, including earliest/latest timings of bat registrations
B29	No bat emergence recorded	Survey method not adopted	CP recorded 37 mins after sunset CP/SP recorded 44 mins after sunset
B33	No bat emergence recorded	Survey method not adopted	CP recorded 53 mins after sunset
B34	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B39	No bat emergence recorded	Survey method not adopted	CP recorded 39 mins after sunset
B40	No bat emergence recorded	Survey method not adopted	CP recorded 24 mins from sunset CP/SP recorded 30 mins from sunset
B41	No bat emergence recorded	Survey method not adopted	CP recorded 50 mins from sunset M recorded 72 mins from sunset
B43	No bat emergence recorded	Survey method not adopted	CP recorded 36 mins from sunset
B44	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B45	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B46	Survey method not adopted	No bat re-entry recorded	CP recorded 111 mins from sunrise
B47	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B50	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B52	Survey method not adopted	No bat re-entry recorded	No bat activity recorded
B53	No bat emergence recorded	Survey method not adopted	CP recorded 63 mins from sunset N recorded 44 mins from sunset
B54	No bat emergence recorded	Survey method not adopted	CP recorded 40 mins from sunset LE recorded 74 mins after sunset
B56	No bat emergence recorded	Survey method not adopted	CP recorded 55 mins from sunset

Structure ref. (Figure 2.2)	Emergence survey results	Re-entry survey results	General notes on bat activity nearby during survey work, including earliest/latest timings of bat registrations
B61	Survey method not adopted	No bat re-entry recorded	CP recorded 117 mins from sunrise
B62	Survey method not adopted	No bat re-entry recorded	CP recorded 117 mins from sunrise
B63	Survey method not adopted	No bat re-entry recorded	CP recorded 117 mins from sunrise
B64	Survey method not adopted	No bat re-entry recorded	CP recorded 117 mins from sunrise
B66	Survey method not adopted	No bat re-entry recorded	CP recorded 117 mins from sunrise

Appendix F
Relevant Legislation and Policy

The *Wildlife and Countryside Act 1981* (as amended) and the *Conservation of Habitats and Species Regulations 2017* (as amended)

All British bat species are listed in Schedule 5 of the *Wildlife and Countryside Act 1981* in respect of Section 9, which makes it an offence, *inter alia*, to:

- Intentionally or recklessly kill, injure, or take (handle) a bat;
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a bat uses for shelter or protection; or
- Intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection.

British bat species receive further protection under Regulation 43 of the *Conservation of Habitats and Species Regulations 2017* (as amended), which make provision for the purpose of implementing European Union Directive on the *Conservation of Natural Habitats and of Wild Fauna and Flora 1992*. All British bat species are listed on Annex IV of the Directive, which means that member states[8] are required to put in place a system of strict protection as outlined in Article 12, and this is done through inclusion on Schedule 2 of the Regulations, which makes it an offence, *inter alia*, to:

- Deliberately capture, injure or kill any bat;
- Deliberately disturb a bat, in particular any disturbance which is likely:
  - (a) To impair their ability:
    - (i) To survive, to breed or reproduce, or to rear or nurture their young; or
    - (ii) To hibernate or migrate.
  - (b) To affect significantly the local distribution or abundance of the bat species.
- Damage or destroy a breeding site or resting place of a bat.

In addition, five British bat species are listed on Annex II of the Habitats Directive. These are:

- Greater horseshoe bat;
- Lesser horseshoe bat;
- Bechstein's bat;
- Barbastelle; and
- Greater mouse-eared bat.

As Annex II species under the Habitats Regulations, the Directive requires the designation of Special Areas of Conservation (SACs) by EC member states to ensure that their populations are maintained at a favourable conservation status. Where bats occur outside SACs the level of legal protection that these species receive is

[8] The *Conservation of Habitats and Species Regulations 2017* (as amended) have been amended by the *Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019* to make them operable after the 1 January 2021. The Regulations as detailed above remain in force following the UK's departure from the EU.

the same as for other bat species, however their inclusion on Annex II serves to underline their conservation significance and it is therefore less likely that adequate mitigation for loss of roosts of these species will be possible.

Natural Environment and Rural Communities (NERC) *Act 2006*

Under Section 41 of the *Natural Environment and Rural Communities Act 2006*, seven bats species are of principal importance for the purpose of conserving biodiversity in England. Under Section 41(3) of the Act, the Secretary of State must take steps (where they are reasonably practicable), and promote the taking of steps by others, to further the conservation of these species. The bat species listed as priority species are:

- Greater horseshoe bat;
- Lesser horseshoe bat;
- Barbastelle;
- Bechstein's bat;
- Brown long-eared bat;
- Soprano pipistrelle; and
- Noctule.

The Kent Local Biodiversity Action Plan (LBAP) includes:

- Common pipistrelle; and
- Soprano pipistrelle.

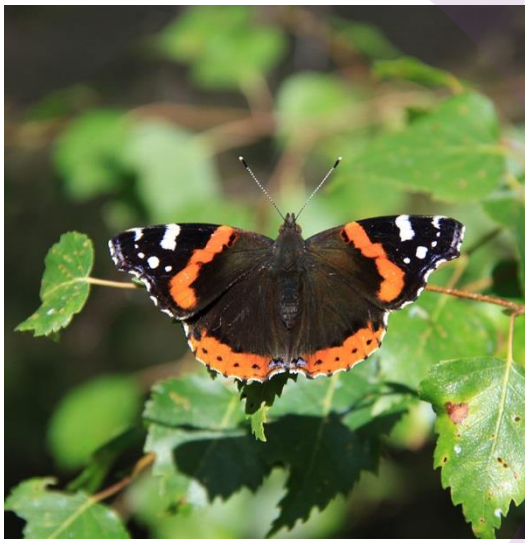
National Planning Policy Framework

The National Planning Policy Framework (NPPF) refers to the steps that local authorities should take through the planning process in relation to species and habitats of principal importance. NPPF states that: "*Planning policies should promote the preservation, restoration and recreation of priority habitats, ecological networks and the recovery of priority species*".

Riveroak Strategic Partners Ltd

Manston Airport

Reptile Survey Report 2020



Wood Group UK Limited – April 2021

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Wood Group UK Limited

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Document revisions

No.	Details	Date
1	Final Report	February 2021
2	Re-issue with change to introduction	April 2021

Contents

1. Introduction

1.1 Project background

1.1.1 RiverOak Strategic Partners Ltd has commissioned Wood PLC. (hereafter referred to as 'Wood') to meet Condition 12 of the Development Consent Order (DCO) for the redevelopment of an area of approximately 296 hectares (ha) at Manston airport, Kent (hereinafter referred to as 'the Site'; central National Grid Reference TR 330 658). Condition 12 states:

1.1.2 *No part of the authorised development is to commence until for that part final preconstruction survey work has been carried out to establish whether European or nationally protected species are present on any of the land affected or likely to be affected by any part of the relevant works, or in any of the trees and shrubs to be lopped or felled as part of the relevant works.*

1.1.3 The Site is located in north-east Kent, approximately 1.1 kilometres (km) west of Manston, central National Grid Reference TR 330 658. The DCO sets out proposals for the demolition of buildings and development to deliver an area for cargo freight operations able to handle at least 10,000 movements per year, facilities for other aviation-related development including a passenger terminal and associated facilities, an aircraft teardown and recycling facility, a flight training school, a base for at least one passenger carrier, a fixed base operation for executive travel, and business facilities for aviation related organisations.

1.1.4 Since Wood's appointment, following an Order of the High Court made on 15 February 2021, the decision of the Secretary of State dated 9 July 2020 to grant the application for development consent for the proposed re-development of Manston Airport has been quashed. The Secretary of State must now redetermine the application. Notwithstanding this, the purpose of this report has not changed

1.2 Purpose of this report

1.2.1 This report details the methods adopted and results of survey work undertaken to establish the presence or likely absence of reptiles in those areas of Manston Airport that could not be surveyed in 2017 due to access restrictions. This report will be used to discharge Condition 12 of the DCO.

2. Reptile Survey Background

2.1 Desktop study – 2016

2.1.1 In 2016, Kent and Medway Biological Records Centre (KMBRC)[1] provided records of legally protected and notable species up to a 5km radius around the centre of the Site. This included the following records of reptiles:

- Grass snake (*Natrix natrix*) – 12 records dating from 1993-2009;
- Slow worm (*Anguis fragilis*) – 60 records dating from 1969-2011; and
- Viviparous lizard (*Zootoca vivipara*) – 30 records dating from 1964-2015.

2.1.2 None of the records appeared to be associated with the Site itself.

2.2 Field survey – 2017

In 2017, survey work to establish the presence or likely absence of reptiles across most of the Site was carried out[2], with the exception of three areas (c.3.5 ha) to which there was no access. A total of 1,500 artificial reptile refugia, were deployed in August 2017, and were subsequently visited on seven occasions.

2.2.1 A single adult viviparous lizard was recorded basking along the western site boundary during the deployment of reptile refugia (**Figure 2.1** in **Appendix A**); no further reptiles were recorded during any of the survey visits.

[1] Kent & Medway Biological Records Centre (2016). *Area requested - Manston Airport. Enquiry on behalf of Emma Toovey, Amec Foster Wheeler E & I UK. 14/06/2016. ENQ/16/275. 5km radius search surrounding – TR330658.*

[2] Babec Ecological Consultants (2017). *Building inspection for bats and barn owls and reptile presence/likely absence survey*. Submitted as part of the DCO application for Manston Airport [online], available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-002419-5.2-7%20-%20Environmental%20Statement%20-%20Volume%207%20-%201%20of%203%20-%20Appendices%207.1-7.6.pdf (Accessed 10/02/20).

3. Methods

3.1 Survey methods

3.1.1 A reptile survey was conducted within the three areas of the Site boundary that were not surveyed in 2017 (see **Figure 3.1** in **Appendix A**). Following good practice guidance[3], an initial site visit was undertaken by an experienced Wood ecologist on 21 August 2019, during which a total of 110 artificial refugia (comprised of 84 sheets of bitumen felt, or 'felts', measuring 500 mm x 1000 mm and 26 corrugated metal sheets, or 'tins', measuring 500 mm x 500 mm) were set out within areas of potential reptile habitat.

3.1.2 The three survey areas, and details of refugia deployment in each, are described in **Table 3.1**. As indicated, the density of refugia deployment exceeded the minimum recommended density of 5-10 refugia per hectare[3], thereby maximising the opportunity to detect reptiles.

Table 3.1 Survey area descriptions and detail of refugia deployed

Survey area reference	Description of survey area	Total refugia deployed	No refugia per ha
1	3 ha of semi-improved grassland with scattered and dense scrub, and a tree line along the western boundary.	45 felts and 15 tins	20
2	0.2 ha of poor semi-improved grassland with some scattered scrub and a hedge along the west boundary.	18 felts and 7 tins	125
3	0.3 ha of semi-improved grassland with scattered scrub around the margins.	21 felts and 4 tins	83.3

3.1.3 After allowing two weeks for the refugia to 'bed-in', seven survey visits were undertaken in appropriate weather conditions for detecting reptile activity (see section 3.2).

3.1.4 In accordance with good practice methodology, the survey included a combination of inspections on top of and below the artificial refugia, searches of any existing refugia (such as log piles) and visual searches of potential basking sites. The first three survey visits took place in autumn 2019, with another four in spring 2020, providing a dataset spanning two seasons and covering both the pre- and post-hibernation periods (see **Table 4.1** for dates of survey visits).

3.2 Weather conditions

3.2.1 Reptile activity is highly dependent on the weather, as reptiles must bask in order to warm themselves and become active. April, May and September are key months for basking reptiles, as more continuous mid-summer heat means reptiles require less basking time to become active, however successful surveys may still be carried out from June to August and in October if weather conditions are suitable.

[3] Froglife (1999): *Reptile Survey: An introduction to planning, conducting and interpreting surveys for snake and lizard conservation* Froglife, Halesworth

3.2.2 The influence of weather on reptile detection is complex and may vary depending on the target species (e.g. different species have different optimal body temperatures), the time of year (whether early or late in the survey season), the prevailing weather conditions in the weeks prior to the survey, and the geographic location in which the survey is being carried out (e.g. which region of the UK). In general, guidance suggests that reptile surveys should ideally be conducted on warm, dry days with intermittent sunshine; particularly after a spell of cooler or wetter weather. Various publications suggest optimal temperatures for detecting reptiles, with the figures quoted ranging from 9 to 20°C[3,4,5], although JNCC recommend a minimum of 15°C[6].

3.2.3 Outside of these conditions weather may still be suitable for surveying (e.g. surveys during light summer showers interspersed with sunny spells can be very productive) and, being close to the English Channel and on a raised plateau, the Site tends to experience stronger winds than the surrounding landscape. As such, while survey visits were conducted as far as was practically possible in optimum conditions, an element of professional judgement was applied by the experienced surveyor leading the survey work as to what constituted suitable conditions.

[4] Griffiths, R. and Inns, H. (1998). Surveying. In: Gent, A. H. and Gibson, S. D. eds. *Herpetofauna workers' manual*. Joint Nature Conservation Committee, Peterborough, pp1-13.
[5] Froglife (2015). *Surveying for reptiles. Tips, techniques and skills to help you survey for reptiles*. Froglife, Halesworth
[6] Joint Nature Conservation Committee (2004). *Common Standards Monitoring Guidance for Reptiles and Amphibians. Version February 2004*. JNCC, Peterborough

4. Results

4.1.1 The reptile survey was conducted between 3 September and 12 September in 2019 and 29 April and 8 June in 2020. The survey did not reveal any species of reptile to be present. Results of the seven visits are shown in **Table 4.1**.

Table 4.1 Reptile survey results

Visit number	Date	Reptiles recorded	Total count adult reptiles
1	03/09/2019	None	0
2	06/09/2019	None	0
3	12/09/2019	None	0
4	29/04/2020	None	0
5	21/05/2020	None	0
6	28/05/2020	None	0
7	08/06/2020	None	0

The weather conditions during each survey visit are provided in **Appendix B.**

5. Summary and Conclusion

5.1.1 Three reptile species have been recorded within 5km of the Site: slow worm, viviparous lizard and grass snake. A reptile survey carried out across most of the Site in 2017 recorded the presence of a single viviparous lizard on the western boundary. The three areas that could not be accessed in 2017 were subject to survey work in 2019/20, during which no further reptile observations were made.

5.1.2 All survey work followed standard guidance for establishing reptile presence or likely absence, and it can be concluded that both slow worm and grass snake are likely to be absent from the Site, while a very low population of viviparous lizards uses habitats along the southernmost section of the western site boundary, possibly only on a transient basis.

5.1.3 Much of the Site provides habitat that is potentially suitable to support reptiles in the form of semi-natural grassland, however, there is little variety in the topography or vegetation structure over much of the Site and few areas of scrub to provide denser areas of cover. The habitat has only become suitable for reptiles in relatively recent years, as a result of less intensive management since the Site ceased operating as an airport in 2014. Given that the Site is surrounded by busy A and B roads and large arable fields with narrow vegetated margins, there is very limited connectivity with reptile habitat in the wider landscape and it is likely that this has impeded the colonisation of the site by reptiles.

Appendix A
Figures

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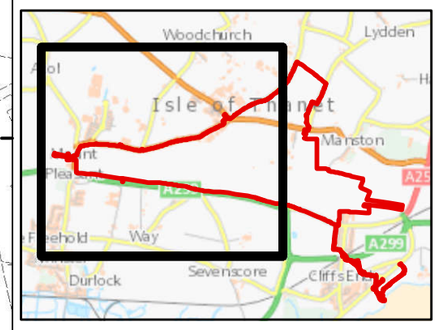
Area 2
Area 3

Key

Order Limits

Reptile survey area

Common lizard



0 100 200 300 400 500 600 m

Scale at A3: 1:10,000

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RSP

Manston Airport DCO
Reptile Presence/Absence Survey 2020

Figure 2.1
Reptile survey results - 2017

February 2021

wood.

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N

Area 2

Area 3

Area 1

Key

Order Limits

Reptile survey area

0 100 200 300 400 m

Scale at A3: 1:7,500

Client

RSP

Manston Airport DCO
Reptile Presence/Absence Survey 2020

Figure 3.1
Location map of 2019/20 survey areas

February 2021

wood.

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Appendix B
Dates of survey visits and weather conditions

Visit no.	Date	Time		Temperature (°C)		Rain	Cloud cover (%)	Ground moisture	Wind strength
		Start	End	Min	Max				
1	03/09/2019	11:15	12:30	18.0	19.0	None	70	Dry	Moderate
2	12/09/2019	08:50	10:15	13.3	14.4	None	10	Damp	Light
1	06/09/2019	09:10	10:40	16.5	17.5	None	100	Dry	Strong
4	29/04/2020	10:00	11:00	12.0	13.0	None	80	Wet	Strong
5	21/05/2020	18:30	19:30	20.0	19.0	None	80	Dry	Light
6	28/05/2020	14:00	15:30	17.0	16.0	None	0	Dry	Moderate
7	08/06/2020	10:00	11:30	14.0	15.0	None	10	Damp	Moderate

Appendix C
Relevant Legislation

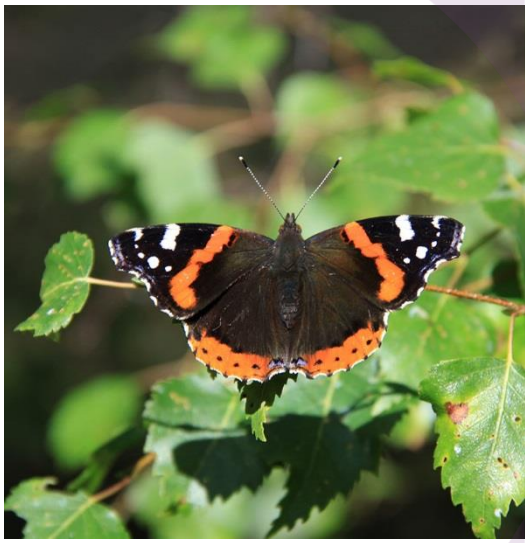
The four-widespread species of reptile that are native to Britain, namely viviparous lizard, slow worm, adder (*Vipera berus*) and grass snake, are listed on Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and are afforded limited protection under Section 9 of this Act. This makes it an offence, *inter alia*, to:

- Intentionally kill or injure any of these species.

RiverOak Strategic Partners Ltd

Manston Airport

Invertebrate Survey Report 2020



Wood Group UK Limited –April 2021

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Document revisions

No.	Details	Date
1	First issue	February 2021
2	Re-issue with change to introduction	April 2021

Contents

1. Introduction

1.1 Project background

1.1.1 RiverOak Strategic Partners Ltd has commissioned Wood PLC. (hereafter referred to as 'Wood') to meet Condition 12 of the Development Consent Order (DCO) for the redevelopment of an area of approximately 296 hectares (ha) at Manston airport, Kent (hereinafter referred to as 'the Site'; central National Grid Reference TR 330 658). Condition 12 states:

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1.1.3 The Site is located in north-east Kent, approximately 1.1 kilometres (km) west of Manston, central National Grid Reference TR 330 658. The DCO sets out proposals for the demolition of buildings and development to deliver an area for cargo freight operations able to handle at least 10,000 movements per year, facilities for other aviation-related development including a passenger terminal and associated facilities, an aircraft teardown and recycling facility, a flight training school, a base for at least one passenger carrier, a fixed base operation for executive travel, and business facilities for aviation related organisations.

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1.2 Purpose of this report

1.2.1 This report details the methods adopted (**Section 2**) and results (**Section 3**) of survey work undertaken in relation to the invertebrate fauna of the Site. It will be used to discharge Condition 12 of the DCO.

1.3 Site description

1.3.1 The Site (covering 316ha) occupies a large area of land on the site of the former Kent International Airport and RAF Manston, divided by the B2050 (Manston Road). The area to the north of the road is mostly grassland with informal public access, but also includes the Spitfire Memorial Museum and its associated features. Land to the south of the Manston Road, where the former operational airport lies, is dominated by open grassland and large areas of hard standing, especially the runway and taxiing areas, but also includes a substantial area occupied by buildings. On both sides of the road there are areas of various habitats produced by disturbance, the removal of structures, tree and shrub planting and natural succession. The airport ceased functioning in 2014, but various peripheral activities have continued and the Site has continued to be regularly managed, with the bulk of the open grassland cut for silage.

1.4 Invertebrate survey background

1.4.1 A scoping survey undertaken for the proposed development in 2017[1] considered that the Site had high potential to support invertebrates of open habitats, with factors contributing to this potential being: a large area; a favourable geographical location; a long history of open conditions; high floristic diversity; large populations of some important invertebrate foodplants, and varied structure, including bare and sparsely vegetated ground, managed grassland, and unmanaged or lightly managed tall herbs. Diversity and interest were considered likely to be higher in open habitats other than the mown grassland, including open mosaics, tall ruderals, banks and mounds, and the margins of hard-standing.

[1] Amec Foster Wheeler (2018). *Manston Airport DCO EIA. Technical Note. Invertebrate scoping survey.*

2. Methods

2.1 Overview

2.1.1 This section details:

- The recording areas used in the survey;
- Coverage of the Site;
- The methods used for the collection and storage of invertebrate specimens;
- The nomenclature and conservation statuses referred to in this report; and
- The methods used for the collation and analysis of data.

2.1.2 The need to comply with regulations and guidelines associated with Covid-19 has meant that the survey has differed somewhat in character from that proposed in the 2017 scoping survey, but it has been possible to sample the fauna over a series of visits between early May and early October 2020 and to generate sufficient records to meet the aims of the survey.

2.1.3 There are two sources of historical invertebrate data for the Site, as follows:

- An invertebrate survey was undertaken in 2016 to provide information for the Environmental Statement associated with an earlier planning application, not related to the current proposed development[2]. Most records from that survey are from relatively intensive sampling of small areas selected as being of relatively high invertebrate potential. One hundred and sixty-two species of invertebrates were recorded, of which nine have a formal conservation status; and
- The scoping survey of 2017 made casual and widespread records over the Site. One hundred and sixty-eight taxa were recorded, of which nineteen have a formal conservation status.

2.1.4 Though these lists are recent, there have been changes to parts of the Site in the intervening years that may have resulted in changes to the invertebrate communities present, so the data from them has not been used in assessment for current purposes, which is based solely on 2020 data.

2.1.5 The information on which this report is based has been collated onto a spreadsheet which contains considerably more detail than it has been possible, or useful, to include in the report itself. The spreadsheet should be consulted if, for example, more precise information is needed on individual records.

2.2 Recording areas and coverage of the Site

2.2.1 The Site does not lend itself to easy splitting into usefully sized recording compartments. Much of its area is grassland of fairly uniform character with a narrow band of ruderal vegetation bordering hard standing. Variation within the grassland was largely small areas of different vegetation character due to soil conditions or disturbance. Further variation can be found in the vicinity of buildings, several disturbed areas and soil mounds, boundary hedges and a large area of open-mosaic habitat close to the car park. The Site can be divided into five major units, the broad character of which is given below:

[2] WSP | Parsons Brinckerhoff (2016) Stone Hill Park – Terrestrial invertebrate survey. Project number 70009799, Report 012.

- **Grassland and edges of tarmac along runway** - Extensive areas of uniform and relatively species poor grassland bordering runway; small areas of more species rich and flower rich grassland; disturbed areas and ruderal vegetation, particularly at edges of tarmac; boundary hedges; buildings;
- **Grassland to the north of Manston Road** - Extensive areas of uniform and relatively species poor grassland; small areas of more species rich and flower rich grassland; disturbed areas and ruderal vegetation, particularly at edges of tarmac; boundary hedges and trees;
- **Museum area and surroundings** - Buildings; mown grass and ornamental plantings; moderately species rich and flower rich grassland; scrub and planted trees;
- **Surroundings of Terminal buildings including open mosaic** - Open mosaic habitat; areas of uniform and relatively species poor grassland; areas of more species rich and flower rich grassland; disturbed areas and ruderal vegetation, particularly at edges of tarmac; boundary hedges and trees; scrub; and
- **Large areas of disturbed or ruderal habitat** - Disturbed ground, spoil piles and ruderal vegetation.

2.2.2 These areas are too large, uneven in size and varied in character to be particularly useful recording units, however, and division into finer recording compartments based on habitat character would have resulted in one huge, a few reasonably sized and many tiny compartments which would make comparisons between units both challenging and unhelpful in view of the broad sweep of the development. It was therefore decided that the best approach was to record the Site based on 100m squares. The pragmatic approach adopted was that survey work should extend to all parts of the Site unless they were unambiguously of low potential, identical in character to adjacent recorded areas, or inaccessible for useful sampling, but that this broad coverage should not compromise the gathering of additional data from areas of higher potential.

2.2.3 **Figure 2.1** shows the major subdivisions used in invertebrate surveys. **Figure 2.2** shows the distribution of invertebrate recording across the Site.

2.3 Sampling methods

2.3.1 Sampling used a combination of active survey methods and passive traps. Trapping utilised simple, easily replaced traps which could be set, serviced or moved quickly. These were set in a small number of carefully selected locations, in quantities that enabled the traps and the necessary amount of preservative to be carried during active survey. This removed any need for separate visits for trap servicing. The following paragraphs summarise the survey methods employed.

Sweep-netting

2.3.2 A lightweight folding circular aluminium frame 40 centimetres (cm) in diameter was fitted with a net bag supplied for sweep-netting by GB Nets and attached to an extending lightweight aluminium handle. Net strokes were reasonably rapid and penetrated as far into the vegetation as possible without the stroke being seriously slowed by its resistance. A maximum of fifty sweeps (counted as single strokes of the net) was taken before examining the catch. The sample was initially examined in the net, noting or capturing large, fast-moving or readily identified species. The remaining net contents were then emptied onto a white tray, and the material in the tray examined for smaller and slower animals.

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Key

- Order Limits
- 1 Runway area
- 2 Grassland to the north of Manston Road
- 3 Surroundings of the Spitfire Memorial Museum
- 4 Surroundings of Terminal buildings including open mosaic
- 5 Large areas of disturbed ground with slopes and ruderal vegetation

0 200 400 600 800 m

Scale at A3: 1:15,000

Client

RSP

Manston Airport DCO
Invertebrate Survey Report 2020

Figure 2.1
Major subdivision of survey areas used in invertebrate survey

February 2021

wood.

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Key

Order Limits

Surveyed 100m²

0 200 400 600 800 m

Scale at A3: 1:15,000

Client

RSP

Manston Airport DCO
Invertebrate Survey Report 2020

Figure 2.2
Coverage of invertebrate survey

February 2021

wood.

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Beating

2.3.3 Samples were taken from tree and shrub foliage, ivy, and dense, tall herbaceous vegetation by holding a net under the foliage and tapping the branches or stems above sharply several times with a stout stick. The sweep net currently in use was most often employed for this purpose. For high vegetation and larger branches, a net with a lightweight folding frame 55 cm in diameter and a long bag was also used. This net has the advantage that substantial amounts of foliage can be inserted, or a substantial length of tall vegetation placed next to the net, before sampling. Material was initially examined in the net, then emptied onto a white tray for further sorting.

Suction sampling

2.3.4 Suction sampling used a garden leaf-blower modified by taping a fine-meshed net in the inlet tube, following the method of Stewart & Wright (1998)[3]. The inlet tube was repeatedly pushed down into the vegetation until ground contact was made. After fifty to one hundred ground contacts, the contents of the collection net were sieved through a 0.5 cm mesh sieve onto a white tray for sorting.

Active search

2.3.5 Features of significance to invertebrates which are not adequately sampled by sweeping, beating or suction sampling were investigated by close examination and hand searching. Attention was particularly paid to accumulations of plant litter; the ground beneath wood, stones and other debris; tree trunks and the undersides of plant rosettes.

Targeted netting

2.3.6 Large, active, species, especially those prone to visiting flowers, resting on leaves, or with regularly visited and recognisable nests, are often most effectively recorded by netting individual animals. This is particularly effective for solitary bees and wasps, but also for some groups of flies. Such sampling was often employed on a more-or-less casual basis, as opportunity dictated, but some survey time was also devoted exclusively to it. On those occasions, the net used for sweep-netting was employed.

Direct observation

2.3.7 A small number of relatively large and readily identified species, especially butterflies, dragonflies, some grasshoppers and crickets, larger hoverflies, and some bees and wasps, can be seen without the need for specific search and identified from sight. Many butterfly records, in particular, are from casual observations made during other sampling work.

Water traps

2.3.8 White plastic trays, 40 cm by 30 cm across and 9 cm deep, were partly filled with glycerol/ salt/ detergent preservative and placed in sheltered locations where flying invertebrates of interest are likely to accumulate, such as flower-rich areas, close to bare ground and banks, or at habitat transitions. Such traps actively attract some species, and passively capture a range of others.

[3] Stewart, A.J.A. & Wright, A.F. 1998. A new inexpensive suction apparatus for sampling arthropods in grassland. *Ecological Entomology*, 20, 98-102.

2.4 Standardisation of recording

2.4.1 Use of the Pantheon tool for analysis of data (see **Section 2.11**) requires that samples are standardised: sampling must be quantified, and should take a representative sample of the fauna, without targeting individual species or concentrating effort on especially rewarding areas within a sample area. All species within the target groups are then identified from each sample. Estimates of species quality can then be made which reflect the actual proportion of uncommon or specialised species within the fauna.

2.4.2 All the recording methods described above can be standardised. Trap samples, being passive collections of invertebrates, which happen to visit over set periods of time, are all regarded as standardised. Other methods have been standardised by recording for a pre-set period of time. Thirty minutes was selected for all methods.

2.5 Collection, short term storage and identification of specimens

2.5.1 In active sampling, readily identified species were noted in the field. Representative examples of other species were collected for later identification. A dry pooter made from a flexible polythene sample bottle and a combination of rigid plastic and flexible polythene tubing was used to capture most insects and retain them alive. For spiders, some soft-bodied insects and predacious species which damage other material if collected live into a dry pooter, a simple spider-pooter was used to gather up individual specimens which were then blown directly into a container of 60% propan-2-ol. Dry-pooted material was kept alive until the completion of fieldwork, then killed using ethyl acetate vapour and either layered between sheets of tissue paper in a labelled plastic box or frozen for later examination under a 7-45x magnification binocular microscope.

2.5.2 Water traps were checked at roughly fortnightly intervals. On servicing and retrieval, they were emptied by removing any large items of debris and filtering the contents through a fine sieve. The collected material was labelled using waterproof paper and a soft pencil, preserved by the addition of 80% propan-2-ol and sealed in a polythene bag. It was later cleaned under gently flowing water to remove mud and fine debris, then emptied into a white tray and covered with a thin layer of water. The material in the tray was sorted under a bright light using a head-band magnifier of 2.5x magnification. Representative individuals for identification were placed in distilled water in Petri dishes for closer, microscopic, examination.

2.6 Long term storage and curation of specimens

2.6.1 Most material collected was identified within a few weeks of capture, and field or initial laboratory preservation were sufficient to retain it in good condition. Voucher specimens have been retained of all species with a national Red Data Book or Nationally Scarce status (see **Section 2.10**), except for butterflies. These have been prepared and stored using standard curatorial methods and materials.

2.7 Identified groups

2.7.1 Though it was desirable to identify as wide a range as possible of invertebrates, effort was concentrated on groups which are especially likely to be of value for assessment, which are not excessively difficult to identify, and which are at least moderately familiar to the surveyors. Natural

England Research Report NERR005 (Drake *et al*., 2007)[4] gives guidance on useful groups in different habitats. **Table 2.1** lists the major groups which were identified, together with exclusions within them.

Table 2.1 Invertebrate groups identified during the survey

Group	Comment
Snails, slugs and mussels (Mollusca)	Slugs are relatively under-represented in the records, because fieldwork was preferentially carried out at times and in conditions least suited to slug activity, and though some slugs were caught in traps they were not generally in a good condition for identification.
Spiders (Araneae)	
Harvestmen (Opiliones)	
Centipedes (Chilopoda)	
Beetles (Coleoptera)	Featherwing beetles (Ptiliidae), the more difficult rove beetles (Staphylinidae) in the subfamily Aleocharine Staphylinidae, most silken fungus beetles (Cryptophagidae) of the genera *Atomaria* were not identified. Pollen beetles *Meligethes spp*. (of the sap beetle family, Nitidulidae), were usually identified only when collected from known host plants.
Woodlice (Crustacea)	
Earwigs (Dermaptera)	
Flies (Diptera)	The following families were not identified: leaf-miner flies (Agromyzidae), root-maggot flies (Anthomyiidae), gall midges Cecidomyiidae), non-biting midges (Chironomidae), shore flies (Ephydridae), lesser house flies (Fanniidae), house flies (Muscidae) (except for very distinctive species), dark-winged fungus gnats (Sciaridae), and some small and difficult families of the Acalyptrate group. Identification was selective amongst fungus gnats (Bolitophilidae, Diadocidiidae, Ditomyiidae, Keroplatidae and Mycetophilidae), fruit flies (Drosophilidae), and lauxaniid flies (Lauxaniidae).
Bugs (Hemiptera):	Aphids, whitefly and scale insects were not identified.
Bees, wasps, ants and allies (Hymenoptera)	
Moths and butterflies (Lepidoptera)	All butterflies and day-flying larger moths (Macrolepidoptera) were identified; identification of day-flying smaller moths (Microlepidoptera) was selective; records were also made of distinctive larvae, and readily recognised night-flying species disturbed during diurnal survey.
Scorpionflies (Mecoptera)	
Lacewings (Neuroptera)	
Dragonflies (Odonata)	
Grasshoppers and crickets (Orthoptera)	
Barklice (Psocoptera)	

[4] Drake, C.M., Lott, D.A., Alexander, K.N.A. & Webb, J. (2007). *Surveying terrestrial and freshwater invertebrates for conservation evaluation*. Natural England Research Report NERR005. Sheffield: Natural England.

2.7.2 None of these groups was targeted to the extent of aiming for a complete species list. The methods and timings of the survey effectively preclude thorough recording of some groups.

2.8 Timing of survey work

2.8.1 Field surveys were carried out between 6 May and 7 October 2020. The Site was visited for general invertebrate sampling at roughly two-week intervals throughout this period. For each visit, three surveyors undertook survey work from approximately 9am to 5:30pm. The first visit was used chiefly for familiarisation and limited standardised sampling. Traps were set on the second visit, in mid-May. On this and all subsequent visits, samples were taken widely over the Site by active methods. All traps were serviced on each visit. Some trapping stations were 'retired' and new ones adopted over the course of the survey.

2.8.2 **Appendix A** provides a complete timetable of survey work and indicates the weather conditions under which survey visits took place.

2.9 Nomenclature

2.9.1 Checklists and other sources used for names have been selected as far as possible on the basis of easy availability, broad coverage, specific reference to the British fauna, being reasonably recent, and being available in printed form. There are few occasions when all these criteria are met. The main sources of nomenclature that have been used are provided in **Table 2.2**, though in some cases, names have been updated from more recent publications:

Table 2.2 Invertebrate nomenclature

Group	Nomenclature source
Snails, slugs and mussels	Anderson, R. (2005). An annotated list of the non-marine Mollusca of Britain and Ireland. *Journal of Conchology*, 38, 607-633.
Spiders	Lavery, A. (2019). A revised checklist of the spiders of Great Britain and Ireland. *Arachnology* 18(3), 196-212.
Harvestmen	Hillyard, P.D. (2005). Harvestmen. *Synopses of the British Fauna (new series)*, no. 4 (3rd edition).
Centipedes	Barber, A.D. (2009). *Centipedes: keys and notes for the identification of species. Synopses of the British Fauna* (new series), 58.
Woodlice	Gregory, S. (2009). *Woodlice and water lice (Isopoda: Oniscoidea and Asellota) in Britain and Ireland*. Shrewsbury: FSC Publications.
Beetles	Duff, A.G. (2016). *Beetles of Britain and Ireland. Volume 4: Cerambycidae to Curculionidae*. A.G. Duff (Publishing), West Runton.
Earwigs	Sutton, P.G. (2015). *A review of the Orthoptera (grasshoppers and crickets) and allied species of Great Britain (Orthoptera, Dictyoptera, Dermaptera, Phasmida)*. Natural England Commissioned Report NECR187 (Species Status no. 24).
Flies	Chandler, P. (2020). *An update of the 1998 checklist of the Diptera of the British Isles*. www.dipteristsforum.org.uk/documents/BRITISH_ISLES_CHECKLIST.pdf
Leafhoppers and planthoppers	Biedermann, R. & Niedringhaus, R. (2009). *The plant- and leaf-hoppers of Germany*. Scheeßel: WABV.

Group	Nomenclature source
True bugs	Aukema, B. & Rieger, C. (1995-2006). *Catalogue of the Heteroptera of the Palaearctic region. 5 volumes. Wageningen*: The Netherlands Entomological Society.
Jumping plant-lice	http://www.britishbugs.org.uk/systematic.html
Bees, wasps and ants	Else, G. R., Bolton, B., & Broad, G. R. (2016). *Checklist of British and Irish Hymenoptera - aculeates (Apoidea, Chrysidoidea and Vespoidea).* Biodiversity Data Journal, (4), e8050. Advance online publication: http://doi.org/10.3897/BDJ.4.e8050
Sawflies	Liston, A. D., Knight, G. T., Sheppard, D. A., Broad, G. R., & Livermore, L. (2014). *Checklist of British and Irish Hymenoptera - Sawflies, "Symphyta."* Biodiversity Data Journal, (2), e1168. Advance online publication: http://doi.org/10.3897/BDJ.2.e1168
Moths and butterflies	Agassiz, D.J.L., Beavan, S.D. & Heckford, R.J. (2013). *Checklist of the Lepidoptera of the British Isles*. Field Studies Council, for the Royal Entomological Society.
Scorpionflies	Plant, C.W. (1997). *A key to the adults of British lacewings and their allies (Neuroptera, Megaloptera, Raphidioptera and Mecoptera)*. Shrewsbury: Field Studies Council.
Lacewings	Plant, C.W. (1997). *A key to the adults of British lacewings and their allies (Neuroptera, Megaloptera, Raphidioptera and Mecoptera)*. Shrewsbury: Field Studies Council.
Dragonflies	Cham, S., Nelson, B., Parr, A., Prentice, S., Smallshire, D. & Taylor, P. (2014). *Atlas of dragonflies in Britain and Ireland*. Telford: Field Studies Council for the Biological Records Centre.
Grasshoppers and crickets	Sutton, P.G. (2015). *A review of the Orthoptera (grasshoppers and crickets) and allied species of Great Britain (Orthoptera, Dictyoptera, Dermaptera, Phasmida)*. Natural England Commissioned Report NECR187 (Species Status no. 24).
Barklice	New, T.R. (2005). *Psocoptera (booklice, barklice)*. Handbooks for the Identification of British Insects, 1(7).

2.10 Conservation status

2.10.1 The better-known groups of invertebrates were assessed for formal conservation status in Red Data Books and National Reviews from the mid-1980s onwards, using criteria from the International Union for Conservation of Nature (IUCN) for the rarest (Red Data Book) species, and defining species believed to occur in 100 or fewer 10 km squares of the National Grid as Notable (now known as Nationally Scarce). The earlier IUCN criteria have been superseded, but only a fraction of the fauna has yet been assessed, in published reviews, under the newer criteria. Other groups are under review, and further new sets of published statuses are likely soon to appear.

2.10.2 Under the revised criteria, at the national level, countries are permitted to refine the definitions for the non-threatened categories and to define additional ones of their own. The **Nationally Rare (NR)** category is defined as species recorded from 15 or fewer hectads of the Ordnance Survey national grid in Great Britain. The **Nationally Scarce (NS)** category is defined in the same way but the species is recorded from between 16 and 100 hectads since 1980. These correspond respectively to the former Red Data Book Categories 1-3 and the former Nationally Scarce (or Nationally Notable) categories A and B. Collectively, they are referred to as the GB Rarity status.

2.10.3 The sources of the formal national status of invertebrate groups are provided in **Table 2.3**.

Table 2.3 Sources of formal national status of invertebrate groups

Group	Status source(s)
Snails and slugs	Seddon, M.B., Killeen, I.J. & Fowles, A.P. (2014). *A review of the non-marine Mollusca of Great Britain*. Species Status no. 17. NRW Evidence Report no. 14. Natural Resources Wales, Bangor.
Spiders	Harvey, P., Davidson, M., Dawson, I., Fowles, A., Hitchcock, G., Lee, P., Merrett, P., Russell-Smith, A. & Smith, H. (2017). *A review of the scarce and threatened spiders (Araneae) of Great Britain*. Species Status no. 22. NRW Evidence Report no. 11. Natural Resources Wales, Bangor.
Beetles	Alexander, K.N.A. (2014). A review of the scarce and threatened beetles of Great Britain. Buprestidae, Cantharidae, Cleridae, Dasytidae, Drilidae, Lampyridae, Lycidae, Lymexilidae, Malachiidae and Trogossitidae. Natural England (Species Status no. 16). Alexander, K.N.A., Dodd, S. & Denton, J.S. (2014). *A review of the scarce and threatened beetles of Great Britain. The darkling beetles and their allies: Aderidae. Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scraptiidae, Tenebrionidae and Tetratomidae (Tenebrionoidea less Ciidae)*. Natural England Commissioned Report NECR148 (Species Status no. 18). Hubble, D.S. (2014). *A review of the scarce and threatened beetles of Great Britain. The leaf beetles and their allies: Chrysomelidae, Megalopodidae and Orsodacnidae*. Natural England Commissioned Report NECR161 (Species Status no. 19). Hyman, P.S. & Parsons, M.S. (1992). *A review of the scarce and threatened Coleoptera of Great Britain. Part 1*. Peterborough: Joint Nature Conservation Committee. (UK Nature Conservation, no. 3). Hyman, P.S. & Parsons, M.S. (1994). *A review of the scarce and threatened Coleoptera of Great Britain. Part 2. U.K. Nature Conservation, no. 12.* Peterborough: Joint Nature Conservation Committee. Telfer, M.G. (2016). *A review of the beetles of Great Britain: ground beetles (Carabidae)*. Natural England Commissioned Report NECR189 (Species Status no. 25).
Earwigs	Sutton, P.G. (2015). *A review of the Orthoptera (grasshoppers and crickets) and allied species of Great Britain (Orthoptera, Dictyoptera, Dermaptera, Phasmida)*. Natural England Commissioned Report NECR187 (Species Status no. 24).
Flies	Ball, S.G. & Morris, R.K.A. (2014). *A review of the scarce and threatened flies of Great Britain. Part 6. Syrphidae*. Joint Nature Conservation Committee, Peterborough (Species Status no. 9). Drake, C.M. (2017). *A review of the status of Larger Brachycera flies of Great Britain*. Natural England Commissioned Report NECR192 (Species Status no. 29). Drake, C.M. (2018). *A review of the status of the Dolichopodidae flies of Great Britain*. Natural England Commissioned Reports NERC195. (Species Status no. 30). Falk, S. (1991b). *A review of the scarce and threatened flies of Great Britain (part 1)*. Nature Conservancy Council. (Research and Survey in Nature Conservation, no. 39). Falk, S.J. & Chandler, P. (2005). *A review of the scarce and threatened flies of Great Britain. No.2: Nematocera and Aschiza not dealt with by Falk (1991)*. Peterborough: Joint Conservation Committee (Species Status, no. 3). Falk, S.J. & Crossley, R. (2005). *A review of the scarce and threatened flies of Great Britain. Part 3: Empidoidea*. Peterborough: Joint Conservation Committee (Species Status, no. 3).

Group	Status source(s)
	Falk, S.J. & Pont, A.C. (2017). *A provisional assessment of the status of Calypterate flies in the UK*. Natural England Commissioned Report NECR 234. Falk, S.J., Ismay, J.W. & Chandler, P.J. (2016). *A provisional assessment of the status of Acalyptratae flies in the UK*. Natural England Commissioned Report NECR217.
Bugs	Bantock, T. (2016). *A review of the Hemiptera of Great Britain: the shieldbugs and allied families*. Natural England Commissioned Report NECR190. (Species Status no. 26). Kirby, P. (1992). *A review of the scarce and threatened Hemiptera of Great Britain. Peterborough*: Joint Nature Conservation Committee. (UK Nature Conservation, 2).
Bees, wasps and ants	Falk, S. (1991a). *A review of the scarce and threatened bees, wasps and ants of Great Britain*. Nature Conservancy Council. (Research and Survey in Nature Conservation, no. 35).
Moths and butterflies	Davis, A.M. (2012). *A review of the status of Microlepidoptera in Britain*. Butterfly Conservation, Wareham. (Butterfly Conservation report no. S12-02). Fox, R., Warren, M.S. & Brereton, T.M. (2010). *A new Red List of British Butterflies.* Peterborough: Joint Nature Conservation Committee. (Species Status, no.12). Waring, P. & Townsend, M. (2017). *Field guide to the moths of Great Britain & Ireland (3rd edition)*. Rotherwick: Bloomsbury Publishing plc: London.
Grasshoppers and crickets	Sutton, P.G. (2015). *A review of the Orthoptera (grasshoppers and crickets) and allied species of Great Britain (Orthoptera, Dictyoptera, Dermaptera, Phasmida)*. Natural England Commissioned Report NECR187 (Species Status no. 24).

2.10.4 The Red Data Book for Kent (Waite, 2000)[5] provides county statuses for many invertebrates. County statuses for bees, wasps and ants in Kent were updated by Allen (2009)[6]. These publications provide local Red Data Book or scarcity statuses for several species without a national status, and for others where the national status under-states their county significance. The Kent statuses are based primarily on mapped occurrence by tetrads (2 km squares) of the National Grid. Waite (2000)[5] defines four Kent Red Data Book categories. Allen (2009)[13] refines and extends the definitions and categories, using tetrad mapping for the period 1985 to 2007 to assign statuses to bees, wasps and ants.

2.10.5 In tables and appendices, formal conservation statuses have been abbreviated. The following lists give the statuses used in this report, and the abbreviations employed for them. The definitions of the formal statuses are given in **Appendix B**.

2.10.6 Statuses from the old IUCN and national criteria:

- Red Data Book category 1 - Endangered (RDB1);
- Red Data Book category 2 – Vulnerable (RDB2);
- Red Data Book category 3 – Rare (RDB3);
- Red Data Book category K - Insufficiently Known (RDBK);
- Red Data Book – Undefined (RDB);
- Nationally Scarce category A (Na);

[5] Waite, A. (ed.) (2000). *The Kent Red Data Book: a provisional guide to the threatened flora and fauna of Kent*. Kent County Council.
[6] Allen, G. (2009). *Bees, wasps and ants of Kent*. Sittingbourne: Kent Field Club.

- Nationally Scarce category B (Nb); and
- Nationally Scarce (N).

2.10.7 Statuses from the new IUCN and national criteria:

- Endangered (EN);
- Vulnerable (VU);
- Near Threatened (NT);
- Least Concern (LC);
- Data Deficient (DD);
- Nationally Rare (NR); and
- Nationally Scarce (NS).

2.10.8 Kent statuses.

- Kent Red Data Book category 1 (KRDB1);
- Kent Red Data Book category 2 (RDB2);
- Kent Red Data Book category 3 (KRDB3);
- Kent Red Data Book category K (RDBK);
- Provisional Kent Red Data Book 1 (pKRDB1);
- Provisional Kent Red Data Book 2 (pKRDB2);
- Provisional Kent Red Data Book 3 (pKRDB3);
- Provisional Kent Red Data Book K (pRDBK);
- Provisional Kent Scarce category A (pKa); and
- Provisional Kent Scarce category B (pKb).

2.10.9 Species not falling into any formal conservation category have been assessed as either local or common. Neither term has a precise definition, and they are used in the context of this report only to distinguish between species of wide distribution and either broad or commonly met habitat requirements, and those which, because of more specialised habitat requirements, lesser mobility, or other cause, are of less frequent occurrence. These categories have been applied according to personal experience and the opinions of standard texts and are in part subjective.

2.10.10 A few species have not been assigned a definitive status. These are species which have recently colonised Britain and are actively spreading, and the statuses of which are fluid and potentially changing rapidly, or recently recognised species, the distribution of which has yet to be elucidated. The two categories are not necessarily mutually exclusive. They are denoted by a "?" in the status column.

2.10.11 The list has also been checked for any species included in Section 41 of the Natural Environment and Rural Communities Act 2006[7] ("*species of principal importance for the conservation of biodiversity in England*") (abbreviated in tables and appendices as **S41**).

[7] Parliament of the United Kingdom, Natural Environment and Rural Communities Act 2006 (Online). Available at: https://www.legislation.gov.uk/ukpga/2006/16/contents

2.11 Analytical methods

Pantheon analysis

2.11.1 Pantheon is a database tool developed by Natural England and the Centre for Ecology & Hydrology to analyse invertebrate sample data. Users import lists of invertebrates into Pantheon, which then matches the species to the preferred name in the UK Species inventory before analysing the sample, attaching associated habitats and resources, assemblage types (adapted from the Invertebrate Species-habitat Information System [ISIS]), habitat fidelity scores and other information against them. The analysis then displays much of this data as numerical scores. This information can be used to determine site quality by revealing whether the species list is indicative of good quality habitat, inform on species ecology and assist in management decisions by revealing the key ecological resources.

2.11.2 Not all the macro-invertebrate taxa are included in the database. To date over 13,000 species have been added, this being about a quarter of the total macro-invertebrate fauna (estimated at 37,000). It remains limited to those taxa and families where there is enough ecological information to give a fair level of coding accuracy. Pantheon is still under development and, as such, its value is limited and there remains errors and omissions in the version released.

2.11.3 One of the most relevant components for current purposes is the use of ISIS for assessment of the overall fauna of the survey area. This interprets species lists by identifying assemblage types within a list and then assessing the conservation value of each based on the rarity of the species it contains. If the rarity score of an assemblage crosses a pre-set threshold the assemblage is assessed as being of favourable status, this indicates it is of SSSI quality. The program can theoretically work at any geographic scale, and so can be used to assess assemblages over the whole survey area.

2.11.4 That said, there are limitations, and the interests of different assemblages cannot be combined to provide an overall assessment of the interest of a site or a fauna. Furthermore, the assemblages identified cannot always be easily related to habitats and features on the site; analysis can sub-divide what is clearly a single functional assemblage on the ground, or combine assemblages more usefully regarded as separate. Species which are usually, but not invariably, part of a particular assemblage can result in the identification of phantom assemblages, based on small numbers of species, and the appearance in the analysis of habitats which are not present on the site under investigation.

Invertebrate Quality Index (IQI)

2.11.5 A disadvantage of Pantheon assessment is that it provides no convenient means of calculating a single, overall, assessment of invertebrate interest for a site or area. Simple species quality assessments which can do this have been in use for some time. Harvey (2014[8], for example) outlines the calculation of an overall Invertebrate Species Quality Index (hereafter referred to as IQI) derived from a scoring system based on conservation status first proposed by Ball (1986)[9] and used for various sites on the Essex side of the Thames corridor. **Table 2.4** details this scoring system. Each species with a formal conservation status, or considered to be local, is assigned a score corresponding to its status. The IQI is calculated by dividing the summed scores of all invertebrate species (IQS) by the number of species present to give an average score (IQI).

[8] Harvey, P.R. (2014). *Chafford Hundred 2014 Invertebrate Survey Report*. Report for Buglife – The Invertebrate Conservation Trust.
[9] Ball, S.G. (1986). *Terrestrial and Freshwater Invertebrates with Red Data Book, Notable or habitat indicator status*. Nature Conservancy Council. (Invertebrate Site Register internal report no. 66).

Table 2.4 Conservation status-based scoring system used to calculate Invertebrate Quality Index (IQI)

Conservation Status	Score
RDB (Red Data Book) species	100
Notable – Na species	50
Notable – Nb species	40
Notable – N species	40
Local	20
Common	no score
Unknown	no score

2.11.6 Review of various invertebrate groups under revised IUCN criteria has given rise to status categories not included in the original scoring system. Newer statuses used in this report have been assigned a score from the older system that reflects their rarity as closely as possible. **Table 2.5** gives the score assigned to each newer status used in the report along with a justification for each.

2.11.7 Some species recorded during the survey have conservation statuses that significantly exaggerate their current rarity. Several such species are widespread on the Site. Their inappropriate scores have little effect on the analyses carried out in this report and have currently been left unchanged for ease of comparison with other reports.

Table 2.5 Scores assigned to statuses not listed in Harvey (2014)[8]

Status	Score	Justification
NS – Nationally Scarce	40	GB Rarity status - equivalent to old Na and Nb statuses but the majority would have fallen into Nb category so scored as Nb.
NR – Nationally Rare	100	GB Rarity status - equivalent to old RDB statuses.
NT – Near Threatened	40	IUCN status - not always scarce in Britain but globally Near Threatened, scored as Nb to reflect this.
VU - Vulnerable	100	IUCN status – globally vulnerable and therefore of high conservation value, scored as RDB to reflect this.
EN - Endangered	100	IUCN status - globally endangered and therefore of high conservation value, scored as RDB to reflect this.
NTB (New to Britain)	100	A precautionary score - by definition a NTB species is only known from a single site making it of potentially high conservation value - however, in the case of alien or tramp species of negligible conservation value this score may need to be changed.

2.11.8 It is now possible for a species to have two national conservation statuses: the IUCN status and the GB Rarity status. In such cases the higher scoring status has been used for analysis. Scoring has been further complicated by the discovery of species new to Britain (NTB) during the survey of Manston Airport. These species have been assigned a precautionary score of 100 as they are currently known from a very limited area and have the potential to be of high conservation value. It

could validly be argued that many species colonising Britain expand rapidly and become common within a matter of years, however, in this case, assigning these species no score did not affect the overall assessment of the Site and its subdivisions based on IQI.

2.11.9 Harvey (2014)[8] provides a limited guide to interpretation of IQI scores based on at least moderate recording effort. The interpretation guidelines are given for the Essex countryside but are equally applicable to Kent, which is relatively similar in character, as follows:

- A 'good' invertebrate site is likely to achieve an IQI score of at least 5.00;
- An 'excellent' invertebrate site is likely to achieve an IQI score of around 7.50; and
- A nationally significant invertebrate site is likely to have an IQI score of close to 10.00.

Solitary bee and wasp assemblage analysis

2.11.10 A national quality assessment scheme for solitary bee and wasp assemblages is available in the form of a Species Quality Index (Archer, 1996)[10], hereafter referred to as an Aculeate Quality Index (AQI). Each species is assigned a quality score based on the number of 10 km squares occupied post 1970 and geographical range within Britain. The most recent set of published scores (Archer, 2014)[11] were used in this analysis. **Table 2.6** details the scoring system. The AQI is derived by summing the quality scores of all recorded species (AQS) and dividing by the number of recorded species.

Table 2.6 Aculeate Quality scoring system (Archer 2014)[11]

Rarity	Score	Grid Square occupation (post 1970)	Distribution
Very rare	32	1-15, 10 km squares	-
Rare	16	16-30, 10 km squares	-
Scarce	8	31-70, 10 km squares	-
Restricted	4	>70, 10 km squares	Restricted to southern England, south-west and southern coast, about half of England, including East Anglia.
Widespread	2	>70, 10 km squares	Restricted area and within Midland lowlands and central coasts of England, lowland Wales and south-west Scotland, excluding Northumbria, about three-quarters of England.
Universal	1	>70, 10 km square	Restricted and widespread areas and within the rest of England, Wales and Scotland.

2.12 Botanical recording

2.12.1 The character and interest of an invertebrate fauna is strongly influenced by the floristic composition of the habitats of a site, especially open habitats such as grassland. Accordingly, a plant list was made over the course of the survey. This is not exhaustive or detailed: plants have been recorded by monad, so that the data is useful for national mapping, rather than by detailed

[10] Archer, M. (1996). The Aculeate Wasps and Bees (Hym. Aculeata) of Sherwood Forest in Nottinghamshire and the Development of a National Quality Assessment Scheme. *Entomologist's Monthly Magazine*, 132, 35-44.
[11] Archer, M. (2014). *Archer's status values for the Solitary Wasps and Bees*. Bees, Wasps and Ants Recording Scheme Newsletter, Autumn 2014, 32-37.

location. Some species are likely to have been missed, simply because of the size of the survey area, but such species are likely to be rare or very localised on the Site and not of great consequence for current purposes.

2.13 Constraints and limitations

2.13.1 Due to disruption caused by the Covid-19 pandemic the survey work, which was planned to commence in early-April 2020, was delayed by approximately a month. This means that early spring species, particularly aculeate Hymenoptera and Diptera, that rely on the nectar source provided by flowering blackthorn, sallow and alexanders may be under-represented in the survey results.

2.13.2 Ground along the runway had been recently disturbed in a search for unexploded ordnance. The excavated fringe was narrow, but the dry spring delayed recovery of vegetation and resulted in dead plants and bare ground in this area during the early survey visits. As such, the invertebrates of this fringe may be underestimated, in frequency if not diversity.

2.13.3 No pitfall trapping was undertaken due to the risk of unexploded ordnance on the Site. Pitfall trapping and suction sampling tend to collect a somewhat overlapping selection of species but pitfall trapping invariably collects a greater abundance of nocturnal and particularly secretive species. All active survey work was undertaken in daylight hours, and preferentially in warm fine sunny weather conducive to high levels of overall insect activity. Traps should have caught invertebrates indiscriminately during overcast weather and at night but, overall, there will be a bias in the results towards diurnal and heliophilic insects, especially due to the lack of pitfall trapping.

2.13.4 The large, open nature of the Site, coupled with its coastal location, meant that there was almost invariably a strong breeze, particularly along the runway. On several occasions the wind was strong enough to make sweep netting almost impossible and even on less windy days was usually strong enough to negatively affect recording of flying invertebrates, especially aculeate Hymenoptera and flower visiting Diptera.

2.13.5 The prevalence of warm, dry weather during the survey and very little through the middle of the survey period notably suppressed invertebrate populations. Suction sampling in particular produced very poor results during this period.

2.13.6 The soil fauna has not been sampled. It is routine not to do so in general surveys: the amount of work needed to adequately sample this component of the fauna is large and the information gained generally small. Since digging was prohibited at Manston Airport, such survey was not an option. Inevitably, there will be a subterranean element of the fauna which the 2020 records do not reveal.

3. Results

3.1.1 The 2020 survey made a total of 13,290 records of 1,224 mutually exclusive taxa of invertebrates. Of these, 174 have at least one formal conservation status. **Appendix C** is a complete list of recorded invertebrate taxa. **Table 3.1** shows the number of species/ taxa within each group (and sub-group of particular interest), together with the number with a formal conservation status. The pie-charts shown in **Figure 3.1** and **Figure 3.2** provide a visual representation of the distribution of taxa and species with formal status amongst major groups.

Table 3.1 Distribution of recorded taxa

Group	Number of species/ Taxa	Number of species/ taxa with a formal status	Sub-group	Number of species/ Taxa	Number of species/ taxa with a formal status
Araneae	95	8			
Chilopoda	2	0			
Coleoptera	390	60	Carabidae	48	3
			Chrysomelidae	58	6
			Curculionoidea	111	30
Crustacea	4	0			
Dermaptera	2	1			
Diptera	201	21			
Hemiptera	245	30			
Hymenoptera	164	43	Solitary aculeates	126	36
			Social aculeates	28	7
Lepidoptera	72	9			
Mollusca	15	0			
Neuroptera	9	0			
Odonata	2	0			
Opiliones	8	0			
Orthoptera	11	1			
Psocoptera	6	0			

Figure 3.1 Representation by group: all recorded taxa

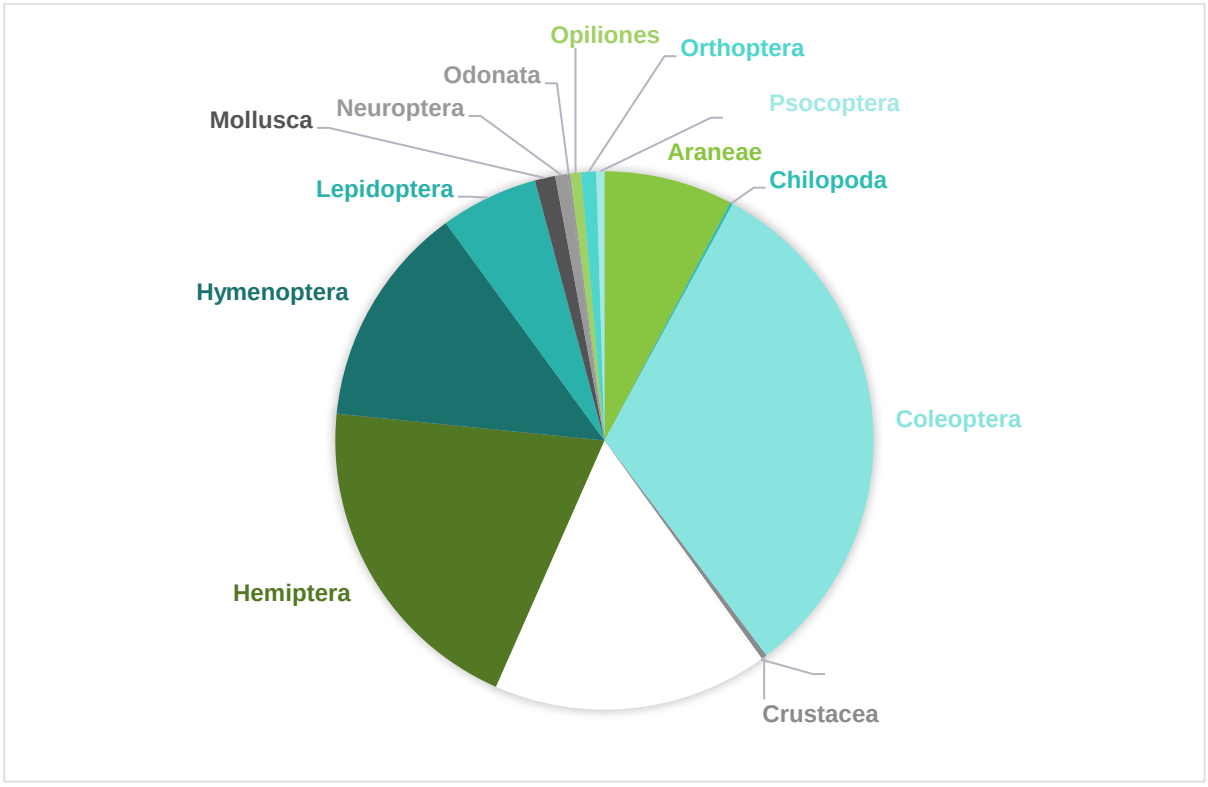
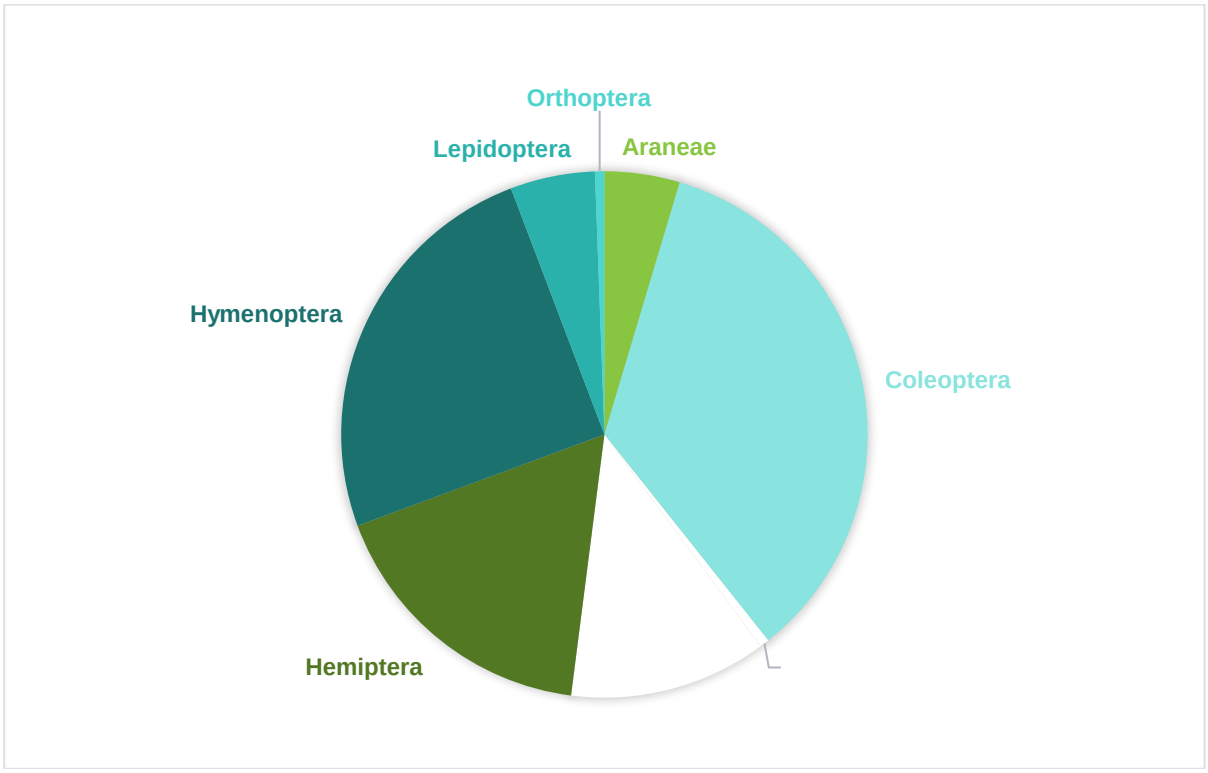


Figure 3.2 Representation by group: species with formal conservation status



3.1.2 **Table 3.2** provides a list of the recorded species with their formal conservation status.

Table 3.2 List of recorded species with formal conservation status

Group	Species	English name	UK status	IUCN status	NERC Act (s41)[15]	Kent Status
Araneae	*Cheiracanthium virescens*	a sac spider	NS	LC		
Araneae	*Phrurolithus minimus*	an ant-mimic spider	NS	LC		
Araneae	*Argenna subnigra*	a mesh-web spider	NS	LC		
Araneae	*Meioneta simplicitarsis*	a money spider	NS	LC		
Araneae	*Panamomops sulcifrons*	a money spider	NS	LC		
Araneae	*Walckenaeria dysderoides*	a money spider	NS	LC		
Araneae	*Alopecosa cuneata*	a wolf spider	NS	LC		
Araneae	*Thanatus striatus*	a running crab spider	NS	LC		
Coleoptera	*Diplapion stolidum*	a seed weevil	Nb			
Coleoptera	*Kalcapion semivittatum*	a seed weevil	Na			
Coleoptera	*Protapion difforme*	a seed weevil	Nb			
Coleoptera	*Protapion filirostre*	a seed weevil	Nb			
Coleoptera	*Trachys scrobiculatus*	Ground-ivy Jewel Beetle	NS	LC		
Coleoptera	*Malthodes pumilus*	a soldier beetle	NS	LC		
Coleoptera	*Rhagonycha lutea*	a soldier beetle	NS	LC		
Coleoptera	*Harpalus attenuatus*	Solitary Seed-eater	NS	LC		
Coleoptera	*Ophonus azureus*	Hairy Seed-eater	NS	LC		
Coleoptera	*Ophonus melletii*	Mellet's Downy-back	NR	NT	S41	
Coleoptera	*Ophonus parallelus*	a ground beetle	NR	VU		
Coleoptera	*Paracorymbia fulva*	Tawny Longhorn Beetle	NS	LC		
Coleoptera	*Aphthona nigriceps*	a flea beetle	NS	DD		
Coleoptera	*Longitarsus ballotae*	a flea beetle	NS	LC		
Coleoptera	*Phyllotreta consobrina*	a flea beetle	NS	LC		
Coleoptera	*Phyllotreta cruciferae*	Cabbage Flea Beetle	NS	LC		
Coleoptera	*Podagrica fuscicornis*	Mallow Flea Beetle	NS	LC		
Coleoptera	*Podagrica fuscipes*	Mallow Flea Beetle	NS	LC		
Coleoptera	*Hippodamia variegata*	Adonis' Ladybird	Nb			
Coleoptera	*Nephus quadrimaculatus*	Four-spotted Nephus	RDB2			

Group	Species	English name	UK status	IUCN status	NERC Act (s41)[15]	Kent Status
Coleoptera	*Platynaspis luteorubra*	Ant-nest Ladybird	Na			
Coleoptera	*Scymnus femoralis*	Heath Scymnus	Nb			
Coleoptera	*Scymnus schmidti*	Schmidt's Scymnus	Nb			
Coleoptera	*Anthonomus rufus*	a weevil	RDB3			
Coleoptera	*Cathormiocerus aristatus*	a weevil	Nb			
Coleoptera	*Cathormiocerus spinosus*	a weevil	Nb			
Coleoptera	*Glocianus punctiger*	a weevil	Nb			
Coleoptera	*Graptus triguttatus*	a weevil	Nb			
Coleoptera	*Gronops lunatus*	a weevil	Nb			
Coleoptera	*Gymnetron melanarium*	a weevil	Nb			
Coleoptera	*Hypera melancholica*	a weevil	Nb			
Coleoptera	*Hypera meles*	a weevil	Na			
Coleoptera	*Kissophagus vicinus*	Ivy Bark Beetle	Nb			
Coleoptera	*Larinus carlinae*	Thistle Bud Weevil	Nb			
Coleoptera	*Lixus scabricollis*	a weevil	RDBK			
Coleoptera	*Microplontus campestris*	a weevil	Nb			
Coleoptera	*Orthochaetes setiger*	a weevil	Nb			
Coleoptera	*Phyllobius vespertinus*	a leaf weevil	Nb			
Coleoptera	*Polydrusus formosus*	a leaf weevil	Na			
Coleoptera	*Rhinocyllus conicus*	Thistle-head Weevil	Na			
Coleoptera	*Sirocalodes mixtus*	a weevil	Nb			
Coleoptera	*Smicronyx reichi*	a weevil	RDB3			
Coleoptera	*Strophosoma faber*	a weevil	Nb			
Coleoptera	*Trachyphloeus alternans*	a weevil	Nb			
Coleoptera	*Trachyphloeus spinimanus*	a weevil	Nb			
Coleoptera	*Trichosirocalus barnevillei*	a weevil	Nb			
Coleoptera	*Tychius pusillus*	a weevil	Nb			
Coleoptera	*Tychius squamulatus*	a weevil	Nb			
Coleoptera	*Zacladus exiguus*	Bloody Cranesbill Weevil	Nb			
Coleoptera	*Athous campyloides*	a click beetle	Nb			

Group	Species	English name	UK status	IUCN status	NERC Act (s41)[15]	Kent Status
Coleoptera	*Corticarina truncatella*	a minute brown scavenger beetle	N			
Coleoptera	*Ptomaphagus varicornis*	a round fungus beetle	RDBK			
Coleoptera	*Mordellistena neuwaldeggiana*	a tumbling flower beetle	NS	LC		
Coleoptera	*Mordellistena parvula*	a tumbling flower beetle	NS	LC		
Coleoptera	*Meligethes fulvipes*	a pollen beetle	N			
Coleoptera	*Meligethes rotundicollis*	a pollen beetle	N			
Coleoptera	*Olibrus flavicornis*	a shining flower beetle	RDBK			
Coleoptera	*Olibrus millefolii*	a shining flower beetle	Nb			
Coleoptera	*Anotylus insecatus*	a rove beetle	Nb			
Coleoptera	*Medon fusculus*	a rove beetle	RDBI			
Dermaptera	*Forficula lesnei*	Lesne's Earwig	NS	LC		
Diptera	*Lucilia bufonivora*	Toad Greenbottle	pNS			
Diptera	*Trachysiphonella ruficeps*	a fruit fly	pNS			
Diptera	*Thecophora fulvipes*	Orange-thighed Beegrabber	N			
Diptera	*Neurigona abdominalis*	a long-footed fly	NT	EN		
Diptera	*Empis woodi*	a dance fly	N	LC		
Diptera	*Geomyza apicalis*	an opomyzid fly	pNS	LC		
Diptera	*Geomyza subnigra*	an opomyzid fly	pNS	LC		
Diptera	*Sarcophaga agnata*	a flesh fly	pNS			
Diptera	*Chrysotoxum elegans*	Variable Wasp Hoverfly	NS	LC		
Diptera	*Triglyphus primus*	Mugwort Hoverfly	NS	LC		
Diptera	*Catharosia pygmaea*	a parasitic fly	local			KRDBK
Diptera	*Cistogaster globosa*	a parasitic fly	RDB2			
Diptera	*Gymnosoma nitens*	a parasitic fly	RDB1			KRDB2
Diptera	*Litophasia hyalipennis*	a parasitic fly	Extinct			KRDB2
Diptera	*Acanthiophilus helianthi*	a gall fly	N			
Diptera	*Dioxyna bidentis*	a gall fly	N			
Diptera	*Merzomyia westermanni*	a gall fly	N			
Diptera	*Orellia falcata*	a gall fly	N			

Group	Species	English name	UK status	IUCN status	NERC Act (s41)[15]	Kent Status
Diptera	*Oxyna flavipennis*	a gall fly	N			
Diptera	*Urophora cuspidata*	a gall fly	N			
Diptera	*Thereva fulva*	Small Plain Stiletto	NR	NT		KRDB1
Hemiptera	*Berytinus hirticornis*	a stiltbug	Nb			
Hemiptera	*Euscelidius variegatus*	a leafhopper	Nb			
Hemiptera	*Pentastiridius leporinus*	a lacehopper	Nb			
Hemiptera	*Reptalus quinquecostatus*	a lacehopper	Nb			
Hemiptera	*Arenocoris falleni*	Fallén's Leatherbug	NS	LC		
Hemiptera	*Bathysolen nubilus*	Cryptic Leatherbug	NS	LC		
Hemiptera	*Ceraleptus lividus*	Slender-horned Leatherbug	NS	LC		
Hemiptera	*Legnotus picipes*	Heath Shieldbug	NS	LC		
Hemiptera	*Thyreocoris scarabaeoides*	Scarab Shieldbug	NS	LC		
Hemiptera	*Asiraca clavicornis*	a planthopper	Nb			
Hemiptera	*Ribautodelphax imitans*	Tall Fescue Planthopper	RDBK		S41	
Hemiptera	*Scottianella dalei*	a planthopper	Nb			
Hemiptera	*Aphanus rolandri*	a groundbug	Na			
Hemiptera	*Emblethis griseus*	a groundbug	RDB3			
Hemiptera	*Ischnodemus quadratus*	a groundbug	RDB1			KRDB1
Hemiptera	*Megalonotus antennatus*	a groundbug	Nb			
Hemiptera	*Megalonotus praetextatus*	a groundbug	Nb			
Hemiptera	*Megalonotus sabulicola*	a groundbug	Nb			
Hemiptera	*Nysius graminicola*	a groundbug	RDB3			
Hemiptera	*Ortholomus punctipennis*	a groundbug	RDB3			KRDBK
Hemiptera	*Peritrechus gracilicornis*	a groundbug	RDB3			KRDBK
Hemiptera	*Chlamydatus evanescens*	a capsid bug	RDB3			
Hemiptera	*Hallodapus montandoni*	a capsid bug	RDB3			KRDB2
Hemiptera	*Lygus pratensis*	a capsid bug	RDB3			KRDB3
Hemiptera	*Systellonotus triguttatus*	a capsid bug	Nb			
Hemiptera	*Sciocoris cursitans*	Sand-runner Shieldbug	NS	LC		

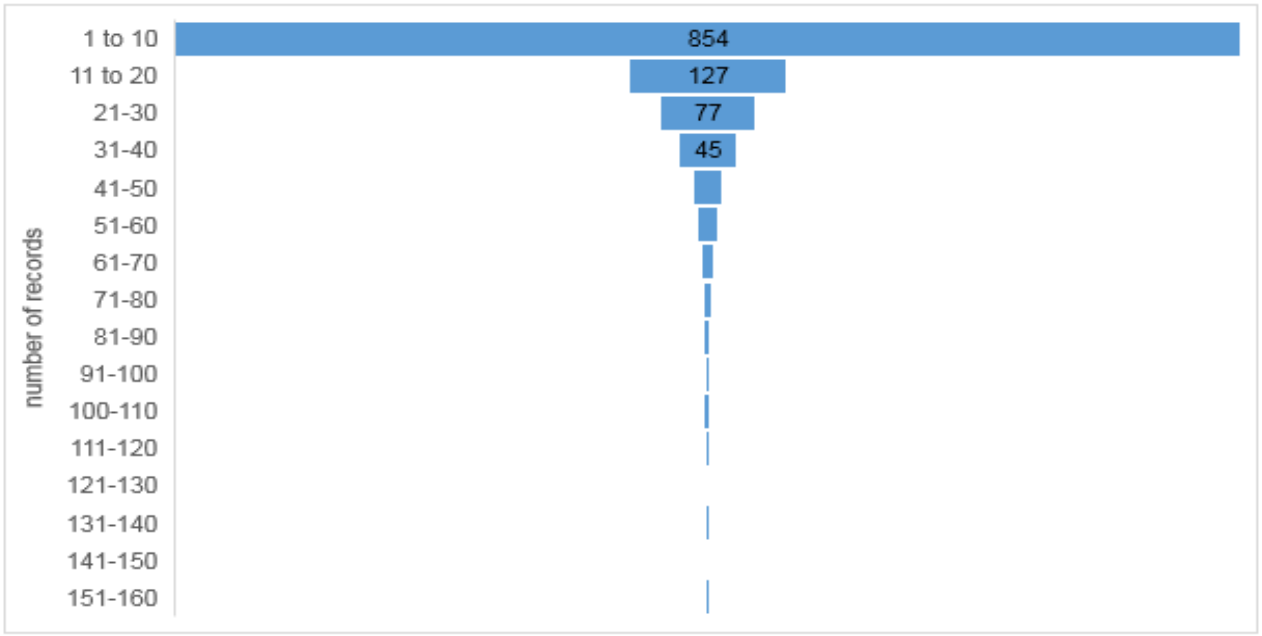
Group	Species	English name	UK status	IUCN status	NERC Act (s41)[15]	Kent Status
Hemiptera	*Pyrrhocoris apterus*	Fire Bug	NR	LC		
Hemiptera	*Liorhyssus hyalinus*	a scentless plant bug	NS	LC		
Hemiptera	*Eurygaster maura*	Scarce Tortoise Shieldbug	NS	LC		
Hemiptera	*Odontoscelis fuliginosa*	Greater Streaked Shieldbug	NR	VU		KRDB1
Hymenoptera	*Andrena alfkenella*	Alfken's Mini-miner	RDB3			pKRDB2
Hymenoptera	*Andrena fulvago*	Hawk's-beard Mining Bee	Na			pKRDB2
Hymenoptera	*Andrena hattorfiana*	Large Scabious Mining Bee	RDB3			pKRDB2
Hymenoptera	*Andrena minutuloides*	Plain Mini-miner	Na			
Hymenoptera	*Andrena niveata*	Long-fringed Mini-miner	RDB2			pKRDB1
Hymenoptera	*Andrena proxima*	Broad-faced Mining Bee	RDB3			pKa
Hymenoptera	*Andrena trimmerana*	Trimmer's Mining Bee	Nb			
Hymenoptera	*Andrena varians*	Blackthorn Mining Bee	Nb			pKa
Hymenoptera	*Bombus humilis*	Brown-banded Carder Bee	local		S41	Kb
Hymenoptera	*Bombus ruderarius*	Red-Shanked Carder Bee	local		S41	pKb
Hymenoptera	*Bombus ruderatus*	Large Garden Bumblebee	Na		S41	pKRBB2
Hymenoptera	*Bombus rupestris*	Hill Cuckoo Bee	Nb			
Hymenoptera	*Nomada conjungens*	Fringeless Nomad Bee	RDB2			pKRDB2
Hymenoptera	*Nomada fucata*	Painted Nomad Bee	Na			
Hymenoptera	*Nomada fulvicornis*	Orange-horned Nomad Bee	RDB3			pKa
Hymenoptera	*Hedychridium roseum*	a cuckoo wasp	local			pKb
Hymenoptera	*Hedychrum niemelai*	a cuckoo wasp	RDB3			pKa
Hymenoptera	*Colletes hederae*	Ivy Bee	common			pKRDBK
Hymenoptera	*Hylaeus cornutus*	Spined Hylaeus	Nb			pKb
Hymenoptera	*Hylaeus signatus*	Large Yellow-face Bee	Nb			
Hymenoptera	*Crabro cribrarius*	Slender-bodied Digger Wasp	local			pKb
Hymenoptera	*Dryudella pinguis*	a digger wasp	local			pKb
Hymenoptera	*Philanthus triangulum*	Bee-wolf	RDB2			
Hymenoptera	*Myrmica schencki*	a red ant	Nb			

Group	Species	English name	UK status	IUCN status	NERC Act (s41)[15]	Kent Status
Hymenoptera	*Ponera coarctata*	Indolent Ant	Nb			
Hymenoptera	*Lasioglossum brevicorne*	Short-horned Furrow Bee	RDB3			
Hymenoptera	*Lasioglossum malachurum*	Sharp-collared Furrow Bee	Nb			
Hymenoptera	*Lasioglossum pauperatum*	Squat Furrow Bee	RDB3			pKb
Hymenoptera	*Lasioglossum pauxillum*	Lobe-spurred Furrow Bee	Na			
Hymenoptera	*Lasioglossum xanthopus*	Orange-footed Furrow Bee	Nb			pKa
Hymenoptera	*Sphecodes crassus*	Swollen-thighed Blood Bee	Nb			
Hymenoptera	*Sphecodes rubicundus*	Red-tailed Blood Bee	Na			pKa
Hymenoptera	*Sphecodes spinulosus*	Spined Blood Bee	RDB2			pKRDB1
Hymenoptera	*Megachile leachella*	Silvery Leaf-cutter Bee	Nb			pKb
Hymenoptera	*Osmia aurulenta*	Gold-fringed Mason Bee	local			pKb
Hymenoptera	*Arachnospila minutula*	a spider-hunting wasp	Nb			pKa
Hymenoptera	*Auplopus carbonarius*	a spider-hunting wasp	Nb			pKb
Hymenoptera	*Pompilus cinereus*	Leaden Spider Wasp	local			pKb
Hymenoptera	*Priocnemis agilis*	a spider-hunting wasp	Nb			pKa
Hymenoptera	*Priocnemis confusor*	a spider-hunting wasp	Nb			pKb
Hymenoptera	*Priocnemis parvula*	Small Priocnemis	local			pKb
Hymenoptera	*Gymnomerus laevipes*	a potter wasp	local			pKRDB3
Hymenoptera	*Odynerus melanocephalus*	Black Headed Mason Wasp	Na		S41	pKRDB3
Lepidoptera	*Nemophora fasciella*	Horehound Long-horn Moth	pNb		S41	
Lepidoptera	*Oncocera semirubella*	Rosy-striped Knot-horn	pNb			
Lepidoptera	*Spilosoma luteum*	Buff Ermine	common		S41	
Lepidoptera	*Tyria jacobaeae*	Cinnabar Moth	common		S41	
Lepidoptera	*Calophasia lunula*	Toadflax Brocade	RDB			KRDB1
Lepidoptera	*Ceramica pisi*	Broom Moth	common		S41	
Lepidoptera	*Coenonympha pamphilus*	Small Heath	common	NT	S41	
Lepidoptera	*Lasiommata megera*	Wall Brown	local	NT	S41	
Lepidoptera	*Bembecia ichneumoniformis*	Six-belted Clearwing	Nb			

Group	Species	English name	UK status	IUCN status	NERC Act (s41)[15]	Kent Status
Mollusca	*Candidula gigaxii*	Eccentric Snail	NS	LC		
Orthoptera	*Stenobothrus lineatus*	Stripe-winged Grasshopper	NS	LC		

3.1.3 Few of the recorded species were found both widely and frequently on the Site. Three hundred and fifty-eight taxa (29.3% of the total) were recorded only once, though some of these single records were of multiple individuals. Twelve species (0.1% of the total) provide 10% of the records. **Figure 3.3** illustrates the frequency distribution of recorded taxa.

Figure 3.3 Frequency distribution of recorded taxa



3.1.4 A total of 256 mutually exclusive taxa (species) were recorded during the botanical recording exercise, of which five are Near Threatened in England, one is Near Threatened in the UK and included on Schedule 8 of the *Wildlife & Countryside Act 1981 (as amended)*[12], and one is Vulnerable in England. The plant list obtained for the Site is of potential value in determining the preferred composition of the vegetation for invertebrates. A list of plant species recorded is given in **Appendix D**, together with an estimate of the current importance of each plant species for invertebrates, based on the records obtained in 2020, on a five-point scale (0 to 4). A plant has been given a score of at least one if it is confidently known to support, on the Site, at least one species with formal status, or a group of specialist species at least one of which is considered local. The assigned score is raised according to the number of associated species and their exact statuses, and if the flowers are used by a wider range of non-specialist species, including scarce ones, as a source of nectar or pollen.

3.1.5 The placing of plant species in these categories is not entirely straightforward and it has not been practically possible to use a defined set of criteria uniformly across the list. Complications arise from several sources. Some recorded scarce species are polyphagous and it is not known what plants

[12] Parliament of the United Kingdom, Wildlife and Countryside Act 1981 (Online). Available at: https://www.legislation.gov.uk/ukpga/1981/69 (Accessed February 2021).

they are using: if there is believed to be a particularly strong association with one species then that species has been scored, but for others it is likely that some plant species are under-valued. Grass-feeding species pose a problem because it is often not fully known what range of grasses they feed on, and the default option has been to give a score of 1 to those species of grass most regularly reported as foodplants of the scarcer species. Where part of the score given to a species depends on its value as a nectar source this is based on widespread acceptance of their value coupled with field observation from the Site but is, to a degree, subjective.

4. Assessment and Distribution of Interest

4.1.1 This section gives the results of analysis of the data gathered during the survey. It includes simple analysis of the rare and scarce species found on the Site and highlights species of particular interest. It also provides the results of Pantheon analysis; analysis of overall invertebrate assemblages using the Invertebrate Quality Index (IQI) and analysis of solitary bee and wasp assemblages using the Aculeate Quality Index (AQI). An overall summary assessment is provided, and the distribution of interest on the Site is mapped.

4.1 Pantheon analysis

4.1.1 The results and output from the Pantheon analysis for the fauna of the entire Site are given in **Appendix E** and a complete list of species with Pantheon annotations is included in the detailed spreadsheet. There are obvious errors and omissions in the entries for a large proportion of species, reflecting the unfinished character of the Pantheon application, so detailed consideration of the analysis could potentially be misleading. The ISIS assemblages which form a key component of assessment in Pantheon are affected in part because the statuses, habitats, and in some cases behaviours of some species have changed since species were first allocated to assemblages.

4.1.2 ISIS analysis is most appropriate for relatively small numbers of samples taken in a standardised way, therefore, the large number of samples taken at the Site and consideration of the whole Site is not well-suited to analysis in this way. Assessment of the overall interest of the fauna, and of selected components of the Site, is therefore based on the IQI. That said, the number of species recorded is sufficiently large that some elements of Pantheon analysis are useful in indicating overall assemblages and broad habitat associations.

4.1.3 **Table 4.1** and **Table 4.2** show, respectively, the breakdown of the recorded fauna by habitat and into assemblages, together with the Species Quality Index (SQI) for that habitat.

Table 4.1 Summary of broad biotopes and habitats identified by Pantheon analysis

Broad biotope	Habitat	Number of species	% of total species	SQI	Species with status
Open habitats	Tall sward & scrub	518	20	124	41
Open habitats	Short sward & bare ground	311	24	192	89
Tree-associated	Arboreal	85	6	125	4
Tree-associated	Decaying wood	41	3	161	7
Tree-associated	Shaded woodland floor	40	4	108	2
Wetland	Peatland	22	2	112	1
Wetland	Marshland	14	2	160	1
Coastal	Saltmarsh	5	2	200	2
Wetland	Running water	5	<1	100	
Open habitats	Upland	3	2	100	

Broad biotope	Habitat	Number of species	% of total species	SQI	Species with status
Wetland	Wet woodland	3	1	100	
Tree-associated	Wet woodland	2	<1	100	
Coastal	Sandy beach	2	2	250	1
Coastal	Brackish pools & ditches	2	2	100	
Coastal	Sea cliff	1	2	800	1

Table 4.2 Summary of ISIS assemblages identified by Pantheon analysis

Broad biotope	Specific Assemblage Type	Number of species	% of total species	SQI	Species with status	Reported condition
Open habitats	Rich flower resource	79	33	159	23	Favourable
Open habitats	Bare sand & chalk	57	13	308	29	Favourable
Open habitats	Open short sward	49	24	182	15	Favourable
Open habitats	Scrub edge	36	16	133	4	Favourable
Tree-associated	Bark & sapwood decay	32	6	169	5	Favourable
Open habitats	Scrub-heath & moorland	12	3	125	2	Favourable
Tree-associated	Epiphyte fauna	2	10	100		Unfavourable
Coastal	Saltmarsh & transitional brackish marsh	2	2	250	1	Unfavourable
Wetland	Reed-fen & pools	1	<1	100		Unfavourable
Open habitats	Exposed sea-cliff	1	2	800	1	
Tree-associated	Heartwood decay	1	<1	100		Unfavourable

4.1.4 The presence of "upland" is clearly incorrect and the result of inappropriate coding. The number of "shaded woodland floor" species is surprisingly large for a site without woodland, but they can be considered a component of this assemblage which falls towards the edge of eligibility (i.e. the Site does possess some shade). Otherwise, the unexpected components of the fauna that are genuinely present are associated with the coast or with wetland.

4.1.5 The Site, particularly at the eastern end, is located close to the coast and, as such, the presence of "coastal" species is not entirely unexpected. The species typically associated with "sandy beach" and "sea cliff" species are genuinely established on the Site. None are restricted to coastal areas in European mainland but tend to be confined as such in Britain because it is at the western edge of the range and climate change is causing the spread of many previously restricted species. In combination, these factors are sufficient to account for a few unexpected species.

4.1.6 Species associated with saltmarsh and wetland, however, are either miscoded or represent occasional 'stray' records from saltmarsh, e.g., the soldierfly *Nemotelus notatus* and the lacehopper *Pentastiridius leporinus*, which have no suitable habitat on the Site.

4.1.7 Manston Airport is in an exposed and often windy location which will inevitably receive windblown strays and actively dispersing individuals from sites for a considerable distance around. The numbers of such species appearing, though, must be quite large for representatives to be so frequently recorded during survey work.

4.1.8 The number of tree-associated species recorded might be considered large in view of the small number and low diversity of trees on the Site. However, this is a large category with varied ecology. Many of its species can be found in quite low scrub, and a single tree can provide a substantial volume of habitat and support a large number of species. That said, the two components of open habitat represented in **Table 4.1** include 20% and 24% of the British fauna, while the three tree-associated components include only 6%, 3% and 4%, as well as a much lower proportion of species with formal status.

4.1.9 Overwhelmingly, the recorded fauna is dominated by species associated with open habitats, which are divided into "short sward" and "tall sward" species. The differentiation of these alternatives is not always easy, not least because Pantheon does not recognise "medium sward" as a possibility, forcing an abrupt dichotomy which does not exist in reality. In **Table 4.1** "tall sward" has the greater number of species, but "short sward" includes a larger proportion of the total available fauna and includes far more species with formal status. It is a safe general assumption, and conforms with expectations from observations, that all the open habitats on the Site, from bare ground to dense continuous grassland, are of value, but that the shorter and more open-structured the sward is, the higher the level of interest in the invertebrate fauna it contains.

4.1.10 The ISIS assemblages reported confirm and slightly expand this assessment of the concentration of interest in open habitats, with favourable condition reported for the *Bare Sand and Chalk* assemblage and the *Open Short Sward* assemblage, to which are added the *Rich Flower Resource* assemblage and the *Scrub Edge* assemblage, both represented by large numbers of species. This extends the demonstrated interest of open habitats to transitions with woody vegetation and emphasises the value of flowering plants in the sward.

4.1.11 The assessment of favourable condition for the *Bark and Sapwood Decay* assemblage is surprising, but might be ascribed to the large number of samples taken compared to the number expected in surveys for ISIS analysis. In practice only a small proportion of the samples included dead wood in more than trivial amounts, simply because there is very little on the Site. There are several other small assemblages that can be ignored for current purposes because they are based on strays or miscoded species; or are of fringe relevance.

4.2 Invertebrate Quality Index (IQI)

4.2.1 **Table 4.3** gives the IQS and IQI for the Site as a whole, and separately for each major division. The IQI is calculated by dividing the summed scores of all invertebrate species (IQS) by the number of species present to give an average score (IQI).

Table 4.3 Invertebrate Quality Index (IQI) values for the whole site and all major recording units.

Area	Number of species	IQS	IQI	Value
The Site	1,266	12,620	10.29	National
1 - Runway grassland	879	8,220	9.35	Excellent
2 - Grassland north of Manston Road	472	3,580	7.58	Excellent

Area	Number of species	IQS	IQI	Value
3 - Spitfire memorial museum area	278	2,420	8.71	Excellent
4 - Terminal area and open mosaic	547	5,470	10.00	National
5 - Disturbed areas	657	6,010	6.15	Good

4.2.2 These figures confirm the overall importance of the Site for invertebrates with the IQI score indicating national conservation value. The highest scoring individual area, with an IQI indicating national significance, is the surroundings of the terminal buildings. This is mostly due to the large number of scarce species recorded from the open mosaic habitat to the south of the car park. The runway area, the Museum area and its immediate vicinity and the grassland to the north of Manston Road all achieved IQI scores indicative of excellent invertebrate conservation value. The only individual area to achieve a lower score was the large areas of disturbed ground, achieving an IQI score indicating good invertebrate conservation value.

4.3 Solitary bee and wasp assemblages

4.3.1 A total of 123 scoring species of solitary bees and wasps was recorded during the survey. **Appendix F** lists all scoring species and the scores assigned to each. AQI scores were calculated for the Site as a whole and for each major recording area. **Table 4.4** summarises the results of the analysis for each major recording unit.

4.3.2 There are currently no published definitions of conservation value based on the Solitary Bee and Wasp AQI. Archer (1996)[10] suggests that an AQI of two or more is indicative of a good quality site. AQI's for the highest quality sites range from 1.3 in Northumbria to 5.5 in Dorset, reflecting the correlation between warm climate and aculeate diversity. Kent, positioned on the southeast tip of England, and one of the warmest counties in the country, can be expected to be towards the top end of this range. Based on the assumption that an outstanding aculeate site in Kent would have an AQI of around 5.0, the following broad quality categories have been assigned:

- 5.00 or greater = outstanding, of exceptional conservation value, nationally important;
- 4.00 – 4.99 = very high; regionally and potentially nationally important;
- 3.00 - 3.99 = high; locally and potentially regionally important;
- 2.00 – 2.99 = moderate, of some conservation value but probably only locally important; the range of scores that might be expected from high quality wider countryside or unexceptional (for aculeates) protected areas; and
- 1.00 – 1.99 = low, limited to negligible conservation value; this range of scores likely to occur in the general wider countryside and other sites of low quality for aculeates.

Table 4.4 Aculeate Quality Indices (AQI) and assessment of aculeate conservation value

Area	Species	Quality score	AQI	Conservation value
The Site	123	506	4.11	very high
1 - Runway grassland	76	310	4.08	very high

Area	Species	Quality score	AQI	Conservation value
2 - Grassland north of Manston Road	29	82	2.83	Moderate
3 - Spitfire Memorial Museum area	10	24	2.40	Moderate
4 - Terminal area and open mosaic	83	293	3.53	high
5 - Disturbed areas	88	356	4.05	very high

4.3.3 The overall quality of the Site's solitary bee and wasp assemblage, as measured by the AQI, is very high. This is unsurprising as the Site supported a good number of scarce species, some with very localised distribution. Taken individually, both the area surrounding the runway and the large areas of disturbed ground and ruderal vegetation supported assemblages of very high conservation value. These areas supported a number of scarce species associated with extensive flower-rich coastal grasslands. Flower resources were largely concentrated in areas of disturbed or ruderal habitat and the edges or small patches of the grassland; and much of the aculeate interest coincided with these areas. The area surrounding the terminal buildings achieved an AQI score indicating high conservation value. This area had good nesting habitats in the open mosaic to the south of the car park and plentiful nectar sources, in the form of brambles, thistles and Brassicaceae at the edges of the area, and yellow Asteraceae and ox-eye daisy within the open mosaic itself. Both areas to the north of Manston Road, the grassland and bordering hedges and the Museum area achieved AQI scores indicative of moderate conservation value.

4.3.4 The grassland to the north of Manston Road had fewer, flower-rich areas than that to the south. This may go some way towards explaining the poorer solitary wasp and bee assemblage. The Museum area had plentiful nectar sources and seemed relatively well structured for aculeates, but appeared to lack bare ground for nesting sites and shading by trees and scrub, which may have reduced its value for aculeates.

4.4 Rare species

4.4.1 Manston Airport supports many species possessing at least one formal conservation status. A substantial proportion belong to groups that have not received a recent status review, meaning many assigned statuses are out of date and may overstate current rarity. Most of the species with formal status are individually unsurprising given the size, location and character of the Site. There are, however, some species which are worthy of particular note.

4.4.2 The Nationally Rare ground beetle *Ophonus parallelus* is a significant record. Recent records are limited to a small number of coastal localities in South-east England from Ventnor (Isle of Wight) to East Kent. This record is the first for northeast Kent and the only post-2000 record for the county. As only a single individual was encountered during the survey, it cannot be said with certainty that the species is established at Manston, however, the Site does provide suitable habitat and there is no obvious reason that a population should not be established.

4.4.3 The Nationally Rare long-footed fly *Neurigona abdominalis* is a surprising record. It is associated with woody vegetation, but in Britain has usually been found in gardens, suggesting an association with wood edge habitats or scrub. Previous records suggest a restricted distribution in East Anglia. It may be under-recorded, especially if it lives in the interior of shrubs, but the Manston record could be part of a secondary colonisation. The record is, however, based on a single damaged female and more material would be required before the species could be confirmed as resident in the area.

4.4.4 The Nationally Rare small plain stiletto *Thereva fulva* (**Photograph 4.1**) was found abundantly on the large spoil mound to the south of Manston Road and occasionally elsewhere. Although its distribution on the Site may be restricted, the population appeared to be large. It is a rare species of restricted distribution in southeast England and south Wales. Historically it appears to have been well-established in parts of Kent that are now absorbed into the London fringe. Most records are from open sandy areas, including dunes, but it is also known from chalk. The discovery of a large population at Manston Airport is noteworthy.

Photograph 4.1 Small plain stilletto, *Thereva fulva*

4.4.5 The groundbug *Emblethis griseus* (**Photograph 4.2**) has previously been known from single sites in Kent and mainland Cornwall, and from a number of places in the Scilly Isles. All previously known sites are on coastal dunes. The Manston population is notable for being not only the third mainland British locality (though very close to the previously known population at Sandwich Bay) but the first one found inland and not on sand. The Manston population is also noteworthy for its size. *E. griseus* occurred in abundance at the margins of hard standing across the Site.

Photograph 4.2 A groundbug, *Emblethis griseus*.

4.4.6 The greater streaked shieldbug, *Odontoscelis fuliginosa* is another rare bug species recorded from Manston Airport. There are now only two other strongholds known for this species: at Sandwich Bay, Kent, and on the south coast of Pembrokeshire, although it was recorded from a new location

on the north Kent coast in 2014. The Manston population is interesting in being the first confirmed inland record. It is scarce but widespread at Manston, preferring the vegetation at the boundary between grassland and hard standing.

4.4.7 The groundbug *Ischnodemus quadratus* has only previously been recorded with certainty from Folkestone Warren, where it has been known for many years. It occurs there especially in grassland at the top of the cliffs and can be abundant. There is at least one report of the species from another nearby site but this appears to be unconfirmed. The features separating this species from the very common *I. sabuleti* are quite subtle and it is possible that other populations of *I. quadratus* have gone unrecorded, but at present it seems that the Manston population, which seems quite large, is only the second confirmed British population. It was found quite widely in the better-quality grassland on the Site as well as in the open mosaic to the south of the car park.

4.4.8 The plantbug *Hallodapus montandoni* (**Photograph 4.3**) is a rare calcicolous species, recorded from a thin scatter of chalk and limestone grassland in southern counties from Kent to Gloucestershire. It may be somewhat under-recorded, but has a restricted range and habitat, and seems to be genuinely absent from many calcareous grasslands. It was recorded in abundance at the boundary between grassland and hard standing at Manston Airport.

Photograph 4.3 A plantbug, *Hallodapus montandoni*.

4.4.9 The firebug, *Pyrrhocoris apterus* (**Photograph 4.4**) was recorded in large numbers from the car park and road verges around the Terminal buildings at Manston Airport. In the nineteenth century, the species was recorded from a quite wide scatter of locations across southern Britain, but it declined for unknown reasons and was for many years apparently confined to a single locality in Devon. In recent years it has re-appeared in south-eastern England, almost certainly as a result of a separate introduction (or introductions). It is slowly increasing, but the bug is flightless, colonies appear, at the moment, to be highly localised, and the spread is slow, erratic and uncertain. Since its dispersal is often human-facilitated, colonies tend to crop up in places such as car parks, service stations and road verges. The large population discovered at Manston is a notable step in this expansion.

Photograph 4.4 Firebug, *Pyrrhocoris apterus*.

4.4.10 The long-fringed mini-miner *Andrena niveata* was one of the more abundant species of solitary bee at Manston Airport. This small mining bee gathers pollen exclusively from members of the Brassicaceae, which were found abundantly in disturbed areas and along the edges of hard standing at Manston. It is ground-nesting, but nests are rarely seen and the exact requirements are unclear. It has a very restricted distribution, mostly in Kent, Sussex and Surrey, though it has recently been recorded from East Anglia and old records are more widespread. The large population present at Manston Airport is of significance.

4.4.11 The fringeless nomad bee, *Nomada conjungens* is a very rare parasite of the broad-faced mining bee *Andrena proxima*. The host is itself rare, found locally in umbellifer-rich open habitats in the southeast, and occurring locally at Manston Airport. Records of *N. conjungens* are few and widely scattered within the range of its host, from habitats including calcareous grassland, coastal cliffs and heathland margins. Manston Airport is now one of only a handful of known sites.

4.4.12 In addition to the rare species listed above, several species were recorded from Manston Airport that represent their first occurrence in the British Isles. While it is likely that these are all recent colonists and may expand rapidly, following the pattern of many other recent invertebrate colonists, it is worth highlighting their presence.

- Shining blue weevil *Aulacobaris coerulescens* – a single specimen (**Photograph 4.5**) was recorded from an area of disturbed ruderal ground at the northwest edge of the runway. This species is widespread in nearby coastal France and the Netherlands and feeds on members of the Brassicaceae. No more could be found despite further searches, potentially indicating it is not established on the Site, although the habitat and food plants are suitable;
- Planthopper *Acanthodelphax spinosa* – recorded from several areas of unexceptional tussocky grassland. This species is widespread in continental Europe and does not seem to have particularly demanding habitat requirements. The spread of records and number of individuals encountered show that it is well established at Manston Airport; and
- Two species of tettigometrid planthopper – recorded as new to Britain during the 2017 scoping survey. These have now tentatively been identified as *Tettigometra laeta* (**Photograph 4.6**) and *Tettigometra virescens* (**Photograph 4.7**) although taxonomy and identification in this group is challenging and there is some doubt about whether these are indeed separate taxa. During the 2020 survey, both species were found to be abundant in the open mosaic to the south of the car park and were recorded with reasonable frequency from grassland along the runway and to the north of Manston Road. They are clearly well established at Manston and are now expanding. Both have now been recorded elsewhere in Kent.

Photograph 4.5 A weevil, *Aulacobaris* cf. *coerulescens*.

Photograph 4.6 A planthopper, *Tettigometra* cf. *laeta*.

Photograph 4.7 A planthopper, *Tettigometra* cf. *virescens*.

4.5 Distribution of interest

4.5.1 Records of species with formal conservation status are widespread but very unevenly distributed. **Figure 4.1** shows the number of species with formal conservation status recorded from each of the 100 metre squares surveyed. Squares with high numbers of scarce species are particularly concentrated around the entrance track, car park and airport buildings, with a secondary peak associated with the elongate ruderal-covered earth mound immediately south of the Manston Road. The Museum area and its immediate vicinity has a somewhat more diffuse concentration of records. A third smaller concentration is around the southern limit of the business premises running south from the Manston Road.

4.5.2 Though these differences are probably real, the map may exaggerate them. Because of the need to get good seasonal coverage of all habitat components, areas with special or unique features were repeatedly visited, whereas in large areas of relatively uniform habitat many squares were visited only once. Water traps were also concentrated in the area close to the entrance track, partly because this was an area with high potential and little management, but also for the pragmatic reason that they could be serviced in passing on each visit without a great time commitment.

4.5.3 The Site is large and its habitats for invertebrates very varied. There is also great variation in the level of interest recorded from the different habitat types and features encountered. Some of these habitats and features are either very large or are present in multiple locations, so that mapping does not easily capture their relative significance. The following paragraphs attempt to subdivide the Site into its more conspicuous, expansive, frequent and special features and to consider the level of invertebrate interest associated with each. The classification is inevitably simplistic and incomplete but provides a degree of context for the findings from Pantheon analysis.

Woody vegetation

4.5.4 Tree cover on the Site is low and very localised. The trees themselves are not of particular value for invertebrates: they are not old enough to support substantial dead wood interest and they are of species which do not support large numbers of phytophagous species (feeding on plants or plant material).

4.5.5 Scrub is of higher interest (**Photograph 4.8**). The fauna of interfaces and transitions between scrub and open habitats is of demonstrated value, some of the solitary bees and wasps recorded nest in broken ends of twigs and bramble stems; the flowers of rosaceous shrubs are a valuable nectar source generally and specifically to some scarce bees; some uncommon phytophagous species are specifically associated with recorded scrub species, and scrub probably provides useful shelter and hibernation sites. Little interest has, however, been recorded from recently planted hedges along some parts of the Site boundary. This, however, may be simply because they are too young to have yet developed good structure or to have accumulated many species.

631000 632000 633000 634000 635000

167000 166000 165000 164000

Key

Order Limits

Scarce Species Richness

1 - 5

6 - 10

11- 20

21 - 30

30 +

0 200 400 600 800 m

Scale at A3: 1:15,000

Client

RSP

Manston Airport DCO
Invertebrate Survey Report 2020

Figure 4.1
Distribution of records of species with formal conservation status

February 2021

wood.

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Photograph 4.8 Well-structured scrub-grass transitions south of the terminal buildings

Mown grassland

4.5.6 Much of the Site is mown for silage; in 2020 it was cut early in June. The Phase 1 habitat survey of the Site identified all this grassland as semi-improved but noted variation in the degree of improvement. There is, in fact, considerable variety in character and there is great variation in species-richness and herb content. In view of the uniformity of management, these variations presumably reflect differences in the underlying soil. There are corresponding variations in the character of the fauna. While no sample from the mown grassland included more than a few species with formal status, and none was particularly species-rich, the variation in character means the overall total of species recorded from this grassland is large.

4.5.7 Grassland along and near the entrance track to the Site was cut in summer, and therefore technically qualifies as mown grassland. These areas are, however, very different in character from the main area of silage-mown grassland. Cutting is essential to their maintenance, though the timing was not necessarily ideal for invertebrates and coincided with flowering for some valuable plants. The fauna recorded from the summer-mown grassland was rich and interesting but was concentrated in ground-dwelling and near ground-dwelling species which are relatively indifferent to cutting times and in solitary bees and wasps which had alternative foraging areas close by.

Photograph 4.9 Bedstraw-rich open-structured vegetation growing in the aftermath of mowing

Unmown grassland

4.5.8 For current purposes, unmown grassland refer to all areas which were not mown during the 2020 survey period and makes no allowance for past management or events after the last survey visit. The range of character runs from rank species-poor vegetation, often with tall ruderals (such as occurs quite commonly along the boundary fence), to relatively species-rich and unimproved calcareous grassland (in and near the Museum area). It also includes substantial areas of moderately herb-rich vegetation, both in the south-eastern part of the land north of the Manston Road and also in the area immediately east of the business premises close to the north-western Site boundary south of the Manston Road. Collectively, these areas of grassland support a large number of species of invertebrates, including many species with formal status and some which were not recorded from other habitats or features, but no individual area proved exceptionally productive and none equalled the interest of more open habitats.

Photograph 4.10 Umbellifer-rich unmown grassland along Site boundary

Photograph 4.11 Well-structured unmown grassland, with transition to open habitats and bare ground

Runway and track edges

4.5.9 Narrow strips of vegetation along the margins of hard surfaces proved to be important for the invertebrates on the Site. These margins vary in character: in places the vegetation even at the edge of a track is indistinguishable from the mown grassland which adjoins it, but there is usually a narrow strip of vegetation of different character. The most interesting areas are those with a relatively broad band of vegetation of different character to the adjoining grassland, which often includes a high proportion of annuals and xerophytes. Only the least differentiated of these fringes were without substantial invertebrate interest; the best-structured areas supported large assemblages on interesting species, especially of ground-dwelling bugs and beetles. The total of

species recorded from such fringes is large, but a core group of uncommon species was found repeatedly.

Photograph 4.12 Vegetation fringing concrete surface, with sloping bare ground and overhanging plants

Photograph 4.13 An unusually broad band of well-structured vegetation beside tarmac

Open habitats on hard surfaces and gravel

4.5.10 This category is not entirely distinct from the previous one (runway and track edges), in that some areas of vegetation on tarmac or concrete have developed from peripheral fringes and there is a continuum of degrees of spread. There are also, however, discrete areas of open-structured

vegetation which have developed on areas of hostile substrate such as eroded concrete. The character of the underlying material is not always obvious and the areas may manifest only as neatly symmetrical areas of short, summer-parched vegetation. They may be almost devoid of green plants by late summer. Such small areas can support substantial populations of uncommon species.

Photograph 4.14 A well-structured area of open vegetation on a gravelly surface

Photograph 4.15 Small areas of short summer-parched vegetation are often associated with inset structures

Photograph 4.16 To the west of the entrance road, vegetation spreading through and across hard surfacing produces open habitats which contrast with adjoining taller grassland

Mounds with ruderal vegetation

4.5.11 Mounds, composed of various materials and of varied ages but supporting vegetation with at least some tall ruderal species, occurred in several parts of the Site (e.g. **Photograph 4.19**). One of the largest mounds, completely dominated by tall ruderals, is immediately south of the Manston Road. The fauna recorded here was diverse and rich in species with formal status. This owed much to the large foraging resource it supplied to nectar and pollen-feeding species. The phytophagous and ground-level fauna was also notable, probably due to the friable character of the soil and the fact that in summer the vegetation became quite open-structured, despite its height, because of the very dry conditions and the decline of early species. More recently made mounds and banks of somewhat similar character produced less interest, but also showed less decline in vegetation density over the course of the summer.

Photograph 4.17 Dense growth of flower-rich tall ruderal vegetation on a low mound of earth and debris

Open mosaic vegetation south of the car park

4.5.12 This area was notable for supporting the highest quality habitat encountered and for producing more species with formal status than anywhere else on the Site. Caveats on this statement, however, are that there are many species it did not support, and that some of the species found there were found in higher numbers elsewhere. Characteristics favouring invertebrates are varied sward height, extensive bare ground, diverse vegetation with large populations of important invertebrate foodplants in varied growth forms, a large number of flowering plants throughout the summer, transitions to bramble and scrub, and a low bordering bank which, where not hidden beneath dense vegetation, provided an aculeate nesting area of different type to that of the more level ground.

Photograph 4.18 Abundant flowering yellow composites in open-structured grassland

Photograph 4.19 Parched and very open conditions in autumn

5. Conclusion

5.1.1 The mosaic of habitats provided on the Site are clearly of high conservation value for invertebrates, however, the analyses used may overestimate this value to a degree due to a number of factors, including the following.

- An uncertain number of species with formal status are not established but have been recorded as strays;
- Several groups which are well-represented in the list of species with formal status (aculeate Hymenoptera, weevils, most Hemiptera) have not been recently reviewed and include species which are likely to be of lower value that their current status suggests; and
- The Invertebrate Quality Index uses current statuses as the basis for species scores, so outdated statuses are likely to have inflated the value of the Index obtained. The estimate for the Site overall was of national significance, but the Index exceeded the threshold by a quite small amount. It is likely that it will fall below this level when statuses are updated.

5.1.2 The presence of large populations of several very rare invertebrate species, as noted in **Section 4.5**, raises the conservation value of the Site, although it is difficult to make a reasonable assessment of the importance of Manston Airport for these species. For some species, their presence may represent the beginning of a general expansion in range, making the importance of Manston Airport transitory. Until further evidence of expansion is found, however, the precautionary principal suggests that the Site should be treated as of high importance for these rare species.

Appendix A
Survey Visit Details

Date	Time	Surveyors	Temperature range (°C)	Wind speed (m/sec)	Wind direction	Cloudy/clear	Cloud cover (%)	Rain
06/05/2020	09.00-17.00	CK-L, PK, SJL	12.0 - 14.1	2 - 5	NE	Mostly clear	0 - 5	none
20/05/2020	09.00-17.00	CK-L, PK, SJL	19.5 - 24.1	4 - 5	SW - S - SE	Intermittent light cloud	4-17	none
03/06/2020	09.30-18.00	CK-L, PK, SJL	14.7 - 17.8	4 - 6	N - NE	Cloudy with clear periods	47 - 79	none
22/06/2020	09.00-17.00	CK-L, PK, SJL	16.7 - 20.7	4 - 7	S - SW	Mostly clear	4 - 5	none
03/07/2020	09.00-17.00	CK-L, PK, SJL	17.3 - 20.9	8 - 12	SW	Mostly cloudy	69 - 86	none
17/07/2020	09.00-18.00	CK-L, PK, SJL	20.6 - 25.4	2 - 7	variable	Cloudy early but clearing	2 - 89	brief very light rain early
31/07/2020	09.00-17.00	CK-L, PK, SJL	23.1 - 32.5	5 - 8	E - SE	Clear	2 - 5	none
18/08/2020	09.00-17.00	CK-L, PK, SJL	20.5 - 23.7	4 - 8	S - SW	Partly cloudy, sunny periods	32 - 62	none
09/09/2020	09.00-17.30	CK-L, PK, SJL	21.2 - 22.3	4 - 7	W - NW	Extensive overcast	73 - 76	none
07/10/2020	09.00-16.30	CK-L, PK, SJL	11.6 - 15.2	3 - 8	W	Clear early and late, part cloudy between	10 - 54	none

NB: CK-L = Christopher Kirby-Lambert, PK = Peter Kirby, SJL = Sarah Lambert

Appendix B
Conservation Status

The following paragraphs give the definitions of the formal status categories used.

Statuses from old IUCN and national criteria

Red Data Book category 1 - Endangered (RDB1)

Taxa in danger of extinction in Great Britain and whose survival is unlikely if causal factors continue operating. Included are those taxa whose numbers have been reduced to a critical level or whose habitats have been so dramatically reduced that they are deemed to be in immediate danger of extinction. Also included are some taxa that are possibly extinct. Criteria for inclusion are:

- Species which are known or believed to occur as only a single population within one hectad of the National Grid;
- Species which only occur in habitats known to be especially vulnerable;
- Species which have shown a rapid or continuous decline over the last twenty years and are now estimated to exist in five or fewer hectads; and
- Species which are possibly extinct but have been recorded within the last century and if rediscovered would need protection.

Red Data Book category 2 – Vulnerable (RDB2)

Taxa believed likely to move into the Endangered category in the near future if the causal factors continue operating. Included are:

- Taxa of which most or all of the populations are decreasing because of over-exploitation, extensive destruction of habitat or other environmental disturbance;
- Taxa with populations that have been seriously depleted and whose ultimate security is not yet assured; and
- Taxa with populations that are still abundant but are under threat from serious adverse factors throughout their range. Criteria for inclusion are: species declining throughout their range; species in vulnerable habitats.

Red Data Book category 3 – Rare (RDB3)

Taxa with small populations in Great Britain that are not at present Endangered or Vulnerable, but are at risk. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. Included are species which are estimated to exist in only fifteen or fewer hectads. This criterion may be relaxed where populations are likely to exist in over fifteen hectads but occupy small areas of especially vulnerable habitat.

Red Data Book category K - Insufficiently Known (RDBK)

Taxa that are suspected, but not definitely known, because of lack of information, to belong to Red Data Book category 1, 2 or 3. Included are:

- Species recently discovered or recognised in Great Britain, which may prove to be more widespread in the future;
- Species with very few or perhaps only a single known locality but which belong to poorly recorded or taxonomically difficult groups;
- Species known from very few localities, but which occur in inaccessible habitats or habitats which are seldom sampled; and
- Species with very few or perhaps only a single known locality and of questionable native status, but not clearly falling into the category of recent colonist, vagrant or introduction.

Red Data Book category I - Indeterminate

Taxa considered to be Endangered, Vulnerable or Rare in Great Britain, but where there is not enough information to say which of the three categories (RDB 1 to 3) is appropriate.

Nationally Scarce category A (Na)

Taxa which do not fall within RDB categories but which are nonetheless uncommon in Great Britain and are thought to occur in 30 or fewer hectads of the National Grid or, for less well-recorded groups, within seven or fewer vice-counties.

Nationally Scarce category B (Nb)

Taxa which do not fall within RDB categories but which are nonetheless uncommon in Great Britain and are thought to occur in between 31 and 100 hectads of the National Grid or, for less-well recorded groups, between eight and twenty vice-counties.

Nationally Scarce (N)

For some less well-recorded groups and species, it has not been possible to determine which of the Nationally Scarce categories (A or B) is most appropriate for scarce species. These species have been assigned to an undivided Nationally Scarce category.

Statuses from current IUCN and national criteria

Endangered (EN)

A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the following criteria (C and D omitted).

A Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:

    a. Direct observation;

    b. An index of abundance appropriate for the taxon;

c. A decline in area of occupancy, extent of occurrence and/or quality of habitat;

d. Actual or potential levels of mexploitation; and

e. The effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

2. A reduction of at least 50%, projected or suspected to be met within the next ten years or three generations, whichever id the longer, based on (and specifying) any of b, c, d, or e above.

B. Extent of occurrence estimated to be less than 5000 km^2 or area of occupancy estimated to be less than 500 km^2, and estimates indicating any two of the following:

1. Severely fragmented or known to exist at no more than five locations.

2. Continuing decline, observed, inferred or projected, in any of the following:

a. Extent of occurrence;

b. Area of occupancy;

c. Area, extent and/or quality of habitat;

d. Number of locations or subpopulations; and

e. Number of mature individuals.

3. Extreme fluctuations in any of the following

a. Extent of occurrence;

b Area of occupancy;

c. Number of locations or subpopulations; and

d. Number of mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer.

Vulnerable (VU)

A taxon is considered Vulnerable if it fulfils any of the following criteria.

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of 70% or more over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible and understood and ceased.

2. An observed, estimated, inferred or suspected population size reduction of 50% or more over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible.

3. A population size reduction of 50% or more, projected or suspected to be met within the next ten years or three generations, whichever is the longer.

4. An observed, estimated, inferred or suspected population size reduction of 50% or more over any ten year or three generation period, whichever is the longer, where the time period must include both the past and the future, and where the reduction or its causes may not have ceased or may not be understood or may not be reversible.

B. Geographic range in the form of either B1 (extent of occurrence) or B2 (area of occupancy) or both:

1. Extent of occurrence estimated to be less than 500 km^2, and estimates including at least two of a-c:

a. Severely fragmented or known to exist at no more than five locations;

b. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent or quality of habitat, number of locations or subpopulations, or number of mature individuals; and

c. Extreme fluctuation in extent of occurrence, area of occupancy, number of locations or subpopulations, or number of mature individuals.

2. Area of occupancy estimated to be less than 500 km^2, and estimates including at least two of a-c:

a. Severely fragmented or known to exist at no more than five locations;

b. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent or quality of habitat, number of locations or subpopulations, or number of mature individuals; and

c. Extreme fluctuations in area of occupancy, extent of occurrence, number of locations of subpopulations, or number of mature individuals.

C. Population size estimated to be fewer than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within five years or two generations, whichever is the longer, or

2. A continuing decline, observed, projected or inferred, in numbers of mature individuals and at least one of the following:

a. Population structure either with no subpopulation estimated to contain more than 250 mature individuals or at least 95% of mature individuals in one subpopulation; and

b. Extreme fluctuations in the number of mature individuals.

D. Population size estimated to number fewer than 350 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer.

Lower Risk (LR)

A taxon is Lower Risk where it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the LR category can be separated into the following subcategories.

1. **Conservation Dependent (CD).** Taxa, which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
2. **Near Threatened (NT).** Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable - in Britain, defined as occurring in 15 or fewer hectads but not CR, EN or VU. The absolute count of hectads is, in this review, considered subordinate to evidence of decline on an extent not qualifying the species for CR, EN or VU.
4. **Least Concern (LC).** Taxa, which do not qualify for Conservation Dependent, Near Threatened or National Scarce subcategories - in Britain, this covers all species found on evaluation not to fit into any of the other categories.

Nationally Rare (NR)

Species recently recorded from 15 or fewer hectads of the Ordnance Survey national grid in Great Britain.

Nationally Scarce (NS)

Species recently recorded from between 16 and 100 hectads of the Ordnance Survey national grid in Great Britain.

Kent statuses

Waite (2000)[5] defines four Kent Red Data Book categories:

- Kent Red Data Book category 1 (KRDB1):
  - Species that have been found in only 1 – 2 tetrads in the county.
- Kent Red Data Book category 2 (RDB2):
  - Species that have been found in between 3 – 5 tetrads in Kent or, if more than this, where the species is considered to be undergoing a significant decline.
- Kent Red Data Book category 3 (KRDB3):
  - Species that have been recorded in 6 – 10 tetrads in Kent.
- Kent Red Data Book category K (RDBK):
  - Species known to be rare in Kent, but where insufficient information is available to enable any further division.

Allen (2009)[6] refines and extends the definitions and categories, using tetrad mapping for the period 1985 to 2007. Allen prefixes his statuses with the letter "p", to reflect the fact that these are proposed, but not officially incorporated into the county Red Data Book. The following statuses from this publication are relevant to this report.

- Provisional Kent Red Data Book 1 - Endangered in Kent (pKRDB1):
  - Without modern records from the county, but recorded in the period 1950-1984, or with modern records from 1 or 2 tetrads only in the county, or both.in the period from 1985 onwards.

- Provisional Kent Red Data Book 2 – Vulnerable to extinction in Kent (pKRDB2):
  - With modern records from 3 to 4 tetrads in the county.
- Provisional Kent Red Data Book 3 – Rare in Kent (pKRDB3):
  - With modern records from 5 to 8 tetrads in the county.
- Provisional Kent Red Data Book K (pRDBK):
  - Rare species of unknown status in the county.
- Provisional Kent Scarce A (pKa):
  - With modern records from 9 – 15 tetrads in the county.
- Provisional Kent Scarce B (pKb):
  - With modern records from 25 – 40 tetrads in the county.

Appendix C
Full List of Recorded Invertebrate Taxa

Group	Family	Species	Status[13]	Number of Records
Araneae	Agelenidae	*Agelena labyrinthica*	Common	1
Araneae	Agelenidae	*Eratigena agrestis*	Common	2
Araneae	Amaurobiidae	*Amaurobius fenestralis*	Common	1
Araneae	Araneidae	*Agelenatea redii*	Local	26
Araneae	Araneidae	*Agelenatea redii*	Local	26
Araneae	Araneidae	*Araneus diadematus*	Common	37
Araneae	Araneidae	*Araneus quadratus*	Local	6
Araneae	Araneidae	*Araniella cucurbitina*	Common	14
Araneae	Araneidae	*Araniella opisthographa*	Common	1
Araneae	Araneidae	*Argiope bruennichi*	Local	15
Araneae	Araneidae	*Gibbaranea gibbosa*	Common	1
Araneae	Araneidae	*Hypsosinga pygmaea*	Local	24
Araneae	Araneidae	*Larinioides cornutus*	Common	6
Araneae	Araneidae	*Mangora acalypha*	Local	16
Araneae	Araneidae	*Neoscona adianta*	Local	22
Araneae	Araneidae	*Nuctenea umbratica*	Common	3
Araneae	Araneidae	*Zygiella x-notata*	Common	8
Araneae	Clubionidae	*Cheiracanthium erraticum*	Common	21
Araneae	Clubionidae	*Cheiracanthium virescens*	NS	6
Araneae	Clubionidae	*Clubiona brevipes*	Common	1
Araneae	Clubionidae	*Clubiona diversa*	Common	3
Araneae	Clubionidae	*Clubiona neglecta*	Common	7
Araneae	Clubionidae	*Clubiona pallidula*	Common	1
Araneae	Clubionidae	*Clubiona reclusa*	Common	2
Araneae	Clubionidae	*Clubiona stagnatilis*	Common	2

[13] Formal conservation status of the invertebrate species (see Appendix B for details of the codes/ abbreviations used).

Group	Family	Species	Status[13]	Number of Records
Araneae	Clubionidae	*Clubiona subtilis*	Common	2
Araneae	Corinnidae	*Phrurolithus festivus*	Common	3
Araneae	Corinnidae	*Phrurolithus minimus*	NS	1
Araneae	Dictynidae	*Argenna subnigra*	NS	3
Araneae	Dictynidae	*Dictyna arundinacea*	Common	14
Araneae	Dictynidae	*Dictyna uncinata*	Common	10
Araneae	Dictynidae	*Nigma walckenaeri*	Common	1
Araneae	Dysderidae	*Dysdera crocata*	Common	1
Araneae	Dysderidae	*Dysdera erythrina*	Local	1
Araneae	Gnaphosidae	*Drassodes cupreus*	Common	18
Araneae	Gnaphosidae	*Drassodes lapidosus*	Local	2
Araneae	Gnaphosidae	*Drassyllus pusillus*	Common	12
Araneae	Gnaphosidae	*Haplodrassus signifer*	Local	2
Araneae	Gnaphosidae	*Micaria pulicaria*	Common	9
Araneae	Gnaphosidae	*Trachyzelotes pedestris*	Local	1
Araneae	Gnaphosidae	*Zelotes latreillei*	Common	1
Araneae	Hahniidae	*Hahnia nava*	Common	12
Araneae	Linyphiidae	*Bathyphantes gracilis*	Common	2
Araneae	Linyphiidae	*Cnephalocotes obscurus*	Local	1
Araneae	Linyphiidae	*Diplostyla concolor*	Common	1
Araneae	Linyphiidae	*Erigone atra*	Common	8
Araneae	Linyphiidae	*Erigone dentipalpis*	Common	3
Araneae	Linyphiidae	*Meioneta rurestris*	Common	3
Araneae	Linyphiidae	*Meioneta simplicitarsis*	NS	15
Araneae	Linyphiidae	*Microlinyphia pusilla*	Common	18
Araneae	Linyphiidae	*Panamomops sulcifrons*	NS	1
Araneae	Linyphiidae	*Pelecopsis parallela*	Local	1
Araneae	Linyphiidae	*Pocadicnemis juncea*	Common	1
Araneae	Linyphiidae	*Stemonyphantes lineatus*	Common	11
Araneae	Linyphiidae	*Tenuiphantes tenuis*	Common	41

Group	Family	Species	Status[13]	Number of Records
Araneae	Linyphiidae	*Walckenaeria dysderoides*	NS	1
Araneae	Lycosidae	*Alopecosa cuneata*	NS	5
Araneae	Lycosidae	*Alopecosa pulverulenta*	Common	6
Araneae	Lycosidae	*Pardosa hortensis*	Common	1
Araneae	Lycosidae	*Pardosa nigriceps*	Common	3
Araneae	Lycosidae	*Pardosa palustris*	Common	16
Araneae	Lycosidae	*Pardosa prativaga*	Common	4
Araneae	Lycosidae	*Pardosa pullata*	Common	34
Araneae	Lycosidae	*Trochosa ruricola*	Common	1
Araneae	Lycosidae	*Trochosa terricola*	Common	1
Araneae	Mimetidae	*Ero furcata*	Common	3
Araneae	Oonopidae	*Oonops pulcher*	Common	1
Araneae	Philodromidae	*Philodromus albidus*	Local	1
Araneae	Philodromidae	*Philodromus aureolus*	Common	20
Araneae	Philodromidae	*Philodromus cespitum*	Common	11
Araneae	Philodromidae	*Thanatus striatus*	NS	9
Araneae	Philodromidae	*Tibellus maritimus*	Local	2
Araneae	Philodromidae	*Tibellus oblongus*	Common	36
Araneae	Pholcidae	*Pholcus phalangioides*	Common	2
Araneae	Pisauridae	*Pisaura mirabilis*	Common	31
Araneae	Salticidae	*Euophrys frontalis*	Common	7
Araneae	Salticidae	*Heliophanus cupreus*	Common	1
Araneae	Salticidae	*Heliophanus flavipes*	Common	48
Araneae	Salticidae	*Salticus scenicus*	Common	10
Araneae	Salticidae	*Talavera aequipes*	Local	9
Araneae	Tetragnathidae	*Metellina segmentata*	Common	2
Araneae	Tetragnathidae	*Pachygnatha degeeri*	Common	22
Araneae	Tetragnathidae	*Tetragnatha extensa*	Common	1
Araneae	Tetragnathidae	*Tetragnatha montana*	Common	1
Araneae	Theridiidae	*Anelosimus vittatus*	Common	1

Group	Family	Species	Status[13]	Number of Records
Araneae	Theridiidae	*Enoplognatha ovata*	Common	21
Araneae	Theridiidae	*Neottiura bimaculata*	Common	5
Araneae	Theridiidae	*Robertus lividus*	Common	1
Araneae	Theridiidae	*Steatoda nobilis*	Local	1
Araneae	Thomisidae	*Misumena vatia*	Local	3
Araneae	Thomisidae	*Ozyptila praticola*	Local	2
Araneae	Thomisidae	*Ozyptila sanctuaria*	Local	4
Araneae	Thomisidae	*Xysticus audax*	Local	1
Araneae	Thomisidae	*Xysticus cristatus*	Common	74
Araneae	Thomisidae	*Xysticus kochi*	Local	5
Araneae	Zoridae	*Zora spinimana*	Common	6
Chilopoda	Lithobiidae	*Lithobius forficatus*	Common	1
Chilopoda	Lithobiidae	*Lithobius microps*	Common	2
Coleoptera	Anobiidae	*Anobium inexspectatum*	Local	2
Coleoptera	Anobiidae	*Anobium punctatum*	Common	1
Coleoptera	Anobiidae	*Ochina ptinoides*	Local	2
Coleoptera	Anthicidae	*Anthicus antherinus*	Common	35
Coleoptera	Anthicidae	*Notoxus monoceros*	Local	1
Coleoptera	Anthicidae	*Omonadus floralis*	Common	2
Coleoptera	Anthribidae	*Bruchela rufipes*	Local	3
Coleoptera	Apionidae	*Apion cruentatum*	Common	1
Coleoptera	Apionidae	*Apion frumentarium*	Common	6
Coleoptera	Apionidae	*Aspidapion aeneum*	Common	52
Coleoptera	Apionidae	*Aspidapion radiolus*	Common	37
Coleoptera	Apionidae	*Catapion seniculus*	Local	1
Coleoptera	Apionidae	*Ceratapion carduorum*	Common	3
Coleoptera	Apionidae	*Ceratapion gibbirostre*	Common	7
Coleoptera	Apionidae	*Ceratapion onopordi*	Common	23
Coleoptera	Apionidae	*Diplapion stolidum*	Nb	6
Coleoptera	Apionidae	*Eutrichapion viciae*	Common	1

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Apionidae	*Eutrichapion vorax*	Common	1
Coleoptera	Apionidae	*Exapion ulicis*	Common	1
Coleoptera	Apionidae	*Holotrichapion pisi*	Common	7
Coleoptera	Apionidae	*Ischnopterapion loti*	Common	31
Coleoptera	Apionidae	*Ischnopterapion virens*	Common	5
Coleoptera	Apionidae	*Kalcapion semivittatum*	Na	16
Coleoptera	Apionidae	*Malvapion malvae*	Common	69
Coleoptera	Apionidae	*Oxystoma pomonae*	Common	3
Coleoptera	Apionidae	*Perapion curtirostre*	Common	5
Coleoptera	Apionidae	*Protapion apricans*	Common	25
Coleoptera	Apionidae	*Protapion assimile*	Common	21
Coleoptera	Apionidae	*Protapion difforme*	Nb	1
Coleoptera	Apionidae	*Protapion filirostre*	Nb	5
Coleoptera	Apionidae	*Protapion fulvipes*	Common	11
Coleoptera	Apionidae	*Protapion nigritarse*	Common	15
Coleoptera	Apionidae	*Protapion trifolii*	Common	22
Coleoptera	Apionidae	*Pseudapion rufirostre*	Common	30
Coleoptera	Apionidae	*Stenopterapion tenue*	Common	12
Coleoptera	Apionidae	*Taeniapion urticarium*	Local	10
Coleoptera	Buprestidae	*Trachys scrobiculatus*	NS	5
Coleoptera	Byrrhidae	*Byrrhus pilula*	Common	1
Coleoptera	Byrrhidae	*Curimopsis maritima*	Local	4
Coleoptera	Byrrhidae	*Simplocaria semistriata*	Local	1
Coleoptera	Byturidae	*Byturus ochraceus*	Common	1
Coleoptera	Byturidae	*Byturus tomentosus*	Common	5
Coleoptera	Cantharidae	*Cantharis decipiens*	Common	2
Coleoptera	Cantharidae	*Cantharis flavilabris*	Common	4
Coleoptera	Cantharidae	*Cantharis rustica*	Common	44
Coleoptera	Cantharidae	*Malthinus flaveolus*	Common	1
Coleoptera	Cantharidae	*Malthodes pumilus*	NS	1

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Cantharidae	*Rhagonycha fulva*	Common	44
Coleoptera	Cantharidae	*Rhagonycha lignosa*	Common	1
Coleoptera	Cantharidae	*Rhagonycha lutea*	NS	1
Coleoptera	Carabidae	*Acupalpus parvulus*	Local	1
Coleoptera	Carabidae	*Amara aenea*	Common	9
Coleoptera	Carabidae	*Amara apricaria*	Common	2
Coleoptera	Carabidae	*Amara convexior*	Common	5
Coleoptera	Carabidae	*Amara eurynota*	Common	10
Coleoptera	Carabidae	*Amara familiaris*	Common	1
Coleoptera	Carabidae	*Amara lunicollis*	Common	2
Coleoptera	Carabidae	*Amara ovata*	Common	8
Coleoptera	Carabidae	*Amara plebeja*	Common	1
Coleoptera	Carabidae	*Amara similata*	Common	5
Coleoptera	Carabidae	*Amara tibialis*	Common	4
Coleoptera	Carabidae	*Asaphidion stierlini*	Common	1
Coleoptera	Carabidae	*Badister bullatus*	Common	11
Coleoptera	Carabidae	*Bembidion lampros*	Common	1
Coleoptera	Carabidae	*Bembidion quadrimaculatum*	Common	2
Coleoptera	Carabidae	*Bradycellus harpalinus*	Common	1
Coleoptera	Carabidae	*Bradycellus verbasci*	Common	3
Coleoptera	Carabidae	*Calathus fuscipes*	Common	8
Coleoptera	Carabidae	*Calathus melanocephalus*	Common	1
Coleoptera	Carabidae	*Carabus violaceus*	Common	8
Coleoptera	Carabidae	*Curtonotus aulicus*	Common	12
Coleoptera	Carabidae	*Demetrias atricapillus*	Common	11
Coleoptera	Carabidae	*Harpalus affinis*	Common	6
Coleoptera	Carabidae	*Harpalus attenuatus*	NS	3
Coleoptera	Carabidae	*Harpalus rubripes*	Common	1
Coleoptera	Carabidae	*Harpalus rufipes*	Common	2
Coleoptera	Carabidae	*Harpalus tardus*	Common	1

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Carabidae	*Leistus ferrugineus*	Common	7
Coleoptera	Carabidae	*Leistus spinibarbis*	Common	1
Coleoptera	Carabidae	*Microlestes maurus*	Common	25
Coleoptera	Carabidae	*Microlestes minutulus*	Common	30
Coleoptera	Carabidae	*Nebria brevicollis*	Common	1
Coleoptera	Carabidae	*Notiophilus biguttatus*	Common	2
Coleoptera	Carabidae	*Notiophilus germinyi*	Common	1
Coleoptera	Carabidae	*Notiophilus substriatus*	Common	1
Coleoptera	Carabidae	*Ophonus ardosiacus*	Local	5
Coleoptera	Carabidae	*Ophonus azureus*	NS	2
Coleoptera	Carabidae	*Ophonus melletii*	NR, NT, S41	4
Coleoptera	Carabidae	*Ophonus parallelus*	NR, VU	1
Coleoptera	Carabidae	*Ophonus puncticeps*	Common	5
Coleoptera	Carabidae	*Ophonus rufibarbis*	Common	5
Coleoptera	Carabidae	*Paradromius linearis*	Common	53
Coleoptera	Carabidae	*Philorhizus melanocephalus*	Common	4
Coleoptera	Carabidae	*Poecilus cupreus*	Common	2
Coleoptera	Carabidae	*Pterostichus madidus*	Common	6
Coleoptera	Carabidae	*Pterostichus melanarius*	Common	2
Coleoptera	Carabidae	*Syntomus foveatus*	Common	29
Coleoptera	Carabidae	*Trechus quadristriatus*	Common	13
Coleoptera	Cerambycidae	*Grammoptera ruficornis*	Common	3
Coleoptera	Cerambycidae	*Paracorymbia fulva*	NS	8
Coleoptera	Cerambycidae	*Pogonocherus hispidus*	Local	1
Coleoptera	Cerambycidae	*Pseudovadonia livida*	Local	41
Coleoptera	Cerambycidae	*Stenurella melanura*	Common	3
Coleoptera	Cerambycidae	*Tetrops praeustus*	Local	1
Coleoptera	Chrysomelidae	*Altica lythri*	Common	1
Coleoptera	Chrysomelidae	*Aphthona euphorbiae*	Common	22
Coleoptera	Chrysomelidae	*Aphthona nigriceps*	NS	3

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Chrysomelidae	*Bruchidius imbricornis*	Local	2
Coleoptera	Chrysomelidae	*Bruchidius varius*	Common	11
Coleoptera	Chrysomelidae	*Bruchus atomarius*	Local	10
Coleoptera	Chrysomelidae	*Bruchus rufimanus*	Common	28
Coleoptera	Chrysomelidae	*Bruchus rufipes*	Common	15
Coleoptera	Chrysomelidae	*Cassida rubiginosa*	Common	11
Coleoptera	Chrysomelidae	*Chaetocnema concinna*	Common	10
Coleoptera	Chrysomelidae	*Chaetocnema hortensis*	Common	12
Coleoptera	Chrysomelidae	*Chrysolina americana*	Common	1
Coleoptera	Chrysomelidae	*Chrysolina banksii*	Local	3
Coleoptera	Chrysomelidae	*Chrysolina hyperici*	Local	3
Coleoptera	Chrysomelidae	*Chrysolina oricalcia*	Local	5
Coleoptera	Chrysomelidae	*Chrysolina staphylea*	Common	7
Coleoptera	Chrysomelidae	*Crepidodera aurea*	Common	1
Coleoptera	Chrysomelidae	*Crepidodera fulvicornis*	Common	1
Coleoptera	Chrysomelidae	*Crioceris asparagi*	Common	3
Coleoptera	Chrysomelidae	*Cryptocephalus fulvus*	Local	28
Coleoptera	Chrysomelidae	*Cryptocephalus labiatus*	Local	1
Coleoptera	Chrysomelidae	*Cryptocephalus moraei*	Local	1
Coleoptera	Chrysomelidae	*Cryptocephalus pusillus*	Local	1
Coleoptera	Chrysomelidae	*Epitrix pubescens*	Local	5
Coleoptera	Chrysomelidae	*Gastrophysa polygoni*	Common	9
Coleoptera	Chrysomelidae	*Longitarsus atricillus*	Common	1
Coleoptera	Chrysomelidae	*Longitarsus ballotae*	NS	2
Coleoptera	Chrysomelidae	*Longitarsus dorsalis*	Local	12
Coleoptera	Chrysomelidae	*Longitarsus exoletus*	Local	1
Coleoptera	Chrysomelidae	*Longitarsus flavicornis*	Common	36
Coleoptera	Chrysomelidae	*Longitarsus jacobaeae*	Common	2
Coleoptera	Chrysomelidae	*Longitarsus luridus*	Common	2
Coleoptera	Chrysomelidae	*Longitarsus melanocephalus*	Common	5

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Chrysomelidae	*Longitarsus parvulus*	Common	5
Coleoptera	Chrysomelidae	*Longitarsus pratensis*	Common	37
Coleoptera	Chrysomelidae	*Longitarsus reichei*	Local	1
Coleoptera	Chrysomelidae	*Longitarsus rubiginosus*	Common	2
Coleoptera	Chrysomelidae	*Longitarsus succineus*	Common	38
Coleoptera	Chrysomelidae	*Neocrepidodera ferruginea*	Common	1
Coleoptera	Chrysomelidae	*Neocrepidodera transversa*	Common	10
Coleoptera	Chrysomelidae	*Oulema rufocyanea*	Common	34
Coleoptera	Chrysomelidae	*Phaedon tumidulus*	Common	6
Coleoptera	Chrysomelidae	*Phyllotreta atra*	Common	20
Coleoptera	Chrysomelidae	*Phyllotreta consobrina*	NS	12
Coleoptera	Chrysomelidae	*Phyllotreta cruciferae*	NS	6
Coleoptera	Chrysomelidae	*Phyllotreta diademata*	Common	1
Coleoptera	Chrysomelidae	*Phyllotreta nemorum*	Common	2
Coleoptera	Chrysomelidae	*Phyllotreta nigripes*	Common	86
Coleoptera	Chrysomelidae	*Phyllotreta nodicornis*	Local	4
Coleoptera	Chrysomelidae	*Phyllotreta undulata*	Common	18
Coleoptera	Chrysomelidae	*Phyllotreta vittula*	Common	7
Coleoptera	Chrysomelidae	*Podagrica fuscicornis*	NS	12
Coleoptera	Chrysomelidae	*Podagrica fuscipes*	NS	35
Coleoptera	Chrysomelidae	*Psylliodes affinis*	Common	1
Coleoptera	Chrysomelidae	*Psylliodes chrysocephala*	Common	116
Coleoptera	Chrysomelidae	*Sermylassa halensis*	Local	3
Coleoptera	Chrysomelidae	*Sphaeroderma rubidum*	Local	3
Coleoptera	Chrysomelidae	*Sphaeroderma testaceum*	Common	11
Coleoptera	Coccinellidae	*Adalia bipunctata*	Common	5
Coleoptera	Coccinellidae	*Adalia decempunctata*	Common	6
Coleoptera	Coccinellidae	*Chilocorus renipustulatus*	Common	5
Coleoptera	Coccinellidae	*Coccidula rufa*	Common	2
Coleoptera	Coccinellidae	*Coccinella septempunctata*	Common	110

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Coccinellidae	*Coccinella undecimpunctata*	Common	1
Coleoptera	Coccinellidae	*Exochomus quadripustulatus*	Common	3
Coleoptera	Coccinellidae	*Halyzia sedecimguttata*	Common	1
Coleoptera	Coccinellidae	*Harmonia axyridis*	Common	27
Coleoptera	Coccinellidae	*Harmonia quadripunctata*	Common	1
Coleoptera	Coccinellidae	*Hippodamia variegata*	Nb	71
Coleoptera	Coccinellidae	*Nephus quadrimaculatus*	RDB2	2
Coleoptera	Coccinellidae	*Nephus redtenbacheri*	Common	18
Coleoptera	Coccinellidae	*Platynaspis luteorubra*	Na	26
Coleoptera	Coccinellidae	*Propylea quattuordecimpunctata*	Common	14
Coleoptera	Coccinellidae	*Psyllobora vigintiduopunctata*	Common	72
Coleoptera	Coccinellidae	*Rhyzobius chrysomeloides*	Common	4
Coleoptera	Coccinellidae	*Rhyzobius litura*	Common	84
Coleoptera	Coccinellidae	*Scymnus femoralis*	Nb	2
Coleoptera	Coccinellidae	*Scymnus frontalis*	Common	29
Coleoptera	Coccinellidae	*Scymnus interruptus*	Common	5
Coleoptera	Coccinellidae	*Scymnus schmidti*	Nb	6
Coleoptera	Coccinellidae	*Scymnus suturalis*	Common	1
Coleoptera	Coccinellidae	*Subcoccinella vigintiquattuorpunctata*	Common	9
Coleoptera	Coccinellidae	*Tytthaspis sedecimpunctata*	Common	106
Coleoptera	Corylophidae	*Sericoderus sp.*	n/a	4
Coleoptera	Cryptophagidae	*Antherophagus pallens*	Common	6
Coleoptera	Cryptophagidae	*Antherophagus similis*	Local	1
Coleoptera	Cryptophagidae	*Atomaria atricapilla*	Common	1
Coleoptera	Cryptophagidae	*Cryptophagus distinguendus*	Common	1
Coleoptera	Cryptophagidae	*Cryptophagus pilosus*	Common	3
Coleoptera	Cryptophagidae	*Cryptophagus setulosus*	Common	1
Coleoptera	Cryptophagidae	*Ephistemus globulus*	Common	4
Coleoptera	Cryptophagidae	*Ephistemus reitteri*	?	1
Coleoptera	Curculionidae	*Amalus scortillum*	Local	1

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Curculionidae	*Anthonomus pedicularius*	Common	1
Coleoptera	Curculionidae	*Anthonomus rubi*	Common	13
Coleoptera	Curculionidae	*Anthonomus rufus*	RDB3	1
Coleoptera	Curculionidae	*Aulacobaris* cf. *coerulescens*	NTB	1
Coleoptera	Curculionidae	*Brachypera zoilus*	Local	3
Coleoptera	Curculionidae	*Cathormiocerus aristatus*	Nb	1
Coleoptera	Curculionidae	*Cathormiocerus spinosus*	Nb	8
Coleoptera	Curculionidae	*Ceutorhynchus contractus*	Common	15
Coleoptera	Curculionidae	*Ceutorhynchus erysimi*	Common	3
Coleoptera	Curculionidae	*Ceutorhynchus obstrictus*	Common	84
Coleoptera	Curculionidae	*Ceutorhynchus pallidactylus*	Common	58
Coleoptera	Curculionidae	*Ceutorhynchus picitarsis*	Common	7
Coleoptera	Curculionidae	*Ceutorhynchus turbatus*	Common	8
Coleoptera	Curculionidae	*Ceutorhynchus typhae*	Common	4
Coleoptera	Curculionidae	*Dorytomus rufatus*	Common	2
Coleoptera	Curculionidae	*Exomias pellucidus*	Common	5
Coleoptera	Curculionidae	*Glocianus distinctus*	Common	24
Coleoptera	Curculionidae	*Glocianus punctiger*	Nb	2
Coleoptera	Curculionidae	*Graptus triguttatus*	Nb	1
Coleoptera	Curculionidae	*Gronops lunatus*	Nb	1
Coleoptera	Curculionidae	*Gymnetron melanarium*	Nb	1
Coleoptera	Curculionidae	*Hadroplontus litura*	Common	1
Coleoptera	Curculionidae	*Hypera arator*	Local	1
Coleoptera	Curculionidae	*Hypera melancholica*	Nb	1
Coleoptera	Curculionidae	*Hypera meles*	Na	1
Coleoptera	Curculionidae	*Hypera nigrirostris*	Common	2
Coleoptera	Curculionidae	*Hypera plantaginis*	Common	6
Coleoptera	Curculionidae	*Hypera postica*	Common	13
Coleoptera	Curculionidae	*Kissophagus vicinus*	Nb	3
Coleoptera	Curculionidae	*Larinus carlinae*	Nb	4

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Curculionidae	*Liophloeus tessulatus*	Common	1
Coleoptera	Curculionidae	*Lixus scabricollis*	RDBK	1
Coleoptera	Curculionidae	*Magdalis ruficornis*	Local	1
Coleoptera	Curculionidae	*Mecinus pascuorum*	Common	67
Coleoptera	Curculionidae	*Mecinus pyraster*	Common	16
Coleoptera	Curculionidae	*Microplontus campestris*	Nb	6
Coleoptera	Curculionidae	*Microplontus melanostigma*	Common	1
Coleoptera	Curculionidae	*Nedyus quadrimaculatus*	Common	5
Coleoptera	Curculionidae	*Orthochaetes setiger*	Nb	8
Coleoptera	Curculionidae	*Otiorhynchus ligneus*	Local	10
Coleoptera	Curculionidae	*Otiorhynchus ovatus*	Local	13
Coleoptera	Curculionidae	*Otiorhynchus rugosostriatus*	Local	3
Coleoptera	Curculionidae	*Otiorhynchus singularis*	Common	1
Coleoptera	Curculionidae	*Otiorhynchus sulcatus*	Common	1
Coleoptera	Curculionidae	*Pachyrhinus lethierryi*	Common	2
Coleoptera	Curculionidae	*Parethelcus pollinarius*	Common	4
Coleoptera	Curculionidae	*Phyllobius argentatus*	Common	2
Coleoptera	Curculionidae	*Phyllobius maculicornis*	Common	7
Coleoptera	Curculionidae	*Phyllobius pomaceus*	Common	1
Coleoptera	Curculionidae	*Phyllobius pyri*	Common	4
Coleoptera	Curculionidae	*Phyllobius roboretanus*	Common	26
Coleoptera	Curculionidae	*Phyllobius vespertinus*	Nb	18
Coleoptera	Curculionidae	*Phyllobius virideaeris*	Common	55
Coleoptera	Curculionidae	*Polydrusus cervinus*	Common	4
Coleoptera	Curculionidae	*Polydrusus formosus*	Na	1
Coleoptera	Curculionidae	*Rhamphus oxyacanthae*	Common	2
Coleoptera	Curculionidae	*Rhinocyllus conicus*	Na	2
Coleoptera	Curculionidae	*Rhinoncus castor*	Local	1
Coleoptera	Curculionidae	*Rhinoncus leucostigma*	Common	8
Coleoptera	Curculionidae	*Rhinusa antirrhini*	Local	12

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Curculionidae	*Romualdius angustisetulus*	Local	8
Coleoptera	Curculionidae	*Sirocalodes mixtus*	Nb	1
Coleoptera	Curculionidae	*Sitona hispidulus*	Common	18
Coleoptera	Curculionidae	*Sitona humeralis*	Common	12
Coleoptera	Curculionidae	*Sitona lineatus*	Common	140
Coleoptera	Curculionidae	*Sitona sulcifrons*	Common	7
Coleoptera	Curculionidae	*Smicronyx reichi*	RDB3, KRDB1	7
Coleoptera	Curculionidae	*Strophosoma faber*	Nb	3
Coleoptera	Curculionidae	*Trachyphloeus alternans*	Nb	24
Coleoptera	Curculionidae	*Trachyphloeus scabriculus*	Local	3
Coleoptera	Curculionidae	*Trachyphloeus spinimanus*	Nb	1
Coleoptera	Curculionidae	*Trichosirocalus barnevillei*	Nb	15
Coleoptera	Curculionidae	*Trichosirocalus troglodytes*	Common	83
Coleoptera	Curculionidae	*Tychius junceus*	Common	39
Coleoptera	Curculionidae	*Tychius picirostris*	Common	22
Coleoptera	Curculionidae	*Tychius pusillus*	Nb	9
Coleoptera	Curculionidae	*Tychius squamulatus*	Nb	1
Coleoptera	Curculionidae	*Xylocleptes bispinus*	Local	1
Coleoptera	Curculionidae	*Zacladus exiguus*	Nb	25
Coleoptera	Dermestidae	*Anthrenus verbasci*	Common	2
Coleoptera	Elateridae	*Agriotes lineatus*	Common	2
Coleoptera	Elateridae	*Agriotes obscurus*	Common	1
Coleoptera	Elateridae	*Agriotes sputator*	Common	49
Coleoptera	Elateridae	*Agrypnus murinus*	Local	1
Coleoptera	Elateridae	*Athous campyloides*	Nb	13
Coleoptera	Elateridae	*Athous haemorrhoidalis*	Common	1
Coleoptera	Elateridae	*Hemicrepidius hirtus*	Common	2
Coleoptera	Elateridae	*Kibunea minuta*	Common	18
Coleoptera	Erirhinidae	*Stenopelmus rufinasus*	Local	2
Coleoptera	Histeridae	*Kissister minima*	Local	4

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Histeridae	*Margarinotus purpurascens*	Common	3
Coleoptera	Hydrophilidae	*Helophorus rufipes*	Local	1
Coleoptera	Hydrophilidae	*Megasternum concinnum*	Common	3
Coleoptera	Kateretidae	*Brachypterolus linariae*	Local	1
Coleoptera	Kateretidae	*Brachypterolus pulicarius*	Common	15
Coleoptera	Kateretidae	*Brachypterus glaber*	Common	6
Coleoptera	Kateretidae	*Brachypterus urticae*	Common	2
Coleoptera	Latridiidae	*Cartodere bifasciata*	Common	26
Coleoptera	Latridiidae	*Cartodere nodifer*	Common	1
Coleoptera	Latridiidae	*Corticaria impressa*	Common	4
Coleoptera	Latridiidae	*Corticarina curta*	Local	1
Coleoptera	Latridiidae	*Corticarina minuta*	Common	13
Coleoptera	Latridiidae	*Corticarina truncatella*	N	15
Coleoptera	Latridiidae	*Cortinicara gibbosa*	Common	9
Coleoptera	Latridiidae	*Enicmus transversus*	Common	10
Coleoptera	Leiodidae	*Choleva angustata*	Common	2
Coleoptera	Leiodidae	*Colon brunneum*	Common	1
Coleoptera	Leiodidae	*Leiodes calcarata*	Common	1
Coleoptera	Leiodidae	*Nargus velox*	Common	2
Coleoptera	Leiodidae	*Ptomaphagus subvillosus*	Common	16
Coleoptera	Leiodidae	*Ptomaphagus varicornis*	RDBK	1
Coleoptera	Leiodidae	*Sciodrepoides watsoni*	Common	1
Coleoptera	Malachiidae	*Anthocomus rufus*	Local	1
Coleoptera	Malachiidae	*Cordylepherus viridis*	Common	93
Coleoptera	Malachiidae	*Malachius bipustulatus*	Common	13
Coleoptera	Melolonthidae	*Amphimallon solstitiale*	Local	8
Coleoptera	Melolonthidae	*Melolontha*	Common	2
Coleoptera	Mordellidae	*Mordellistena neuwaldeggiana*	NS	1
Coleoptera	Mordellidae	*Mordellistena parvula*	NS	18
Coleoptera	Mordellidae	*Mordellistena pumila*	Local	13

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Nitidulidae	*Meligethes aeneus*	Common	44
Coleoptera	Nitidulidae	*Meligethes carinulatus*	Common	4
Coleoptera	Nitidulidae	*Meligethes fulvipes*	N	5
Coleoptera	Nitidulidae	*Meligethes rotundicollis*	N	1
Coleoptera	Nitidulidae	*Meligethes ruficornis*	Common	3
Coleoptera	Oedemeridae	*Oedemera lurida*	Common	102
Coleoptera	Oedemeridae	*Oedemera nobilis*	Common	102
Coleoptera	Phalacridae	*Olibrus aeneus*	Common	22
Coleoptera	Phalacridae	*Olibrus affinis*	Common	11
Coleoptera	Phalacridae	*Olibrus* cf. *norvegicus*	?	3
Coleoptera	Phalacridae	*Olibrus corticalis*	Common	14
Coleoptera	Phalacridae	*Olibrus flavicornis*	Nb	12
Coleoptera	Phalacridae	*Olibrus liquidus*	Common	37
Coleoptera	Phalacridae	*Olibrus millefolii*	Nb	95
Coleoptera	Phalacridae	*Phalacrus fimetarius*	Local	32
Coleoptera	Phalacridae	*Stilbus testaceus*	Common	5
Coleoptera	Pyrochroidae	*Pyrochroa serraticornis*	Common	1
Coleoptera	Rhynchitidae	*Deporaus betulae*	Common	1
Coleoptera	Rhynchitidae	*Tatianaerhynchites aequatus*	Common	8
Coleoptera	Scraptiidae	*Anaspis garneysi*	Common	6
Coleoptera	Scraptiidae	*Anaspis maculata*	Common	9
Coleoptera	Scraptiidae	*Anaspis pulicaria*	Common	16
Coleoptera	Scraptiidae	*Anaspis regimbarti*	Common	5
Coleoptera	Silphidae	*Silpha laevigata*	Local	5
Coleoptera	Staphylinidae	*Aleochara curtula*	Common	1
Coleoptera	Staphylinidae	*Aleochara intricata*	Common	1
Coleoptera	Staphylinidae	*Anotylus complanatus*	Common	3
Coleoptera	Staphylinidae	*Anotylus insecatus*	Nb	1
Coleoptera	Staphylinidae	*Cilea silphoides*	Common	1
Coleoptera	Staphylinidae	*Cypha longicornis*	Common	5

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Staphylinidae	*Drusilla canaliculata*	Common	11
Coleoptera	Staphylinidae	*Heterothops praevius*	Common	1
Coleoptera	Staphylinidae	*Medon fusculus*	RDBI	1
Coleoptera	Staphylinidae	*Megalinus glabratus*	Common	2
Coleoptera	Staphylinidae	*Metopsia clypeata*	Common	22
Coleoptera	Staphylinidae	*Micropeplus staphylinoides*	Common	10
Coleoptera	Staphylinidae	*Ocypus olens*	Common	11
Coleoptera	Staphylinidae	*Omalium caesum*	Common	1
Coleoptera	Staphylinidae	*Omalium excavatum*	Common	1
Coleoptera	Staphylinidae	*Othius angustus*	Local	1
Coleoptera	Staphylinidae	*Othius laeviusculus*	Common	2
Coleoptera	Staphylinidae	*Oxytelus laqueatus*	Common	1
Coleoptera	Staphylinidae	*Paederus littoralis*	Local	10
Coleoptera	Staphylinidae	*Philonthus cognatus*	Common	1
Coleoptera	Staphylinidae	*Philonthus debilis*	Common	1
Coleoptera	Staphylinidae	*Philonthus splendens*	Common	1
Coleoptera	Staphylinidae	*Quedius levicollis*	Common	2
Coleoptera	Staphylinidae	*Quedius picipes*	Common	1
Coleoptera	Staphylinidae	*Quedius semiaeneus*	Common	1
Coleoptera	Staphylinidae	*Quedius semiobscurus*	Common	9
Coleoptera	Staphylinidae	*Rugilus orbiculatus*	Common	2
Coleoptera	Staphylinidae	*Sepedophilus marshami*	Common	1
Coleoptera	Staphylinidae	*Sepedophilus nigripennis*	Common	24
Coleoptera	Staphylinidae	*Stenus brunnipes*	Common	2
Coleoptera	Staphylinidae	*Stenus clavicornis*	Common	1
Coleoptera	Staphylinidae	*Stenus impressus*	Common	3
Coleoptera	Staphylinidae	*Stenus ossium*	Common	37
Coleoptera	Staphylinidae	*Sunius propinquus*	Common	2
Coleoptera	Staphylinidae	*Tachinus rufipes*	Common	2
Coleoptera	Staphylinidae	*Tachinus subterraneus*	Local	2

Group	Family	Species	Status[13]	Number of Records
Coleoptera	Staphylinidae	*Tachyporus chrysomelinus*	Common	8
Coleoptera	Staphylinidae	*Tachyporus dispar*	Common	1
Coleoptera	Staphylinidae	*Tachyporus hypnorum*	Common	52
Coleoptera	Staphylinidae	*Tachyporus nitidulus*	Common	14
Coleoptera	Staphylinidae	*Tachyporus obtusus*	Common	1
Coleoptera	Staphylinidae	*Tachyporus pallidus*	Common	2
Coleoptera	Staphylinidae	*Tachyporus solutus*	Common	3
Coleoptera	Staphylinidae	*Xantholinus elegans*	Local	1
Coleoptera	Staphylinidae	*Xantholinus linearis*	Common	8
Coleoptera	Tenebrionidae	*Cteniopus sulphureus*	Local	2
Coleoptera	Tenebrionidae	*Lagria hirta*	Common	7
Crustacea	Armadillidiidae	*Armadillidium nasatum*	Local	1
Crustacea	Armadillidiidae	*Armadillidium vulgare*	Common	69
Crustacea	Philosciidae	*Philoscia muscorum*	Common	51
Crustacea	Porcellionidae	*Porcellio scaber*	Common	6
Dermaptera	Forficulidae	*Forficula auricularia*	Common	50
Dermaptera	Forficulidae	*Forficula lesnei*	NS	4
Diptera	Anisopodidae	*Sylvicola cinctus*	Common	3
Diptera	Asilidae	*Dioctria baumhaueri*	Common	5
Diptera	Asilidae	*Dioctria rufipes*	Common	22
Diptera	Asilidae	*Leptogaster cylindrica*	Common	47
Diptera	Asilidae	*Machimus cingulatus*	Local	1
Diptera	Bibionidae	*Bibio hortulanus*	Common	1
Diptera	Bibionidae	*Bibio marci*	Common	16
Diptera	Bibionidae	*Dilophus febrilis*	Common	53
Diptera	Bibionidae	*Dilophus femoratus*	Common	25
Diptera	Bombyliidae	*Bombylius major*	Common	1
Diptera	Calliphoridae	*Calliphora vicina*	Common	33
Diptera	Calliphoridae	*Calliphora vomitoria*	Common	3
Diptera	Calliphoridae	*Cynomya mortuorum*	Common	4

Group	Family	Species	Status[13]	Number of Records
Diptera	Calliphoridae	*Lucilia ampullacea*	Common	1
Diptera	Calliphoridae	*Lucilia bufonivora*	pNS	1
Diptera	Calliphoridae	*Lucilia caesar*	Common	4
Diptera	Calliphoridae	*Lucilia illustris*	Common	1
Diptera	Calliphoridae	*Lucilia richardsi*	Common	17
Diptera	Calliphoridae	*Lucilia sericata*	Common	26
Diptera	Calliphoridae	*Lucilia silvarum*	Common	5
Diptera	Calliphoridae	*Melinda viridicyanea*	Common	1
Diptera	Chloropidae	*Chlorops pumilionis*	Common	6
Diptera	Chloropidae	*Dicraeus vagans*	Common	1
Diptera	Chloropidae	*Meromyza bohemica*	Common	2
Diptera	Chloropidae	*Meromyza femorata*	Common	1
Diptera	Chloropidae	*Oscinella frit*	Common	2
Diptera	Chloropidae	*Thaumatomyia glabra*	Common	2
Diptera	Chloropidae	*Thaumatomyia hallandica*	Local	4
Diptera	Chloropidae	*Thaumatomyia notata*	Common	3
Diptera	Chloropidae	*Trachysiphonella ruficeps*	pNS	1
Diptera	Chloropidae	*Tricimba cincta*	Common	2
Diptera	Conopidae	*Conops flavipes*	Local	1
Diptera	Conopidae	*Conops quadrifasciatus*	Common	1
Diptera	Conopidae	*Sicus ferrugineus*	Common	12
Diptera	Conopidae	*Thecophora atra*	Common	17
Diptera	Conopidae	*Thecophora fulvipes*	NS	2
Diptera	Dolichopodidae	*Chrysotus* sp.	n/a	1
Diptera	Dolichopodidae	*Dolichopus griseipennis*	Common	1
Diptera	Dolichopodidae	*Dolichopus ungulatus*	Common	1
Diptera	Dolichopodidae	*Medetera saxatilis*	Common	20
Diptera	Dolichopodidae	*Medetera truncorum*	Common	1
Diptera	Dolichopodidae	*Neurigona abdominalis*	NR, DD	1
Diptera	Dolichopodidae	*Sciapus longulus*	Local	11

Group	Family	Species	Status[13]	Number of Records
Diptera	Dolichopodidae	*Sciapus platypterus*	Common	2
Diptera	Drosophilidae	*Drosophila suzukii*	Common	4
Diptera	Empididae	*Empis caudatula*	Common	10
Diptera	Empididae	*Empis femorata*	Common	12
Diptera	Empididae	*Empis livida*	Common	2
Diptera	Empididae	*Empis stercorea*	Common	1
Diptera	Empididae	*Empis tessellata*	Common	3
Diptera	Empididae	*Empis woodi*	N	1
Diptera	Ephydridae	*Philygria interstincta*	Local	2
Diptera	Heleomyzidae	*Neoleria maritima*	Local	2
Diptera	Heleomyzidae	*Suillia variegata*	Common	1
Diptera	Hybotidae	*Platypalpus leucocephalus*	Common	1
Diptera	Hybotidae	*Platypalpus minutus*	Common	2
Diptera	Lauxaniidae	*Calliopum aeneum*	Common	3
Diptera	Lauxaniidae	*Calliopum tuberculosum*	Common	2
Diptera	Lauxaniidae	*Minettia inusta*	Common	5
Diptera	Lauxaniidae	*Minettia longipennis*	Common	2
Diptera	Lauxaniidae	*Minettia rivosa*	Common	13
Diptera	Lauxaniidae	*Sapromyza quadripunctata*	Common	10
Diptera	Limoniidae	*Molophilus griseus*	Common	1
Diptera	Limoniidae	*Symplecta stictica*	Common	1
Diptera	Lonchaeidae	*Silba fumosa*	Common	1
Diptera	Lonchopteridae	*Lonchoptera lutea*	Common	6
Diptera	Micropezidae	*Cnodacophora sellata*	Local	1
Diptera	Opomyzidae	*Geomyza apicalis*	pNS	2
Diptera	Opomyzidae	*Geomyza subnigra*	pNS	5
Diptera	Opomyzidae	*Geomyza tripunctata*	Common	11
Diptera	Opomyzidae	*Opomyza florum*	Common	1
Diptera	Opomyzidae	*Opomyza germinationis*	Common	8
Diptera	Opomyzidae	*Opomyza petrei*	Common	2

Group	Family	Species	Status[13]	Number of Records
Diptera	Pipunculidae	*Eudorylas* sp.	n/a	1
Diptera	Pipunculidae	*Tomosvaryella geniculata*	Local	1
Diptera	Pipunculidae	*Tomosvaryella sylvatica*	Common	5
Diptera	Psilidae	*Chamaepsila rosae*	Common	1
Diptera	Rhinophoridae	*Melanophora roralis*	Common	14
Diptera	Rhinophoridae	*Phyto melanocephala*	Common	1
Diptera	Rhinophoridae	*Stevenia deceptoria*	?	51
Diptera	Sarcophagidae	*Brachicoma devia*	Common	2
Diptera	Sarcophagidae	*Sarcophaga agnata*	pNS	1
Diptera	Sarcophagidae	*Sarcophaga anaces*	Local	1
Diptera	Sarcophagidae	*Sarcophaga carnaria*	Common	7
Diptera	Sarcophagidae	*Sarcophaga crassimargo*	Common	2
Diptera	Sarcophagidae	*Sarcophaga filia*	Local	2
Diptera	Sarcophagidae	*Sarcophaga haemorrhoa*	Common	3
Diptera	Sarcophagidae	*Sarcophaga incisilobata*	Common	25
Diptera	Sarcophagidae	*Sarcophaga melanura*	Common	4
Diptera	Sarcophagidae	*Sarcophaga nigriventris*	Common	10
Diptera	Sarcophagidae	*Sarcophaga pumila*	Common	1
Diptera	Sarcophagidae	*Sarcophaga sexpunctata*	Local	4
Diptera	Sarcophagidae	*Sarcophaga subvicina*	Common	16
Diptera	Sarcophagidae	*Sarcophaga variegata*	Common	10
Diptera	Scathophagidae	*Scathophaga stercoraria*	Common	11
Diptera	Sciomyzidae	*Coremacera marginata*	Common	19
Diptera	Sciomyzidae	*Dichetophora obliterata*	Local	2
Diptera	Sciomyzidae	*Limnia unguicornis*	Common	13
Diptera	Sciomyzidae	*Pherbellia cinerella*	Common	36
Diptera	Sciomyzidae	*Trypetoptera punctulata*	Common	9
Diptera	Sepsidae	*Saltella sphondylii*	Common	2
Diptera	Sepsidae	*Sepsis cynipsea*	Common	1
Diptera	Sepsidae	*Sepsis neocynipsea*	Local	2

Group	Family	Species	Status[13]	Number of Records
Diptera	Sepsidae	*Sepsis thoracica*	Local	3
Diptera	Stratiomyidae	*Beris chalybata*	Common	1
Diptera	Stratiomyidae	*Chloromyia formosa*	Common	24
Diptera	Stratiomyidae	*Chorisops tibialis*	Common	3
Diptera	Stratiomyidae	*Microchrysa polita*	Common	4
Diptera	Stratiomyidae	*Nemotelus notatus*	Local	3
Diptera	Stratiomyidae	*Pachygaster atra*	Common	9
Diptera	Stratiomyidae	*Pachygaster leachii*	Common	4
Diptera	Syrphidae	*Cheilosia albitarsis*	Common	1
Diptera	Syrphidae	*Cheilosia lasiopa*	Local	1
Diptera	Syrphidae	*Cheilosia latifrons*	Local	4
Diptera	Syrphidae	*Cheilosia ranunculi*	Common	3
Diptera	Syrphidae	*Cheilosia soror*	Local	1
Diptera	Syrphidae	*Chrysotoxum bicinctum*	Local	3
Diptera	Syrphidae	*Chrysotoxum elegans*	NS	1
Diptera	Syrphidae	*Chrysotoxum festivum*	Local	1
Diptera	Syrphidae	*Episyrphus balteatus*	Common	30
Diptera	Syrphidae	*Eristalis arbustorum*	Common	2
Diptera	Syrphidae	*Eristalis horticola*	Common	1
Diptera	Syrphidae	*Eristalis pertinax*	Common	1
Diptera	Syrphidae	*Eristalis tenax*	Common	9
Diptera	Syrphidae	*Eumerus strigatus*	Common	1
Diptera	Syrphidae	*Eupeodes corollae*	Common	27
Diptera	Syrphidae	*Eupeodes latifasciatus*	Local	1
Diptera	Syrphidae	*Eupeodes luniger*	Common	10
Diptera	Syrphidae	*Helophilus pendulus*	Common	2
Diptera	Syrphidae	*Helophilus trivittatus*	Local	3
Diptera	Syrphidae	*Melangyna umbellatarum*	Common	1
Diptera	Syrphidae	*Melanostoma mellinum*	Common	23
Diptera	Syrphidae	*Melanostoma scalare*	Common	3

Group	Family	Species	Status[13]	Number of Records
Diptera	Syrphidae	*Meliscaeva auricollis*	Common	2
Diptera	Syrphidae	*Myathropa florea*	Common	1
Diptera	Syrphidae	*Paragus haemorrhous*	Common	18
Diptera	Syrphidae	*Pipizella viduata*	Common	22
Diptera	Syrphidae	*Platycheirus albimanus*	Common	2
Diptera	Syrphidae	*Platycheirus angustatus*	Common	23
Diptera	Syrphidae	*Platycheirus manicatus*	Common	1
Diptera	Syrphidae	*Platycheirus scutatus*	Common	1
Diptera	Syrphidae	*Scaeva pyrastri*	Common	6
Diptera	Syrphidae	*Sphaerophoria scripta*	Common	71
Diptera	Syrphidae	*Syritta pipiens*	Common	7
Diptera	Syrphidae	*Syrphus ribesii*	Common	3
Diptera	Syrphidae	*Syrphus torvus*	Common	2
Diptera	Syrphidae	*Syrphus vitripennis*	Common	1
Diptera	Syrphidae	*Triglyphus primus*	N	2
Diptera	Syrphidae	*Volucella bombylans*	Common	2
Diptera	Syrphidae	*Xanthogramma citrofasciatum*	Local	2
Diptera	Syrphidae	*Xanthogramma pedissequum*	Local	5
Diptera	Tachinidae	*Catharosia pygmaea*	KRDBK	1
Diptera	Tachinidae	*Cistogaster globosa*	RDB1	4
Diptera	Tachinidae	*Dufouria nigrita*	Common	1
Diptera	Tachinidae	*Eriothrix rufomaculata*	Common	42
Diptera	Tachinidae	*Gymnosoma nitens*	RDB1, KRDB2	16
Diptera	Tachinidae	*Litophasia hyalipennis*	Extinct, KRDB2	5
Diptera	Tachinidae	*Lydella grisescens*	Common	21
Diptera	Tachinidae	*Lydella stabulans*	Common	1
Diptera	Tachinidae	*Ocytata pallipes*	Common	1
Diptera	Tachinidae	*Phania funesta*	Common	16
Diptera	Tachinidae	*Phasia obesa*	Common	3
Diptera	Tachinidae	*Phasia pusilla*	Common	11

Group	Family	Species	Status[13]	Number of Records
Diptera	Tachinidae	*Tachina fera*	Common	1
Diptera	Tephritidae	*Acanthiophilus helianthi*	N	1
Diptera	Tephritidae	*Anomoia purmunda*	Common	2
Diptera	Tephritidae	*Campiglossa misella*	Common	3
Diptera	Tephritidae	*Chaetorellia jaceae*	Common	4
Diptera	Tephritidae	*Dioxyna bidentis*	N	5
Diptera	Tephritidae	*Ensina sonchi*	Local	1
Diptera	Tephritidae	*Euleia heraclei*	Common	2
Diptera	Tephritidae	*Merzomyia westermanni*	N	2
Diptera	Tephritidae	*Orellia falcata*	N	4
Diptera	Tephritidae	*Oxyna flavipennis*	N	4
Diptera	Tephritidae	*Oxyna parietina*	Local	1
Diptera	Tephritidae	*Philophylla caesio*	Common	1
Diptera	Tephritidae	*Sphenella marginata*	Common	5
Diptera	Tephritidae	*Tephritis cometa*	Local	16
Diptera	Tephritidae	*Tephritis divisa*	Common	10
Diptera	Tephritidae	*Tephritis formosa*	Common	9
Diptera	Tephritidae	*Tephritis neesii*	Common	28
Diptera	Tephritidae	*Tephritis vespertina*	Common	8
Diptera	Tephritidae	*Terellia colon*	Local	4
Diptera	Tephritidae	*Terellia ruficauda*	Common	15
Diptera	Tephritidae	*Terellia serratulae*	Common	4
Diptera	Tephritidae	*Urophora cuspidata*	N	2
Diptera	Tephritidae	*Urophora quadrifasciata*	Common	1
Diptera	Tephritidae	*Urophora stylata*	Common	11
Diptera	Tephritidae	*Xyphosia miliaria*	Common	1
Diptera	Therevidae	*Thereva fulva*	NT, KRDB1	6
Diptera	Therevidae	*Thereva nobilitata*	Common	5
Diptera	Therevidae	*Thereva plebeja*	Local	4
Diptera	Tipulidae	*Nephrotoma appendiculata*	Common	11

Group	Family	Species	Status[13]	Number of Records
Diptera	Tipulidae	*Nephrotoma flavescens*	Common	11
Diptera	Tipulidae	*Nephrotoma flavipalpis*	Common	1
Diptera	Tipulidae	*Nephrotoma quadrifaria*	Common	1
Diptera	Tipulidae	*Nigrotipula nigra*	Local	1
Diptera	Tipulidae	*Tipula fascipennis*	Common	1
Diptera	Tipulidae	*Tipula lunata*	Common	2
Diptera	Tipulidae	*Tipula paludosa*	Common	7
Diptera	Tipulidae	*Tipula vernalis*	Common	25
Hemiptera	Acanthosomatidae	*Acanthosoma haemorrhoidale*	Common	2
Hemiptera	Acanthosomatidae	*Cyphostethus tristriatus*	Common	3
Hemiptera	Acanthosomatidae	*Elasmucha grisea*	Common	1
Hemiptera	Anthocoridae	*Anthocoris confusus*	Common	4
Hemiptera	Anthocoridae	*Anthocoris nemoralis*	Common	9
Hemiptera	Anthocoridae	*Anthocoris nemorum*	Common	4
Hemiptera	Anthocoridae	*Buchananiella continua*	Common	2
Hemiptera	Anthocoridae	*Cardiastethus fasciiventris*	Common	2
Hemiptera	Anthocoridae	*Orius laevigatus*	Common	6
Hemiptera	Anthocoridae	*Orius majusculus*	Common	2
Hemiptera	Anthocoridae	*Orius niger*	Common	48
Hemiptera	Anthocoridae	*Orius vicinus*	Common	3
Hemiptera	Anthocoridae	*Temnostethus pusillus*	Common	3
Hemiptera	Aphalaridae	*Craspedolepta sonchi*	Local	1
Hemiptera	Aphrophoridae	*Aphrophora alni*	Common	2
Hemiptera	Aphrophoridae	*Neophilaenus campestris*	Local	46
Hemiptera	Aphrophoridae	*Neophilaenus lineatus*	Common	48
Hemiptera	Aphrophoridae	*Philaenus spumarius*	Common	69
Hemiptera	Berytidae	*Berytinus hirticornis*	Nb	9
Hemiptera	Berytidae	*Berytinus minor*	Local	1
Hemiptera	Berytidae	*Berytinus signoreti*	Common	2
Hemiptera	Berytidae	*Gampsocoris punctipes*	Local	3

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Cicadellidae	*Acericerus heydenii*	Common	2
Hemiptera	Cicadellidae	*Agallia consobrina*	Common	1
Hemiptera	Cicadellidae	*Alebra albostriella*	Common	1
Hemiptera	Cicadellidae	*Anaceratagallia ribauti*	Common	111
Hemiptera	Cicadellidae	*Anoscopus albifrons*	Common	12
Hemiptera	Cicadellidae	*Anoscopus serratulae*	Common	18
Hemiptera	Cicadellidae	*Aphrodes makarovi*	Common	30
Hemiptera	Cicadellidae	*Arthaldeus pascuellus*	Common	54
Hemiptera	Cicadellidae	*Athysanus argentarius*	Local	4
Hemiptera	Cicadellidae	*Cicadula persimilis*	Common	15
Hemiptera	Cicadellidae	*Deltocephalus pulicaris*	Common	26
Hemiptera	Cicadellidae	*Doratura stylata*	Common	64
Hemiptera	Cicadellidae	*Edwardsiana crataegi*	Common	2
Hemiptera	Cicadellidae	*Edwardsiana prunicola*	Common	1
Hemiptera	Cicadellidae	*Edwardsiana rosae*	Common	1
Hemiptera	Cicadellidae	*Empoasca decipiens*	Common	5
Hemiptera	Cicadellidae	*Empoasca vitis*	Common	4
Hemiptera	Cicadellidae	*Errastunus ocellaris*	Common	10
Hemiptera	Cicadellidae	*Eupelix cuspidata*	Common	61
Hemiptera	Cicadellidae	*Eupteryx atropunctata*	Common	1
Hemiptera	Cicadellidae	*Eupteryx aurata*	Common	7
Hemiptera	Cicadellidae	*Eupteryx melissae*	Common	5
Hemiptera	Cicadellidae	*Eupteryx origani*	Local	1
Hemiptera	Cicadellidae	*Eupteryx stachydearum*	Common	2
Hemiptera	Cicadellidae	*Eupteryx urticae*	Common	6
Hemiptera	Cicadellidae	*Euscelidius variegatus*	Nb	1
Hemiptera	Cicadellidae	*Euscelis incisus*	Common	85
Hemiptera	Cicadellidae	*Evacanthus interruptus*	Common	1
Hemiptera	Cicadellidae	*Fagocyba cruenta*	Common	1
Hemiptera	Cicadellidae	*Graphocraerus ventralis*	Local	4

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Cicadellidae	*Kybos strigilifer*	Common	2
Hemiptera	Cicadellidae	*Liguropia juniperi*	Common	1
Hemiptera	Cicadellidae	*Macropsis fuscula*	Common	5
Hemiptera	Cicadellidae	*Macropsis infuscata*	Common	1
Hemiptera	Cicadellidae	*Macrosteles laevis*	Common	1
Hemiptera	Cicadellidae	*Megophthalmus scabripennis*	Common	15
Hemiptera	Cicadellidae	*Megophthalmus scanicus*	Common	5
Hemiptera	Cicadellidae	*Mocydia crocea*	Common	31
Hemiptera	Cicadellidae	*Mocydiopsis attenuata*	Local	5
Hemiptera	Cicadellidae	*Mocydiopsis parvicauda*	Local	1
Hemiptera	Cicadellidae	*Oncopsis subangulata*	Local	1
Hemiptera	Cicadellidae	*Opsius stactogalus*	Common	1
Hemiptera	Cicadellidae	*Populicerus confusus*	Common	2
Hemiptera	Cicadellidae	*Psammotettix confinis*	Common	80
Hemiptera	Cicadellidae	*Psammotettix helvolus*	Common	23
Hemiptera	Cicadellidae	*Rhopalopyx elongata*	Common	41
Hemiptera	Cicadellidae	*Ribautiana debilis*	Common	2
Hemiptera	Cicadellidae	*Ribautiana tenerrima*	Common	2
Hemiptera	Cicadellidae	*Streptanus aemulans*	Common	1
Hemiptera	Cicadellidae	*Streptanus sordidus*	Common	23
Hemiptera	Cicadellidae	*Viridicerus ustulatus*	Common	1
Hemiptera	Cicadellidae	*Zyginella pulchra*	Common	2
Hemiptera	Cicadellidae	*Zyginidia scutellaris*	Common	120
Hemiptera	Cixiidae	*Pentastiridius leporinus*	Nb	1
Hemiptera	Cixiidae	*Reptalus quinquecostatus*	Nb	2
Hemiptera	Cixiidae	*Tachycixius pilosus*	Common	1
Hemiptera	Coreidae	*Arenocoris falleni*	NS	1
Hemiptera	Coreidae	*Bathysolen nubilus*	NS	15
Hemiptera	Coreidae	*Ceraleptus lividus*	NS	1
Hemiptera	Coreidae	*Coreus marginatus*	Common	11

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Coreidae	*Coriomeris denticulatus*	Common	22
Hemiptera	Coreidae	*Gonocerus acuteangulatus*	Common	4
Hemiptera	Coreidae	*Syromastus rhombeus*	Local	7
Hemiptera	Cydnidae	*Legnotus limbosus*	Common	11
Hemiptera	Cydnidae	*Legnotus picipes*	NS	3
Hemiptera	Cydnidae	*Sehirus luctuosus*	Local	1
Hemiptera	Cydnidae	*Thyreocoris scarabaeoides*	NS	1
Hemiptera	Cydnidae	*Tritomegas sexmaculatus*	Common	19
Hemiptera	Delphacidae	*Acanthodelphax spinosa*	NTB	3
Hemiptera	Delphacidae	*Asiraca clavicornis*	Nb	54
Hemiptera	Delphacidae	*Criomorphus albomarginatus*	Common	5
Hemiptera	Delphacidae	*Dicranotropis hamata*	Common	9
Hemiptera	Delphacidae	*Eurybregma nigrolineata*	Local	2
Hemiptera	Delphacidae	*Eurysa lineata*	Local	2
Hemiptera	Delphacidae	*Hyledelphax elegantulus*	Common	10
Hemiptera	Delphacidae	*Javesella dubia*	Common	1
Hemiptera	Delphacidae	*Javesella obscurella*	Common	1
Hemiptera	Delphacidae	*Javesella pellucida*	Common	34
Hemiptera	Delphacidae	*Kelisia guttula*	Local	1
Hemiptera	Delphacidae	*Kosswigianella exigua*	Local	7
Hemiptera	Delphacidae	*Muellerianella fairmairei*	Common	1
Hemiptera	Delphacidae	*Ribautodelphax imitans*	RDBK, S41	6
Hemiptera	Delphacidae	*Scottianella dalei*	Nb	1
Hemiptera	Delphacidae	*Stenocranus minutus*	Common	32
Hemiptera	Delphacidae	*Xanthodelphax stramineus*	Local	4
Hemiptera	Issidae	*Issus coleoptratus*	Local	2
Hemiptera	Lygaeidae	*Aphanus rolandri*	Na	3
Hemiptera	Lygaeidae	*Beosus maritimus*	Local	30
Hemiptera	Lygaeidae	*Cymus melanocephalus*	Common	1
Hemiptera	Lygaeidae	*Drymus sylvaticus*	Common	11

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Lygaeidae	*Emblethis griseus*	RDB3	31
Hemiptera	Lygaeidae	*Heterogaster urticae*	Common	4
Hemiptera	Lygaeidae	*Ischnodemus quadratus*	RDB1, KRDB1	12
Hemiptera	Lygaeidae	*Ischnodemus sabuleti*	Common	15
Hemiptera	Lygaeidae	*Kleidocerys resedae*	Common	7
Hemiptera	Lygaeidae	*Megalonotus antennatus*	Nb	1
Hemiptera	Lygaeidae	*Megalonotus chiragra*	Local	12
Hemiptera	Lygaeidae	*Megalonotus emarginatus*	Local	25
Hemiptera	Lygaeidae	*Megalonotus praetextatus*	Nb	35
Hemiptera	Lygaeidae	*Megalonotus sabulicola*	Nb	5
Hemiptera	Lygaeidae	*Metopoplax ditomoides*	Common	23
Hemiptera	Lygaeidae	*Nysius ericae*	Common	9
Hemiptera	Lygaeidae	*Nysius graminicola*	RDB3	28
Hemiptera	Lygaeidae	*Nysius huttoni*	Common	47
Hemiptera	Lygaeidae	*Nysius senecionis*	Common	78
Hemiptera	Lygaeidae	*Orsillus depressus*	Common	3
Hemiptera	Lygaeidae	*Ortholomus punctipennis*	RDB3	7
Hemiptera	Lygaeidae	*Peritrechus geniculatus*	Common	29
Hemiptera	Lygaeidae	*Peritrechus gracilicornis*	RDB3	2
Hemiptera	Lygaeidae	*Peritrechus lundii*	Local	1
Hemiptera	Lygaeidae	*Scolopostethus affinis*	Common	2
Hemiptera	Lygaeidae	*Scolopostethus thomsoni*	Common	2
Hemiptera	Lygaeidae	*Stygnocoris fuligineus*	Common	6
Hemiptera	Lygaeidae	*Stygnocoris rusticus*	Local	2
Hemiptera	Lygaeidae	*Taphropeltus contractus*	Common	9
Hemiptera	Miridae	*Adelphocoris lineolatus*	Common	36
Hemiptera	Miridae	*Amblytylus nasutus*	Common	15
Hemiptera	Miridae	*Apolygus lucorum*	Common	1
Hemiptera	Miridae	*Apolygus spinolae*	Common	2
Hemiptera	Miridae	*Atractotomus mali*	Common	1

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Miridae	*Campylomma verbasci*	Local	4
Hemiptera	Miridae	*Campyloneura virgula*	Common	3
Hemiptera	Miridae	*Capsus ater*	Common	4
Hemiptera	Miridae	*Charagochilus gyllenhalii*	Local	64
Hemiptera	Miridae	*Chlamydatus evanescens*	RDB3	2
Hemiptera	Miridae	*Chlamydatus saltitans*	Local	1
Hemiptera	Miridae	*Closterotomus norwegicus*	Common	33
Hemiptera	Miridae	*Deraeocoris flavilinea*	Common	8
Hemiptera	Miridae	*Deraeocoris lutescens*	Common	8
Hemiptera	Miridae	*Deraeocoris ruber*	Common	1
Hemiptera	Miridae	*Dicyphus annulatus*	Local	5
Hemiptera	Miridae	*Dicyphus escalerae*	Common	1
Hemiptera	Miridae	*Dicyphus globulifer*	Common	1
Hemiptera	Miridae	*Europiella artemisiae*	Common	2
Hemiptera	Miridae	*Hallodapus montandoni*	RDB3	9
Hemiptera	Miridae	*Heterotoma planicornis*	Common	7
Hemiptera	Miridae	*Leptopterna dolabrata*	Common	19
Hemiptera	Miridae	*Leptopterna ferrugata*	Common	21
Hemiptera	Miridae	*Liocoris tripustulatus*	Common	2
Hemiptera	Miridae	*Lopus decolor*	Common	4
Hemiptera	Miridae	*Lygocoris pabulinus*	Common	1
Hemiptera	Miridae	*Lygus maritimus*	Common	24
Hemiptera	Miridae	*Lygus pratensis*	RDB3	40
Hemiptera	Miridae	*Lygus rugulipennis*	Common	25
Hemiptera	Miridae	*Macrolophus cf melanotoma*	?	2
Hemiptera	Miridae	*Macrotylus horvathi*	Common	4
Hemiptera	Miridae	*Macrotylus paykulli*	Local	3
Hemiptera	Miridae	*Megaloceroea recticornis*	Common	34
Hemiptera	Miridae	*Megalocoleus molliculus*	Common	7
Hemiptera	Miridae	*Megalocoleus tanaceti*	Common	1

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Miridae	*Miridius quadrivirgatus*	Local	1
Hemiptera	Miridae	*Neolygus viridis*	Common	1
Hemiptera	Miridae	*Notostira elongata*	Common	102
Hemiptera	Miridae	*Oncotylus viridiflavus*	Common	1
Hemiptera	Miridae	*Orthocephalus coriaceus*	Local	5
Hemiptera	Miridae	*Orthocephalus saltator*	Common	8
Hemiptera	Miridae	*Orthops basalis*	Common	5
Hemiptera	Miridae	*Orthops campestris*	Common	7
Hemiptera	Miridae	*Orthops kalmii*	Common	17
Hemiptera	Miridae	*Orthotylus flavosparsus*	Common	1
Hemiptera	Miridae	*Orthotylus ochrotrichus*	Common	3
Hemiptera	Miridae	*Phylus coryli*	Common	1
Hemiptera	Miridae	*Phytocoris tiliae*	Common	1
Hemiptera	Miridae	*Phytocoris ulmi*	Common	1
Hemiptera	Miridae	*Phytocoris varipes*	Common	36
Hemiptera	Miridae	*Pilophorus perplexus*	Common	2
Hemiptera	Miridae	*Pinalitus cervinus*	Common	8
Hemiptera	Miridae	*Pithanus maerkelii*	Common	6
Hemiptera	Miridae	*Plagiognathus arbustorum*	Common	9
Hemiptera	Miridae	*Plagiognathus chrysanthemi*	Common	32
Hemiptera	Miridae	*Polymerus nigrita*	Local	1
Hemiptera	Miridae	*Psallus haematodes*	Common	1
Hemiptera	Miridae	*Psallus perrisi*	Common	1
Hemiptera	Miridae	*Stenodema calcarata*	Common	18
Hemiptera	Miridae	*Stenodema laevigata*	Common	17
Hemiptera	Miridae	*Stenotus binotatus*	Common	10
Hemiptera	Miridae	*Systellonotus triguttatus*	Nb	34
Hemiptera	Miridae	*Trigonotylus caelestialium*	Common	23
Hemiptera	Miridae	*Tuponia brevirostris*	?	1
Hemiptera	Miridae	*Tuponia hippophaes*	?	1

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Miridae	*Tytthus pygmaeus*	Local	1
Hemiptera	Nabidae	*Himacerus apterus*	Common	4
Hemiptera	Nabidae	*Himacerus boops*	Local	3
Hemiptera	Nabidae	*Himacerus major*	Common	19
Hemiptera	Nabidae	*Himacerus mirmicoides*	Common	31
Hemiptera	Nabidae	*Nabis ferus*	Common	46
Hemiptera	Nabidae	*Nabis flavomarginatus*	Common	30
Hemiptera	Nabidae	*Nabis rugosus*	Common	5
Hemiptera	Pentatomidae	*Aelia acuminata*	Common	46
Hemiptera	Pentatomidae	*Dolycoris baccarum*	Common	39
Hemiptera	Pentatomidae	*Eurydema oleracea*	Common	56
Hemiptera	Pentatomidae	*Eysarcoris venutissimus*	Common	4
Hemiptera	Pentatomidae	*Palomena prasina*	Common	9
Hemiptera	Pentatomidae	*Pentatoma rufipes*	Common	4
Hemiptera	Pentatomidae	*Piezodorus lituratus*	Common	1
Hemiptera	Pentatomidae	*Podops inuncta*	Common	33
Hemiptera	Pentatomidae	*Sciocoris cursitans*	NS	18
Hemiptera	Piesmatidae	*Piesma maculatum*	Local	1
Hemiptera	Psyllidae	*Cacopsylla hippophaes*	Common	1
Hemiptera	Psyllidae	*Psylla buxi*	Common	1
Hemiptera	Psyllidae	*Spanioneura fonscolombei*	Common	1
Hemiptera	Pyrrhocoridae	*Pyrrhocoris apterus*	NR	14
Hemiptera	Reduviidae	*Empicoris rubromaculatus*	?	1
Hemiptera	Rhopalidae	*Brachycarenus tigrinus*	Local	2
Hemiptera	Rhopalidae	*Chorosoma schillingi*	Local	3
Hemiptera	Rhopalidae	*Corizus hyoscyami*	Local	16
Hemiptera	Rhopalidae	*Liorhyssus hyalinus*	NS	1
Hemiptera	Rhopalidae	*Myrmus miriformis*	Local	12
Hemiptera	Rhopalidae	*Rhopalus subrufus*	Common	2
Hemiptera	Rhopalidae	*Stictopleurus abutilon*	Common	21

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Rhopalidae	*Stictopleurus punctatonervosus*	Common	9
Hemiptera	Scutelleridae	*Eurygaster maura*	NS	41
Hemiptera	Scutelleridae	*Eurygaster testudinaria*	Local	2
Hemiptera	Scutelleridae	*Odontoscelis fuliginosa*	NR, VU, KRDB1	7
Hemiptera	Tettigometridae	*Tettigometra* cf *laeta*	?	25
Hemiptera	Tettigometridae	*Tettigometra* cf *virescens*	?	21
Hemiptera	Tingidae	*Acalypta parvula*	Common	27
Hemiptera	Tingidae	*Kalama tricornis*	Local	44
Hemiptera	Tingidae	*Physatocheila dumetorum*	Common	5
Hemiptera	Tingidae	*Tingis ampliata*	Common	2
Hemiptera	Tingidae	*Tingis cardui*	Common	7
Hemiptera	Triozidae	*Trioza galii*	Common	2
Hemiptera	Triozidae	*Trioza urticae*	Common	1
Hemiptera	Miridae	*Heterotoma planicornis*	Common	7
Hemiptera	Miridae	*Leptopterna dolabrata*	Common	19
Hemiptera	Miridae	*Leptopterna ferrugata*	Common	21
Hemiptera	Miridae	*Liocoris tripustulatus*	Common	2
Hemiptera	Miridae	*Lopus decolor*	Common	4
Hemiptera	Miridae	*Lygocoris pabulinus*	Common	1
Hemiptera	Miridae	*Lygus maritimus*	Common	24
Hemiptera	Miridae	*Lygus pratensis*	RDB3	40
Hemiptera	Miridae	*Lygus rugulipennis*	Common	25
Hemiptera	Miridae	*Macrolophus cf melanotoma*	?	2
Hemiptera	Miridae	*Macrotylus horvathi*	Common	4
Hemiptera	Miridae	*Macrotylus paykulli*	Local	3
Hemiptera	Miridae	*Megaloceroea recticornis*	Common	34
Hemiptera	Miridae	*Megalocoleus molliculus*	Common	7
Hemiptera	Miridae	*Megalocoleus tanaceti*	Common	1
Hemiptera	Miridae	*Miridius quadrivirgatus*	Local	1
Hemiptera	Miridae	*Neolygus viridis*	Common	1

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Miridae	*Notostira elongata*	Common	102
Hemiptera	Miridae	*Oncotylus viridiflavus*	Common	1
Hemiptera	Miridae	*Orthocephalus coriaceus*	Local	5
Hemiptera	Miridae	*Orthocephalus saltator*	Common	8
Hemiptera	Miridae	*Orthops basalis*	Common	5
Hemiptera	Miridae	*Orthops campestris*	Common	7
Hemiptera	Miridae	*Orthops kalmii*	Common	17
Hemiptera	Miridae	*Orthotylus flavosparsus*	Common	1
Hemiptera	Miridae	*Orthotylus ochrotrichus*	Common	3
Hemiptera	Miridae	*Phylus coryli*	Common	1
Hemiptera	Miridae	*Phytocoris tiliae*	Common	1
Hemiptera	Miridae	*Phytocoris ulmi*	Common	1
Hemiptera	Miridae	*Phytocoris varipes*	Common	36
Hemiptera	Miridae	*Pilophorus perplexus*	Common	2
Hemiptera	Miridae	*Pinalitus cervinus*	Common	8
Hemiptera	Miridae	*Pithanus maerkelii*	Common	6
Hemiptera	Miridae	*Plagiognathus arbustorum*	Common	9
Hemiptera	Miridae	*Plagiognathus chrysanthemi*	Common	32
Hemiptera	Miridae	*Polymerus nigrita*	Local	1
Hemiptera	Miridae	*Psallus haematodes*	Common	1
Hemiptera	Miridae	*Psallus perrisi*	Common	1
Hemiptera	Miridae	*Stenodema calcarata*	Common	18
Hemiptera	Miridae	*Stenodema laevigata*	Common	17
Hemiptera	Miridae	*Stenotus binotatus*	Common	10
Hemiptera	Miridae	*Systellonotus triguttatus*	Nb	34
Hemiptera	Miridae	*Trigonotylus caelestialium*	Common	23
Hemiptera	Miridae	*Tuponia brevirostris*	?	1
Hemiptera	Miridae	*Tuponia hippophaes*	?	1
Hemiptera	Miridae	*Tytthus pygmaeus*	Local	1
Hemiptera	Nabidae	*Himacerus apterus*	Common	4

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Nabidae	*Himacerus boops*	Local	3
Hemiptera	Nabidae	*Himacerus major*	Common	19
Hemiptera	Nabidae	*Himacerus mirmicoides*	Common	31
Hemiptera	Nabidae	*Nabis ferus*	Common	46
Hemiptera	Nabidae	*Nabis flavomarginatus*	Common	30
Hemiptera	Nabidae	*Nabis rugosus*	Common	5
Hemiptera	Pentatomidae	*Aelia acuminata*	Common	46
Hemiptera	Pentatomidae	*Dolycoris baccarum*	Common	39
Hemiptera	Pentatomidae	*Eurydema oleracea*	Common	56
Hemiptera	Pentatomidae	*Eysarcoris venutissimus*	Common	4
Hemiptera	Pentatomidae	*Palomena prasina*	Common	9
Hemiptera	Pentatomidae	*Pentatoma rufipes*	Common	4
Hemiptera	Pentatomidae	*Piezodorus lituratus*	Common	1
Hemiptera	Pentatomidae	*Podops inuncta*	Common	33
Hemiptera	Pentatomidae	*Sciocoris cursitans*	NS	18
Hemiptera	Piesmatidae	*Piesma maculatum*	Local	1
Hemiptera	Psyllidae	*Cacopsylla hippophaes*	Common	1
Hemiptera	Psyllidae	*Psylla buxi*	Common	1
Hemiptera	Psyllidae	*Spanioneura fonscolombei*	Common	1
Hemiptera	Pyrrhocoridae	*Pyrrhocoris apterus*	NR	14
Hemiptera	Reduviidae	*Empicoris rubromaculatus*	?	1
Hemiptera	Rhopalidae	*Brachycarenus tigrinus*	Local	2
Hemiptera	Rhopalidae	*Chorosoma schillingi*	Local	3
Hemiptera	Rhopalidae	*Corizus hyoscyami*	Local	16
Hemiptera	Rhopalidae	*Liorhyssus hyalinus*	NS	1
Hemiptera	Rhopalidae	*Myrmus miriformis*	Local	12
Hemiptera	Rhopalidae	*Rhopalus subrufus*	Common	2
Hemiptera	Rhopalidae	*Stictopleurus abutilon*	Common	21
Hemiptera	Rhopalidae	*Stictopleurus punctatonervosus*	Common	9
Hemiptera	Scutelleridae	*Eurygaster maura*	NS	41

Group	Family	Species	Status[13]	Number of Records
Hemiptera	Scutelleridae	*Eurygaster testudinaria*	Local	2
Hemiptera	Scutelleridae	*Odontoscelis fuliginosa*	NR, VU, KRDB1	7
Hemiptera	Tettigometridae	*Tettigometra* cf *laeta*	?	25
Hemiptera	Tettigometridae	*Tettigometra* cf *virescens*	?	21
Hemiptera	Tingidae	*Acalypta parvula*	Common	27
Hemiptera	Tingidae	*Kalama tricornis*	Local	44
Hemiptera	Tingidae	*Physatocheila dumetorum*	Common	5
Hemiptera	Tingidae	*Tingis ampliata*	Common	2
Hemiptera	Tingidae	*Tingis cardui*	Common	7
Hemiptera	Triozidae	*Trioza galii*	Common	2
Hemiptera	Triozidae	*Trioza urticae*	Common	1
Hymenoptera	Andrenidae	*Andrena alfkenella*	RDB3, pKRDB2	4
Hymenoptera	Andrenidae	*Andrena bicolor*	Common	2
Hymenoptera	Andrenidae	*Andrena dorsata*	Common	27
Hymenoptera	Andrenidae	*Andrena flavipes*	Common	43
Hymenoptera	Andrenidae	*Andrena fulvago*	Na, pKRDB2	15
Hymenoptera	Andrenidae	*Andrena haemorrhoa*	Common	7
Hymenoptera	Andrenidae	*Andrena hattorfiana*	RDB3, pKRDB2	1
Hymenoptera	Andrenidae	*Andrena minutula*	Common	35
Hymenoptera	Andrenidae	*Andrena minutuloides*	Na	3
Hymenoptera	Andrenidae	*Andrena nigroaenea*	Common	2
Hymenoptera	Andrenidae	*Andrena nitida*	Common	4
Hymenoptera	Andrenidae	*Andrena niveata*	RDB2, pKRDB1	9
Hymenoptera	Andrenidae	*Andrena proxima*	RDB3	2
Hymenoptera	Andrenidae	*Andrena scotica*	Common	1
Hymenoptera	Andrenidae	*Andrena subopaca*	Common	3
Hymenoptera	Andrenidae	*Andrena trimmerana*	Nb	2
Hymenoptera	Andrenidae	*Andrena varians*	Nb, pKa	1
Hymenoptera	Andrenidae	*Andrena wilkella*	Common	7
Hymenoptera	Apidae	*Apis mellifera*	Common	63

Group	Family	Species	Status[13]	Number of Records
Hymenoptera	Apidae	*Bombus campestris*	Common, KVU	6
Hymenoptera	Apidae	*Bombus hortorum*	Common	15
Hymenoptera	Apidae	*Bombus humilis*	S41, Kb	2
Hymenoptera	Apidae	*Bombus hypnorum*	Common	1
Hymenoptera	Apidae	*Bombus lapidarius*	Common	69
Hymenoptera	Apidae	*Bombus lucorum*	Common	60
Hymenoptera	Apidae	*Bombus pascuorum*	Common	47
Hymenoptera	Apidae	*Bombus pratorum*	Common	8
Hymenoptera	Apidae	*Bombus ruderarius*	S41, pKb	1
Hymenoptera	Apidae	*Bombus ruderatus*	Nb, S41, pKRDB2	4
Hymenoptera	Apidae	*Bombus rupestris*	Nb	6
Hymenoptera	Apidae	*Bombus terrestris*	Common	31
Hymenoptera	Apidae	*Bombus vestalis*	Common	15
Hymenoptera	Apidae	*Epeolus variegatus*	Local	1
Hymenoptera	Apidae	*Nomada conjungens*	RDB2, pKRDB2	1
Hymenoptera	Apidae	*Nomada fabriciana*	Common	5
Hymenoptera	Apidae	*Nomada flava*	Common	4
Hymenoptera	Apidae	*Nomada flavoguttata*	Common	32
Hymenoptera	Apidae	*Nomada fucata*	Na	7
Hymenoptera	Apidae	*Nomada fulvicornis*	RDB3, pKa	2
Hymenoptera	Apidae	*Nomada goodeniana*	Common	1
Hymenoptera	Apidae	*Nomada marshamella*	Common	4
Hymenoptera	Apidae	*Nomada panzeri*	Common	1
Hymenoptera	Apidae	*Nomada ruficornis*	Common	5
Hymenoptera	Apidae	*Nomada striata*	Local	1
Hymenoptera	Apidae	*Nomada zonata*	Local	2
Hymenoptera	Bethylidae	*Bethylus cephalotes*	Common	3
Hymenoptera	Bethylidae	*Epyris niger*	Common	2
Hymenoptera	Cephidae	*Calameuta pallipes*	Common	1
Hymenoptera	Cephidae	*Cephus pygmeus*	Common	12

Group	Family	Species	Status[13]	Number of Records
Hymenoptera	Cephidae	*Cephus spinipes*	Common	3
Hymenoptera	Chalcididae	*Brachymeria minuta*	Local	1
Hymenoptera	Chalcididae	*Brachymeria obtusata*	Local	3
Hymenoptera	Chrysididae	*Hedychridium ardens*	Local	8
Hymenoptera	Chrysididae	*Hedychridium roseum*	Local, pKb	1
Hymenoptera	Chrysididae	*Hedychrum niemelai*	RDB3, pKa	3
Hymenoptera	Chrysididae	*Omalus aeneus*	Common	2
Hymenoptera	Chrysididae	*Pseudomalus auratus*	Common	6
Hymenoptera	Chrysididae	*Trichrysis cyanea*	Common	7
Hymenoptera	Colletidae	*Colletes daviesanus*	Common	5
Hymenoptera	Colletidae	*Colletes hederae*	Common, pKRDBK	8
Hymenoptera	Colletidae	*Colletes similis*	Common	1
Hymenoptera	Colletidae	*Hylaeus brevicornis*	Common	8
Hymenoptera	Colletidae	*Hylaeus communis*	Common	5
Hymenoptera	Colletidae	*Hylaeus confusus*	Common	1
Hymenoptera	Colletidae	*Hylaeus cornutus*	Na, pKb	4
Hymenoptera	Colletidae	*Hylaeus dilatatus*	Common	21
Hymenoptera	Colletidae	*Hylaeus hyalinatus*	Common	4
Hymenoptera	Colletidae	*Hylaeus signatus*	Nb	7
Hymenoptera	Crabronidae	*Astata boops*	Local	1
Hymenoptera	Crabronidae	*Cerceris arenaria*	Local	2
Hymenoptera	Crabronidae	*Cerceris rybyensis*	Common	5
Hymenoptera	Crabronidae	*Crabro cribrarius*	Local, pKb	1
Hymenoptera	Crabronidae	*Crossocerus podagricus*	Common	1
Hymenoptera	Crabronidae	*Diodontus luperus*	Common	1
Hymenoptera	Crabronidae	*Diodontus minutus*	Common	1
Hymenoptera	Crabronidae	*Dryudella pinguis*	Local, pKb	1
Hymenoptera	Crabronidae	*Entomognathus brevis*	Common	1
Hymenoptera	Crabronidae	*Harpactus tumidus*	Local	3
Hymenoptera	Crabronidae	*Lindenius albilabris*	Common	1

Group	Family	Species	Status[13]	Number of Records
Hymenoptera	Crabronidae	*Mimumesa dahlbomi*	Common	1
Hymenoptera	Crabronidae	*Oxybelus uniglumis*	Common	2
Hymenoptera	Crabronidae	*Passaloecus singularis*	Common	2
Hymenoptera	Crabronidae	*Pemphredon lethifera*	Common	17
Hymenoptera	Crabronidae	*Pemphredon lugubris*	Common	2
Hymenoptera	Crabronidae	*Philanthus triangulum*	RDB2	2
Hymenoptera	Crabronidae	*Tachysphex pompiliformis*	Common	19
Hymenoptera	Crabronidae	*Trypoxylon attenuatum*	Common	24
Hymenoptera	Crabronidae	*Trypoxylon medium*	Common	17
Hymenoptera	Dryinidae	*Anteon gaullei*	Local	1
Hymenoptera	Formicidae	*Formica cunicularia*	Local	96
Hymenoptera	Formicidae	*Formica fusca*	Common	29
Hymenoptera	Formicidae	*Lasius flavus*	Common	33
Hymenoptera	Formicidae	*Lasius niger*	Common	157
Hymenoptera	Formicidae	*Myrmecina graminicola*	Local	8
Hymenoptera	Formicidae	*Myrmica rubra*	Common	6
Hymenoptera	Formicidae	*Myrmica ruginodis*	Common	6
Hymenoptera	Formicidae	*Myrmica sabuleti*	Common	71
Hymenoptera	Formicidae	*Myrmica scabrinodis*	Common	70
Hymenoptera	Formicidae	*Myrmica schencki*	Nb	26
Hymenoptera	Formicidae	*Ponera coarctata*	Nb	9
Hymenoptera	Formicidae	*Stenamma debile/westwoodi*	Local	2
Hymenoptera	Halictidae	*Halictus rubicundus*	Common	4
Hymenoptera	Halictidae	*Halictus tumulorum*	Common	32
Hymenoptera	Halictidae	*Lasioglossum albipes*	Common	11
Hymenoptera	Halictidae	*Lasioglossum brevicorne*	RDB3	1
Hymenoptera	Halictidae	*Lasioglossum calceatum*	Common	21
Hymenoptera	Halictidae	*Lasioglossum fulvicorne*	Local	1
Hymenoptera	Halictidae	*Lasioglossum lativentre*	Common	7
Hymenoptera	Halictidae	*Lasioglossum leucopus*	Common	4

Group	Family	Species	Status[13]	Number of Records
Hymenoptera	Halictidae	*Lasioglossum leucozonium*	Common	15
Hymenoptera	Halictidae	*Lasioglossum malachurum*	Nb	38
Hymenoptera	Halictidae	*Lasioglossum minutissimum*	Common	2
Hymenoptera	Halictidae	*Lasioglossum morio*	Common	36
Hymenoptera	Halictidae	*Lasioglossum nitidiusculum*	Common	11
Hymenoptera	Halictidae	*Lasioglossum parvulum*	Common	1
Hymenoptera	Halictidae	*Lasioglossum pauperatum*	RDB3, pKb	40
Hymenoptera	Halictidae	*Lasioglossum pauxillum*	Na	69
Hymenoptera	Halictidae	*Lasioglossum punctatissimum*	Common	8
Hymenoptera	Halictidae	*Lasioglossum villosulum*	Common	8
Hymenoptera	Halictidae	*Lasioglossum xanthopus*	Nb, pKa	8
Hymenoptera	Halictidae	*Sphecodes crassus*	Nb	25
Hymenoptera	Halictidae	*Sphecodes ephippius*	Common	12
Hymenoptera	Halictidae	*Sphecodes geoffrellus*	Common	24
Hymenoptera	Halictidae	*Sphecodes gibbus*	Common	19
Hymenoptera	Halictidae	*Sphecodes monilicornis*	Common	18
Hymenoptera	Halictidae	*Sphecodes puncticeps*	Common	6
Hymenoptera	Halictidae	*Sphecodes rubicundus*	Na, pKa	1
Hymenoptera	Halictidae	*Sphecodes spinulosus*	RDB2, pKRDB1	1
Hymenoptera	Megachilidae	*Anthidium manicatum*	Common	1
Hymenoptera	Megachilidae	*Megachile leachella*	Nb, pKb	1
Hymenoptera	Megachilidae	*Megachile ligniseca*	Common	2
Hymenoptera	Megachilidae	*Megachile versicolor*	Common	6
Hymenoptera	Megachilidae	*Megachile willughbiella*	Common	1
Hymenoptera	Megachilidae	*Osmia aurulenta*	Local,pKb	8
Hymenoptera	Megachilidae	*Osmia spinulosa*	Common	42
Hymenoptera	Megachilidae	*Stelis odontopyga*	?	16
Hymenoptera	Melittidae	*Melitta leporina*	Local	4
Hymenoptera	Mutillidae	*Myrmosa atra*	Local	6
Hymenoptera	Pompilidae	*Agenioideus cinctellus*	Local	10

Group	Family	Species	Status[13]	Number of Records
Hymenoptera	Pompilidae	*Anoplius infuscatus*	Local	2
Hymenoptera	Pompilidae	*Anoplius nigerrimus*	Common	9
Hymenoptera	Pompilidae	*Arachnospila anceps*	Common	17
Hymenoptera	Pompilidae	*Arachnospila minutula*	Nb, pKa	1
Hymenoptera	Pompilidae	*Arachnospila spissa*	Common	1
Hymenoptera	Pompilidae	*Auplopus carbonarius*	Nb, pKb	3
Hymenoptera	Pompilidae	*Caliadurgus fasciatellus*	Local	9
Hymenoptera	Pompilidae	*Evagetes crassicornis*	Common	4
Hymenoptera	Pompilidae	*Pompilus cinereus*	Local, pKb	1
Hymenoptera	Pompilidae	*Priocnemis agilis*	Nb, pKa	9
Hymenoptera	Pompilidae	*Priocnemis confusor*	Nb, pKb	2
Hymenoptera	Pompilidae	*Priocnemis parvula*	Local, pKb	3
Hymenoptera	Pompilidae	*Priocnemis perturbator*	Common	3
Hymenoptera	Pompilidae	*Priocnemis pusilla*	Local	2
Hymenoptera	Tenthredinidae	*Athalia rosae*	Common	2
Hymenoptera	Tenthredinidae	*Dolerus picipes*	Common	1
Hymenoptera	Tenthredinidae	*Empria excisa*	Common	1
Hymenoptera	Tenthredinidae	*Macrophya annulata*	Common	1
Hymenoptera	Tenthredinidae	*Macrophya rufipes*	Common	2
Hymenoptera	Tiphiidae	*Tiphia femorata*	Local	10
Hymenoptera	Vespidae	*Ancistrocerus gazella*	Common	2
Hymenoptera	Vespidae	*Gymnomerus laevipes*	Local, pKRDB3	2
Hymenoptera	Vespidae	*Odynerus melanocephalus*	Na, S41, pKRDB3	3
Hymenoptera	Vespidae	*Vespula germanica*	Common	30
Hymenoptera	Vespidae	*Vespula vulgaris*	Common	3
Lepidoptera	Adelidae	*Nemophora cupriacella*	Local	1
Lepidoptera	Adelidae	*Nemophora fasciella*	pNb, S41	3
Lepidoptera	Crambidae	*Agriphila tristella*	Common	3
Lepidoptera	Crambidae	*Pyrausta despicata*	Common	5
Lepidoptera	Erebidae	*Diaphora mendica*	Common	1

Group	Family	Species	Status[13]	Number of Records
Lepidoptera	Erebidae	*Ectidia glyphica*	Local	1
Lepidoptera	Erebidae	*Ectidia mi*	Local	1
Lepidoptera	Erebidae	*Eilema lurideola*	Common	5
Lepidoptera	Erebidae	*Euproctis chrysorrhoea*	Common	7
Lepidoptera	Erebidae	*Spilosoma luteum*	S41	1
Lepidoptera	Erebidae	*Tyria jacobaeae*	S41	34
Lepidoptera	Geometridae	*Aplocera plagiata*	Common	3
Lepidoptera	Geometridae	*Aspitates ochrearia*	Local	2
Lepidoptera	Geometridae	*Camptogramma bilineata*	Common	8
Lepidoptera	Geometridae	*Hemithea aestivaria*	Common	1
Lepidoptera	Geometridae	*Xanthorhoe fluctuata*	Common	1
Lepidoptera	Glyphipterigidae	*Glyphipterix simpliciella*	Common	2
Lepidoptera	Hepialidae	*Korscheltellus lupulina*	Common	1
Lepidoptera	Hepialidae	*Triodia sylvina*	Common	1
Lepidoptera	Hesperiidae	*Ochlodes sylvanus*	Common	14
Lepidoptera	Hesperiidae	*Thymelicus lineola*	Common	16
Lepidoptera	Hesperiidae	*Thymelicus sylvestris*	Common	12
Lepidoptera	Lycaenidae	*Aricia agestis*	Local	8
Lepidoptera	Lycaenidae	*Celastrina argiolus*	Common	3
Lepidoptera	Lycaenidae	*Lycaena phlaeas*	Common	13
Lepidoptera	Lycaenidae	*Polyommatus icarus*	Common	26
Lepidoptera	Noctuidae	*Agrotis exclamationis*	Common	1
Lepidoptera	Noctuidae	*Apamea monoglypha*	Common	1
Lepidoptera	Noctuidae	*Autographa gamma*	Common	10
Lepidoptera	Noctuidae	*Calophasia lunula*	RDB, pKRDB1	4
Lepidoptera	Noctuidae	*Ceramica pisi*	S41	1
Lepidoptera	Noctuidae	*Eremobia ochroleuca*	Common	2
Lepidoptera	Noctuidae	*Hecatera bicolorata*	Common	1
Lepidoptera	Noctuidae	*Luperina testacea*	Common	5
Lepidoptera	Noctuidae	*Mesapamea secalis*	Common	1

Group	Family	Species	Status[13]	Number of Records
Lepidoptera	Noctuidae	*Mythimna conigera*	Common	1
Lepidoptera	Noctuidae	*Mythimna ferrago*	Common	4
Lepidoptera	Noctuidae	*Mythimna impura*	Common	5
Lepidoptera	Noctuidae	*Mythimna pallens*	Common	2
Lepidoptera	Noctuidae	*Noctua comes*	Common	2
Lepidoptera	Noctuidae	*Noctua pronuba*	Common	3
Lepidoptera	Noctuidae	*Orthosia cerasi*	Common	1
Lepidoptera	Noctuidae	*Phlogophora meticulosa*	Common	2
Lepidoptera	Noctuidae	*Xestia sexstrigata*	Common	1
Lepidoptera	Noctuidae	*Xestia xanthographa*	Common	4
Lepidoptera	Nymphalidae	*Aglais io*	Common	11
Lepidoptera	Nymphalidae	*Aglais urticae*	Common	5
Lepidoptera	Nymphalidae	*Aphantopus hyperantus*	Common	1
Lepidoptera	Nymphalidae	*Coenonympha pamphilus*	NT, S41	75
Lepidoptera	Nymphalidae	*Lasiommata megera*	NT, S41	1
Lepidoptera	Nymphalidae	*Maniola jurtina*	Common	60
Lepidoptera	Nymphalidae	*Melanargia galathea*	Local	32
Lepidoptera	Nymphalidae	*Pararge aegeria*	Common	3
Lepidoptera	Nymphalidae	*Pyronia tithonus*	Common	23
Lepidoptera	Nymphalidae	*Vanessa atalanta*	Common	7
Lepidoptera	Nymphalidae	*Vanessa cardui*	Common	3
Lepidoptera	Pieridae	*Gonepteryx rhamni*	Common	1
Lepidoptera	Pieridae	*Pieris brassicae*	Common	9
Lepidoptera	Pieridae	*Pieris napi*	Common	11
Lepidoptera	Pieridae	*Pieris rapae*	Common	35
Lepidoptera	Pterophoridae	*Gillmeria pallidactyla*	Local	1
Lepidoptera	Pyralidae	*Galleria mellonella*	Common	1
Lepidoptera	Pyralidae	*Homoeosoma sinuella*	Local	3
Lepidoptera	Pyralidae	*Myelois circumvoluta*	Common	1
Lepidoptera	Pyralidae	*Oncocera semirubella*	pNb	4

Group	Family	Species	Status[13]	Number of Records
Lepidoptera	Sesiidae	*Bembecia ichneumoniformis*	Nb	7
Lepidoptera	Sphingidae	*Deilephila porcellus*	Local	1
Lepidoptera	Sphingidae	*Macroglossum stellatarum*	immigrant/Local	1
Lepidoptera	Tortricidae	*Cochylis hybridella*	Local	1
Lepidoptera	Totricidae	*Epiphyas postvittana*	Common	1
Lepidoptera	Ypsolophidae	*Ochsenheimeria taurella*	Local	1
Lepidoptera	Zygaenidae	*Zygaena filipendulae*	Common	9
Mollusca	Cochlicellidae	*Cochlicella acuta*	Local	1
Mollusca	Discidae	*Discus rotundatus*	Common	8
Mollusca	Helicidae	*Cepaea nemoralis*	Common	8
Mollusca	Helicidae	*Cornu aspersum*	Common	13
Mollusca	Hygromiidae	*Candidula gigaxii*	NS	2
Mollusca	Hygromiidae	*Candidula intersecta*	Common	31
Mollusca	Hygromiidae	*Cernuella virgata*	Common	47
Mollusca	Hygromiidae	*Monacha cantiana*	Common	56
Mollusca	Oxychilidae	*Aegopinella pura*	Common	1
Mollusca	Punctidae	*Paralaoma servilis*	Local	3
Mollusca	Punctidae	*Punctum pygmaeum*	Common	1
Mollusca	Pupillidae	*Pupilla muscorum*	Local	29
Mollusca	Valloniidae	*Vallonia costata*	Common	6
Mollusca	Valloniidae	*Vallonia excentrica*	Common	5
Mollusca	Vertiginidae	*Vertigo pygmaea*	Local	4
Neuroptera	Chrysopidae	*Chrysoperla carnea*	Common	27
Neuroptera	Chrysopidae	*Dichochrysa prasina*	Common	1
Neuroptera	Coniopterygidae	*Semidalis pseudouncinata*	Common	1
Neuroptera	Hemerobiidae	*Hemerobius humulinus*	Common	4
Neuroptera	Hemerobiidae	*Hemerobius lutescens*	Common	2
Neuroptera	Hemerobiidae	*Micromus variegatus*	Common	3
Neuroptera	Hemerobiidae	*Psectra diptera*	Local	1
Neuroptera	Hemerobiidae	*Sympherobius pygmaeus*	Local	2

Group	Family	Species	Status[13]	Number of Records
Neuroptera	Hemerobiidae	*Wesmaelius nervosus*	Common	1
Odonata	Aeshnidae	*Aeshna mixta*	Common	3
Odonata	Libellulidae	*Sympetrum striolatum*	Common	1
Opiliones	Phalangiidae	*Dicranopalpus caudatus*	Local	1
Opiliones	Phalangiidae	*Lacinius ephippiatus*	Common	1
Opiliones	Phalangiidae	*Mitopus morio*	Common	2
Opiliones	Phalangiidae	*Oligolophus tridens*	Common	2
Opiliones	Phalangiidae	*Opilio parietinus*	Common	1
Opiliones	Phalangiidae	*Opilio saxatilis*	Common	2
Opiliones	Phalangiidae	*Paroligolophus meadii*	Local	1
Opiliones	Phalangiidae	*Phalangium opilio*	Common	9
Orthoptera	Acrididae	*Chorthippus albomarginatus*	Common	29
Orthoptera	Acrididae	*Chorthippus brunneus*	Common	97
Orthoptera	Acrididae	*Chorthippus parallelus*	Common	60
Orthoptera	Acrididae	*Stenobothrus lineatus*	NS	1
Orthoptera	Conocephalidae	*Conocephalus fuscus*	Common	15
Orthoptera	Meconematidae	*Meconema meridionale*	Common	3
Orthoptera	Meconematidae	*Meconema thalassinum*	Common	3
Orthoptera	Phaneropteridae	*Leptophyes punctatissima*	Common	16
Orthoptera	Tettigoniidae	*Metrioptera roeselii*	Common	25
Orthoptera	Tettigoniidae	*Pholidoptera griseoaptera*	Common	1
Orthoptera	Tettigoniidae	*Tettigonia viridissima*	Local	1
Psocoptera	Caeciiusidae	*Valenzuela burmeisteri*	Common	1
Psocoptera	Caeciliusidae	*Valenzuela flavidus*	Common	1
Psocoptera	Ectopsocidae	*Ectopsocus petersi*	Common	5
Psocoptera	Elipsocidae	*Propsocus pulchripennis*	Local	26
Psocoptera	Psocidae	*Loensia variegata*	Common	1
Psocoptera	Stenopsocidae	*Graphopsocus cruciatus*	Common	4

Appendix D
Recorded Plant Species Scoring at Least '1' in Terms of Invertebrate Value

Plant species recorded were assigned an estimate of importance for invertebrates, based on the records obtained in 2020, on a five-point scale (0 to 4). A plant has been given a score of at least one if it is confidently known to support, on the Site, at least one species with formal status, or a group of specialist species at least one of which is considered local. The assigned score is raised according to the number of associated species and their exact statuses, and if the flowers are used by a wider range of non-specialist species, including scarce ones, as a source of nectar or pollen. Species assigned a score of '0' have not been included here.

Species (scientific name)	Species (English name)	Importance for recorded invertebrates
Acer campestre	Field maple	1
Acer platanoides	Norway maple	1
Acer pseudoplatanus	Sycamore	1
Achillea millefolium	Yarrow	4
Agrostis capillaris	Common bent	1
Agrostis stolonifera	Creeping bent	1
Alopecurus pratensis	Meadow foxtail	1
Anthriscus sylvestris	Cow parsley	1
Armoracia rusticana	Horse-radish	1
Arrhenatherum elatius	False oat-grass	1
Artemisia vulgaris	Mugwort	3
Ballota nigra	Black horehound	3
Beta vulgaris subsp. ***maritima***	Sea beet	1
Betula pendula	Silver birch	1
Blackstonia perfoliata	Yellow-wort	1
Brassica nigra	Black mustard	3
Bromus hordeaceus	Soft brome	1
Calendula officinalis	Pot marigold	1
Capsella bursa-pastoris	Shepherd's purse	1
Carex hirta	Hairy sedge	1
Centaurea nigra sens. lat.	Common knapweed	2

Species (scientific name)	Species (English name)	Importance for recorded invertebrates
Centaurea scabiosa	Greater knapweed	3
Centaurium erythraea	Common centaury	2
Cerastium fontanum	Common mouse-ear	1
Cerastium glomeratum	Sticky mouse-ear	1
Cirsium arvense	Creeping thistle	1
Cirsium vulgare	Spear thistle	2
Convolvulus arvensis	Field bindweed	1
Conyza canadensis	Canadian fleabane	1
Conyza sumatrensis	Guernsey fleabane	1
Cornus sanguinea* subsp. *sanguinea	Dogwood	1
Crataegus monogyna	Common hawthorn	1
Crepis capillaris	Smooth hawk's-beard	2
Crepis vesicaria* subsp. *taraxacifolia	Beaked hawk's-beard	2
Dactylis glomerata	Cock's-foot	1
Daucus carota	Wild carrot	5
Diplotaxis tenuifolia	Perennial Wall-rocket	2
Echium vulgare	Viper's bugloss	1
Erodium cicutarium	Common stork's-bill	4
Erodium moschatum	Musk stork's-bill	3
Festuca rubra	Red fescue	2
Foeniculum vulgare	Fennel	1
Fumaria muralis* subsp. *boroei	Common ramping fumitory	2
Fumaria officinalis* subsp. *officinalis	Common fumitory	2
Galium album	Hedge bedstraw	3
Galium verum	Lady's bedstraw	3
Geranium dissectum	Cut-leaved Crane's-bill	1
Geranium molle	Dove's-foot Crane's-bill	2
Geranium pusillum	Small-flowered Crane's-bill	2
Glechoma hederacea	Ground-ivy	1
Hedera helix	Ivy	2

Species (scientific name)	Species (English name)	Importance for recorded invertebrates
Helminthotheca echioides	Bristly oxtongue	2
Heracleum sphondylium	Hogweed	2
Hippophae rhamnoides	Sea buckthorn	1
Holcus lanatus	Yorkshire-fog	1
Hypericum perforatum	Perforate St John's-wort	1
Hypochaeris radicata	Cat's-ear	2
Knautia arvensis	Field scabious	3
Leontodon saxatilis	Lesser hawkbit	2
Lepidium draba	Hoary cress	1
Leucanthemum vulgare	Ox-eye Daisy	3
Linaria purpurea	Purple toadflax	1
Linaria vulgaris	Common toadflax	2
Lotus corniculatus	Common bird's-foot-trefoil	3
Malva sylvestris	Common mallow	2
Medicago lupulina	Black medick	2
Mercurialis annua	Annual mercury	1
Myosotis ramosissima	Early Forget-me-not	1
Myosotis sylvatica	Wood forget-me-not	1
Ononis repens	Common restharrow	1
Papaver dubium	Long-headed poppy	1
Papaver rhoeas	Common poppy	1
Picris hieracioides	Hawkweed oxtongue	2
Plantago coronopus	Buck's-horn plantain	1
Plantago lanceolata	Ribwort plantain	2
Plantago media	Hoary plantain	1
Prunella vulgaris	Self-heal	1
Prunus spinosa	Blackthorn	2
Reseda lutea	Wild mignonette	2
Rubus fruticosus agg.	Bramble	3
Rubus intensior	A bramble	1

Species (scientific name)	Species (English name)	Importance for recorded invertebrates
Rubus ulmifolius	A bramble	1
Rumex acetosa	Common sorrel	1
Rumex crispus	Curled dock	1
Rumex crispus* subsp. *crispus	Curled dock	1
Rumex obtusifolius	Broad-leaved dock	1
Rumex x pratensis	Hybrid dock	1
Sagina filicaulis	Slender pearlwort	2
Sagina procumbens	Procumbent pearlwort	2
Schedonorus arundinaceus	Tall fescue	2
Scorzoneroides autumnalis	Autumn hawkbit	2
Sedum acre	Wall pepper	3
Sedum album	White stonecrop	3
Senecio erucifolius	Hoary ragwort	2
Senecio inaequidens	Narrow-leaved ragwort	1
Senecio jacobaea	Common ragwort	2
Senecio squalidus	Oxford ragwort	1
Sisymbrium officinale	Hedge mustard	1
Smyrnium olusatrum	Alexanders	3
Solanum dulcamara	Woody nightshade	1
Tamarix gallica	Tamarisk	1
Taraxacum agg.	Dandelion	1
Tragopogon porrifolius	Salsify	1
Tragopogon pratensis* subsp. *minor	Goat's-beard	1
Trifolium campestre	Hop trefoil	1
Trifolium dubium	Lesser trefoil	1
Trifolium pratense	Red clover	1
Trifolium repens	White clover	1
Trisetum flavescens	Yellow oat-grass	1
Urtica dioica	Common nettle	1
Vicia sativa* subsp. *nigra	Narrow-leaved vetch	1

Species (scientific name)	Species (English name)	Importance for recorded invertebrates
Vicia sativa* subsp. *segetalis	Common vetch	1
Viola odorata	Sweet violet	1
Viola x wittrockiana	Garden pansy	1
X *Cuprocyparis leylandii*	Leyland cypress	1

Appendix E
Pantheon Analysis

Broad biotope	Habitat	SAT	Number of species	% of total species	SQI	Number of species with status	Code	Reported condition
Open habitats		rich flower resource	79	33	159	23	F002	Favourable
Open habitats	Short sward & bare ground	bare sand & chalk	57	13	308	29	F111	Favourable
Open habitats	Short sward & bare ground	open short sward	49	24	182	15	F112	Favourable
Open habitats		scrub edge	36	16	133	4	F001	Favourable
Tree-associated	Decaying wood	bark & sapwood decay	32	6	169	5	A212	Favourable
Open habitats		scrub-heath & moorland	12	3	125	2	F003	Favourable
Tree-associated	Decaying wood	epiphyte fauna	2	10	100		A215	Unfavourable (2 of 3 species)

Habitat Scores

Habitat Scores	
Number of species	1,212
Number of species with habitat scores	1,083
Rarity score (SQI)	148
Number of species	1,212

Conservation Status

Conservation Status	Number of species with each conservation status
GB Conservation Status (old & new)	1 [Extinct]; 10 [Na]; 16 [Nb]; 1 [Not assessed]; 6 [Notable]; 1 [NS]; 2 [RDB 1]; 3 [RDB 2]; 10 [RDB 3]; 1 [RDB K]; 2 NA; 40 Nb; 2 New to Britain; 4 Notable; 5 NR; 33 NS; 2 pNS; 1 RDB 1; 2 RDB 2; 9 RDB 3; 1 RDB I; 5 RDB K
GB Red List	1 (LR); 4 DD; 1 EN; 354 LC; 7 NA; 1 NR; 4 NT; 4 pLC; 2 VU
Section 41 Priority Species	11 Section 41 Priority Species
Section 41 Priority Species - research only	3 Section 41 Priority Species - research only

Scores	Number of species
Calcareous grassland	14 High, 61 Moderate, 1 Moderate to low, 61 Low
Coarse woody debris	3 facultative xylophages, 2 probable xylophages, 1 probable xylophages/non xylophages
GB Conservation Status (old & new)	1 [Extinct]; 10 [Na]; 16 [Nb]; 1 [Not assessed]; 6 [Notable]; 1 [NS]; 2 [RDB 1]; 3 [RDB 2]; 10 [RDB 3]; 1 [RDB K]; 2 NA; 40 Nb; 2 New to Britain; 4 Notable; 5 NR; 33 NS; 2 pNS; 1 RDB 1; 2 RDB 2; 9 RDB 3; 1 RDB I; 5 RDB K
Section 41 Priority Species - research only	3 Section 41 Priority Species - research only

Habitat Scores

Habitat Scores	
Grazing marsh - salinity	3 Freshwater species tolerant of only mildly brackish water, 1 Species tolerant of mildly brackish conditions
Grazing marsh - status	1.75
IEC	1
Peat bog spiders	1 indicator species
Soft rock cliff	1 Grade 2, 13 Grade 3

Broad Biotopes

Broad biotope	Habitat	SAT	Number of species	% of total species	SQI
Open habitats		Rich flower resource	79	33	159
Open habitats	Short sward & bare ground	Bare sand & chalk	57	13	308
Open habitats	Short sward & bare ground	Open short sward	49	24	182
Open habitats		Scrub edge	36	16	133
Tree-associated	Decaying wood	Bark & sapwood decay	32	6	169

Other Level 1 Resources

Classification L1	Number of species	% of total species	SQI	No. species with status	Conservation status
Plant associated	628	15	156	106	Nb|RDB K|Section 41 Priority Species|NS|[Notable]|NR|VU|NS|[Nb]|NS|NS|RDB 3|Section 41 Priority Species - research only|[RDB 3]|[Nb]|[RDB 2]|Nb|Nb|RDB 2|NS|NS|[RDB 1]|NS|[Nb]|[Na]|NT|Section 41 Priority Species|[Nb]|RDB K|Nb|Nb|NS|Section 41 Priority Species|NR|NT|Nb|NS|RDB 1|[Nb]|Nb|[RDB 3]|pNS|[RDB 3]|RDB 3|Nb|Nb|[Na]|Section 41 Priority Species|Nb|[Nb]|Nb|RDB 3|[Na]|[RDB 3]|Nb|[Notable]|Notable|[RDB 2]|NS|Nb|[RDB 3]|[RDB 3]|Nb|[Notable]|[Not assessed]|[Notable]|[Nb]|NR|Nb|[Na]|[Nb]|[Nb]|Nb|[RDB 3]|Section 41 Priority Species|[Na]|DD|DD|NS|[Nb]|RDB 3|Nb|[Notable]|Nb|[Nb]|Section 41 Priority Species|RDB 3|[Nb]|[RDB 3]|NS|Nb|Nb|[Na]|[Notable]|Nb|RDB 3|Nb|NS|[RDB 3]|NS|Nb|NT|Section 41 Priority Species|NR|NT|Section 41 Priority Species|RDB 2|NS|Nb|[RDB K]|Nb|NS|[Nb]|[RDB 3]|Section 41 Priority Species|NS|NR|VU|New to Britain|NS|NS|Section 41 Priority Species
Ubiquitous	53	27	106	3	Section 41 Priority Species - research only|(LR)|NS|Section 41 Priority Species - research only
Non-native	33	5	100	1	DD
Unknown	24	10	183	3	RDB K|Nb|pNS
Dung & carrion	20	7	100		
Vagrant/ introduced	12	3	167	3	[Not assessed]|[Na]|NS
Synanthropic	7	3	100		

Habitats

Broad biotope	Habitat	Number of species	% of total species	SQI	No. species with status	Conservation status
Open habitats	Tall sward & scrub	518	20	124	41	Section 41 Priority Species|Nb|[Nb]|RDB 3|Nb|[Notable]|Notable|Nb|Nb|RDB K|Section 41 Priority Species|NS|[Notable]|NS|RDB 3|Section 41 Priority Species - research only|NS|NS|NS|pNS|RDB I|Nb|Nb|NS|RDB 1|NS|DD|DD|NS|[Nb]|Nb|[Notable]|[Nb]|Section 41 Priority Species|NS|[Notable]|NS|[Nb]|Section 41 Priority Species|Section 41 Priority Species|NS|NS|Section 41 Priority Species|[Notable]|[Nb]|Nb

Broad biotope	Habitat	Number of species	% of total species	SQI	No. species with status	Conservation status
Open habitats	Short sward & bare ground	311	24	192	89	NS|[Na]|[Nb]|NR|Nb|NT|Section 41 Priority Species|Nb|Nb|[Nb]|VU|NS|NS|Nb|[Nb]|RDB K|Notable|NS|Section 41 Priority Species|NR|NT|Nb|[Na]|Nb|[Notable]|[RDB 3]|Nb|NS|NS|Nb|[Nb]|Nb|Nb|NS|[RDB 3]|pNS|NT|Section 41 Priority Species|Nb|[RDB 3]|RDB 3|Nb|NS|NS|RDB 2|Nb|Nb|RDB 3|[Na]|Nb|DD|Nb|Nb|[RDB 2]|[Na]|NR|NT|[Notable]|[RDB 3]|[Nb]|[Nb]|[RDB 3]|[RDB 3]|[Na]|RDB 2|RDB 3|[Nb]|NS|Nb|RDB 3|NR|Nb|[RDB 3]|Nb|Section 41 Priority Species|NS|Nb|Nb|NS|RDB 3|[Na]|NS|NS|[Nb]|Nb|Nb|Nb|RDB 3|[Nb]|[Na]|[RDB 3]|[Notable]|Nb|[Nb]|Nb|RDB 3|Section 41 Priority Species|NR|VU|NS|[RDB 2]
Tree-associated	Arboreal	85	6	125	4	[RDB 2]|NS|[RDB 3]|[Na]
Tree-associated	Decaying wood	41	3	161	7	RDB 3|DD|NS|RDB 3|NS|[Na]|Nb
Tree-associated	Shaded woodland floor	40	4	108	2	DD|Nb
Wetland	Peatland	22	2	112	1	[Notable]
Wetland	Marshland	14	2	160	1	[Notable]
Coastal	Saltmarsh	5	2	200	2	[Nb]|Nb
Wetland	Running water	5	<1	100		
Open habitats	Upland	3	2	100		
Wetland	Wet woodland	3	1	100		
Tree-associated	Wet woodland	2	<1	100		
Coastal	Sandy beach	2	2	250	1	[RDB K]
Coastal	Brackish pools and ditches	2	2	100		
Coastal	Sea cliff	1	2	800	1	NR

Other Level 2 Resources

Classification L1	Classification L2	Number of species	% of total species	SQI	No. species with status	Conservation status
Plant-associated	Inflorescence-associated	380	9	156	65	[RDB 2]|[RDB 3]|[RDB 3]|Nb| Section 41 Priority Species|[Notable]|[Nb]|Nb|[Na]|[Nb]|Nb| [RDB 3]|[RDB 3]|[RDB 3]|RDB 3|Nb|[Na]|[Notable]|Nb|[Nb]|Section 41 Priority Species|RDB 3|NS|Nb|[Na]|[Notable]|Nb|Nb|[RDB 3]|Nb|NT|Section 41 Priority Species|NR| NT|Section 41 Priority Species|RDB 2|Nb|[Nb]|[RDB 3]|Section 41 Priority Species|NR|VU|[Notable]|[Notable]|[Nb] |NS|NS|RDB 3|Section 41 Priority Species - research only|[RDB 3]|[Nb]| [RDB 2]|RDB 2|NS|[RDB 1]|[Nb]|[Na]|NT|Section 41 Priority Species|[Nb]|NS|Section 41 Priority Species|NR|NT|Nb|[Nb]|Nb|Section 41 Priority Species|[Na]|Section 41 Priority Species|Nb|[Nb]|Nb|RDB 3|[Na]|[RDB 3]|Nb|[Notable]|Notable
plant-associated	Leaves and/or stems	243	6	156	34	Nb|NS|NS|[Notable]|NS|Section 41 Priority Species|RDB K|Nb|DD|DD|NS|[Nb]|Nb|[Nb]|Nb|NS| NT|Section 41 Priority Species| Section 41 Priority Species|NS|pNS|Nb| [RDBK]|[RDB3]|NS|NS|NS|NR|[Nb]|Nb| pNS|Nb|Nb|NS|RDB 1|Nb|Section 41 Priority Species|NT|NS
Plant-associated	Roots	55	1	156	4	Nb|[Notable]|NS|NS
Ubiquitous	All habitats	53	27	106	3	(LR)|NS|Section 41 Priority Species - research only|Section 41 Priority Species - research only
Dung & carrion	Dung	5	2	100		
Dung & carrion	Carrion	5	2	100		
Synanthropic	In buildings	4	2	100		
Synanthropic	Compost/manure heaps	3	1	100		

Other Level 3 Resources

Classification L1	Classification L2	Classification L3	Number of species	% of species total	SQI	No. species with status	Conservation status
Plant-associated	Inflorescence-associated	Nectar and/or pollen	271	7	156	48	[Notable]|Notable|[RDB 2]|[RDB 3]| [RDB 3]|Nb|Section 41 Priority Species|[Notable]|[Nb]|Nb| [Na]|[Nb]|[RDB 3]|[RDB 3]|[RDB 3]|RDB3|Nb|[Na]|[Notable]|NS|[Na] |[Notable]|Nb|[RDB 3]|NT|Section 41 Priority Species|NR|NT|Section 41 Priority Species|RDB2|[Notable]| [Notable]|[Nb]|NS|NS|RDB 3|Section 41 Priority Species - research only| [RDB 2]|RDB 2|[RDB 1]|[Na]|NT| Section 41 Priority Species|[Nb]|Nb|[Nb]|Nb|Section 41 Priority Species| [Na]|Section 41 Priority Species|Nb|[Nb]|RDB 3| [Na]|Nb|[RDB 3]|Section 41 Priority Species
Plant-associated	Inflorescence-associated	Inflorescence	98	2	156	19	NR|[Nb]|NS|NS|Section 41 Priority Species|[RDB3]|NR| [Notable]|NT|Nb|[Nb]| Section 41 Priority Species|Nb|[Nb]|[Notable]| Nb|[Notable]|Notable|[Notable]| NS|[RDB 3]|Nb|[Nb]|VU|NS
Plant-associated	Inflorescence-associated	Seeds	10	<1	156	4	Nb|RDB 3|Nb|Nb
Plant-associated	Inflorescence-associated	Fleshy fruits	1	<1	156	1	[RDB 3]
Plant-associated	Inflorescence-associated	Nectar and/or pollen	1	<1	156		

Appendix F
Aculeate quality index

Table F.1 Scores assigned to recorded solitary bee and wasp species

Group	Family	Species (Scientific name)	Score	Status
Hymenoptera	Andrenidae	*Andrena alfkenella*	16	RDB3
Hymenoptera	Andrenidae	*Andrena bicolor*	1	Common
Hymenoptera	Andrenidae	*Andrena dorsata*	2	Common
Hymenoptera	Andrenidae	*Andrena flavipes*	4	Common
Hymenoptera	Andrenidae	*Andrena fulvago*	8	Na
Hymenoptera	Andrenidae	*Andrena haemorrhoa*	1	Common
Hymenoptera	Andrenidae	*Andrena hattorfiana*	8	RDB3
Hymenoptera	Andrenidae	*Andrena minutula*	2	Common
Hymenoptera	Andrenidae	*Andrena minutuloides*	16	Na
Hymenoptera	Andrenidae	*Andrena nigroaenea*	1	Common
Hymenoptera	Andrenidae	*Andrena nitida*	2	Common
Hymenoptera	Andrenidae	*Andrena niveata*	32	RDB2
Hymenoptera	Andrenidae	*Andrena proxima*	16	RDB3
Hymenoptera	Andrenidae	*Andrena scotica*	1	Common
Hymenoptera	Andrenidae	*Andrena subopaca*	1	Common
Hymenoptera	Andrenidae	*Andrena trimmerana*	4	Nb
Hymenoptera	Andrenidae	*Andrena varians*	16	Nb
Hymenoptera	Andrenidae	*Andrena wilkella*	1	Common
Hymenoptera	Apidae	*Epeolus variegatus*	2	Local
Hymenoptera	Apidae	*Nomada conjungens*	32	RDB2
Hymenoptera	Apidae	*Nomada fabriciana*	2	Common
Hymenoptera	Apidae	*Nomada flava*	2	Common
Hymenoptera	Apidae	*Nomada flavoguttata*	1	Common
Hymenoptera	Apidae	*Nomada fucata*	4	Na
Hymenoptera	Apidae	*Nomada fulvicornis*	8	RDB3

Group	Family	Species (Scientific name)	Score	Status
Hymenoptera	Apidae	*Nomada goodeniana*	1	Common
Hymenoptera	Apidae	*Nomada marshamella*	1	Common
Hymenoptera	Apidae	*Nomada panzeri*	1	Common
Hymenoptera	Apidae	*Nomada ruficornis*	1	Common
Hymenoptera	Apidae	*Nomada striata*	4	Local
Hymenoptera	Apidae	*Nomada zonata*	4	Local
Hymenoptera	Chrysididae	*Hedychridium ardens*	1	Local
Hymenoptera	Chrysididae	*Hedychridium roseum*	8	Local
Hymenoptera	Chrysididae	*Hedychrum niemalei*	8	RDB3
Hymenoptera	Chrysididae	*Omalus aeneus*	4	Common
Hymenoptera	Chrysididae	*Pseudomalus auratus*	1	Common
Hymenoptera	Chrysididae	*Trichrysis cyanea*	2	Common
Hymenoptera	Colletidae	*Colletes daviesanus*	2	Common
Hymenoptera	Colletidae	*Colletes hederae*	2	Common
Hymenoptera	Colletidae	*Colletes similis*	2	Common
Hymenoptera	Colletidae	*Hylaeus brevicornis*	2	Common
Hymenoptera	Colletidae	*Hylaeus communis*	2	Common
Hymenoptera	Colletidae	*Hylaeus confusus*	1	Common
Hymenoptera	Colletidae	*Hylaeus cornutus*	8	Na
Hymenoptera	Colletidae	*Hylaeus dilatatus*	4	Common
Hymenoptera	Colletidae	*Hylaeus hyalinatus*	2	Common
Hymenoptera	Colletidae	*Hylaeus signatus*	2	Nb
Hymenoptera	Crabronidae	*Astata boops*	4	Local
Hymenoptera	Crabronidae	*Cerceris arenaria*	2	Local
Hymenoptera	Crabronidae	*Cerceris rybyensis*	1	Common
Hymenoptera	Crabronidae	*Crabro cribrarius*	2	Local
Hymenoptera	Crabronidae	*Crossocerus podagricus*	2	Common
Hymenoptera	Crabronidae	*Diodontus luperus*	2	Common
Hymenoptera	Crabronidae	*Diodontus minutus*	2	Common
Hymenoptera	Crabronidae	*Dryudella pinguis*	1	Local

Group	Family	Species (Scientific name)	Score	Status
Hymenoptera	Crabronidae	*Entomognathus brevis*	2	Common
Hymenoptera	Crabronidae	*Harpactus tumidus*	1	Local
Hymenoptera	Crabronidae	*Lindenius albilabris*	2	Common
Hymenoptera	Crabronidae	*Mimumesa dahlbomi*	2	Common
Hymenoptera	Crabronidae	*Oxybelus uniglumis*	1	Common
Hymenoptera	Crabronidae	*Passaloecus singularis*	2	Common
Hymenoptera	Crabronidae	*Pemphredon lethifera*	1	Common
Hymenoptera	Crabronidae	*Pemphredon lugubris*	1	Common
Hymenoptera	Crabronidae	*Philanthus triangulum*	2	RDB2
Hymenoptera	Crabronidae	*Tachysphex pompiliformis*	1	Common
Hymenoptera	Crabronidae	*Trypoxylon attenuatum*	1	Common
Hymenoptera	Crabronidae	*Trypoxylon figulus* agg.	2	n/a
Hymenoptera	Crabronidae	*Trypoxylon medium*	2	Common
Hymenoptera	Halictidae	*Halictus rubicundus*	1	Common
Hymenoptera	Halictidae	*Halictus tumulorum*	1	Common
Hymenoptera	Halictidae	*Lasioglossum albipes*	1	Common
Hymenoptera	Halictidae	*Lasioglossum brevicorne*	16	RDB3
Hymenoptera	Halictidae	*Lasioglossum calceatum*	1	Common
Hymenoptera	Halictidae	*Lasioglossum fulvicorne*	2	Local
Hymenoptera	Halictidae	*Lasioglossum lativentre*	2	Common
Hymenoptera	Halictidae	*Lasioglossum leucopus*	1	Common
Hymenoptera	Halictidae	*Lasioglossum leucozonium*	2	Common
Hymenoptera	Halictidae	*Lasioglossum malachurum*	4	Nb
Hymenoptera	Halictidae	*Lasioglossum minutissimum*	2	Common
Hymenoptera	Halictidae	*Lasioglossum morio*	2	Common
Hymenoptera	Halictidae	*Lasioglossum nitidiusculum*	1	Common
Hymenoptera	Halictidae	*Lasioglossum parvulum*	4	Local
Hymenoptera	Halictidae	*Lasioglossum pauperatum*	16	RDB3
Hymenoptera	Halictidae	*Lasioglossum pauxillum*	4	Na
Hymenoptera	Halictidae	*Lasioglossum punctatissimum*	2	Local

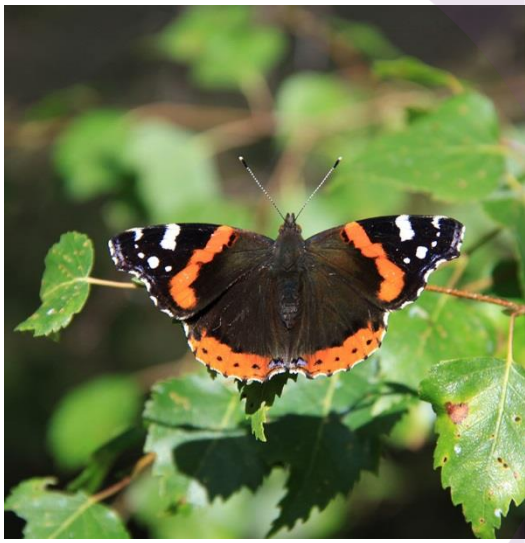
Group	Family	Species (Scientific name)	Score	Status
Hymenoptera	Halictidae	*Lasioglossum villosulum*	2	Common
Hymenoptera	Halictidae	*Lasioglossum xanthopus*	8	Nb
Hymenoptera	Halictidae	*Sphecodes crassus*	2	Nb
Hymenoptera	Halictidae	*Sphecodes ephippius*	2	Common
Hymenoptera	Halictidae	*Sphecodes geoffrellus*	1	Common
Hymenoptera	Halictidae	*Sphecodes gibbus*	2	Common
Hymenoptera	Halictidae	*Sphecodes monilicornis*	1	Common
Hymenoptera	Halictidae	*Sphecodes puncticeps*	2	Common
Hymenoptera	Halictidae	*Sphecodes rubicundus*	8	Na
Hymenoptera	Halictidae	*Sphecodes spinulosus*	32	RDB2
Hymenoptera	Megachilidae	*Anthidium manicatum*	2	Common
Hymenoptera	Megachilidae	*Megachile leachella*	4	Nb
Hymenoptera	Megachilidae	*Megachile ligniseca*	2	Common
Hymenoptera	Megachilidae	*Megachile versicolor*	1	Common
Hymenoptera	Megachilidae	*Megachile willughbiella*	1	Common
Hymenoptera	Megachilidae	*Osmia aurulenta*	8	Local
Hymenoptera	Megachilidae	*Osmia spinulosa*	4	Common
Hymenoptera	Megachilidae	*Stelis odontopyga*	n/a	?
Hymenoptera	Mutillidae	*Myrmosa atra*	2	Local
Hymenoptera	Pompilidae	*Agenioideus cinctellus*	2	Local
Hymenoptera	Pompilidae	*Anoplius infuscatus*	2	Local
Hymenoptera	Pompilidae	*Anoplius nigerrimus*	1	Common
Hymenoptera	Pompilidae	*Arachnospila anceps*	1	Common
Hymenoptera	Pompilidae	*Arachnospila minutula*	8	Nb
Hymenoptera	Pompilidae	*Arachnospila spissa*	1	Common
Hymenoptera	Pompilidae	*Auplopus carbonarius*	8	Nb
Hymenoptera	Pompilidae	*Caliadurgus fasciatellus*	8	Local
Hymenoptera	Pompilidae	*Evagetes crassicornis*	1	Common
Hymenoptera	Pompilidae	*Pompilus cinereus*	1	Local
Hymenoptera	Pompilidae	*Priocnemis agilis*	8	Nb

Group	Family	Species (Scientific name)	Score	Status
Hymenoptera	Pompilidae	*Priocnemis confusor*	8	Nb
Hymenoptera	Pompilidae	*Priocnemis parvula*	1	Local
Hymenoptera	Pompilidae	*Priocnemis perturbator*	1	Common
Hymenoptera	Pompilidae	*Priocnemis pusilla*	2	Local
Hymenoptera	Tiphiidae	*Tiphia femorata*	8	Local
Hymenoptera	Vespidae	*Ancistrocerus gazella*	1	Common
Hymenoptera	Vespidae	*Gymnomerus laevipes*	8	Local
Hymenoptera	Vespidae	*Odynerus melanocephalus*	8	Na,S41

Riveroak Strategic Partners Ltd.

Manston Airport DCO

Grassland Vegetation Assessment 2020



Wood Group UK Limited – April 2021

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Document revisions

No.	Details	Date
1	Report	February 2021
2	Report	March 2021
3	Re-issue with change to introduction	April 2021

Contents

1. Introduction

1.1 Project background

1.1.1 RiverOak Strategic Partners Ltd has commissioned Wood PLC. (hereafter referred to as 'Wood') to compile this ecological survey report in order to facilitate the discharge condition 8 in the Development Consent Order (DCO) which relates to ecological mitigation. Condition 8, stipulates that:

1.1.2 *The details of mitigation approved under subparagraph (1) must incorporate a net gain of at least 10 Biodiversity Units across the Order limits and any land used for ecological mitigation purposes compared to the situation that existed prior to the commencement of the authorised development*".

1.1.3 Consequently, the objective of this survey work was to inform refinement of the mitigation proposals to be able to achieve the required net gain for the redevelopment of an area of approximately 296 hectares (ha) at Manston Airport, Kent (hereinafter referred to as 'the Site') (see **Figure 1.1, Appendix A**).

1.1.4 The Site is located in north-east Kent, approximately 1.1 kilometres (km) west of Manston, central National Grid Reference TR 330 658. The DCO sets out proposals for the demolition of buildings and development to deliver an area for cargo freight operations able to handle at least 10,000 movements per year, facilities for other aviation-related development including a passenger terminal and associated facilities, an aircraft teardown and recycling facility, a flight training school, a base for at least one passenger carrier, a fixed base operation for executive travel, and business facilities for aviation related organisations.

1.1.5 Since Wood's appointment, following an Order of the High Court made on 15 February 2021, the decision of the Secretary of State dated 9 July 2020 to grant the application for development consent for the proposed re-development of Manston Airport has been quashed. The Secretary of State must now redetermine the application. Notwithstanding this, the purpose of this report has not changed.

1.2 Purpose of this report

1.2.1 This report details the methods adopted and results of the Phase 2 botanical survey work undertaken within eleven selected areas of the Site (refer to **Figure 1.2** within **Appendix A**) to investigate the value of semi-improved neutral grassland. These results will be used, along with the results from other ecological studies, to facilitate the discharging of Condition 8 relating to ecological mitigation in the Development Consent Order (DCO) for the Site.

1.3 Habitat Survey Background

1.3.1 In 2018, Wood undertook an Extended Phase 1 Habitat Survey[1] of the Site. The Phase 1 Habitat Survey identified areas of both species-poor semi-improved neutral grassland and semi-improved neutral grassland, and recommendations were made to further evaluate eleven areas using botanical survey techniques.

[1] AMEC Environmental & Infrastructure UK Limited (now known as 'Wood Plc'). (2018). *Chapter 7: Biodiversity.* From DCO Environmental Statement. TR020002-002420-5.2-7 - Environmental Statement - Volume 7 - 2 of 3 - Appendices 7.7-8.1.pdf (planninginspectorate.gov.uk).

1.3.2 There was no requirement to extensively check or reclassify habitats as part of the current survey, as the habitats had not changed since the previous Phase 1 habitat data collection and mapping was undertaken. There has been no change in management of the habitats in the intervening years, and the 2018 report was relied upon in terms of identifying the areas of grassland for the follow-on botanical survey work.

2. Methods

2.1 Vegetation assessment

2.1.1 A walkover survey of the 11 selected survey areas (refer to **Figure 1.2** within **Appendix A**) was undertaken on 13 July 2020 in order to assess them using the National Vegetation Classification (NVC)[2], which is the standard for describing, mapping and classifying British plant communities. This incorporated all of the previously mapped areas of semi-improved neutral grassland, shown in the Phase 1 figures of the Environmental Statement for the DCO[3]. The timing of the survey visit was designed to coincide with the optimal season for grassland survey[4].

2.1.2 Survey areas were assessed for their main NVC plant community or sub-community type using the surveyor's professional judgement in the field and with reference to Volume 3 of the NVC key 3 to mesotrophic grasslands, floristic tables and grassland community descriptions[2].

2.1.3 NVC community boundaries for the grasslands were identified within each land parcel and mapped. A full vascular plant species list, comprising the main plant species that were noted during the walkover, was compiled for each distinct area of grassland surveyed.

2.1.4 The list of vascular plant species recorded during the survey, was checked against the Spreadsheet of Conservation Designations to check for plant species of conservation importance[5].

2.1.5 Given the limited number of different areas of homogenous grassland involved in this walkover survey, and the relatively few differences between the grasslands, it was not considered necessary to collect botanical samples (using quadrats) to make a professional judgement of the best match of the grassland surveyed to the described NVC plant communities.

2.1.6 The grassland assessment was conducted by a FISC[6] level 5 botanist with extensive experience of habitat classification within Kent, with assistance from a FISC level 4 botanist. The botanical nomenclature used throughout follows the standard botanical text[7].

2.2 Other survey information

2.2.1 In addition to the walkover survey plant species were also recorded during the invertebrate survey as the invertebrates often rely on one or a small number of food plants. The plant species identified which had a formal conservation status have been listed in this report.

2.3 Survey limitations

2.3.1 The majority of the grasslands had been mown a few weeks prior to the survey visit. Despite this, it was still possible to make an accurate assessment of the species present and the grassland type.

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[2] Rodwell, J. S. *et al.* (1992). *British Plant Communities Volume 3 – Grasslands and montane communities.* Cambridge University Press.
[3] Figure 7.3 *Manston Airport DCO Environmental Statement: Phase 1 Habitat Plan and Waterbodies in River Basin Management Plan*. Located within the DCO application documents at https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-002414-5.2-4%20-%20Environmental%20Statement%20-%20Figures%20-%205%20of%207%20-%20Figures%204.1-9.6.pdf [Accessed 05/02/21].
[4] UK Habitat Classification Working Group (2018). Available to view at http://ecountability.co.uk/ukhabworkinggroup-ukhab
[5] Joint Nature Conservation Committee (2020). *JNCC Spreadsheet of Conservation Designations for Species*. Available to download at: https://hub.jncc.gov.uk/assets/478f7160-967b-4366-acdf-8941fd33850b
[6] Field Identification Skills Certificate -the industry standard for assessing botanical survey skills
[7] Stace, C. 2019. *New Flora of the British Isles (4th Edition).* C & M Floristics.

3. Results

3.1 Overview

3.1.1 It appeared that most of the grasslands were managed by infrequent or annual mowing with collection and removal of arisings (i.e. a hay cut).

3.1.2 Based on the vascular plant species present, and their relative abundance, NVC classification determinations were made for each of the 11 areas, as described in **Sections 3.2 to 3.12**. The locations of these areas are shown in **Figure 1.2** (**Appendix A**) and the vascular plant species lists recorded during the survey are presented in **Tables B.1** to **B.11 (Appendix B**).

3.2 TN1. Coarse semi-improved neutral grassland

- Area: 22.8ha, centred on TR 3144 6592.

3.2.1 Located within the western limit of the Site. The grassland description is also termed 'Other neutral grassland' and can be further defined as 'Arrhenatherum neutral grassland' at level 5 of the recent UK Habitat Classification (UKHab)[4]. The sward was grass-dominated, with ten grass species recorded; it was fairly rank in nature with abundant cock's-foot and frequent false oat-grass. The fine-leaved grass red fescue was recorded frequently. The best match for NVC is the MG1 - Arrhenatherum elatius Festuca rubra sub-community. The damper south-west corner of the area had more tussocks of tufted hair-grass. Overall, the sward was relatively species-poor and herbaceous broad-leaved species (herbs), were relatively few – 11 in total. Hedge bedstraw was recorded frequently with occasional smooth hawk's-beard and Lady's bedstraw. The rank nature of the grassland indicated relatively infrequent management.

3.3 TN2. Coarse semi-improved neutral grassland (or 'Other neutral grassland' as at TN1)

- Area: 0.3ha, centred on TR 3277 6618.

3.3.1 Located approximately 1.06km to the north-east of TN1.The sward was grass-dominated, comprising seven species with abundant false oat-grass and frequent cock's-foot. There were a relatively large number of herb species present in the sward (total of 22 species). With the exception of hedge bedstraw, which was frequent throughout the sward, the remaining 21 herb species were all only rare occurrences (i.e. they were present but not in high numbers). The best match for NVC is the MG1 - Arrhenatherum elatius Festuca rubra sub-community.

3.4 TN3. Coarse semi-improved neutral grassland

- Area: 0.6 ha, centred on TR 3285 6614.

3.4.1 Located within the fenced compound immediately to the south-east of TN2. The grassland here was broadly similar to TN2, comprising five of the same grass species as TN1 in addition to yellow oat-grass and 10 herb species including bur chervil and greater knapweed. The best match for NVC is the MG1 - Arrhenatherum elatius Festuca rubra sub-community.

3.5 TN4. Coarse semi-improved neutral grassland

- Area: 39.1ha, centred on TR 3407 6555.

3.5.1 This extensive area was located approximately 1.6km east of TN1.The sward was similar in composition to TN1-TN3; grass-dominated (6 species) and rank in nature. The sward contained 16 herb species, including a few which are indicative of basic or calcareous substrates such as common toadflax, common restharrow and greater knapweed. The best match for NVC is the MG1 - Arrhenatherum elatius Festuca rubra sub-community.

3.6 TN5. Coarse semi-improved neutral grassland

- Area: 2.2ha, centred on TR 3472 6541.

3.6.1 A narrow strip of unmown grassland surrounded by TN4, which was in line with the runway. It is possible that the substrate in this area is different to that at TN4, or previously there has been compaction. This grassland contained significantly fewer species of both grasses (3) and herbs (3). The sward was slightly finer than that found at the other grasslands visited on Site, with abundant red fescue. The coarse species, false oat-grass and cock's-foot, were frequent. The best match for NVC is the MG1 - Arrhenatherum elatius Festuca rubra sub-community.

3.7 TN6. Open Mosaic Habitats on Previously Developed Land: Coarse semi-improved neutral grassland with scrub, tall ruderal and perennial species of waste ground

- Area: 0.1ha, centred on TR 3388 6608.

3.7.1 This small area, approximately 0.3km north-west of TN4, comprised a habitat complex of NVC MG1 - Arrhenatherum elatius grassland plant community, with three grass species. Occasional to frequent false oat-grass was present, along with nine predominantly tall ruderal herb species including frequent creeping thistle, hedge mustard, cow parsley and Alexanders, along with elder scrub.

3.8 TN7. Open Mosaic Habitats on Previously Developed Land: Coarse semi-improved neutral grassland with scrub, tall ruderal, annual weeds and perennial species of waste ground

- Area: 0.2ha, centred on TR 3394 6606.

3.8.1 This area, immediately to the south-east of TN6 comprised a habitat complex of NVC MG1 - Arrhenatherum elatius grassland plant community. Grasses comprising false oat grass and cock's-foot were present, alongside a range of herb species including, bramble scrub, Alexanders, prickly lettuce, black medick, dove's-foot crane's-bill, biting stone crop and buck's-horn plantain.

3.9 TN8. Coarse semi-improved neutral grassland

- Area: 0.5ha, centred on TR 3403 6621.

3.9.1 A collection of three small areas of short mown grassland, approximately 69m north of TN7. The best match for NVC is the MG1 - Arrhenatherum elatius Festuca rubra sub-community. The sward

was grass dominated and species comprised false oat-grass, cock's-foot and red fescue. A total of 12 herb species were also present, which included black medick, yarrow, ribwort plantain and Alexanders.

3.10 TN9. Coarse semi-improved neutral grassland

- Area: 3.1ha, centred on TR 3616 6657.

3.10.1 Three areas of short mown and relatively species-poor neutral grassland located approximately 0.36km west of TN8. The best match for NVC is the MG1 - Arrhenatherum elatius Festuca rubra sub-community. There was a greater abundance of Yorkshire fog and perennial rye-grass recorded in the sward here compared to the relatively species-rich areas of TN10. The borders were slightly more herb-rich - these are discussed as part of the TN10 area (see Figure 1.2, Appendix A). A total of six grass species and five herb species were recorded across these areas.

3.11 TN10. Coarse semi-improved neutral grassland

- Area: 2.9ha, centred on TR 3360 6657.

3.11.1 Five areas of semi-improved neutral grassland, which are all adjacent to the areas in T9. All these areas are relatively rich in herb species. The best match for NVC is the MG1 - Arrhenatherum elatius Festuca rubra sub-community. The sward was grass dominated with the following six grass species recorded: cock's-foot, false oat-grass, tufted hair-grass, red fescue, perennial rye-grass, and smaller cat's-tail. A total of 17 herb species were recorded (the highest number of herbs across all areas), although none were frequent within the sward. Herbs included daisy, greater knapweed, wild carrot, hedge bedstraw, bristly oxtongue, field scabious, hoary cress, oxeye daisy, common toadflax, bird's-foot-trefoil, ribwort plantain, mignonette, hedge mustard, dandelion, goat's-beard and hop trefoil.

3.12 TN11. Coarse semi-improved neutral grassland with tall ruderal vegetation

- Area: 0.5ha, centred on TR 3382 6680.

3.12.1 This small area, immediately to the north of TN9 and TN10 had been left unmown and supported more tall ruderal species than the surrounding grassland. Grass species were limited to false oat-grass t; herb species included Alexanders, bristly oxtongue, hoary cress and common nettle. The best match for NVC is the MG1 - Arrhenatherum elatius Festuca rubra sub-community.

3.13 Other survey information

3.13.1 During the invertebrate survey 256 botanical species were identified. Of these seven had some form of conservation status and are listed in **Table 3.1** below.

Table 3.1 List of Plant species with formal conservation status

Common Name	Scientific name	Status	Recorded during grassland survey
Field Mouse-ear	*Cerastium arvense*	Near Threatened England	No

Common Name	Scientific name	Status	Recorded during grassland survey
Common Cudweed	*Filago vulgaris*	Near Threatened England	No
Lizard Orchid	*Himantoglossum hircinum*	Near Threatened UK Schedule 8 WCA 1981	No
Field Scabious	*Knautia arvensis*	Near Threatened England	Yes
Hoary Plantain	*Plantago media*	Near Threatened England	No
Dwarf Cherry	*Prunus cerasus*	Near Threatened England	No
Strawberry Clover	*Trifolium fragiferum*	Vulnerable England	No

4. Summary

4.1.1 The aim of this survey was to assess the NVC plant communities of the semi-improved neutral grassland habitats identified during the Phase 1 Habitat Survey[3],. The best overall match for the grassland plant communities **is the MG1 - *Arrhenatherum elatius Festuca rubra* sub-community**.

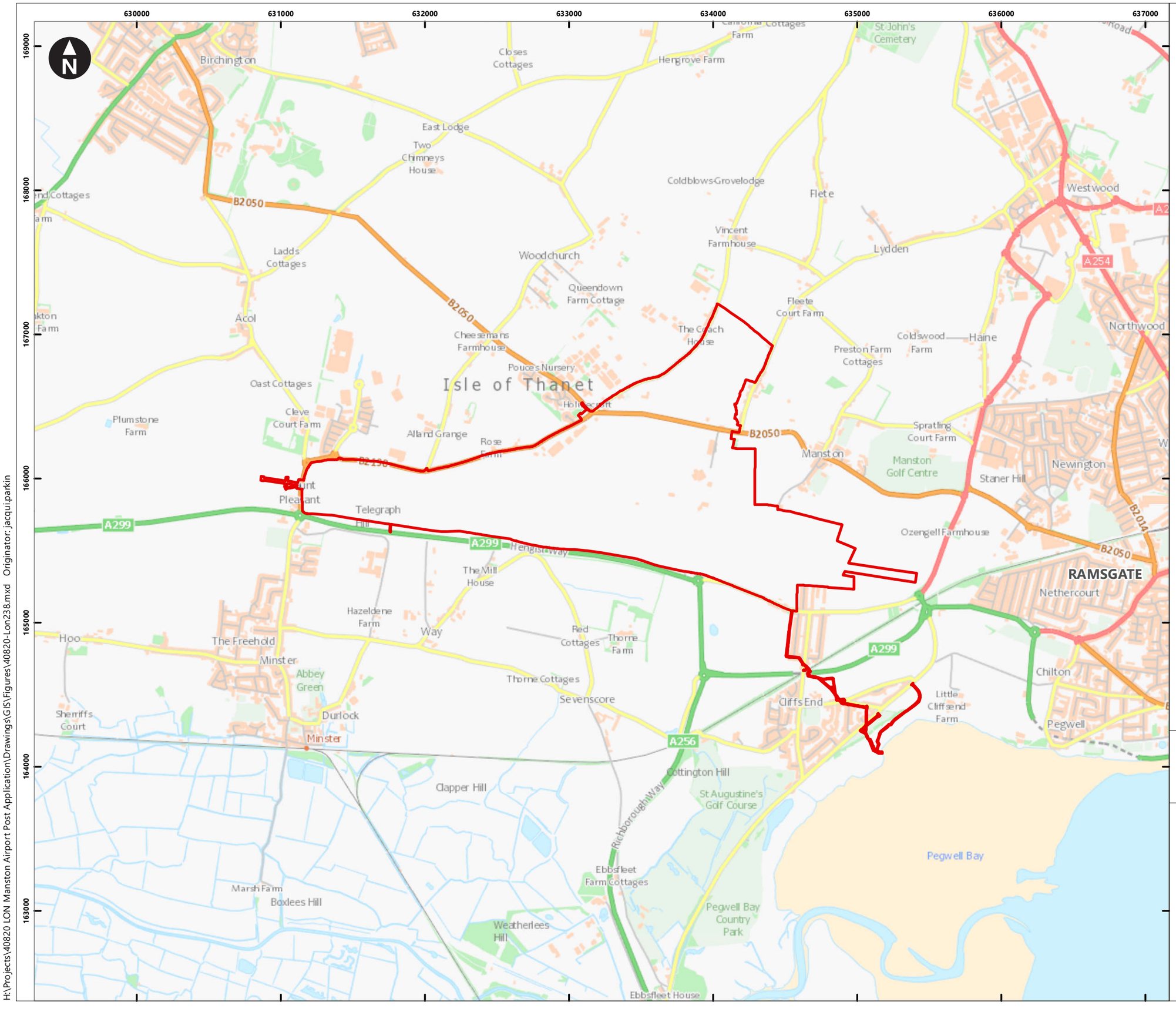
4.1.2 Exceptions are for TN6 and TN7, which have been left unmanaged and patches of vegetation have developed which are more typical of open mosaic habitats associated with previously developed land alongside the **MG1 community**. These patches of scrub, tall ruderal vegetation, annual weeds, and perennial species of waste ground were not mapped separately and are not well matched to specific plant communities of open habitats, as described in Volume 5 of the NVC[8].

4.1.3 In the 11 areas that were visited, the following was recorded:

- No plant species of conservation importance listed on the Spreadsheet of Conservation Designations were identified;
- No legally protected plant species that are listed in Schedule 8 of the *Wildlife and Countryside Act 1981 (as amended)*[9] were recorded during the survey;
- No habitats or Species of Principal Importance (previously known as BAP priority habitats and species) under Section 41 of the *Natural Environment Research Council (NERC) Act (2006)*[10] were recorded during the survey. The neutral grassland did not contain indicator species of sufficient frequency to be classified as priority habitat – Lowland meadow;
- No notable species currently on the Kent Rare Plant Register were recorded at the Site[11]; and
- No invasive non-native species (INNS) were found to be present on the Site[12].

[8] Rodwell, J. S. *et al.* (2000). *British Plant Communities Volume 5 – Maritime communities and vegetation of open habitats.* Cambridge University Press.
[9] Wildlife and Countryside Act (1981) (as amended). UK public general act. https://www.legislation.gov.uk/ukpga/1981/69.
[10] Natural Environment Research Council (NERC) Act (2006). UK public general act. https://www.legislation.gov.uk/ukpga/2006/16/contents.
[11] Kitchener, G. 2020. *Kent Rare Plant Register (Version 15).* Available to download at: https://bsbi.org/kent.
[12] GB Non-Native Species Secretariat (NNSS). Invasive Alien Species of Union concern (2016). http://www.nonnativespecies.org/index.cfm?sectionid=7.

Appendix A
Figures



Key

Order Limits

0 500 1,000 1,500 m

Scale at A3: 1:25,000

Client

RSP

Manston Airport DCO Condition 8
Grassland Vegetation Assessment

Figure 1.1
Site location plan

February 2021

wood.

40820-Lon238

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631000 632000 633000 634000 635000

167000 166000 165000 164000

Inset Map

See inset map for detail

Key

Order Limits

MG1 - Arrhenatherum elatius Festuca rubra sub-community

0 200 400 600 800 m

Scale at A3: 1:15,000

Client

RSP

Manston Airport DCO Condition 8
Grassland Vegetation Assessment

Figure 1.2
Areas of grassland surveyed

February 2021

wood.

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Appendix B
Vascular plant species lists for surveyed areas

Table B.1 Area of grassland TN1

Common Name	Scientific Name
Grasses	
Bread Wheat	*Triticum aestivum*
Cock's-foot	*Dactylis glomerata*
Creeping Bent	*Agrostis stolonifera*
False Oat-grass	*Arrhenatherum elatius*
Perennial Rye-grass	*Lolium perenne*
Red Fescue	*Festuca rubra* agg.
Smaller Cat's-tail	*Phleum bertolonii*
Tufted Hair-grass	*Deschampsia cespitosa*
Yellow Oat-grass	*Trisetum flavescens*
Yorkshire Fog	*Holcus lanatus*
Herbs	
Bristly Oxtongue	*Helminthotheca echioides*
Cow Parsley	*Anthriscus sylvestris*
Creeping Thistle	*Cirsium arvense*
Curled Dock	*Rumex crispus*
Field Bindweed	*Convolvulus arvensis*
Greater Knapweed	*Centaurea scabiosa*
Hedge Bedstraw	*Galium album*
Hoary Cress	*Lepidium draba*
Lady's Bedstraw	*Galium verum*
Smooth Hawk's-beard	*Crepis capillaris*
Yarrow	*Achillea millefolium*

Table B.2 Area of grassland TN2

Common Name	Scientific Name
Grasses	
Cock's-foot	*Dactylis glomerata*
Creeping Bent	*Agrostis stolonifera*
Crested Dog's-tail	*Cynosurus cristatus*
False Oat-grass	*Arrhenatherum elatius*
Perennial Rye-grass	*Lolium perenne*
Red Fescue	*Festuca rubra* agg.
Smaller Cat's-tail	*Phleum bertolonii*
Herbs	
Bird's-foot-trefoil	*Lotus corniculatus*
Bristly Oxtongue	*Helminthotheca echioides*
Common Mallow	*Malva sylvestris*
Common Mouse-ear	*Cerastium fontanum*
Common Vetch	*Vicia sativa*
Creeping Buttercup	*Ranunculus repens*
Creeping Cinquefoil	*Potentilla reptans*
Curled Dock	*Rumex crispus*
Daisy	*Bellis perennis*
Field Bindweed	*Convolvulus arvensis*
Goat's-beard	*Tragopogon pratensis* agg.
Hedge Bedstraw	*Galium album*
Hedge Mustard	*Sisymbrium officinale*
Hoary Cress	*Lepidium draba*
Hoary Ragwort	*Jacobaea erucifolia*
Lady's Bedstraw	*Galium verum*
Ribwort Plantain	*Plantago lanceolata*
Smooth Hawk's-beard	*Crepis capillaris*
Spear Thistle	*Cirsium vulgare*
Sweet Violet	*Viola odorata*

Common Name	Scientific Name
Weld	*Reseda lutea*
Wild carrot	*Daucus carota ssp. carota*

Table B.3 Area of grassland TN3

Common Name	Scientific Name
Grasses	
Creeping Bent	*Agrostis stolonifera*
False Oat-grass	*Arrhenatherum elatius*
Red Fescue	*Festuca rubra* agg.
Smaller Cat's-tail	*Phleum bertolonii*
Soft Brome	*Bromus hordeaceus* ssp. *hordeaceus*
Yellow Oat-grass	*Trisetum flavescens*
Herbs	
Annual Mercury	*Mercurialis annua*
Bladder Campion	*Silene vulgaris*
Bur Chervil	*Anthriscus caulis*
Cleavers	*Galium aparine*
Common Mouse-ear	*Cerastium fontanum*
Creeping Cinquefoil	*Potentilla reptans*
Cut-leaved Crane's-bill	*Geranium dissectum*
Greater Knapweed	*Centaurea scabiosa*
Prickly Sow-thistle	*Sonchus asper*
White Campion	*Silene latifolia*
Yarrow	*Achillea millefolium*

Table B.4 Area of grassland TN4

Common Name	Scientific Name
Grasses	
Cock's-foot	*Dactylis glomerata*

Common Name	Scientific Name
Common Couch	*Elymus repens*
False Oat-grass	*Arrhenatherum elatius*
Red Fescue	*Festuca rubra* agg.
Tufted Hair-grass	*Deschampsia cespitosa*
Yellow Oat-grass	*Trisetum flavescens*
Yorkshire Fog	*Holcus lanatus*
Herbs	
Bramble	*Rubus fruticosus* agg.
Common Restharrow	*Ononis repens*
Common Sorrel	*Rumex acetosa*
Common Toadflax	*Linum catharticum*
Creeping Thistle	*Cirsium arvense*
Daisy	*Bellis perennis*
Dandelion	*Taraxacum* agg.
Field Bindweed	*Convolvulus arvensis*
Greater Knapweed	*Centaurea scabiosa*
Hedge Bedstraw	*Galium album*
Hoary Cress	*Lepidium draba*
Hogweed	*Heracleum sphondylium*
Hop Trefoil	*Trifolium campestre*
Mignonette	*Reseda luteola*
Perforate St. John's-wort	*Hypericum perforatum*
Smooth Hawk's-beard	*Crepis capillaris*
Spotted Medick	*Medicago arabica*
Yarrow	*Achillea millefolium*

Table B.5 Area of grassland TN5

Common Name	Scientific Name
Grasses	
Cock's-foot	*Dactylis glomerata*

Common Name	Scientific Name
False Oat-grass	*Arrhenatherum elatius*
Red Fescue	*Festuca rubra* agg.
Yellow Oat-grass	*Trisetum flavescens*
Herbs	
Field Bindweed	*Convolvulus arvensis*
Hoary Cress	*Jacobaea erucifolia*
Spotted Medick	*Medicago arabica*

Table B.6 Area of grassland TN6

Common Name	Scientific Name
Grasses	
Common Couch	*Elymus repens*
Creeping Bent	*Agrostis stolonifera*
False Oat-grass	*Arrhenatherum elatius*
Herbs	
Alexanders	*Smyrnium olusatrum*
Cow Parsley	*Anthriscus sylvestris*
Creeping Cinquefoil	*Potentilla reptans*
Creeping Thistle	*Cirsium arvense*
Elder	*Sambucus nigra*
Hedge Mustard	*Sisymbrium officinale*
Hogweed	*Heracleum sphondylium*
Ribwort Plantain	*Plantago lanceolata*
Spear Thistle	*Cirsium vulgare*
Yarrow	*Achillea millefolium*

Table B.7 Area of grassland TN7

Common Name	Scientific Name
Grasses	

Common Name	Scientific Name
Cock's-foot	*Dactylis glomerata*
False Oat-grass	*Arrhenatherum elatius*
Herbs	
Alexanders	*Smyrnium olusatrum*
Biting Stonecrop	*Sedum acre*
Black Medick	*Medicago lupulina*
Bramble	*Rubus fruticosus* agg.
Buck's-horn Plantain	*Plantago coronopus*
Creeping Thistle	*Cirsium arvense*
Dove's-foot Crane's-bill	*Geranium molle*
Hedge Bedstraw	*Galium album*
Prickly Lettuce	*Lactuca serriola*
Yarrow	*Achillea millefolium*

Table B.8 Area of grassland TN8

Common Name	Scientific Name
Grasses	
Cock's-foot	*Dactylis glomerata*
False Oat-grass	*Arrhenatherum elatius*
Red Fescue	*Festuca rubra* agg.
Herbs	
Alexanders	*Smyrnium olusatrum*
Bird's-foot-trefoil	*Lotus corniculatus*
Black Medick	*Medicago lupulina*
Bramble	*Rubus fruticosus* agg.
Bristly Oxtongue	*Helminthotheca echioides*
Common Vetch	*Vicia sativa*
Creeping Cinquefoil	*Potentilla reptans*
Daisy	*Bellis perennis*
Goat's-beard	*Tragopogon pratensis* agg.

Common Name	Scientific Name
Hoary Ragwort	*Jacobaea erucifolia*
Ribwort Plantain	*Plantago lanceolata*
Yarrow	*Achillea millefolium*

Table B.9 Area of grassland TN9

Common Name	Scientific Name
Grasses	
Cock's-foot	*Dactylis glomerata*
Creeping Bent	*Agrostis stolonifera*
False Oat-grass	*Arrhenatherum elatius*
Perennial Rye-grass	*Lolium perenne*
Yorkshire Fog	*Holcus lanatus*
Herbs	
Common Ragwort	*Jacobaea vulgaris*
Common Sorrel	*Rumex acetosa*
Curled Dock	*Rumex crispus*
Field Bindweed	*Convolvulus arvensis*
Hoary Cress	*Lepidium draba*

Table B.10 Area of grassland TN10

Common Name	Scientific Name
Grasses	
Cock's-foot	*Dactylis glomerata*
False Oat-grass	*Arrhenatherum elatius*
Perennial Rye-grass	*Lolium perenne*
Red Fescue	*Festuca rubra* agg.
Smaller Cat's-tail	*Phleum bertolonii*
Tufted Hair-grass	*Deschampsia cespitosa*
Herbs	

Common Name	Scientific Name
Bird's-foot-trefoil	*Lotus corniculatus*
Bristly Oxtongue	*Helminthotheca echioides*
Common Toadflax	*Linum catharticum*
Daisy	*Bellis perennis*
Dandelion	*Taraxacum* agg.
Field Scabious	*Knautia arvensis*
Goat's-beard	*Tragopogon pratensis* agg.
Greater Knapweed	*Centaurea scabiosa*
Hedge Bedstraw	*Galium album*
Hedge Mustard	*Sisymbrium officinale*
Hoary Cress	*Lepidium draba*
Hop Trefoil	*Trifolium campestre*
Mignonette	*Reseda luteola*
Oxeye Daisy	*Leucanthemum vulgare*
Ribwort Plantain	*Plantago lanceolata*
Smooth Hawk's-beard	*Crepis capillaris*
Wild Carrot	*Daucus carota* ssp. *carota*

Table B.11 Area of grassland TN11

Common Name	Scientific Name
Grasses	
False Oat-grass	*Arrhenatherum elatius*
Herbs	
Alexanders	*Smyrnium olusatrum*
Bristly Oxtongue	*Helminthotheca echioides*
Common Nettle	*Urtica dioica*
Hoary Cress	*Lepidium draba*

Appendix B – Updated Ecological Baseline and Qualitative Assessment

Technical note:
Updated Ecological Baseline and Qualitative Assessment

1. Introduction

1.1.1 A desk study and programme of ecological surveys were undertaken during 2016-17 (prior to submission of the DCO application) in order to characterise the ecological baseline and inform the Ecological Impact Assessment (EcIA) for the proposed Development. A summary of this data is provided within the Environmental Statement (ES) (Chapter 7 in Tables 7.2 and 7.4[1]). Due to access restrictions at the time, it was not possible to complete a full suite of baseline surveys of the entire Site prior to submission, and therefore the assessment within the ES was based on a worst-case scenario for the baseline environment. Furthermore, a Mitigation and Habitat Creation Plan was also devised on the basis of this worst-case scenario (the details of which are provided in Appendix 7.13 of ES Chapter 7[2]).

1.1.2 Due to the incomplete suite of baseline surveys, **DCO Requirement 12**, was included in the DCO consent in order to establish "*whether European or nationally protected species are present on any of the land affected or likely to be affected by any part of the relevant works, or in any of the trees and shrubs to be lopped or felled as part of the relevant works*".

1.1.3 Wood was therefore appointed in 2019 (continuing into 2020) to undertake the following survey work across the Site in order to complete the baseline data characterisation (note all reports are provided in **Appendix A**):

- Breeding Bird Survey Report 2020 (including surveys for barn owls);
- Bat Survey Report 2020;
- Reptile Survey Report 2020;
- Invertebrate Survey Report; and
- Grassland Vegetation Assessment Report 2020.

1.1.4 This technical note provides a summary of the findings of the new surveys undertaken post-submission (2019-20). Where the new baseline differs from that assessed within the ES (worst-case scenario), this is indicated and a brief qualitative assessment of effects has been made.

[1] Manston Airport DCO. 5.2-1. Environmental Statement, Volume 1: Main Text – Chapters 1– 10. RiverOak Strategic Partners, July 2018 (ref. TR020002/APP/5.2-1).
[2] Detailed descriptions of the habitats within the Site and BA are also provided in Appendix 7.13 of the ES.

1.2 Breeding Birds

Updated Baseline Summary

1.2.1 Results from the breeding bird surveys in 2020, provide no evidence to indicate that barn owl or short-eared owl breed on-Site on a regular basis. The results did however show that the Site supports:

- Seven species of Principal Importance (SPI), listed on Section 41 of NERC[3]: corn bunting (*Emberiza calandra*), dunnock (*Prunella modularis*), house sparrow (*Passer domesticus*), linnet (*Carduelis cannabina*), grey partridge, skylark, and song thrush (*Turdus philomelos*);
- Seven species are Birds of Conservation Concern (BoCC4) red listed (Eaton *et al*., 2015)[4]: corn bunting, house sparrow, linnet, grey partridge, ringed plover (*Charadrius hiaticula*), skylark, and song thrush; and
- Five species are listed as species of conservation concern within Kent (Kent Red Data Book Species). Of these: house sparrow, linnet, song thrush and skylark are listed under KRDB2[5] due to a decline in the breeding population within the county.

1.2.2 Of these, the number of breeding corn bunting on-site (nine territories) are considered to be of importance at a county (Kent) scale, and those for skylark (78) and grey partridge (3) and ringed plover (1) of local importance (Clements *et al*., 2015). Of these, skylark, corn bunting and grey partridge were associated with the semi-improved grassland on-Site, with a single pair of ringed plover breeding on the hard standing (Figure 3.1 in the Breeding Bird Survey Report).

Qualitative Assessment

1.2.3 The loss of foraging and nesting habitat for breeding birds, and disturbance to birds due to the construction and operation of the Proposed Development all have the potential to adversely affect local bird populations. Results from the 2020 breeding bird survey identify the importance of the Site to breeding skylark, grey partridge and corn bunting.

1.2.4 Corn bunting were primarily associated with the perimeter of the Site (Figure 3.1 in the Breeding Bird Survey Report), utilising the fence-line as an elevated position to sing from, and foraging in the adjacent grassland and arable farmland. The species' habitat requirements in Kent are principally arable farmland, primarily containing wheat and barley (Clements *et al*., 2015).

1.2.5 The territories of skylarks were mainly recorded in semi-improved, neutral grassland within the boundary of the airfield. The grey partridges were seen in the neutral/poor semi-improved grassland around the runway (Figure 3.1 in the Breeding Bird Survey Report).

1.2.6 In view of this, mitigation measures will be required in order to avoid adverse effects on the local population of corn bunting, grey partridge and skylark.

[3] Species of Principal Importance listed on Section 41 of the Natural Environment & Rural Communities Act 2006.
[4] Red list species are those that are Globally Threatened according to IUCN criteria; and/or those whose population or range has declined rapidly in recent years; and/or those that have declined historically and not shown a substantial recent recovery.
[5] Kent Red Data Book Species; 1 (recorded in 1-2 tetrads), 2 (recorded in 3-5 tetrads) or 3 (recorded in 6-10 tetrads)

1.3 Bats

Updated Baseline Summary

1.3.1 An overview of the bat survey results is provided as follows, with full details presented in the Bat Survey Report.

1.3.2 The survey results indicate that at least eight species of bat occur within the Site. Much of the Site which comprises mown grassland and hard standing provides limited opportunities for foraging bats. However, moderate quality foraging and commuting habitat for bats is present in patches and bordering the Site, within tree lines, hedgerows and disused unlit buildings.

1.3.3 The Site contains 39 built structures with are potentially suitable to support roosting bats: seven of which were confirmed to support roosts (Figures 2.2a-c in the Bat Survey Report). Following daytime assessments in 2017 and 2019-20, along with hibernation, and emergence and return surveys in 2019-20 the roosts were confirmed as:

- One building containing a day/transitional roost for common pipistrelle (*Pipistrellus pipistrellus*) along with another day/transitional *Pipistrellus* sp.;
- One building containing a hibernation roost for up to three brown long eared bats (*Plecotus auritus*);
- Four buildings containing a day/transitional roost of brown long eared bats and a day/transitional roost of *Pipistrellus* sp.; and
- One building containing a day/transitional roost of brown long eared bats and a day/transitional roost of *Myotis* sp.

1.3.4 There are 34 trees on-Site which contain potential roost features, none of which were confirmed to support bat roosts during the 2020 survey (Figure 2.3 in the Bat Survey Report). However, bats are highly mobile, with many species regularly switching roosts, and therefore bats could use any suitable potential roost feature, including those not occupied during the current survey period.

Qualitative Assessment

1.3.5 The majority of buildings on-Site will be demolished or, if retained, extensively refurbished to accommodate the Proposed Development. In view of this, there is the potential for individual bats to be killed, injured or disturbed during site clearance prior to development. Based on the results of the survey work to date, common pipistrelle, soprano pipistrelle, brown long-eared bat and *Myotis* sp. bats are most at risk from harm or disturbance, as these species are known/considered most likely, to occur in buildings or trees that will be demolished/refurbished or pruned/felled.

1.3.6 There is also the potential for the Proposed Development to have an adverse effect on the conservation status of local bat populations due to:

- Loss of trees and grassland used as foraging habitat, and commuting routes;
- Disturbance due to increased artificial lighting, noise and vibration during construction and operation; and
- Collision with aircraft and ground vehicles.

1.3.7 None of these effects were predicted to result in a significant adverse effect on bat populations, even when a worst-case scenario was assumed. However, as bat roosts are legally protected, they will require consideration in the mitigation.

1.4 Reptiles

Updated Baseline Summary

1.4.1 Reptile presence/ absence surveys were carried out across much of the Site in 2017, with the remaining areas (three parcels of land, covering 3.5 ha) undertaken in 2020. During the 2017 surveys, a single adult common lizard (*Zootoca vivipara*) was recorded basking along the western boundary of the Site during the deployment of reptile refugia (Figure 2.1 in Reptile Survey Report), with no further reptiles recorded during any of the subsequent reptile checks. No reptiles were found in the three areas surveyed in 2020 (for locations see Figure 3.1 in Reptile Survey Report).

Qualitative Assessment

1.4.2 The areas surveyed were those that are considered to most likely support reptiles, and the surveys used a density of refugia per hectare greater than the minimum recommended. In view of this and the combined results of these surveys (from 2017-20), the Site is unlikely to support any reptile populations, or at best, a transitory occurrence by common lizard, or very low populations being present. This is likely due to the poor connectivity between the Site and surrounding areas of suitable habitat which has impeded the colonisation of the Site by reptiles. As such, no adverse effects on reptiles are anticipated and no mitigation measures are deemed necessary for this species group.

1.5 Invertebrates

Updated Baseline Summary

1.5.1 Results from the invertebrate surveys undertaken from May to October 2020 indicate that the Site supports a diverse invertebrate fauna, that is likely to be of regional importance. Key evidence to support this assessment is as follows:

- The Pantheon analysis identified six Special Assemblage Types (SAT's) as being in favourable condition.
- The Site achieved an Invertebrate Quality Index score of 10.29. This is just above the threshold indicating national significance, however current conservation statuses overstate the rarity of many species recorded so, in this case it is considered that this score indicates an excellent quality invertebrate assemblage.
- The Site achieved an Aculeate Quality Index score of 4.11. This indicates a solitary bee and wasp assemblage of very high conservation value for the region.
- Nationally significant populations of several rare invertebrates were recorded: the ground-bugs (*Emblethis griseus* and *Ischnodemus quadratus*) and the greater streaked shieldbug (*Odontoscelis fuliginosa*) and potentially the ground beetle (*Ophonus parallelus*).

1.5.2 The recorded invertebrate interest is not uniformly distributed across the Site (see Figure 4.1 in the Invertebrate Report). Much is concentrated into relatively small areas of habitat, the most important of which are:

- The open-mosaic habitats to the south of the car park;
- A large area of disturbed ground to the south-west of the terminal buildings and a large spoil mound with ruderal vegetation south of the Manston Road;

- The area around the Spitfire Memorial Museum;
- The narrow fringe of ruderal vegetation at the margin of the runway; and
- The grassland along the runway, taken as a whole, although interest is widely spread and no areas of the grassland are individually exceptional.

Qualitative Assessment

1.5.3 Many habitats affected by the Proposed Development will only be partially affected or support little in the way of invertebrate interest. However, there are several areas of particular importance to invertebrates that will be completely lost or significantly impacted and as such, mitigation measures are deemed necessary to compensate for the loss of this invertebrate interest. Specific areas of interest are:

- The entirety of the open mosaic habitat to the south of the car park and the mounds to the south west of the terminal buildings;
- All of the most herb-rich grassland; and
- The existing runway fringes.

1.6 Grassland Vegetation

Updated Baseline Summary

1.6.1 The aim of the botanical survey was to assess the National Vegetation Classification (NVC) plant communities of the small areas of semi-improved neutral grassland habitats identified during the Phase 1 Habitat Survey (see Figure 1.2 in the Grassland Vegetation Assessment Report). The best overall match for the grassland plant communities within the NVC is the **MG1 - *Arrhenatherum elatius / Festuca rubra* sub-community**. In the areas that were visited, the following was noted:

- No plant species of conservation importance listed on the Spreadsheet of Conservation Designations were identified;
- During the botanical survey no legally protected plant species were recorded. However, lizard orchid (*Himantoglossum hircinum*) was recorded during invertebrate survey work, this species is listed under Schedule 8 of the *Wildlife and Countryside Act 1981* (as amended);
- No habitats or Species of Principal Importance under Section 41 of the *Natural Environment Research Council (NERC) Act 2006* were recorded during the survey. The neutral grassland did not contain indicator species of sufficient frequency to be classified as the priority habitat – Lowland Meadow;
- No notable species currently on the Kent Rare Plant Register were recorded on-Site (Kitchener, 2020); and
- No invasive non-native species (INNS) were found on-Site[6].

Qualitative Assessment

1.6.2 The baseline survey work has confirmed that the semi-improved neutral grassland habitats on-site are not a Habitat of Principle Importance and offer no plant species of conservation importance.

[6] GB Non-Native Species Secretariat (NNSS). Invasive Alien Species of Union concern (2016).

The presence of lizard orchid found in areas of semi-improved neutral grassland between the terminal building and car park will require consideration in the mitigation.

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