Oakwood Road, Maidstone, Kent

Extended Phase I Habitat, Reptile and Bat Survey

For and on behalf of

Kent County Council

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1.0 INTRODUCTION

1.1 Corylus Ecology has undertaken an Extended Phase I Habitat survey of an area of land known as Oakwood Park located to the west of the B2246 in Barming, Kent, hereinafter referred to as the Site. Further reptile surveys and bat activity surveys were recommended and have been undertaken. The Site is located to the east of Oakwood Park itself which is in a suburban environment on the western outskirts of Barming which is part of the county town of Maidstone.

1.2 The Phase I Habitat Survey provides information relating to the habitats within and around the Site and identifies potential for and, if apparent, evidence of use by protected species. The extended Phase I Survey highlights habitats that may have the potential to support amphibians, reptiles, badgers and breeding birds. The bat tree assessment survey involved the external assessment of all trees within the development for evidence of use by and for potential use by bats.

1.3 The reptile surveys were undertaken to assess the presence/likely absence of reptiles on site and the bat surveys which were undertaken to assess the significance of the bat assemblage on Site and included transect surveys and static bat detector surveys.

Scope of Survey

1.4 The aims of the Extended Phase I Habitat survey, bat tree assessment and bat activity surveys were to:

- classify the habitats within the site according to those within the Phase I manual;
- identify habitats of ecological interest suitable for further surveys, and the potential to encounter protected species;
- carry out reptile presence/likely absence surveys;
- assess all trees within the Site boundary for their potential to support roosting bats; and
- Determine the range of bat species using the Site.

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Records of protected species and designated sites were sought from the Kent Biological Records Centre (KBRC) encompassing a 3km Desk Study Area. Internet resources such as Kent Landscape Information System and Magic Map were also consulted.

2.2 Extended Phase I Survey

2.2.1 The Site and the surrounding area were subject to an extended Phase I Habitat Survey on 14th May 2013. The habitats present on the Site were mapped in accordance with the '*Handbook for Phase I Habitat Survey – a Technique for Environmental Audit*' (Joint Nature Conservation Committee, 2003). Habitat areas and features of topographical and/or ecological interest were described in the form of target notes (TN). These were later used to create botanical species lists by target note area and also to create a colour coded Phase I Habitat map, which is presented as Figure 1. All nomenclature follows Stace (1997). Non-native or invasive species were also identified and mapped where appropriate.

2.3 Protected Species Assessment

2.3.1 The Phase I Habitat survey included an assessment of the potential for the Site and the surrounding area to support protected species. This type of survey aims to assess the potential for protected species to occur due to the habitats present but does not include any species specific survey methods designed to demonstrate whether the Site is in fact used by such species. Areas of potential for protected species have been indentified on Figure 1.

2.3.2 With regard to badgers *Meles meles*, any holes or scrapes likely to be used by or indicate the presence of badgers were searched for together with any other field signs associated with this species, including latrines, pushes and hairs.

2.4 Reptile Surveys

2.4.1 A total of 35 heat traps were placed throughout the Site in areas considered most suitable for reptiles, these being the areas of ruderal scrub and unmanaged grassland towards the margins of the Site. The Site is approximately 1.9 ha and this achieved a density of greater than ten per ha following guidance from Froglife (1999). Heat traps consisted of heavy gauge green mineral roofing felt cut into approximately 0.7m x 1m rectangles which were placed generally following linear margins and orientated to receive the maximum amount of sunshine.

2.4.2 There is some discrepancy regarding the number of surveys required for reptile surveys. The guidance from the Highways Agency Design Manual for Roads and Bridges (DMRB) Vol. 10 Section 4 Part 7 states that '*Estimating population sizes or densities with any degree of accuracy or reliability will always*

be problematic.....It will be necessary to sample a relatively large proportion of a resident population in order to estimate population sizes accurately and this will be most difficult for common lizards and slow-worms in particular. Given the large survey effort necessary for population estimates to be made for any species, this should be restricted to those situations where, on the basis of the magnitude of predicted impacts and the importance of the population it is clearly warranted." The Froglife guidance suggests that a minimum of 7 survey visits under favourable weather conditions are required, whilst the English Nature advice within the Species Conservation Handbook (1994 *et seq.)* states that *'it is difficult to get any reliable opinion of animals in a population in less than 5 to 10 visits'*.

2.4.3 For this survey, seven survey visits were undertaken, a decision made due to the habitat types present within this area. The Site was surveyed from 27th June to 24th September 2013 with surveys being undertaken in conditions suitable for reptiles. The Herpetofauna Groups of Britain and Ireland (HGBI) guidance suggests that optimum conditions are in temperatures between 9°C and 18°C, in absence of wind and rain. Guidance from Froglife, advises that in relation to time of year, "*Reptiles are generally active from March to October, but the most profitable months for surveying tend to be April, May and September. The exact timing however will depend on temperature, rainfall and other climatic patterns."* Froglife advise further in relation to time of day: *"For the best months indicated above, the best times to search are generally between 8.30am and 11.00am, and between 4.00pm and 6.30pm."* Peak counts of reptiles can often occur outside those times mentioned above, in particular immediately after rain. The surveys were therefore timed to utilise the best available weather conditions and information regarding the time and conditions of each visit were recorded.

Reptile Evaluation Methodology

2.4.4 The criteria for designating Local Wildlife sites, these consisting of sites of importance on a county level include criteria for their selection on the basis of their reptile populations. These criteria follow the guidelines established by Froglife in identifying Key Reptile Sites, a scoring system provided in Table 1.

2.4.5 The scoring system is based upon the maximum number of adult animals, that is all animals recorded excluding hatchlings / juveniles, seen under artificial refugia (placed at a density of a minimum of 10 per hectare) or by general observation by one person, in one day.

Table 1 – Evaluation of Reptile Population Status Based on Counts and Score Given

Species	Low Population Score 1	Good Population Score 2	Exceptional Population Score 3
Adder	<5	5-10	>10
Grass Snake	<5	5-10	>10

Common Lizard	<5	5-20	>20
Slow Worm	<5	5-20	>20

2.4.6 A Key Reptile Site is identified when a site meets any of the following thresholds:

- Supports three or more reptile species; or
- Supports two snake species; or
- Supports an exceptional population of any one species; or
- Supports an assemblage of species scoring ≥4 points using the above system; or,
- Supports a population of adder scoring >1.

2.4.7 Any other reptile or amphibian species noted under the refugia were also recorded.

2.5 Bat Tree Assessment

2.5.1 A ground level investigation of all suitable trees within the Site boundary was carried out to identify bat potential. Bats may use any crack or hole (such as woodpecker holes), splits or flaking bark and ivy (JNCC, 2004). Bats will also use different roosts at different times of the year. It can therefore often be difficult to definitely locate bat roosts in trees. Field signs to look for include dark streaking below holes and crevices, droppings under access points. Chattering noises emitted by bats may also be audible, particularly during the summer, however, even where bats are known to occur, such signs are not always evident.

2.5.2 Trees were placed into one of three categories as described below in accordance with the Bat Conservation Trust Good Practice Survey Guidelines 2nd Edition 2012:

1*. Trees with multiple, highly suitable features capable of supporting larger roosts;
1. Trees with definite bat potential but supporting features suitable for use by singleton bats;
2. No obvious potential although the tree is of a size and age that elevated surveys may result in cracks or crevices being found or the tree supports some features which may have limited potential to support bats; and,
3. Trees with no potential.

2.5.3 Trees were also noted if they supported ivy *Hedera Helix*. Ivy can do one of two things; very old, dense ivy can provide cavities for bats between the thick interwoven stems and the tree trunk or it can conceal features in the tree itself. The former would be classed as Category 1; the latter would be Category 2.

2.6 Transect Surveys

2.6.1 Two transect surveys were undertaken on 12th September and 24th September by two surveyors to allow the Site to be covered adequately. The aim of the transect surveys was to provide information during the active season, including the main breeding period, to try to allow for an assessment of activity throughout the active season to be made.

2.6.2 The transect routes were identified before the surveys and monitoring points marked along their length. The transect routes were designed to cover a wide area and include areas of key habitat type and structures such as woodland, woodland edge and the field boundaries with the monitoring points at intersection points. It should be noted that the lengths of each section of transect between each monitoring point was not standardised to a set length. This is because no statistical analysis is to be undertaken regarding the numbers of bats in specific areas or types of habitat, and in the process of carrying out surveys for an impact assessment the important issues are covering the Site adequately and utilising research information already published and peer reviewed regarding the use of different habitats used by bats.

2.6.3 The transect surveys commenced approximately 45 minutes after sunset. One tree, a Scot's pine in the south-east of the site, was identified as having potential for a bat roost. The transect surveys were preceded by static emergence surveys of this tree and of the western boundary feature.

2.6.4 The BCT guidelines state that transects should commence 15 minutes before sunset; however, the methodology used follows Warren, Waters *et al* 2000. If transects commenced ¼ hour prior to sunset, the first 30 minutes or so would have no bat passes. This would result in a bias of negative results for those parts of the Site that are walked during those first 30 minutes and bias the first 45 minutes towards earlier emerging species such as *Nyctalus* and *Pipistrelle* bats. The aim of this transect survey was to identify key commuting and foraging habitats within the Site, therefore the survey started with a static point (co-incidental with the emergence survey of a tree) with the transect starting during the main active period and continuing for approximately 2hrs after sunset. On each evening the time of each bat pass, the species and where possible to observe information regarding the behaviour, for example foraging, and flight direction were recorded.

2.6.5 Frequency division bat detectors (Duets) and time expansion detectors (Peterson D240X) were used together having been adapted to be used simultaneously to allow both types of detector sonogram to be recorded onto digital mini-disc recorders. All surveyors used headphones to allow the frequency division component to be heard during the survey, this allows the surveyor to hear bats using all frequencies. If headphones are not used only the heterodyne frequency that the Duet bat detector is tuned to can be heard and the frequency division output is inaudible. EM3 bat detectors were also used. The sonograms were subsequently up-loaded onto the computer software 'BatSound V.3.31' for analysis (see Section

2.5 below). Using this adapted linked system the left channel shows the frequency division whilst the right channel shows the time expansion recordings. The benefit of this arrangement is that all bat passes can be recorded (frequency division) whilst better quality sonograms can also be recorded (time expansion).

2.6.6 The surveyors used for the transect surveys were Paul Spencer (CLS0452) and Michael Berwick of Corylus Ecology Ltd and Kate Baldock, a freelance ecologist.

2.7 Bat Sound Analysis

2.7.1 The sonograms were subsequently uploaded onto the computer software 'BatSound V.3.31' for analysis. The sonograms were analysed and compared to identification parameters given in Parsons and Jones 2000 and Russ, 1999 and also compared with library recordings made by the surveyors. It should be noted that it is not always possible to identify each bat pass to species level due either to poor recordings of their echolocations or due to similarities between echolocations of bat species. It should also be noted that bats will vary their echolocation in different habitats and their calls may therefore not always resemble 'typical' echolocation calls. Where identification has not been possible suggestions of likely bat species have been provided.

2.7.2 The pipistrelle bats can often be confidently identified by the frequency at which the peak energy is recorded, around 45kHz for the 45kHz pipistrelle and around 55kHz for the 55kHz pipistrelle. However, there is a level of overlap, for example Russ (1999) records the 55kHz pipistrelle's peak frequency to be as low as 48.8kHz, whilst that of the 45kHz pipistrelle may be as high as 49.5kHz. Where sonograms show the peak frequency within this overlap this is recorded as an unidentified pipistrelle unless another feature such as a social call can be used to differentiate the bat to species level. Where pipistrelles were recorded the peak frequency recorded has been checked.

2.7.3 The *Myotis* genus is generally the hardest to separate to species level due to the plasticity of the calls and overlapping of call characteristics between the different species. Where the sonogram quality has allowed, parameters including call duration, pulse interval, start frequency, end frequency and peak energy have been recorded.

2.8 Static Monitoring Surveys

2.8.1 In addition to the transects, SongMeter3 (SM3) remote detectors were set at Static Monitoring Points (SMP's) in two SMP locations, for a duration of three nights. The SM3 devices were positioned in locations where there was suitable vegetation and the microphones placed at head height.

2.8.2 The calls were then uploaded and converted into ZC format for analysis using Analook software. As with the data generated from emergence surveys and transect surveys, the sonograms are then analysed and compared to identification parameters given in Parsons and Jones (2000) and Russ (1999 and 2012) and also compared with library recordings made by the surveyors. Where confidence of identification has not been possible suggestions of likely bat species are provided.

3.0 RESULTS

3.1 Desk Study

Statutory Designated Nature Conservation Sites

3.1.1 The nearest SSSI is Allington Quarry located to the north of the Site and designated for Pleistocene geomorphology rather than nature conservation.

Non-Statutory Designated Nature Conservation Sites

Local Wildlife Site

3.1.2 The following Local Wildlife Sites are within 3km: Cuckoo Wood, Sandling; Oaken Wood, Barming; Loose Valley, Maidstone and Mote Park and River Len, Maidstone. The nearest is Mote Park and River Len LWS at 1.8km east of site.

3.1.3 Fant Local Nature Reserve is located 650m south of the Site, Len Valley LNR is 1.8km to the east of Site and Vinters Valley Park Local Nature Reserve is located approximately 2.75km to the east of the Site.

Protected Species

Reptiles

3.1.4 Slow worm, common lizard, grass snake and adder have been recorded within the 3km search area. The nearest slow worm record comes from 0.42km north-east, in 2011. The nearest grass snake record is at 0.28km north-west of site and within Oakwood Park, recorded in 2005. The record for common lizard is a bit further afield, at 1.36km north-east of Site and this is a record dating back to 1945. Based on available data, KRAG consider the likelihood of slow worm and grass snake being present on this Site to be 'High' and the presence of common lizard to be 'likely'. The coverage of reptile surveys in the area is relatively high.

Amphibians

3.1.5 Six species: palmate newt, smooth newt, great crested newt, common toad, common frog and marsh frog have been recorded within 3km. The nearest pond is 1.1km away and the nearest records are for smooth newt, common frog and marsh frog that have been recorded 0.32km from Site. The nearest great crested newt record comes from Mote Park 2.3km to the east. The likelihood of smooth newt, palmate newt, common toad, common frog and marsh frog being present on site is considered high.

Bats

3.1.6 Nine species of bat out of the 15 species recorded in Kent have been recorded in the 5km radius of the Site. These nine bat species recorded are serotine, Daubenton's bat, whiskered bat, Natterer's bat, Leisler's bat, noctule, 45kHz pipistrelle, 55kHz pipistrelle and brown long-eared bat. The nearest record

for a 45kHz pipistrelle roost comes from approximately 0.3km north-west where 9 individuals were recorded in July 2009. There is also a roost of 54 45kHz pipistrelle bats recorded 1.7km northeast of the site. A 55kHz pipstrelle roost of 8 bats was noted in the same location and for the same date. The nearest noctule roost is 4.5km south-west of the site, where 14 individuals where recorded in August 2008. A long-eared maternity roost of 10 individuals has been recorded 0.5km to the south-west in July 2011.

Dormice

3.1.7 There are 12 records of dormice within 3km radius of the Site and the nearest record is 2.8km to the west.

3.2 Extended Phase 1 Habitat Survey

Site Description

3.2.1 The Site lies within a semi-urban environment on the outskirts of Maidstone adjacent to Oakwood Park. The Site is approximately 1.9ha in size and is predominantly abandoned paddocks. To the east, south and north of the Site is residential housing and to the west is Oakwood Park which is dominated by playing fields and mature oaks trees in the area adjacent to the site.

3.2.2 The habitats present are shown within Figure 1 with further details provided by way of specific Target Notes, denoted by the letters TN.

Scattered trees

3.2.3 In the south-east corner (TN2) is a small tree clump/area of scrub formed by sycamore *Acer pseudoplatanus* and a species of elm *Ulmus* sp. with holly *Ilex aquifolium* and elder *Sambucus nigra* also present and the ground flora layer dominated by common nettle.

3.2.4 The Site's eastern boundary (TN3) is a formed by a line of Scots pine *Pinus sylvestris* in the south and sycamore trees further north with oak, hornbeam *Carpinus betulus* and lime *Tilia* sp. also present.

Scrub

3.2.5 Along the Site's western boundary is an area of dense bramble scrub (TN8) which is waist to head high and extends some 8m from the boundary in places, particularly at the northern end.

3.2.6 At the entrance to the Site in the south in an area of scrub consisting of elder *Sambucus nigra*, silver birch *Betula pendula*, oak *Quercus robur*, hawthorn *Crataegus monogyna* and dog rose *Rosa canina*.

Semi-improved grassland

3.2.7 The Site is predominately an overgrown grassy field with scrubby edges. The grassland (TN1) is tall and rank and dominated by false oat-grass *Arrhenatherum elatius* with perennial rye-grass *Lolium perenne*, cock's-foot *Dactylis glomerata* Yorkshire-fog *Holcus lanatus,* couch grass *Elymus repens,* Timothy *Phleum pratense,* brown bent *Agrostis canina,* red fescue *Festuca rubra* and giant fescue *Festuca gigantea* also recorded. The herb species recorded were typical of species-poor semi-improved grassland which has become rank with ragwort *Senecio jacobeae* and common nettle *Urtica dioica* locally dominant within the sward. In addition there was spear thistle *Cirsium vulgare* and creeping thistle *Cirsium arvense*, yarrow *Achillea millefolium*, field bindweed *Convolvuls arvensis*, bristly ox-tongue *Helminthotheca echioides*, nipplewort *Lapsana communis*, creeping cinquefoil *Potentilla reptans*, meadow vetchling *Lathyrus pratensis* and bramble *Rubus fruticosus* sp. agg. In places particularly along the western boundary blackthorn scrub is encroaching with hogweed also common in these areas.

Tall Ruderal

3.2.8 To the south at TN9 is a 3m wide strip of tall ruderal vegetation consisting of red dead-nettle *Lamium purpureum*, common mallow *Malva sylvestris*, bramble, common ragwort, spear thistle, broad-leaved dock, common nettle, wood avens *Geum urbanum*, rosebay willowherb, *Chamerion angustifolium,* mullein*,* creeping thistle, nipplewort *Lapsana communis*, bush vetch *Vicia sepium*, evening primrose *Oenothera glazioviana*, butterfly bush *Buddleia davidii* and stone parsley *Sison amomum*.

Boundary features

Species- poor hedgerow

3.2.9 The northern boundary feature is a hedge with a footpath the other side of a fence (TN5). It is a mixed hedgerow with ornamental species including barberry *Berberris vulgaris*, garden privet *Ligustrum vulgare* and turkey oak *Quercus cerris* with hawthorn *Crataegus monogyna* and ash *Fraxinus excelsior*. Approximately 15m of the eastern part of this boundary feature is formed by bramble.

3.2.10 To the south there is a small passage extending to Oakwood Road. Alongside this is a hedgerow (TN10) dominated by hawthorn with blackthorn, tulip tree *Liriodendron sp.* and plum.

Species-rich hedgerow

3.2.11 The western boundary is a broad belt of woodland which appears to fall just outside the Site. Beyond the Site boundary is a very large, old double-stemmed field maple *Acer campestre* (TN6). The ground flora supported stinking iris *Iris foetidissima,* Lords-and-Ladies *Arum maculatum* and ivy *Hedera helix*. Within the Site an old field maple extends into the Site (TN7) by some 4m. This western boundary also supports elder, sycamore, ash, blackthorn, mature hawthorn, sweet chestnut *Castanea sativa* and a plum *Prunus* sp. Elm saplings are becoming dominant within the grassland sward of the field near the boundary feature.

3.3 Protected Species Assessment

Bat Tree Assessment

3.3.1 The trees within the Site were assessed for potential to support roosting bats. A single tree was considered to hold potential to be used by bats, a Scots pine T1 in the south-east corner which has suffered a wound at the top of the tree.

Bat Building Assessment

3.3.2 A single building is present at the entrance of the Site to the south. The building has stone and brick walls and has a steel frame with a tin roof. Internally the building is divided into a small number of rooms. A number of holes in the concrete of the western wall were noted inside the building. These holes extended back but no evidence of bats was seen and it was considered unlikely that they would be used.

Reptiles

3.3.3 The majority of the Site is unmanaged semi-improved grassland which is tussocky with numerous ant hills and considered to have good support potential for reptiles. As a result a reptile survey was undertaken, the details of which are provided below.

Mammals

3.3.4 No sign of badgers were found on site, with no obvious holes, latrines or well-used mammal paths found.

Amphibians

3.3.5 There are no ponds within the Site and no water bodies were apparent within 500m of the Site. The closest ponds located on an OS map are some 990m east of the Site, to the west of a number of roads and urban development. As a result the Site is not considered suitable for great crested newts. Furthermore, no overwintering habitat such as log or brash piles was noted.

3.4 Reptile Survey

3.4.1 A reptile presence/likely absence survey was conducted during September and October 2013. The heat traps were set a week before the first survey and a total of seven reptile checks were undertaken with the final survey completed on 14th October. The visits were spread throughout this period in good weather conditions to maximise the chance of reptiles being recorded.

3.4.2 Only a single species of reptile was recorded during the survey this being slow worm (*Anguis fragilis*). No reptiles were recorded on the first four visits; on the fifth visit a single sub-adult slow worm was

discovered. The slow worm was recorded on the north- west edge of the Site in the marginal area of the western boundary (TN8). This was the only reptile record during the surveys and thus also represents the peak reptile count of one sub-adult slow worm on 8th October. The full survey results including weather conditions are included as Appendix 1.

3.5 Bat Transect Surveys

12th September 2013 – sunset time 19.20

3.5.1 The weather conditions for this first survey were good, with a clear sky and no wind. The temperature was 16°C at the beginning of the survey falling to 14°C by the end. The surveyors were Michael Berwick of Corylus Ecology and Kate Baldock an independent ecologist. The survey began at 19:20 and continued until two hours after sunset. The full results are provided within Appendix 2 with a summary of the results for each transect provided in Table 2.

3.5.2 The two surveyors walked different but overlapping transects, the first surveyor commenced the survey at point A to try to determine where bats would enter the Site. This static point was monitored for the initial 45 minutes of the survey prior to the transect which then proceeded in a clockwise direction. The second surveyor surveyed at a static point observing Tree T1 for the initial 45 minutes of the survey before following the boundary in an anti-clockwise direction for the remainder of the survey.

3.5.3 The recordings made by the first surveyor were corrupted and as a result identification was made in the field. The first bat recorded was at 19.38hrs, 18 minutes after sunset when a bat was seen foraging over the gardens to the east of the site, beyond point X. At 19.42hrs a 45kHz pipistrelle was heard and not seen at point X and a further three passes by this species were recorded. The first bat recorded by the second surveyor at point A in the southwest corner of the site was a bat from the pipistrelle genus at 19.49hrs and was a very distant and brief pass. From 19.54hrs regular passes by a pipistrelle bat were heard at this location.

3.5.4 The second surveyor recorded regular passes by 45kHz pipistrelle throughout the transect survey. Two 55kHz pipistrelle bat passes were recorded, the earliest at 20.20hrs, an hour after sunset, and two long-eared bat *Plecotus* sp. passes were also recorded at 20:12hrs, 52 minutes after sunset on the eastern boundary, and at 20:19hrs, 59 minutes after sunset on the northern boundary. A pass by a noctule bat *Nyctalus noctula* was also recorded on the northern boundary around this time and is not considered to have emerged nearby. The highest concentration of bat activity (12 passes, approximately 27.2%) was on the northern boundary (C to D).

3.5.5 During the transect the first surveyor recorded regular bat passes by bats from the Pipistrellus genus. The noctule bat was heard by both surveyors at the same time with a second pass heard by the first

surveyor some ten minutes later at transect point D. Along the western boundary two passes by bats from either the *Plecotus* or *Myotis* genus were recorded some 66 minutes after sunset in the northern part of the site. On this evening the bat activity diminished approximately 70 minutes after sunset however two passes that in the field were considered to be by serotine bat *Eptesicus serotinus* were recorded 1hr 44mins after sunset on the northern boundary and some six minutes later along the eastern boundary. The highest concentration of bat activity (seven passes, approximately 15%) was on the northern to western boundary (C to D).

3.5.6 There were 44 bat passes recorded in total with the majority (20 passes, approximately 45.5% of total passes) by 45kHz pipistrelle bats. The area of the Site with the highest amount of activity (17 passes, approximately 38.6% of total passes) was along the northern boundary (C to D).

24th September 2013 – sunset at 18:53

3.5.7 The weather conditions for this survey were dry with little wind and no cloud cover throughout the night. The temperature was 16°C at the beginning of the survey falling to 14°C by the end. The surveyors were Paul Spencer and Michael Berwick of Corylus Ecology. The survey began at 19:00hrs some seven minutes after sunset and continued until two hours after sunset. The full results are provided within Appendix 2 with a summary of the results for each transect provided in Table 1.

3.5.8 The two surveyors walked different but overlapping transects; the first surveying a static point (T1 in the south-west corner of the site) for the initial 40 minutes before following the boundary anti-clockwise from transect point F. The second commenced with a static point near transect point A for the initial 40 minutes of the survey before following the boundary anti-clockwise for the remainder of the survey.

3.5.9 The first bat recorded was at 19.04hrs some nine minutes after sunset. This was a faint pass by a 55kHz pipistrelle bat by the surveyor observing tree T1 but it was not seen. At 19.13hrs a 45kHz pipistrelle was recorded by the surveyor at point A entering the Site from the west. At 19.17hrs some 24 minutes after sunset the surveyor at T1 recorded a 45kHz pipistrelle entering the Site through the trees close to point F on the southern boundary. It is possible the bat emerged from a roost on one of the trees being surveyed however no potential features were identified in the location where the bat was first seen. Passes by 45kHz pipistrelle and 55kHz pipistrelle bats were then recorded throughout the survey. The surveyor also recorded a single pass by a long-eared bat at 19:54hrs some 61 minutes after sunset and two passes by a bat from the *Myotis genus.* Five passes by a serotine bat were also recorded during the latter part of the survey. The highest concentration of bat activity (11 passes, approximately 26.1% of total passes) during the survey was on the northern boundary (C to D).

3.5.10 The second surveyor recorded passes by 45kHz pipistrelle and 55kHz pipistrelle bats throughout the survey, from 19:13hrs some 20 minutes after sunset onwards. The surveyor also recorded a single pass by a noctule bat at 20:39hrs, 1hr 45mins after sunset and two passes by a bat from the *Myotis genus.* Two passes by a serotine bat were also recorded during the survey. The single pass by a Nathusius' pipistrelle *Pipistrellus nathusii,* recorded at 20.38hrs at point C on the north east corner of the site. The highest concentration of bat activity (11 passes, approximately 26.1% of total passes) was on the northern boundary (C to D).

Summary

3.5.11 Over the two surveys 86 bat passes were recorded, with the majority being from the Pipistrelle genus, with most of these being 45kHz pipistrelle bats. At least seven species of bat were recorded during the survey, displaying a range of activity including foraging behaviour and social calling. A possible 45kHz pipistrelle emergence was recorded during the second survey (24/09/2013) from a tree in the south-east corner close to transect point F. The majority of bat activity (51 out of 86 passes, approximately 59.3%) from the two surveys was recorded along the northern boundary between points C and D, close to a group of mature pine trees.

3.5.12 A summary of the transect results are present in Table 1 below:

Table 1 Summary of Bat Transect Results

Species	12/09/2013	24/09/2013	Total
P45	20	25	45
P55	1	4	5
Pipistrelle	11	0	11
Nathusius	0	1	1
Nyctalus	2	0	2
Myo	2	4	6
LEB	2	3	5
Noctule	2	0	2
Sero	2	5	7
Bat	2	0	2
Total	**44**	**42**	**86**

3.6 Bat Static Monitoring Surveys

3.6.1 Two SM3 devices were set out from 13th to 16th June 2014 for three nights and the results are summarised in Table 1 below. SM3 device 1 was positioned in the southeast of the site near a collection of mature Scot's Pine (Monitoring Point 1). SM3 device 2 was positioned in the northwest of the site near a mature field maple and bramble scrub (Monitoring Point 2).Their locations are marked on Figure 3.

3.6.2 The two SM3 devices were subsequently analysed for three complete night's activity with all bat sound files identified. The SM3 in the south east of the site recorded a total of 457 calls, including four species. Common pipistrelle (P45) were by far the dominant species recorded, comprising 98% of the calls. Long-eared bat and soprano pipistrelle (P55) were also recorded as well as a pass by a species belonging to the *Nyctalus* genera. The activity was consistent between night, suggesting similar weather conditions were present and the habitats are consistently used foraging and commuting routes. The earliest pipistrelle pass was at 21.40hrs some 21 minutes after sunset on the 15th June.

Table 2 Static Monitoring Point 1 (south-east)

	Bat Species				
Date	**LEB**	**Nyct**	**P45**	**P55**	**Grand Total**
13/06/2014	1	1	151	1	155
14/06/2014			175	3	178
15/06/2014			121	3	124
	1	**1**	**446**	**7**	**457**

3.6.3 The bat activity recorded at SMP 2 was less than at SMP 1; 114 calls in total were recorded across the same three nights which is approximately ¼ of the activity at SMP 1. The calls were again dominated by those from common pipistrelle (P45) however these comprise just 63% of all calls. Notable bat passes recorded included a nathusius' pipistrelle call, a Leisler's call and 23 noctule passes, the earliest of which was 28 minutes after sunset. The earliest pipistrelle pass was a common pipistrelle 6 minutes after sunset on the 14th June.

Table 3 Static Monitoring Point 2 (north-west)

	Bat Species						
Date	**LEB**	**Leisler's**	**Nath**	**Noc**	**P45**	**P55**	**Grand Total**
13/06/2014		1	1	9	20	5	36
14/06/2014	2				29	1	32
15/06/2014				14	24	8	46
	2	**1**	**1**	**23**	**72**	**14**	**114**

4.0 EVALUATION AND IMPACT ASSESSMENT

4.1.1 The proposals for the Site are to build a new housing estate along with the associated access paths and roads.

4.1.2 The extended Phase 1 Habitat Survey identified no rare or nationally scarce plant species. The majority of the Site supports semi-improved grassland.

Reptiles

4.1.3 A reptile survey undertaken in September and October 2014 recorded a low population of slow worm. Only a single animal was recorded, a sub-adult. The survey was undertaken in the latter part of the survey period, however, reptiles were still active at other sites being surveyed during this same period.

4.1.4 A peak count of 1 slow worm equates to a low population and a score of 1 points under the Froglife criteria. This score does not exceed the threshold for a Key Reptile Site. A total of 35 heat traps in a Site area of 1.9ha equates to a density of traps greater than the minimum density of 10 traps per/ha recommended by Froglife.

4.1.5 To derive an indication of the size of the population which may be present, the proportion of the total population recorded during a standard presence/likely absence survey may be suggested to be in the region of 10%. This would equate to approximately 10 slow worms. However, at this site the thatch of the grassland sward was very dense and as a result it was difficult to set the heat traps in locations where they would create a warm enough environment and bedded down sufficiently. In addition, after rain the adjacent vegetation would often fall over the mats. It is considered likely that the record of a single slow worm is an under-recording of animals. The desk study data suggested that the likelihood of slow worm and grass snake being present is high and a grass snake has been recorded 280m northwest in 2005. Considering the large home ranges of grass snake, it is likely that the site is within this range.

4.1.6 It is likely that habitat suitable for reptiles will be lost as a result of proposals to develop the Site. As all common reptile species are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) against intentional death or injury then a reptile mitigation strategy is required. Whilst no EPS licensing requirement exists for common reptile species, the planning authority would need to be reassured that the proposals would not impact on reptiles. A detailed mitigation strategy would therefore be required and this would follow best practice guidance for reptile mitigation and would need to tie in with the programme for the scheme. A general outline of the mitigation strategy is given in Section 5 but a specific plan based on the developing proposals will be required.

Bats

4.1.7 All trees within the Site were assessed for their potential to be used by bats. A single tree was considered to hold potential to be used by bats, a Scot's pine in the south-east corner which has suffered a wound at the top of the tree. The desk study revealed that a 45kHz pipistrelle roost was recorded in July 2099 0.3km north-west of site, where 9 individuals were recorded. This roost, if still active, may have contributed to the prevalence of 45kHz pipistrelle bat activity noted.

4.1.8 At least seven species of bat have been recorded using the Site through detector surveys alone during 2013 and a further species, Leisler's bat, recorded during static detector surveys in 2014. Seven species of bat have been positively identified whilst bats from the *Myotis* genus were also recorded although identification to species level was not possible. These species are:

- 45 kHz pipistrelle;
- 55 kHz pipistrelle;
- Nathusius pipistrelle;
- long-eared bat;
- serotine;
- noctule;
- Leisler's, and
- unidentified *Myotis* species

4.19 Within the Site the total number of bat passes for both transect surveys is 86; the majority of these passes (61 or 71%) were by pipistrelle bats. 45 passes (52.3%) were from 45kHz pipistrelle bats, 11 (12.8%) passes were from unidentified pipistrelle bats and five (5.8%) passes were from 55kHz pipistrelle bats. In addition six (7%) passes were from *Myotis* bats, five (5.8%) passes were from long-eared bats, two (2.3%) passes were from noctule bats, two (2.3%) passes were from *Nyctalus sp* bats, two (2.3%) passes from serotine bats and one (1.2%) pass from a Nathusius' pipistrelle. There were also two (2.3%) passes from unidentified bats.

4.20 For both the first and second surveys the majority of bat activity was on the Site's northern boundary, specifically the north-eastern corner between points C and D. In this corner is an established hedge with mature trees and shrubs (TN5) and a group of mature trees associated with the neighbouring residential properties, this provides a good linear feature for foraging and commuting. There is also a small area of woodland to the north-west which connects directly to the western boundary. Other areas of notable bat activity were along the western (TN7), eastern and southern boundaries. The two noctule bat passes

were recorded at points B to C on the north-western boundary and the single Nathusius' pipistrelle bat pass was recorded at point C on the northern boundary.

4.21 Passes by bats from the *Myotis* genus which could not be identified to species level were recorded during transect surveys (classed as long-eared or *Myotis* bats). None of the passes could be determined as Natterer's bats as none of the recordings provided clear enough sonograms to see if the end frequencies were below 25kHz, a parameter which is considered to be an indicative feature of the Natterer's call (*pers comm*. D Hill and G Jones, 2006). Daubenton's bats can be positively identified by observing them flying low over water, however there is no open water in or near the Site. Other *Myotis* species are considered likely to have been recorded, including whiskered/Brandt's, however, there is no reliable way of specifically determining whether such other *Myotis* species are present on the Site without catching the bats. Whiskered/Brandt's bats are relatively widespread species which would be expected to occur in the habitats of the Site and the surrounding countryside.

Recordings of earliest bat passes in relation to sunset

4.22 With respect to the different bat species, research has been undertaken regarding the average times different species emerge from their roosts in relation to sunset and also into preferred habitats. The mean emergence time for 45kHz pipistrelles has been calculated as 25 minutes after sunset (Davidson-Watts and Jones, 2006), while the mean emergence time for 55kHz pipistrelles has been calculated as 23 minutes after sunset. During the first emergence survey the first bat, a 45kHz pipistrelle, was recorded at 19.38hrs 18 minutes after sunset, close to transect point F. During the second emergence survey the first bat pass, a 55kHz pipistrelle, was recorded at only 11 minutes after sunset, again close to point F. 24 minutes after sunset at 19.17hrs the same surveyor recorded a possible 45kHz pipistrelle seen between a Scot's Pine and sycamore tree close to point F and from the flight and call pattern this was considered a possible emergence.

4.23 For the static monitoring surveys, the earliest pass at SMP2 in the north of the site was at 21 minutes after sunset. At SMP1 in the south-east of the site (near point F) the earliest pass was a 45kHz pipistrelle just 6 minutes after sunset on the 14th June. It is likely that this bat was using a tree roost on site or very nearby the site. During the two other nights of recording at SMP1, the first bats were a 45kHz pipistrelle out at 31 minutes after sunset and a 55kHz pipistrelle out 27 minutes after sunset. A peak of 45kHz pipistrelle activity occurred at SMP1 starting 35 - 60 minutes after sunset on each of the three nights, suggesting a peak in foraging activity. Further to the possible 45 kHz pipistrelle emergence recorded by on the second emergence survey, the early 45kHz pipistrelle passes may indicate that there is a roost near to the Site.

4.24 The median emergence time for brown long-eared bats has been recorded as 54 minutes after sunset (Altringham, 2003). During the transects, the earliest pass from a long-eared bat was at 52 minutes after sunset on 12th September at 20.12hrs close to point D, adjacent to the area of highest bat activity. There were no early passes during the static monitoring surveys. The relatively early record of this species suggests that it could have been roosting close to the Site however this was only recorded on one occasion and long-eared bat activity was low across the surveys.

4.25 The earliest noctule was at 20.19hrs some 59 minutes after sunset, at transect point D on 12th September. There were frequent noctule passes recorded at SMP 2. This is one of the earliest emerging species and may be observed flying well before dark (Altringham, 2003) so it therefore thought to be roosting at a distance from site. It is the largest of the British bats and is capable of travelling long distances between roosts and foraging sites.

4.26 In terms of the levels of activity, only sustained foraging by multiple bats was recorded along the northern boundary particularly between point C and D and the majority of the passes across the rest of the Site recorded were commuting. Social calling from 45 kHz pipistrelle bats was also recorded towards the end of the second survey along the northern boundary.

Bat Habitat Assessment

4.27 There has been much research into the dispersal and foraging of bats. Research into the habitat preferences for foraging of vespertilionid bats (Walsh and Harris, 1996) found that habitats associated with broadleaved woodland, particularly the woodland edge, and water were most preferred for foraging, whilst arable land, moorland and improved grassland were strongly avoided. As well as the selective preference of habitats for foraging by bats, it has also been shown that certain habitats have strong correlations with bat abundance, with riverine, woodland, lacustrine and vegetation corridors having a strong positive effect on bat numbers in comparison to arable land being strongly negatively related (Walsh and Harris, 1996). The same research found that broad-leaved woodland and riparian habitats were of 'pivotal' importance to bats. Indeed semi-natural broad-leaved woodland and open water sheltered by tree cover are considered to be the prime foraging habitats for Natterer's bat for example, although grassland is also well used for foraging (Smith and Racey, 2002).

4.28 The two more widespread species of pipistrelle have been found to have different habitat requirements with the 45kHz pipistrelle foraging in many habitats whilst the 55kHz pipistrelle were more strongly associated with wetland habitats (Vaughan, Jones and Harris, 1997). More recent research suggests that the 55kHz pipistrelle selects roosts with a significant proportion of surrounding habitats being wetland within 2km of the roost and spends a high percentage of foraging time over static or slow moving water adjacent to mature trees up to 2.3km from its roost (Davidson-Watts, 2006). As there is no water

body within the Site or within 500m this would help to justify the lower number of passes by 55kHz pipstrelle compared with the slightly higher number of passes by 45kHz pipistrelle. The overall bat activity was considered to be low.

4.29 Based on the results of the bat activity surveys, the habitats present within the Site are considered to be of low quality for bats. The surveys have shown that the most amount of activity is restricted to the species-rich hedge along the southern boundary, the woodland on the north-west boundary and the species-poor hedge in the north-east corner of the Site.

Overall Bat Assessment

4.30 The transect surveys recorded at least seven species using the Site and an additional species was recorded during the static surveys. In terms of habitat use, the main area bats were recorded were along the northern boundary, specifically in the northeast corner. Observations of all other species involved singleton bats passing briefly through the Site. The habitats present are generally of low value but with the boundary features, being of higher value. The site is considered of **Local importance** for bats.

Breeding Birds

4.31 The hedgerows in the south-east corner and southern boundary as well as the mature trees on the north-east boundary are considered suitable for breeding birds. It is considered likely that these habitats would be used by the more widespread species rather than any rare or protected species. All wild birds receive protection under the Wildlife and Countryside Act 1981 as amended and this includes disturbance while breeding. It is recommended that any clearance of these features should be undertaken outside of the breeding bird season May- September limiting this work to between September and end of February. If these dates do not coincide with Site works then it is recommended that these areas are checked by a suitably experienced ecologist before the work commences.

5.0 Recommendations for Mitigation/Avoidance

5.1 An indicative site layouts has been reviewed, with approximately 60 units on an area of approximately 1.9ha. The current ecological interest within and immediately adjacent to the Site will need to be incorporated into the proposals including mitigation for reptiles and careful design to limit impacts on bats.

Reptiles

5.2 The reptile mitigation strategy aims to minimise the risk of harming reptiles on Site during the works and provides habitat enhancement for reptiles to be retained on Site to ensure the long-term survival of reptiles. With regard to this Site the general mitigation strategy will involve a trapping effort to move animals out of the development area. The trapping effort will be proportional to the size of the population present and appropriate habitat enhancements within a receptor area for relocated reptiles would be required. Under the Herpetofauna Groups of Britain and Ireland (HGBI) Advisory Note to Amphibian and Reptile Groups, it is considered that a population of at least 10 slow worms would require a minimum trapping session of 30 visits to clear the development area of reptiles and the trapping sessions will continue until 5 clear visits have been achieved.

5.3 On completion of this trapping exercise a destructive search would be required that would commence with the hand removal of log and brash piles scattered around the Site. This will then be followed by a destructive search using machines supervised by ecologists.

5.4 In terms of a receptor Site, an area within the Site could be used as the on-site receptor for the reptiles. This area should be linked to the surrounding landscape through linkage with either the northern or western boundary and it is suggested that an area in the south-west corner of the site is used (plots 7 and 8).

5.5 The area of grassland should also be enhanced with both log piles and artificial hibernacula. The hibernacula will be built above the ground level to prevent it from flooding and will be dug to a depth of 500mm and back filled with a mix of clean rubble, timber logs and dead wood to a height of 500mm above ground. The hibernacula will be covered with a terram membrane and capped with a 50mm – 100mm layer of soil and seeded with wildflower grass seed mix. Rubble and logs will be exposed at ground level to maintain gaps for reptile access. The hibernacula will be 1.5m wide by 2m long and will run along an east-west direction so there is a southerly facing slope to maximise basking habitat. Hibernacula design guidelines are provided in Appendix 3.

5.6 Logs with a maximum diameter of 20cm will be used to create log piles. Each log pile should be secured with stakes to prevent piles from collapsing and with wire to prevent removal or dismantling. Any trees removed during site preparation works should be used to create log piles.

Bats

5.6 With regard to bats, a single tree was identified as supporting potential for bats. Limited bat activity was recorded but the boundary features to the north and west were the most well used. It is recommended that the boundary features are retained within the scheme design as being outside the curtilage of the new houses to protect them from being removed and fragmented in the future. It is also recommended that sensitive use of lighting and landscape planting should be designed to help protect key habitat features from the effects of the development. Guidance regarding lighting is provided below.

Lighting

5.6 The southern, north-west and north-east boundaries of the Site will not be directly affected by the proposals, however, indirect impacts from lighting may result from the development. The transect surveys have shown that bats use the southern, north-west boundary and north-east corner of the Site for foraging and communing.

5.7 Within the light sensitive areas the following measures would be recommended, taking into account current best practice guidance (page 28, Landscape and urban design for bats and biodiversity, Bat Conservation Trust, 2012):

- Do not provide excessive lighting. Use only the minimum amount of light needed for safety
- Minimise light spill. Eliminate any bare bulbs and any upward pointing light. The spread of light should be kept near to or below the horizontal. Flat cut-off lanterns are best.
- Use narrow spectrum bulbs to lower the range of species affected by lighting. Use light sources that emit minimal ultra-violet light and avoid the white and blue wavelengths of the light spectrum to avoid attracting lots of insects. Lighting regimes that attract lots of insects result in a reduction of insects in other areas like parks and gardens that bats may be using for foraging.
- Lights should peak higher than 550nm or use glass lantern covers to filter UV light. White LED lights do not emit UV but have still been shown to disturb slow-flying bat species
- Reduce the height of lighting columns. Light at a low level reduces impact. However, higher mounting heights allow lower main beam angles, which can assist in reducing glare.
- For pedestrian lighting, use low level lighting that is as directional as possible and below 3 lux at ground level but preferably below 1 Lux
- Increase the spacing of lanterns

- Use embedded road lights to illuminate the roadway and light only high risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times
- Limit the times that lights are on to provide some dark periods
- Use lighting design software and professional lighting designers to predict where light spill will occur
- Avoid using reflective surfaces under lights
- Use temporary close-boarded fencing until vegetation matures to shield sensitive areas from lighting.
- Lighting within the light sensitive areas could be fitted with passive infra red motion sensors to reduce disturbance by light spillage.

5.8 In terms of landscape planting, it is recommended that the planting up of any gaps in vegetation along all boundaries to the Site is undertaken.

Recommendations with regard to NPPF

5.9 The National Planning Policy Framework (NPPF) replaced the Planning Policy Statement 9 (2005) Biodiversity and Geological Conservation in March 2012 and sets out planning policies on protection of biodiversity and geological conservation through the planning system. Section 11 of the National Planning Policy Framework sets out the Government's current planning policy in relation to conserving and enhancing the natural environment. The NPPF states that "the planning system should contribute to and enhance the natural and local environment by:

- Protecting and enhancing valued landscapes, geological conservation interests and soils;
- Recognising wider benefits of ecosystem services;
- Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures

5.10 With regard to providing a net gain for biodiversity it is proposed that the following measures are employed within the development:

- Additional planting should be added to the boundaries with hedgerows to the planted to fill any gaps in existing hedges and plant new hedge were there are none. Any new tree and shrub planting should be from native species and locally sourced. Suitable species would include hawthorn, blackthorn *Prunus spinosa*, holly, spindle *Euonymous europaeus*, hazel, field maple *Acer campestre*, dog rose *R. canina*

and honeysuckle *Lonicera periclymenum* that all benefit small mammals and birds. Fruit trees including apple *Malus* sp. and cherry plum *Prunus cerasifera* are valuable for wildlife and would be in fitting with the species already present.

- In addition to the above it is recommended that nectar rich plants are considered for any landscape planting around the Site and where other opportunities may exist, for example, where any flower beds are to be created. A list of nectar rich species for pollinators has been put together by the RHS and is given as Appendix 4. It is essential that flowering plants are available for as long as possible through the seasons and a combination should be chosen from the plants recommended for spring, summer and late summer.
- A variety of bird and bat boxes should be incorporated into the new buildings. Bird and bat boxes can also be installed on trees around the perimeter of the Site. The following are recommended:
    1. Four single cavity swift boxes installed into the external walls at maximum possible height, at least 5m from the ground and away from direct sunlight. Swifts nest colonially and so the boxes should be installed in pairs.
    2. Four colonial house sparrow boxes installed in pairs at the eaves. Installing on the eastern elevation of the buildings should ensure that they will avoid being in strong sun or prevailing wind and rain. Ready-made wooden or woodcrete (Schwegler) boxes are widely available. Alternatively, nesting spaces for sparrows can be incorporated into the soffits when the house is being constructed with an entrance formed by cutting away a 32mm slot in the back of the soffit board against the external wall. Sparrows are colonial, so four of these slots should be created.
    3. Six tit boxes installed on trees, out of direct sunlight.
    4. Eight bat tubes installed in a variety of locations. The Schwegler Bat Tube 2FR units link together and it is recommended that eight units are installed in groups of three, three and two. The locations chosen should be near hedges and treelines to increase the likelihood of the boxes being used.

6.0 CONCLUSIONS

6.1 An Extended Phase 1 Habitat Survey has been undertaken of the Site. No rare or uncommon habitats or plant species have been recorded

6.2 An assessment of all trees within Site for the potential to be used by bats has been conducted and a single tree T1 was found to support roost potential.

6.3 At least eight species of bat have been positively determined as being present through detector surveys in 2013 and static surveys in 2014. These species are:

- 45 kHz pipistrelle;
- 55 kHz pipistrelle;
- Nathusius' pipistrelle;
- long-eared bat;
- serotine;
- noctule;
- Leisler's; and
- unidentified *Myotis* bats.

6.4 Passes by bats from the *Myotis* genus could not be identified to species level were recorded.

6.5 A low population of reptiles has been recorded within the Site. Only a single slow worm was recorded, however, this was considered to be an under-recording of animals at the site. The thatch of the grassland sward was very dense and as a result it was difficult to set the heat traps in locations where they would create a warm enough environment and bed down sufficiently. A reptile mitigation strategy has been proposed.

6.6 With regard to the NPPF, recommendations have been given for the planting of native tree and shrub species where possible to create new habitats and the planting of pollen rich plants. Provision of a variety of bird boxes and bat boxes has been recommended to enhance biodiversity on the Site.

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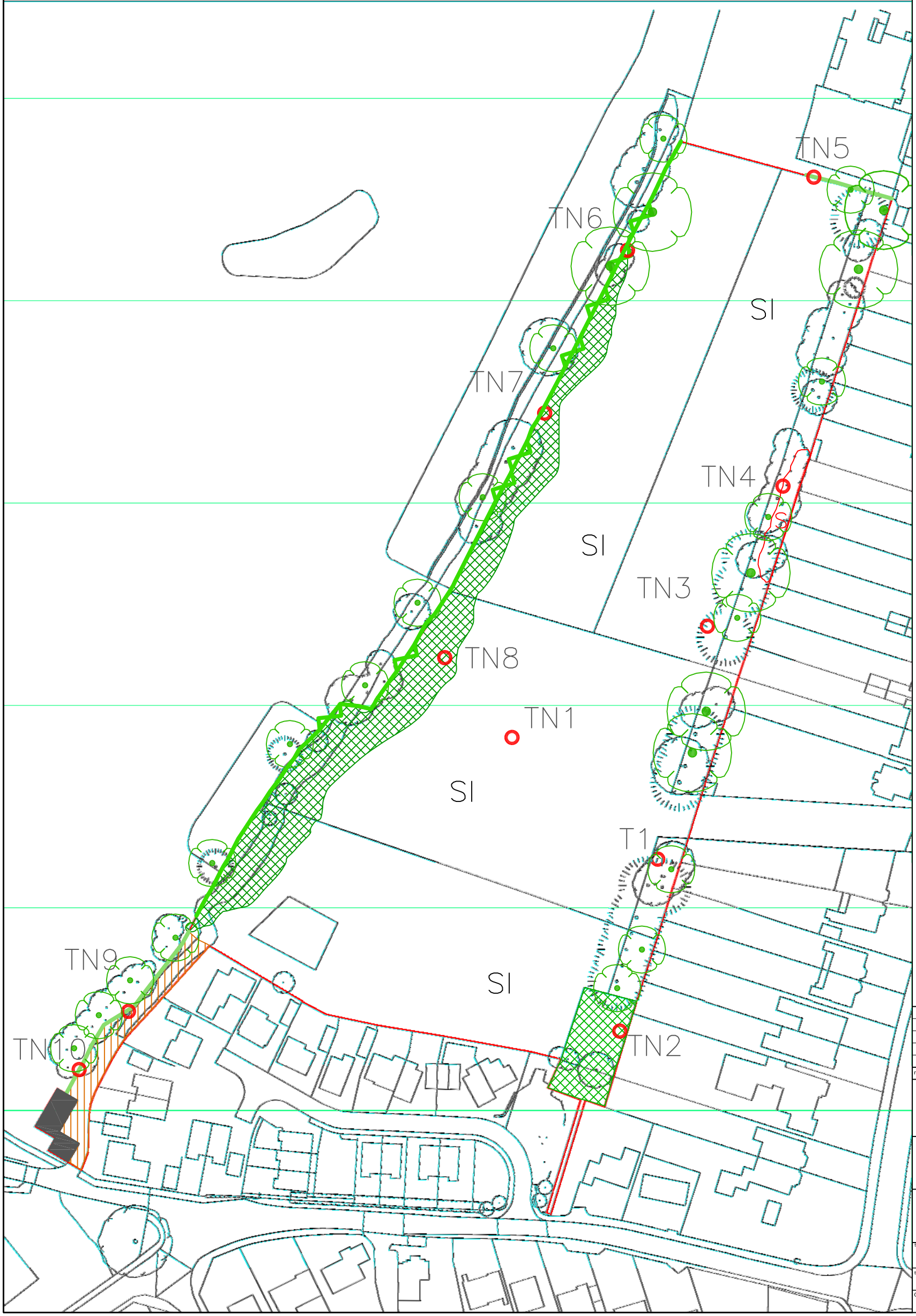
FIGURES



Key

- Site Survey Area
- Tree
- Dense Scrub
- Scattered Scrub
- SI — Semi–Improved Grassland
- Tall Ruderal
- S — Spoil
- Species Rich Hedge
- Species Poor Hedge
- Building
- Hard Standing
- Bare Ground
- TN1 — Target Note 1
- Site survey area

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 5005553, Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

CORYLUS ECOLOGY

Project:
Land at Oakwood Park

Title:
Phase 1 Habitat Survey Plan

status		drawing no.		
		Figure 1		
scale	size	date	drawn	checked
NTS	A3	07-07-14	JP	HL

CAD filename
Figure_1.dwg

Figure 2 Annotated Photographs of Oakwood Park, Maidstone

Derelict building B1 in the south of the site

Narrow alleyway of tall ruderal TN9

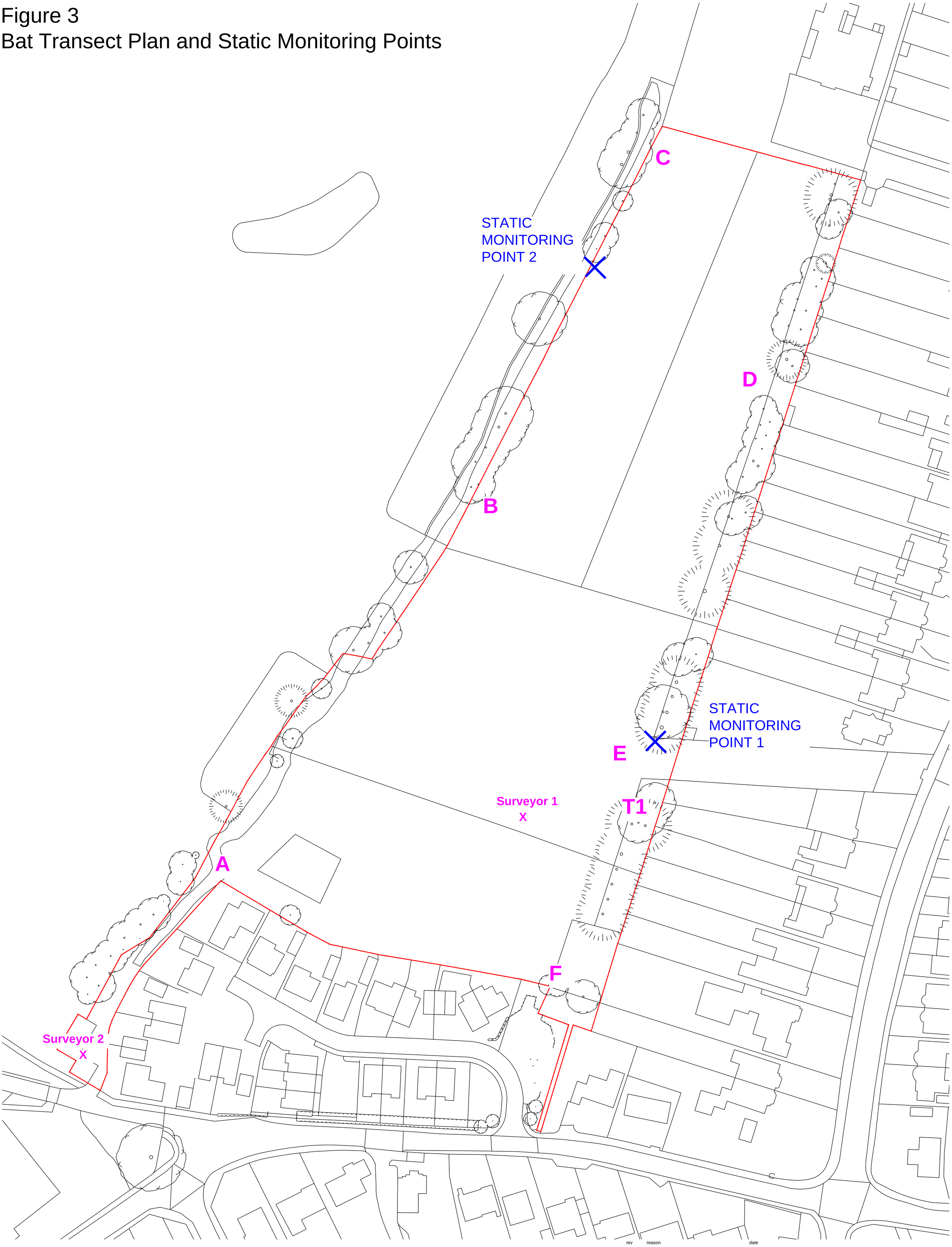
TN1 semi-improved grassland covers the majority of the site

The eastern tree lined boundary of the site, TN3

The north-east corner where there is a small section of hedge TN5

The bramble bank TN8 on the western side of the site.

Figure 3
Bat Transect Plan and Static Monitoring Points



notes

5 0 5 10 15 20 25
Metres (1:500)
N

client
KENT COUNTY COUNCIL

dha urban design
& development masterplanning

project
LAND AT OAKWOOD PARK
MAIDSTONE

Eclipse House, Eclipse Park. Sittingbourne Road
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title
EXISTING SITE LAYOUT

drwg	rev	scale	date	CAD Reference	
DHA/9852/02	-	1:500	JUNE 2014	9852 - Oakwood Park, Maidstone	A1

rev	reason	date

APPENDICES

Appendix 1: Oakwood Park Reptile Survey Results Felts Set: 04/09/2013

Visit no	Date	Species	Common lizard	Slow worm	Grass Snake	Tv/Th	Toad	Frog	Weather conditions	
1	16/09/2013	Male							Time	11.30
		Female							Temperature	18C
		Adult sex unknown							Cloud cover %	50%
		Sub							Rain	recent ovenight
		Juv							Wind	BF 3
		TOTAL	0	0	0	0	0	0		
		PEAK	0	0	0	0	0	0		
2	20/09/2013	Male							Time	14.30
		Female							Temperature	18C
		Adult sex unknown							Cloud cover %	20%
		Sub							Rain	nil
		Juv							Wind	BF 0
		TOTAL	0	0	0	0	0	0		
		PEAK	0	0	0	0	0	0		
3	30/09/2013	Male							Time	11.45
		Female							Temperature	19C
		Adult sex unknown							Cloud cover %	10%
		Sub							Rain	nil
		Juv							Wind	BF 3
		TOTAL	0	0	0	0	0	0		
		PEAK	0	0	0	0	0	0		
4	01/10/2013	Male							Time	17:30
		Female							Temperature	16C
		Adult sex unknown							Cloud cover %	100%
		Sub							Rain	nil
		Juv							Wind	BF 2
		TOTAL	0	0	0	0	0	0		
		PEAK	0	0	0	0	0	0		
5	08/10/2013	Male							Time	11:20
		Female							Temperature	18C
		Adult sex unknown							Cloud cover %	10%
		Sub		1					Rain	nil
		Juv							Wind	BF 1
		TOTAL		**1**						
		PEAK		**1**						
6	10/10/2013	Male							Time	10:00
		Female							Temperature	11C
		Adult sex unknown							Cloud cover %	20%
		Sub							Rain	nil
		Juv							Wind	BF 3
		TOTAL	0	0	0	0	0	0		
		PEAK	0	0	0	0	0	0		
7	14/10/2013	Male							Time	15.45
		Female							Temperature	12C
		Adult sex unknown							Cloud cover %	100%
		Sub							Rain	nil
		Juv							Wind	BF2
		TOTAL	0	0	0	0	0	0		
		PEAK	0	0	0	0	0	0		

Appendix 2 - Transect Data

Site	Oakwood Park				
Date	12/09/2013	**Sunset:**	19:20	**Temp:**	16 C
		Cloud:	20%	**Rain:**	Dry

Surveyor: MB

Transect Survey

Location	Time		Species	Time	Comments
	From	To			
Point 1.	19.25	19.30			
	19.45	19.50	Pip	19.49	Heard not seen. Distant and brief
	19.50	19.55	Pip	19.54	Briefly entred site.
	19.55	2000	Pip	19.55	Passing through.
			Pip	19.57	Passing through.
	20.00	20.05	Pip	20.00	Passing through.
1 - A	20.05	20.10			
A	20.10	20.13			
A - B	20.13	20.16	Pip	20.15	Heard not seen.
B	20.16	20.20	Pip	20.17	Heard not seen. Brief.
B - C	20.20	20.26	Noc	20.21	Heard not seen. Brief.
C	20.26	20.28	Myo	20.27	Flew along boundary, circled lights.
C - D	20.28	20.30	Myo	20.28	Same Myo foraging in car park.
D	20.30	20.33	Nyct	20.30	Heard not seen.
			Pip	20.31	Heard not seen. Brief.
			Pip + Nyct	20.31	Heard not seen. Brief.
D - E	20.33	20.36			
E	20.36	20.39	Pip + Bat	20.37	Heard not seen.
			Pip	20.38	Heard not seen. Brief. Social call.
E - F	20.39	20.43			
F	20.43	20.46			
F - A	20.46	20.50			
A	20.50	20.53			
A - B	20.53	20.57			
B	20.57	21.00			
B - C	21.00	21.04			
C	21.04	21.06	Sero	21.07	Heard not seen. Brief.
C - D	21.06	21.07			
D	21.07	21.10			
D - E	21.10	21.13	Sero	21.11	Heard not seen.
E	21.13	21.16			
E - A	21.16	21.19			

Total for surveyor - transect

Species	No passes
Sero	2
Nyct	2
Pip	11
Bat	1
Myo	2
Noc	1
LEB	0

TOTAL 19

Surveyor: KB

Transect Survey

Location	Time		Species	Time	Comments
	From	To			
Point 1	19.20		Bat	19.38	Seen and Heard. Foraging over gardens behind pine trees.
			P45	19.42	Heard not seen.
			P45	19.52	Heard not seen.
			P45	19.54	
			P45	19.56	
				19.55	
				19.58	
				20.00	
				20.02	
				20.04	
				20.05	
				20.05	
1 - E	20.05	20.07	-		
E	20.07	20.10	P45	20.09	x2 passes
E - D	20.10	2013	P45	20.10	x4 passes. Foraging along boundary.
			LEB	20.12	x1 pass
D	20.13	20.16	P45	20.14	x1 pass
			P45	20.15	x1 pass
D - C	20.16	20.17			
C	20.17	20.20	P45	20.17	x1 pass. Faint
			P45	20.18	x1 pass.
			LEB	20.19	x1 pass.
			Noc	20.19	x1 pass.
C - B	20.20	20.25	P55	20.20	x1 pass.
B	20.25	20.28	P45	20.26	x1 pass.
B - A	20.28	20.33			
A	20.33	20.36			
A - F	20.36	20.37			
F	20.37	20.40			
F - E	20.40	20.45			
E	20.45	20.48	P45	20.47	x4 passes.
E - D	20.48	20.50			
D	20.50	20.53	P55	20.51	1x pass.
D - C	20.53	20.54	P45	20.53	1x pass.
C	20.54	20.57			
C - B	20.57	21.01			
B	21.01	21.04			
B - A	21.04	21.07			
A	21.07	21.10			
A - F	21.10	21.12			
F	21.12	21.15			
F - A	21.15	21.20			End survey 21.20

Total for surveyor

Species	No passes
P45	20
P55	1
Pip	0
Myo	0
Bat	1
Noc	1
LEB	2

Total 25

Grand Total

Species	No passes	Percentage
P45	20	45.5
P55	1	2.3
Pip	11	25.0
Bat	2	4.5
Sero	2	4.5
Myo	2	4.5
LEB	2	4.5
Noc	2	4.5
Nyct	2	4.5

Total 44

Site	Oakwood Park				
Date	24/09/2013	Sunset:	18.53	Temp:	16 C
		Cloud:	0%	Rain:	nil
Surveyor:	PS				
Transect Survey					

Location	Time		Species	Time	Comments
	From	To			
Point 2.	19.00	19.05	P55	19.04	V. faint, heard not seen.
	19.05	19.10			
	19.10	19.15			
	19.15	19.20	P45	19.17	Through trees on boundary near to point F -
					between pine and sycamore, possible emergence
					but unsure as can't see possible feature
	19.20	19.25	P45	19.20	W - E through tree line and away off site.
			P45	19.24	Heard not seen, near point F
	19.25	19.30	P45	19.26	E - W through trees
	19.31	19.36	Myo	19.36	Heard not seen. Very faint
	19.36	19.41			
F - E	19.40	19.42			
E	19.42	19.45	P55	19.42	Heard not seen.
E - D	19.45	19.48	P45	19.47	At point D. Heard not seen.
D	19.48	19.51	P45	19.48	Foraging.
			P45	19.49	Heard not seen.
			P45	19.50	Heard not seen.
			Myo	19.51	Heard not seen. But close.
			P45	19.52	
			LEB	19.54	At point C.
C	19.54	19.57			
C - B	19.57	20.01			
B	20.01	20.04	P55	20.04	Heard not seen.
B - F	20.04	20.10			
F	20.10	20.16	P45	20.11	Close by. Heard not seen.
F - E	20.16	20.18			
E	20.18	20.21	P45	20.19	Heard not seen.
			P45	20.20	Heard not seen.
			P45	20.21	
E - D	20.21	20.24			
D	20.24	20.27	Sero	20.24	At point D.
			Sero	20.24	
			Sero	20.26	
D - C	20.27	20.28			
C	20.28	20.31			
C - B	20.31	20.34			
B	20.34	20.37	Sero	20.37	
B - A	20.37	20.40			
A	20.40	20.43			
A - F	20.43	20.45			
F	20.45	20.48			
F - E	20.48	20.49			
E	20.49	20.52	Sero	20.52	Heard not seen.
E - car park	20.52	20.55			

Total for surveyor	
Species	No passes
P45	12
LEB	1
P55	3
Sero	5
Myo	2
Total	23

Surveyor: MB

Transect Survey

Location	From	To	Species	Time	Comments
Point 2	19.00	1910			
	19.10	19.15	P45	19.13	Emerged off site. Flew into site. Brief
	19.15	19.20	P55	19.18	Heard not seen. Very brief.
	19.20	19.25	P45	19.25	Passing through.
	19.25	19.30	P45	19.26	Circled into site and then left.
			P45	19.29	Passing through.
	19.35	19.40	P45	19.37	Passing through.
D - A	19.40	19.42			
A	19.42	19.45			
A - F	19.45	19.48			
F	19.48	19.51	Myo	19.50	Heard not seen. Brief
F - E	19.51	19.53			
E	19.53	19.56	Myo	19.54	Heard not seen. Possibly hugging boundary
			P45	19.56	Heard not seen.
E - D	19.56	19.59			
D	19.59	20.02	P45	19.59	Heard not seen. Brief.
D - C	20.02	20.04			
C	20.04	20.07	LEB	20.05	Heard not seen. Sounded close. (social call)
C - B	20.07	20.10			
B	20.10	20.13			
B - A	20.13	20.16			
A	20.16	20.19	P45	20.18	Heard not seen. Brief.
A - F	20.19	20.21			
F	20.21	20.24	P45	20.21	Heard not seen. Brief.
			P45	20.22	Heard not seen. Brief.
F - E	20.24	20.25			
E	20.25	20.28			
E - D	20.28	20.30			
D	20.30	20.33	P45	20.30	x1 pass & social calling.
			LEB	20.31	x1 pass along boundary
			P45	20.31	Heard not seen. Social call.
D - C	20.33	20.35			
C	20.35	20.38	P45	20.36	Pass and social call.
			Nathusius	20.38	
C - B	20.38	20.40			
B	20.40	20.43			
B - A	20.43	20.46			
A	20.46	20.49			
A - car park	20.49	20.55			

Total for surveyor	
Species	**No passes**
P45	13
LEB	2
Nathusius	1
Myo	2
P55	1

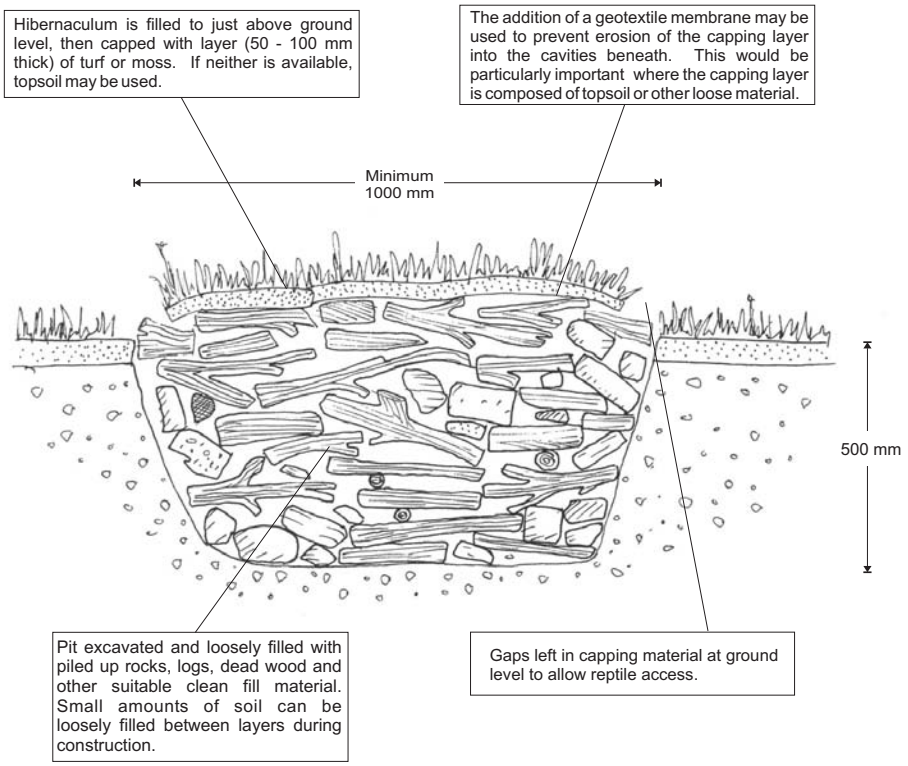
Total 19

Grand Total	
Species	**No passes**
P45	25
P55	4
Myo	4
LEB	3
Nathusius	1
Sero	5

Total 42

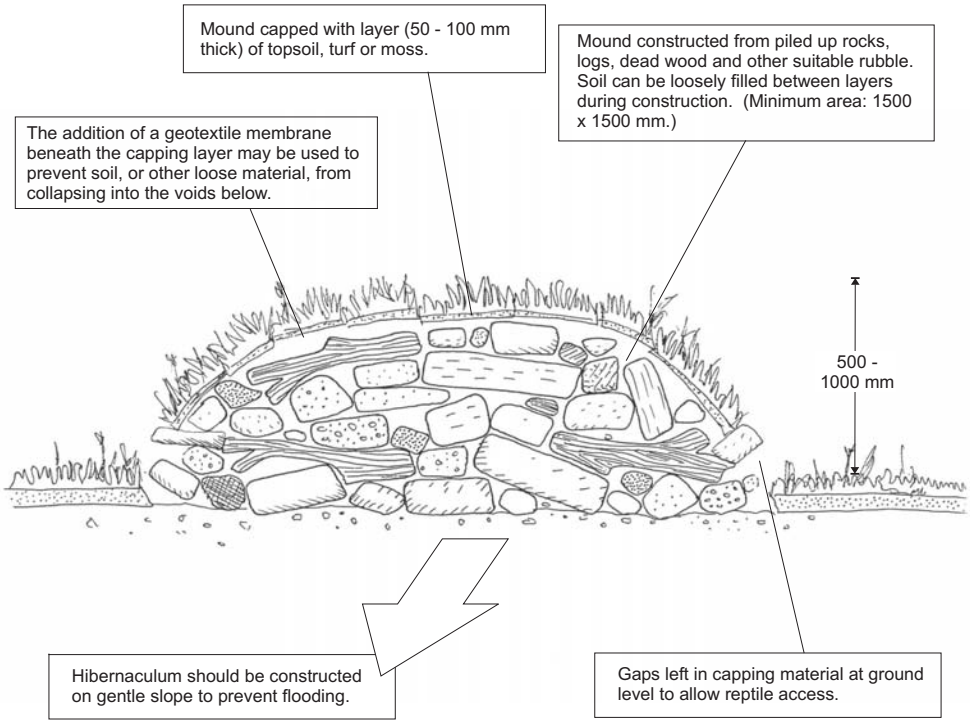
Hibernaculum on free-draining ground

Where ground conditions allow, the hibernaculum should be incorporated into a shallow pit. This design is more likely to remain frost-free, and will be less obtrusive and thus unlikely to be subject to interference.



Hibernaculum on impermeable ground

Where ground conditions are impermeable, then an 'above-ground' or mounded design should be utilised in order to prevent the hibernaculum from flooding. This design should also be used if it is not possible to excavate a pit for any other reason.



Appendix 4

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RHS PERFECT FOR POLLINATORS WILDFLOWER LIST

SHORT GRASS, UP TO 15CMS

Ajuga reptans *bugle*	H
Bellis perennis *daisy*	H
Campanula rotundifolia *common harebell*	H
Hippocrepis comosa *horseshoe vetch*	H
Lotus corniculatus *bird's foot trefoil*	H
Potentilla anserina *silverweed*	H
Potentilla erecta *tormentil*	H
Potentilla reptans *creeping cinquefoil*	H
Primula veris *common cowslip*	H
Prunella vulgaris *selfheal*	H
Ranunculus repens *creeping buttercup*	H
Sanguisorba minor *salad burnet*	H
Taraxacum officinale *dandelion*	H
Thymus polytrichus *wild thyme*	H
Thymus pulegioides *large thyme*	H
Trifolium pratense *red clover*	H
Trifolium repens *white clover*	H
Veronica chamaedrys *germander speedwell*	H

HEDGES, SHRUB BORDERS AND WOODLAND EDGE

Acer campestre *field maple*	S or T
Alliaria petiolata *garlic mustard*	Bi
Allium ursinum *ramsons*	B
Aquilegia vulgaris *common columbine*	H
Ballota nigra *black horehound*	H
Berberis vulgaris *barberry*	S
Bryonia dioica *white bryony*	H/C
Buxus sempervirens *common box*	S

HEDGES, SHRUB BORDERS AND WOODLAND EDGE (cont.)

Campanula trachelium *nettle-leaved bellflower*	H
Clematis vitalba *old man's beard/traveller's joy*	C
Clinopodium vulgare *wild basil*	H
Cornus sanguinea *common dogwood*	S
Crataegus monogyna *common hawthorn*	S or T
Cytisus scoparius *common broom*	S
Digitalis purpurea *common foxglove*	Bi
Euonymus europaeus *spindle*	S
Fragaria vesca *wild strawberry*	H
Frangula alnus *alder buckthorn*	S
Galium mollugo *hedge bedstraw*	H
Galium odoratum *sweet woodruff*	H
Galium verum *lady's bedstraw*	H
Geranium robertianum *herb robert*	A/Bi
Geum urbanum *wood avens*	H
Hedera helix *common ivy*	C
Helleborus foetidus *stinking hellebore*	H
Hyacinthoides non-scripta *bluebell*	B
Ilex aquifolium *common holly*	T
Lamium album *white deadnettle*	H
Lamium galeobdolon *yellow archangel*	H
Ligustrum vulgare *wild privet*	S
Lonicera periclymenum *common honeysuckle*	C
Malus sylvestris *crab apple*	T
Malva sylvestris *common mallow*	H
Myosotis sylvatica *wood forget-me-not*	H
Primula vulgaris *primrose*	H
Prunus avium *wild cherry/gean*	T
Prunus padus *bird cherry*	T
Prunus spinosa *blackthorn/sloe*	S

Natural England states: You can legally collect small quantities of wildflower seed for your own use, but you must get permission from the land's owner, tenant or other authority, as necessary. Although seed collecting is allowed, you should not dig up native plants – many rare species are protected by law. You can collect seed of even rare plants, but cannot sell/trade seed or progeny.

KEY

T = tree; **S** = shrub; **C** = climber; **B** = bulbs and corms; **A** = annual; **Bi** = biennial; **H** = herbaceous perennial

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RHS PERFECT FOR POLLINATORS WILDFLOWER LIST

HEDGES, SHRUB BORDERS AND WOODLAND EDGE (cont.)

Ranunculus ficaria *lesser celandine*	H
Rhamnus catharticus *Purging buckthorn*	S
Rosa canina *Dog rose*	S
Rosa rubiginosa *sweet briar*	S
Rubus fruticosus *blackberry*	S
Salix atrocinerea *grey willow*	S - male forms best
Salix caprea *goat willow*	S - male forms best
Sanicula europaea *sanicle*	H
Sedum telephium *orpine*	H
Silene dioica *red campion*	H
Silene latifolia subsp. **alba** *white campion*	H
Smyrnium olusatrum *alexanders*	Bi
Sorbus aria *common whitebeam*	T
Sorbus aucuparia *rowan/mountain ash*	T
Sorbus torminalis *wild service tree*	T
Stachys officinalis *betony*	H
Stellaria holostea *greater stitchwort*	H
Symphytum officinale *common comfrey*	H
Teucrium scorodonia *wood sage*	H
Tilia cordata *small-leaved lime*	T
Viburnum lantana *common wayfaring tree*	S
Viburnum opulus *guelder rose*	S
Vicia cracca *common tufted vetch*	H
Vicia sativa *common vetch*	H

DISTURBED GROUND

Agrostemma githago *corncockle*	A
Anchusa arvensis *bugloss*	A
Anthemis arvensis *corn chamomile*	A
Anthemis cotula *stinking chamomile*	A
Centaurea cyanus *cornflower*	A
Cichorium intybus *chicory*	H
Dipsacus fullonum *common teasel*	Bi
Echium vulgare *viper's bugloss*	Bi
Glebionis segetum *corn marigold*	A
Iberis amara *wild candytuft*	A
Lamium amplexicaule *Henbit deadnettle*	A
Matricaria recutita *scented mayweed*	A

DISTURBED GROUND (cont.)

Mentha arvensis *corn mint*	H
Myosotis arvensis *field forget-me-not*	A/H
Myosotis arvensis *Common forget-me-not*	A
Onopordum acanthium *cotton thistle*	Bi
Papaver dubium *long-headed poppy*	A
Papaver rhoeas *common poppy*	A
Sinapis arvensis *charlock*	A
Sonchus arvensis *perennial sowthistle*	H
Tussilago farfara *coltsfoot*	H
Verbascum thapsus *great mullein*	Bi

FLOWER BEDS

Calluna vulgaris *heather / ling*	S
Erica ciliaris *Dorset heath*	S
Erica cinerea *bell heather*	S
Erica tetralix *cross-leaved heath*	S

LONG GRASS, ABOVE 50CMS

Arctium minus *lesser burdock*	Bi
Carduus crispus *welted thistle*	Bi
Carduus nutans *musk thistle*	Bi
Chamaenerion angustifolium *rosebay willowherb*	H
Cirsium arvense *creeping thistle*	H
Cirsium vulgare *spear thistle*	Bi
Conopodium majus *pignut*	H
Cynoglossum officinale *hound's tongue*	H
Daucus carota *wild carrot*	Bi
Geranium pratense *meadow cranesbill*	H
Heracleum sphondylium *hogweed*	Bi
Hypericum perforatum *perforate St John's wort*	H
Knautia arvensis *field scabious*	H
Lathyrus pratensis *meadow vetchling*	H
Pastinaca sativa *wild parsnip*	Bi
Succisa pratensis *devil's bit scabious*	H
Tanacetum vulgare *tansy*	H

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RHS PERFECT FOR POLLINATORS WILDFLOWER LIST

LONG GRASS, ABOVE 50CMS (cont.)

Thalictrum flavum *meadow rue*	H
Tragopogon pratensis *goat's beard*	Bi
Verbascum nigrum *dark mullein*	Bi/H

MEDIUM HEIGHT GRASS, UP TO 50CMS

Achillea millefolium *common yarrow*	H
Achillea ptarmica *sneezewort*	H
Agrimonia eupatoria *agrimony*	H
Anthyllis vulneraria *kidney vetch*	H
Armeria maritima *thrift/sea pink*	H
Blackstonia perfoliata *yellowwort*	A
Campanula glomerata *clustered bellflower*	H
Centaurea nigra *common knapweed/hardheads*	H
Centaurea scabiosa *greater knapweed*	H
Centaurium erythraea *common centaury*	Bi
Echium vulgare *viper's bugloss*	Bi
Erigeron acris *blue fleabane*	A/H
Filipendula vulgaris *dropwort*	H
Helianthemum nummularium *common rockrose*	H
Hypochaeris radicata *cat's ear*	H
Inula conyzae *ploughman's spikenard*	H
Leontodon autumnalis *autumn hawkbit*	H
Leontodon hispidus *rough hawkbit*	H
Leucanthemum vulgare *ox-eye daisy*	H
Linaria vulgaris *common toadflax*	H
Malva moschata *musk mallow*	H
Ononis repens *common restharrow*	H
Origanum vulgare *wild marjoram*	H
Pilosella officinarum *mouse-ear hawkweed*	H
Ranunculus acris *meadow buttercup*	H
Ranunculus bulbosus *bulbous buttercup*	H
Reseda lutea *wild mignonette*	Bi/H
Rhinanthus minor *yellow rattle*	A
Scabiosa columbaria *small scabious*	H
Silene vulgaris *bladder campion*	H
Solidago virgaurea *goldenrod*	H

PONDS, POND MARGINS AND WET SOILS

Alisma plantago-aquatica *water plantain*	H
Angelica sylvestris *wild angelica*	Bi
Butomus umbellatus *flowering rush*	H
Caltha palustris *marsh marigold*	H
Cardamine pratensis *cuckoo flower/lady's smock*	H
Cirsium dissectum *meadow thistle*	H
Epilobium hirsutum *great willowherb*	H
Eupatorium cannabinum *hemp agrimony*	H
Filipendula ulmaria *meadowsweet*	H
Galium palustre *marsh bedstraw*	H
Geum rivale *water avens*	H
Hypericum tetrapterum *square-stalked St John's wort*	H
Iris pseudacorus *yellow iris*	H
Lotus pedunculatus *greater bird's-foot trefoil*	H
Lychnis flos-cuculi *ragged robin*	H
Lycopus europaeus *gypsywort*	H
Lysimachia nummularia *creeping Jenny*	H
Lysimachia vulgaris *yellow loosestrife*	H
Lythrum salicaria *purple loosestrife*	H
Mentha aquatica *water mint*	H
Menyanthes trifoliata *bogbean*	H
Myosotis scorpioides *water forget-me-not*	H
Nasturtium officinale *common watercress*	H
Nuphar lutea *yellow water lily*	H
Nymphaea alba *white water lily*	H
Oenanthe aquatica *fine-leaved water dropwort*	A/Bi
Oenanthe crocata *hemlock water dropwort*	H
Persicaria amphibia *amphibious bistort*	H
Persicaria bistorta *common bistort*	H
Polemonium caeruleum *Jacob's ladder*	H
Pulicaria dysenterica *common fleabane*	H
Ranunculus aquatilis *common water crowfoot*	A/H
Ranunculus flammula *lesser spearwort*	H
Ranunculus fluitans *river water crowfoot*	H
Ranunculus lingua *greater spearwort*	H
Ranunculus sceleratus *celery-leaved buttercup*	A
Sagittaria sagittifolia *arrowhead*	H
Sanguisorba officinalis *great burnet*	H
Scrophularia auriculata *water figwort*	H

KEY

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RHS PERFECT FOR POLLINATORS WILDFLOWER LIST

PONDS, POND MARGINS AND WET SOILS (cont.)

Scutellaria galericulata *common skullcap*	H
Stachys palustris *marsh woundwort*	H
Valeriana officinalis *common valerian*	H
Veronica beccabunga *brooklime*	H

SHINGLE/GRAVEL GARDEN

Cakile maritima *sea rocket*	A
Crambe maritima *sea kale*	H
Crithmum maritimum *rock samphire*	H
Eryngium maritimum *sea holly*	H
Glaucium flavum *yellow horned-poppy*	Bi/H
Sedum acre *siting stonecrop*	H
Sedum album *white stonecrop*	H
Silene uniflora *sea campion*	H

KEY

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