Millbrook Power Project

Preliminary Environmental Information Report (2017) – Appendices

Volume F

Ecology

On behalf of **Millbrook Power Ltd**

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2nd Draft Reviewed	Jim Fairclough	Principal Ecologist	11 August 2014
3rd Draft Reviewed	Jim Fairclough	Principal Ecologist	14 August 2014
4th Draft Reviewed	Jim Fairclough	Principal Ecologist	02 December 2014
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Contents

1 Summary

1.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

1.2 MPL commissioned BSG Ecology to undertake a Phase 1 Habitat Survey of the Project Site (the 'Survey Site'). The purpose of the survey was to inform and support an application for Development Consent for the Power Generation Plant. A supporting desk study and literature review was also conducted, which covered the Project Site and land up to 5 km for statutory designated sites, and 2 km for non-statutory designated sites from the Survey Site.

1.3 The desk study undertaken in support of this assessment identified the presence of seven nationally designated Sites of Special Scientific Interest (SSSI) within a 5 km radius of the Survey Site. The closest of these is King's Wood and Glebe Meadows, Houghton Conquest SSSI located approximately 1.1 km to the east of the Survey Site. This site comprises ash/maple woodland, and represents a habitat which has become increasingly scarce in Bedfordshire. Species-rich unimproved grassland and ponds are also present. In addition, there are six Local Nature Reserves (LNRs) within a 5 km radius of the Survey Site, four of which are also designated as SSSIs. The closest LNR, which is not also a SSSI is Flitwick Wood LNR located approximately 4.1 km to the south of the Survey Site. This site comprises an area of ancient woodland supporting a diverse botanical assemblage.

1.4 A total of 12 non-statutory designated CWSs are present within a 2 km radius of the Survey Site. The closest of these is Rookery Clay Pit CWS, which covers a proportion of the northern extremity of the Survey Site within the area also known as Rookery South Pit. The Rookery Clay Pit CWS consists of three large pools with associated reedbed, sparse ephemeral/short perennial vegetation and rank neutral grassland in the north-western corner. It is understood that habitats within Rookery South Pit (which occupies the southern half of the Rookery Clay Pit CWS) is currently the subject of an ongoing Low Level Restoration Scheme (LLRS) by the landowner. Towards the end of 2014, the base of Rookery South Pit it is expected to comprise just bare earth following bulk movement of soils that are required for the LLRS.

1.5 The Phase 1 Habitat Survey found the Survey Site to predominantly comprise intensively managed arable land. Other habitats present included plantation broadleaved and mixed woodland, scrub, neutral grassland, improved grassland, tall ruderal vegetation, ephemeral / short perennial vegetation, swamp, standing water (ponds), running water (ditches) and species-poor hedgerows.

1.6 There are several habitats across the Survey Site which may be considered to meet the criteria for being Habitats of Principal Importance (HPI) (s. 41; NERC Act 2006). These include all hedgerows within the Survey Site and the open mosaic habitats (on previously developed land) contained within the Rookery Clay Pit CWS.

2 Introduction

2.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

Site Description

2.2 The Project Site, as identified in the Project Scoping Report comprises the Power Generation Plant Area within Rookery South Pit, and the Gas and Electrical Connection Areas which extend from The Rookery into the surrounding agricultural land to the south and east. The approximate centre of the Project Site lies at grid reference 501373, 240734, which is situated between Bedford and Milton Keynes.

2.3 The Survey Site covers the red-line boundary of the Project Site as reported in the Project Scoping Report, as illustrated on Figure 2. The main habitats within the Survey Site are arable fields, delineated by hedgerows, ditches and minor roads and lanes. To the north, an area of land exists that is in the process of being restored as part of a Low Level Restoration Scheme (LLRS) by the landowner. At the time of survey, in spring and summer of 2014, this area included sparsely vegetated ground, swamp and bare earth. Towards the end of 2014, it is expected to comprise just bare earth following bulk movement of soils that are required for the LLRS.

Description of Project

2.4 The Power Generation Plant would operate as a Simple Cycle Gas Turbine (SCGT) peaking plant and would be designed to provide an electrical capacity of up to 299 Megawatts (MW). It would be fuelled by natural gas, supplied by a new underground gas pipeline connecting the Power Generation Plant to the existing National Grid Gas (NGG) National Transmission System (NTS). It will connect to the National Grid Electrical Transmission System (NETS) via underground cable or overhead lines.

2.5 BSG Ecology was appointed as the ecological consultant to undertake a preliminary ecology survey, which included a desk study and initial Extended Phase 1 Habitat Survey. This identified the need to undertake a suite of Phase 2 surveys in order to fully assess the nature conservation value of the Project Site, including an update of the Phase 1 Habitat Survey, conducted at an appropriate time of year. These baseline surveys will be included in an appendix to an ecology chapter of an Environmental Statement, which will be submitted, as an integral part of the application for Development Consent.

Aims of Study

2.6 The aims of the Phase 1 Habitat Survey were to:

- Identify and characterise any statutory and non-statutory sites within 5 km and 2 km radii from the Survey Site boundary, respectively.
- Identify whether any Habitats of Principal Importance (S. 41; NERC Act 2006) are present within the Survey Site, and if present, to describe their condition and coverage.

2.7 This report updates the preliminary Ecological Appraisal for the Survey Site (BSG Ecology, 2014) with the main focus being on the identification and characterisation of designated sites and description of habitats within the Survey Site. Recommendations for protected and otherwise notable species of animal were made in the preliminary Ecological Appraisal. Accordingly, separate (Phase 2) surveys have been completed, and reports produced for mammals, herpetofauna (reptiles and amphibians), breeding birds and invertebrates. These were conducted synchronous to the present Phase 1 Habitat Survey.

3 Methods

Desk Study

3.1 Existing ecological information for the Survey Site and its surrounding area was requested from the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BRMC). Information on statutory designated sites was requested covering the Survey Site and land up to 5 km from the Survey Site boundary, and information regarding non-statutory designated sites was requested covering the Survey Site and land up to 2 km from the Survey Site boundary.

Phase 1 Habitat Survey

3.2 Habitats within the Survey Site were identified and described following standard Joint Nature Conservation Committee (JNCC) Phase 1 habitat survey methodology as detailed in the Phase 1 Habitat Survey Handbook (JNCC, 2010). This uses a system of codes to describe different habitat types based on the dominant vegetation present, which are recorded through the preparation of habitat maps and target notes. All plant names in this report follow *The New Flora of British Isles* (Stace, 2010).

3.3 An initial field survey to map and describe habitats was undertaken by Stephen Foot MCIEEM and Dr Jessica Frame MCIEEM on 25th February 2014, this was subsequently updated by Dr Jim Fairclough MCIEEM following several visits to the Survey Site in late spring and summer, the last of these visits being on 30 July 2014.

3.4 It should be noted that species lists derived from the target notes are not necessarily an exhaustive inventory of all species occurring at a site. They are intended to illustrate the character of habitats present, general species richness of a particular area, and draw attention to any species that may be considered uncommon or unusual.

3.5 During the survey the presence of any invasive species of plant (listed on Schedule 9 of the Wildlife and Countryside Act 1981, as amended) was recorded.

Limitations to Methods

3.6 There are no limitations to the survey conducted. The initial survey was undertaken in February 2014, which is outside the optimal period for Phase 1 Habitat Survey. However, the present survey was conducted across several survey visits during the optimal survey season (late spring and summer), providing confidence that any plants or habitats of conservation concern would have been identified.

4 Results and Interpretation

Desk Study

Statutory Designated Sites

4.1 There are seven nationally designated Site of Special Scientific Interest (SSSI) located within 5 km of the Survey Site boundary. The closest of these is King's Wood and Glebe Meadows, Houghton Conquest SSSI which covers an area of 36.10 ha and is located approximately 1.1 km to the east of the Survey Site. This site comprises ash/maple woodland, and represents a habitat which has become increasingly scarce in Bedfordshire. The wood is characteristic of ancient semi-natural woodland supporting a rich flora. Glebe Meadows border the woodland to the north and consist of species-rich unimproved grassland managed for hay and grazing. Small ponds supporting amphibians are also present on the site.

4.2 There are also six Local Nature Reserves (LNRs) within a 5 km radius of the Survey Site; four of which are also designated as SSSIs. The closest LNR, which is not also a SSSI is Flitwick Wood LNR located approximately 4.1 km to the south of the Survey Site. This site comprises an area of ancient woodland supporting a diverse botanical assemblage.

4.3 All statutory designated sites present within a 5 km radius of the Survey Site are outlined in Table 1 in Appendix 2, and locations of these are shown on Figures 1a and 1b (Appendix 1), based on data provided by the BRMC.

Non-statutory Designated Sites

4.4 A total of 17 non-statutory designated County Wildlife Sites (CWSs) (including Cooper's Hill CWS which overlaps with Cooper's Hill SSSI) are present within a 2 km radius of the Survey Site. The closest of these is Rookery Clay Pit CWS, which covers a proportion of the northern part of the Survey Site. The pit consists of three large pools (one of which is in the process of being drained) with associated reedbed (swamp), marshy grassland, scrub and unimproved neutral grassland. A patchy mosaic of sparse ephemeral/short perennial vegetation and bare ground is also present throughout the site. A broadleaved plantation is present forming a band through the centre of the Rookery Clay Pit CWS.

4.5 Two Roadside Nature Reserves (RNRs) are also present within the study area. Marston Bypass RNR, and Cooper's Hill RNR. The closest of these is Marston Bypass RNR, which is located approximately 0.7 km to the west of the Survey Site and consists of a road verge sown with wildflower seeds.

4.6 The remaining sites are described in Table 2 in Appendix 2 with their locations shown in Figure 1b (produced and provided by the BRMC). Where there is overlap of a non-designated site with a statutory designated site (see above), the description for the statutory designated site takes precedence. A single Local Geological Site (LGS), Quest Pit LGS, which is not of nature conservation importance, lies approximately 1 km north east of the Survey Site.

Habitats

4.7 The majority of the Survey Site comprised intensively managed agricultural land, characterised by large arable fields, grass-covered field margins and fairly recent, species-poor, yet intact hedgerows (dominated by hawthorn *Crataegus monogyna*). Occasional wooded plantations of fairly recent origin (less than 30 years old) were located across the Survey Site. To the north of the Survey Site is land within the Rookery Clay Pits CWS. The parts of the Survey Site within the CWS included an access track that was a mosaic of bare ground with ephemeral vegetation and scrub at varying density; and a large depression (the southern pit) that comprised a patchy mosaic of bare ground, ephemeral vegetation and swamp vegetation in the form of drying reedbed dominated by stunted common reed *Phragmites australis*.

4.8 The following broad habitat types were recorded within the Survey Site during the survey:

- Arable;
- Plantation woodland;
- Scrub and tall ruderal vegetation;
- Neutral grassland;
- Improved grassland;
- Ephemeral / short perennial vegetation;
- Swamp (reedbed)
- Standing water (ponds);
- Running water (wet ditches); and
- Species-poor hedgerows (some with standard trees).

4.9 The distribution of these habitats is shown on Figure 2 (Appendix 1) with summary descriptions given below. Dominant or characteristic flora is described, together with notes on the relative abundance of floral species within the context of each habitat parcel. Target Notes (TNs) referred to in the text below and on Figure 2 are provided in Appendix 3 with photographs provided in Appendix 4.

Arable

4.10 The majority of the Survey Site comprised intensively managed arable farmland. Field margins were up to 4 m wide, but generally species poor and appeared to have been sown with grasses that permit infrequent vehicular access along the margins without 'cutting up' the ground. Photograph 1 shows a typical arable field margin, located on the eastern side of the railway.

Plantation Woodland

4.11 There were a number of parcels of plantation woodland within the Survey Site. One of the larger and more structurally diverse parcels is located towards the north of the Survey Site adjacent to the Rookery Clay Pit CWS (TN 1 & Photograph 2). This semi-mature plantation woodland contained a mix of deciduous and coniferous species, including alder *Alnus glutinosa*, pedunculate oak *Quercus robur*, ash *Fraxinus excelsior,* field maple *Acer campstre* and silver birch *Betula pendula*. The core of the woodland had a dense canopy and therefore a sparse shrub layer and ground flora.

4.12 Another area of plantation woodland, immediately south of South Pillinge Farm (TN 2) was also of note. This block of plantation woodland comprised broadleaved species and was also semi-mature. Planted poplar *Populus sp*. was abundant (locally dominant) within the canopy, and occasional Lombardy poplar *Populus nigra "italica*" lined the western edge, which is also delineated by a ditch and hedgerow with hawthorn and crack willow *Salix fragilis*. The shrub layer was relatively dense and included frequent hawthorn *Crataegus monogyna* with occasional field maple *Acer campestre* and wych elm *Ulmus glabra*. The ground flora of this woodland parcel, similar to others, was sparse.

4.13 Other parcels of plantation woodland had similar properties to those described, although plantations to the south and east of the Survey Site tended to be used for pheasant rearing, so had characteristically poor ground floras attributed to the foraging activity of game birds. One exception was an area of recently planted broadleaved woodland, at TN 3, between Millbrook Road and the railway line. The young trees are establishing on what is presently unimproved neutral grassland characterised by coarse grasses and common fleabane *Pulicaria dysenterica*.

Scrub and Tall Ruderal Vegatation

4.14 Scattered scrub was represented across the Survey Site in varying amounts, especially in association with edges of plantation woodland (e.g. TNs 1, 2 and 3). More dense stands of continuous scrub were associated with the railway corridor running north-south, through the centre

of the Survey Site, and the sides of the access track to the north west (TN4). Hawthorn, blackthorn *Prunus spinosa*, elder *Sambucus nigra* and bramble *Rubus fruticosus agg*. were the main species that comprised the scrub habitat, although young silver birch and alder were locally abundant along the access track (Photograph 3).

4.15 Tall ruderal vegetation, including common nettle *Urtica dioica*, hogweed *Heracleum sphondylium* cleavers *Galium aparine* and tall willowherbs *(*e.g. great willowherb *Epilobium hirsutum* and rosebay willowherb *Chamerion angustifolium*) were found in varying proportions with the scrub. The most extensive area of tall ruderal vegetation was on the edge of plantation woodland, bordering a large arable field to the far south west of the Survey Site.

Neutral Grassland

4.16 The neutral grassland habitat category is generally reserved for areas of grassland that are barely managed (unimproved) or show a lack of intensive management (semi-improved) and are characterised by grassland vegetation of neutral soils. Such grasslands are often (but not always) relatively species-rich. The best example of neutral grassland in the Survey Site was that to the south east corner of the Rookery Clay Pit CWS (see TN 5 and Photograph 4). This area was on raised ground (elevated above the pit), was species-rich and was being invaded by scrub. Typical species included agrimony *Agrimonia eupatoria*, bird's-foot-trefoil *Lotus corniculatus*, St John's-wort's *Hypericum sp*. and yellow oat-grass *Trisetum flavescens*.

4.17 Several arable field margins, particularly in the northern and western parts of the Survey Site (TN 8 and Photograph 5), and along the railway corridor showed evidence of semi-improved and unimproved neutral grassland, and were of slightly greater value than their species-poor counterparts further east and south across the Survey Site. Typical species of these margins, which were between 1 to 2 m wide, were red fescue *Festuca rubra*, false oat-grass *Arrhenatherum elatius*, common fleabane, creeping buttercup *Ranunculus repens*, wild carrot *Daucus carota*, bramble, cow parsley *Anthriscus sylvestris*, hogweed and great willowherb.

4.18 Two other prominent areas of neutral grassland included an area within the wooded glade to the west of the Survey Site (TN 2), and in association with the young broadleaved plantation adjacent to the railway and Millbrook Road (TN3).

Improved Grassland

4.19 One area of improved grassland, characterised by rye-grass *Lolium perenne*, was located to the west of the Survey Site. This was a small sheep grazed pasture immediately south of South Pillinge Farm.

Ephemeral / Short Perennial Vegetation

4.20 The access track in the north-west of the Survey Site (see TN4 and Photographs 3 and 6) included the most interesting areas of ephemeral vegetation within the Survey Site. An extensive range of plants associated with the track was found here, albeit as a mosaic with other habitat types (e.g. tall ruderal vegetation, scrub, neutral grassland, bare earth); especially at the far north, close to the gateway where the target note (TN 4) is positioned.

4.21 Other extensive areas of ephemeral vegetation were located around the south western part of the Rookery Clay Pit CWS, and extending into an arable field (dissected by a ditch) that had been set aside (see Photographs 7, 8 and 9). Here the ephemeral vegetation was characterised by bristly oxtongue *Helminthotheca echioides*, sow-thistles *Sonchus sp.*, scentless mayweed *Tripleurospermum inodorum*, common fleabane and, in damper soils, encroaching wood small-reed *Calamagrostis epijegos*.

Swamp (reedbed)

4.22 Part of the Survey Site (to the north) encroaches onto Rookery Clay Pit CWS, most notably the southern pit. Here the vegetation comprised a patchy mosaic of bare ground, ephemeral vegetation and swamp vegetation in the form of drying reedbed dominated by stunted common reed *Phragmites australis*. This land is being restored as part of a Low Level Restoration Scheme (LLRS) by the landowner and is due to be completed by December 2014. The most extensive

areas of reedbed, dominated by healthier common reed, at a lower gradient were recognised as 'swamp' under the Phase 1 Habitat classification, and other plants recorded here are provided at TN 6.

Standing water

4.23 There were three ponds within the Survey Site (see TN 7 and Photograph 9). These are located to the east and are positioned centrally in arable fields. The ponds themselves were mature, yet still with plenty of open water and marginal vegetation. This included species such as reedmace *Typha latifolia* which was dominant in two of the ponds, and broad-leaved pondweed *Potamogeton natans*, which was a dominant aquatic plant in one of the ponds.

Running water

4.24 A network of wet and damp (seasonally wet) ditches was present across the Survey Site. The ditches had steep sided earth banks and were quite shallow, with water depths ranging between just a few cm to 50 cm in depth. Aquatic and marginal macrophytes were relatively limited largely because of the heavy shading to most of the ditches from hedgerows running parallel to the ditch, and also due to them becoming periodically dry in summer / early autumn.

4.25 The ditch described at TN 8, at the centre of the Survey Site (see Photograph 5), had the most interest, primarily due to the open aspect of the ditch, especially along the section that ran east – west.

Species-poor hedgerows

4.26 The majority of hedgerows across the Survey Site were of a uniform structure, being intensively managed (approximately 2 m in height and 1.5 m in width); and species-poor, being dominated by hawthorn. Other woody plants were to be found in the hedgerows, although none were found frequently enough for any hedgerow to merit designation as 'species-rich', and as such, none are likely to meet the criteria required to be 'Important' under the Hedgerow Regulations, 1997. The occasionally occurring woody species included: blackthorn, field maple *Acer campestre*, willow *Salix sp*., English elm *Ulmus procera*, wild privet *Ligustrum vulgare*, ash, hazel, elder, dog rose, bramble and ivy *Hedera helix*. The ground flora associated with the hedgerows was limited to coarse grasses, cow parsley, cleavers, common nettle, ivy and lords and ladies *Arum maculatum*.

4.27 A small number of hedgerows, especially those near to TN 1 and TN 2 were unmanaged and were up to 3 m in height, although the composition of woody species remained similar.

Other habitats

4.28 Other habitats of limited ecological significance within the Survey Site included hard-standing (roads, surfaced tracks and pedestrian access) and the railway line running north –south, that splits the Survey Site down the centre.

Invasive, non-native species

4.29 New Zealand pigmyweed *Crassula helmsii* was the only invasive, non-native species listed on Schedule 9, Part II of the Wildlife and Countryside Act 1981 (as amended) that was recorded during the survey. This was confined to the Rookery Clay Pits CWS (southern pit).

Habitats of Principal Importance

4.30 There were several habitats across the Survey Site which may be considered in relation to whether they merited inclusion as Habitats of Principal Importance (HPI) (s. 41; NERC Act 2006). These are discussed below, with reference to the relevant habitat description, provided by JNCC (BRIG, 2008).

Arable field margins

4.31 All field margins were established as grassland strips providing vehicular (4 x 4) access. None of these margins specifically provided benefits for wildlife, and as such are not considered to meet the requirements for this HPI.

Hedgerows

4.32 All hedgerows mapped within the Survey Site were over 20 m long and predominantly comprise native plants. Accordingly, these are classified as HPIs.

Ponds

4.33 On vegetative characteristics alone, the three ponds within the Survey Site do not merit classification as HPIs. This is on the basis that the ponds did not support a diverse plant community.

Open mosaic habitats on previously developed land

4.34 Taken together, the habitats across the northern part of the Survey Site, which lie within the Rookery Clay Pits CWS, merit inclusion under this HPI. All of the following criteria are met:

- The area of open mosaic habitat is at least 0.25 ha in size. The area of land within the Survey Site that is within the CWS far exceeds this amount;
- There is a known history of disturbance at the site (notably clay extraction);
- The site contained some vegetation, in this case, ephemeral / short perennial, tall ruderal, scrub, neutral grassland and swamp habitat types;
- The site contained unvegetated, loose bare substrate and vegetated pools were present, principally in the southern pit; and
- The site showed spatial variation, forming a mosaic of one or more of the early successional communities, plus bare substrate, within 0.25 ha. The access road and southern pit all included mosaics of habitat, with bare substrate being a feature at both.

Lowland mixed deciduous woodland

4.35 The areas of planted woodland across the Survey Site displayed some characteristics of the HPI; however, given their age and general structure (e.g. sparse ground flora and often managed through game keeping interests), it is unlikely that these woodlands can be classified as this priority habitat type. Despite this, the planted woodland blocks do have intrinsic value and are likely to provide habitat for a range of species.

5 References

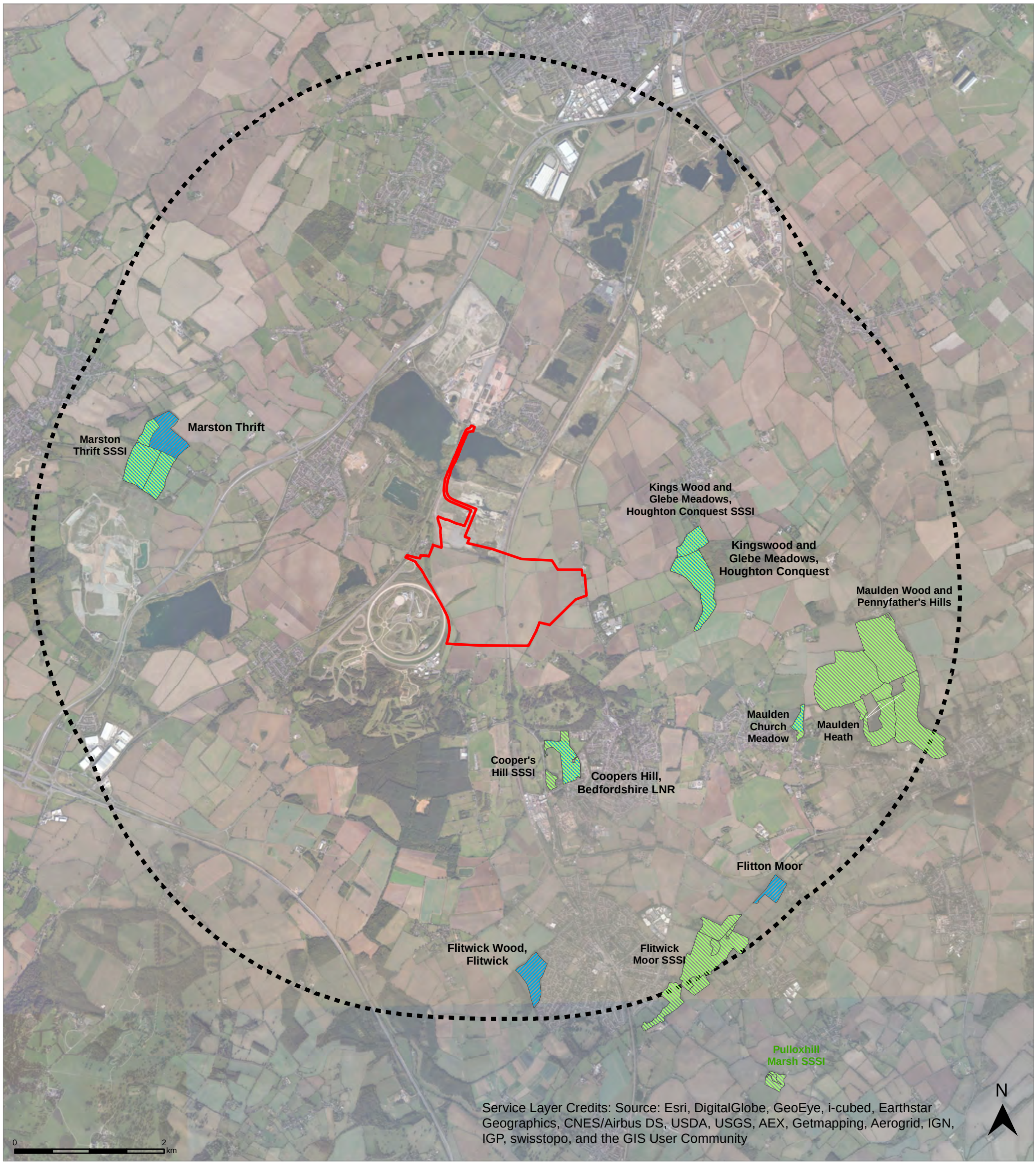
BSG Ecology (2014) *Millbrook Power Project, Bedfordshire. Ecological Appraisal.*

Joint Nature Conservation Committee (2010) *Handbook for Phase 1 habitat survey - a technique for environmental audit*.

BRIG (ed. Ant Maddock) (2008) *UK Biodiversity Action Plan; Priority Habitat Descriptions. (Updated Dec 2011)*. JNCC, Peterborough.

Stace, C. A. (2010) *New Flora of the British Isles, Third Edition*. Cambridge University Press, Cambridge.

Appendix 1: Figures



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PROJECT TITLE
MILLBROOK POWER PROJECT

DRAWING TITLE
Figure 1a: Statutory designated sites within 5km of site

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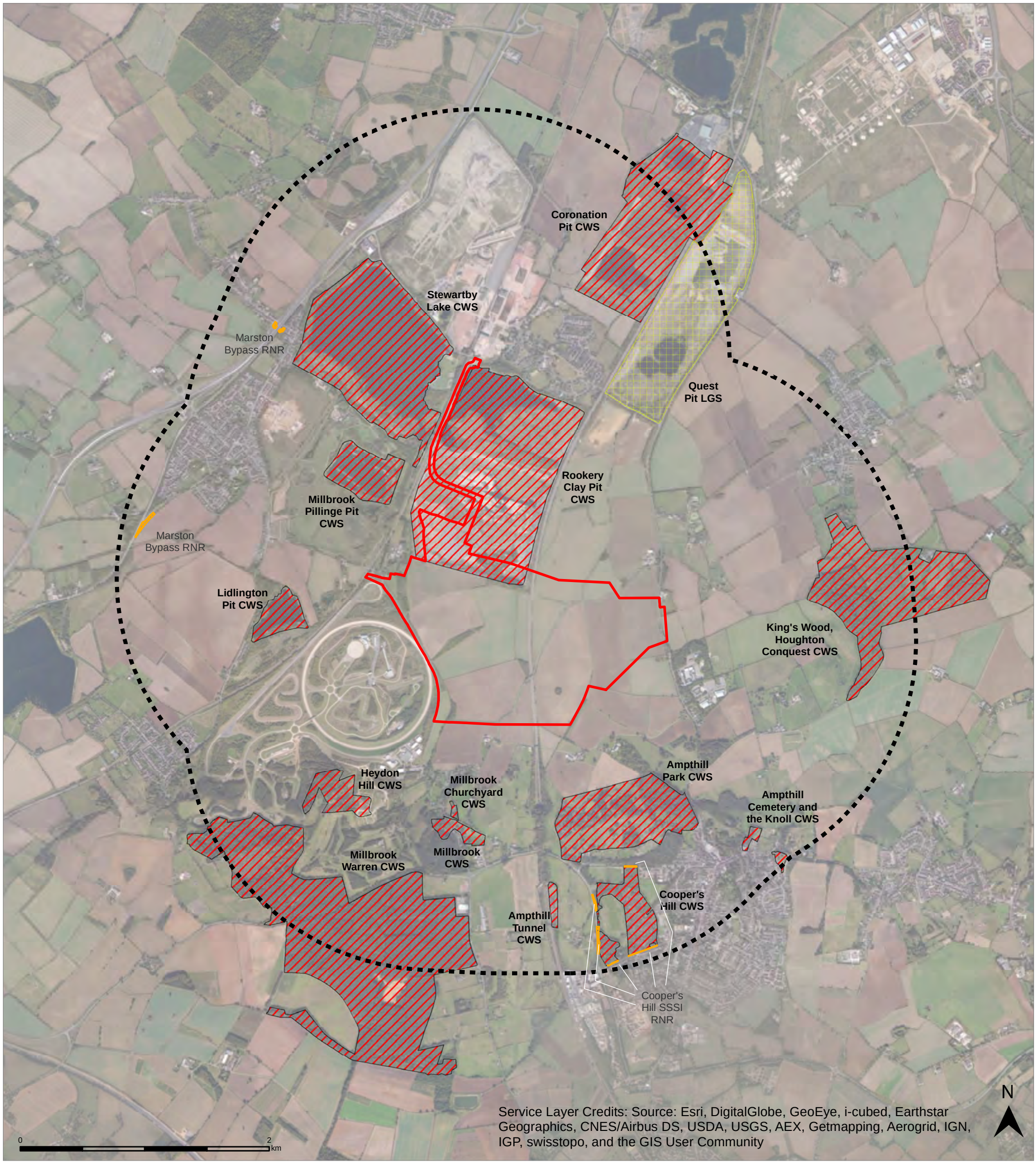
LEGEND

- Project Site at the time of Scoping Report submission
- 5km search area
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserves (LNR)



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PROJECT TITLE
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DRAWING TITLE
Figure 1b: Non-statutory designated sites within 5km of site

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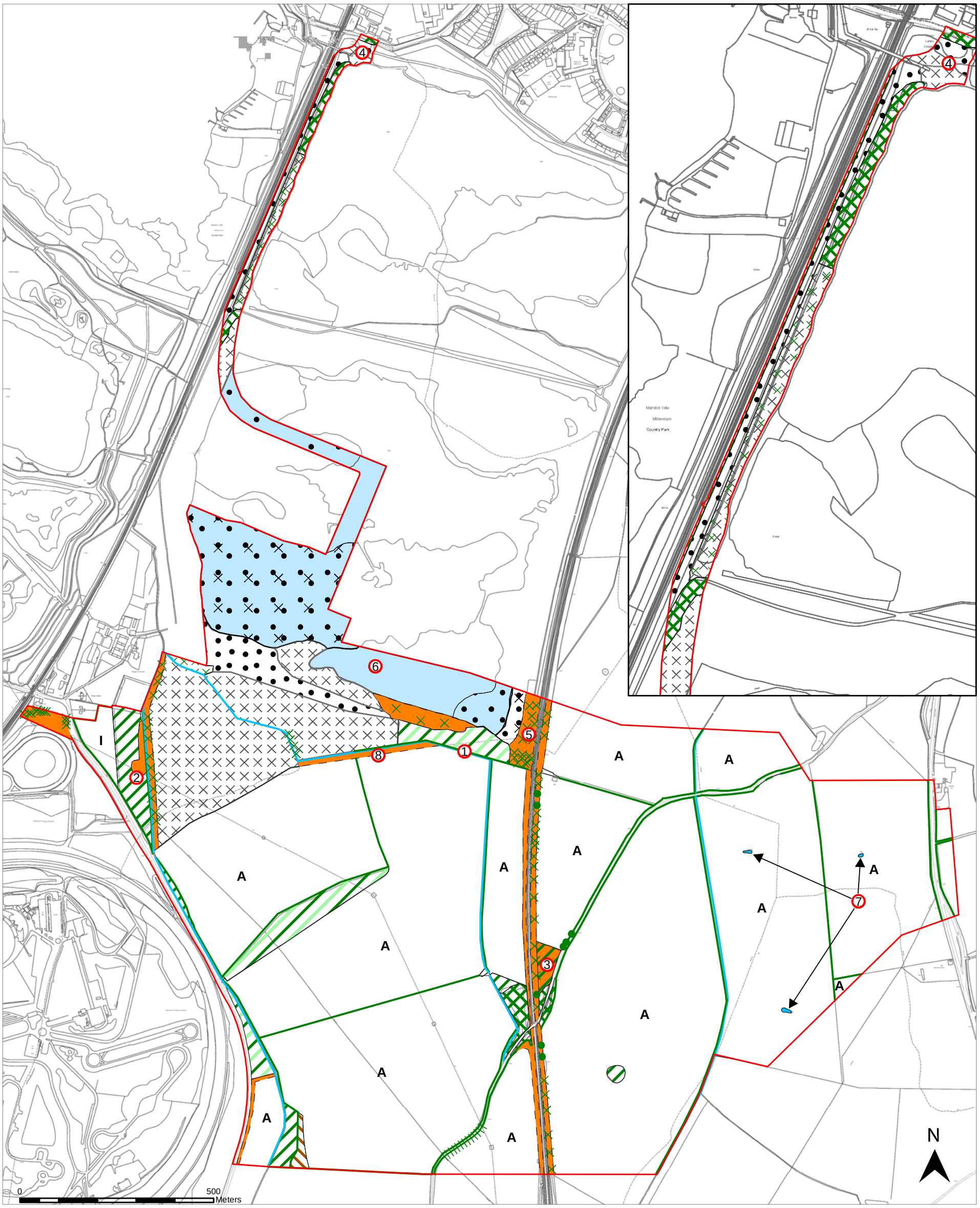
LEGEND

- Project Site at the time of Scoping Report submission
- 2km search area
- County Wildlife Sites (CWS)
- Roadside Nature Reserves (RNR)
- Local Geological Sites (LGS)



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DRAWING TITLE

Figure 2: Phase 1 Habitat Survey Map

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LEGEND

- Project Site at the time of Scoping Report submission
- Target note
- Plantation broadleaved woodland
- Plantation mixed woodland
- Continuous scrub
- Scattered scrub
- Neutral grassland
- Improved grassland
- Tall ruderal vegetation
- Standing water (pond)
- Arable
- Ephemeral / short perennial vegetation
- Bare ground
- Swamp
- Wet ditch
- Species-poor intact hedgerow
- Species-poor intact hedgerow with trees
- Species-poor defunct hedgerow
- Scattered broadleaved tree

Appendix 2: Relevant Desk Study Results

Table 1: Statutory Designated Sites within 5km of Site Boundary

Site Name	Area (ha)	Grid ref.	Description
Kingswood & Glebe Meadows, Houghton Conquest SSSI, LNR, CWS	36.10	TL045403	This site is located approximately 1.1 km to the east of the Survey Site. Kingswood comprises ash/maple woodland, and represents a habitat which has become increasingly scarce in Bedfordshire. The wood is characteristic of ancient semi-natural woodland supporting a rich flora. Glebe Meadows border the woodland to the north and consist of species-rich unimproved grassland managed for hay and grazing. Small ponds supporting amphibians are also present on the site.
Cooper's Hill SSSI, LNR, CWS, RNR	18.06	TL028376	This site lies approximately 1.2 km to the south east of the Survey Site. Cooper's Hill consists of extensive heathland situated on acidic soil. Springs are present and form wet flushes supporting rich marsh plant communities. A small acidic mire (a rare habitat type in Bedfordshire is also present). Two areas of woodland have developed on the marshy areas adding to the biodiversity value of the site. The site supports a diverse invertebrate fauna.
Maulden Church Meadow SSSI, LNR	4.14	TL059382	This site is located approximately 3.2 km to the east of the Survey Site, and comprises unimproved pasture supporting neutral grassland communities. Acid grassland communities are also present in the south of the site. Three ponds are also present on this site and the site is known to support a rich invertebrate fauna.
Maulden Wood and Pennyfather's Hills SSSI	148.77	TL170390	This site lies approximately 3.2 km to the east of the Survey Site and consists of a large block of mixed deciduous and coniferous woodland supporting a very rich invertebrate fauna. Maulden Wood is an ancient woodland site with Pennyfather's Hills consisting of former heathland habitat within plantations of Scot's pine. The wood has a diverse breeding bird and fungi population. Several ponds are also present on site.
Marston Thrift SSSI, LNR, CWS	37.41	SP973417	This site is located 3.3 km to the west of the Survey Site. Marston Thrift comprises ash/maple ancient, semi-natural woodland formerly managed as coppice-with standards. The ground flora is diverse and varied with damp woodland rides also present. The site is important for butterflies with purple hairstreak present. The western meadow consists of short acidic grassland.

Site Name	Area (ha)	Grid ref.	Description
Maulden Heath SSSI	7.56	TL070386 TL068384	Maulden Heath SSSI is located 3.9 km to the east of the Survey Site. The site consists of lowland acidic grassland supporting a rich herb community. Areas of scrub and bracken are also present throughout the site.
Flitwick Moor SSSI, CWS	59.78	TL045350	Flitwick Moor is located approximately 3.3 km to the south-east of the Survey Site and is a remnant of eutrophic mire renowned for its flora and invertebrate fauna. A number of draining channels bisect the moor where two woodland types have also developed. Flitwick Moor is also important for mosses and liverworts, fungi, invertebrates and breeding birds.
Flitwick Wood LNR	14.4	TL023348	Flitwick Wood LNR is located approximately 4.1 km to the south of the Survey Site. This site consists of an area of ancient woodland supporting a diverse botanical assemblage.
Flitton Moor LNR	6.7	TL056360	This site is located 4.5 km to the south east of the Survey Site and consists of fen, moor, grassland and woodland habitats.

SSSI = Site of Special Scientific Interest, LNR = Local Nature Reserve, CWS = County Wildlife Site, RNR = Roadside Nature Reserve

Table 2: Non-statutory Designated Sites within 2km of Site Boundary

Site Name	Area (ha)	Grid ref.	Description
Rookery Clay Pit CWS	153.1	TL017413	This CWS covers the northern portion of land within the Survey Site. The pit consists of three large pools with sparse ephemeral/short perennial vegetation and rank neutral grassland in the north-western corner. Small patches of marsh vegetation are also present throughout the site. A broadleaved plantation is present in the centre of the site.
Stewartby Lake CWS	111.1	TL005425	This CWS lies approximately 35 m north west of the Survey Site. This site includes a large steep-sided lake supporting typical marshland communities on its periphery. The clay areas in the south-west of the support an MG1 grassland community that includes species associated with calcareous soils. A survey in 2004 found the grassland to most closely resemble a CG7d community (Fragaria-Erigeron sub-community) with affinities to MG5 grassland. There are marshy areas interspersed within the grassland along with small ponds and ditches. The northeast side of the lake mostly consists of dense hawthorn scrub with a regularly mown path through it. The site supports a diverse assemblage of breeding and overwintering birds.

Site Name	Area (ha)	Grid ref.	Description
Millbrook Pillinge Pit CWS	19.5	TL006412	This CWS is also located approximately 200 m west of the Survey Site and comprises a water-filled Oxford Clay pit bordered by a margin of neutral grassland (MG1) and scattered scrub. An area of dense scrub is present on the eastern side of the site. A number of small, scrub-covered islands are present in the lake and there are also stands of (S13) lesser reedmace swamp habitat of CWS status present on site.
Ampthill Park CWS	50.5	TL027385	This site is located approximately 560 m to the south east of the Survey Site. This site consists of a large area of unimproved acidic grassland, semi-improved acidic grassland and marshy grassland with scattered trees and scrub, dense scrub and some open water (three fish-stocked ponds); and Laurel Wood (mature semi-natural broadleaved woodland).
Lidlington Pit CWS	10.5	TL001401	This site lies approximately 570 m from the west of the Survey Site and comprises a large flooded clay pit with peripheral neutral grassland and swamp habitats.
Millbrook Churchyard CWS	0.57	TL013385	This churchyard lies approximately 630 m south of the Survey Site and consists of semi-improved acid grassland (U1 and MG5 communities). The site supports three acid grassland indicators, eight neutral and neutral/calcareous indicators (meeting the CWS threshold of eight), two strong neutral and neutral/calcareous indicators and one strong calcareous grassland indicator. The site therefore meets CWS criteria for both neutral and acid grassland recognition.
Millbrook CWS	4.9	TL013384	This CWS is also located approximately 750 m south of the Survey Site (just south of Millbrook Churchyard CWS) and consists of acidic and marshy grassland habitats. Broadleaved woodland is also present on site.
Heydon Hill CWS	11.8	TL004387	This site is located approximately 770 m to the south-west of the Survey Site and comprises a single block of semi-natural broadleaved (ancient) woodland and two fields of acidic grassland adjacent to east.
Coronation Pit CWS	95.4	TL030433	Coronation Pit CWS is located approximately 940 m to the north-east of the Survey Site. The site is a large disused brick pit with a large lake over 33 ha in area located in the south of the site. Areas of broadleaved woodland, dense scrub and rank neutral grassland are also present on this site.
Millbrook Warren CWS	202.2	TL001375	This site lies approximately 1.2 km to the south-west of the Survey Site and consists of ancient woodland and mature plantation woodland.

Site Name	Area (ha)	Grid ref.	Description
Ampthill Cemetery and the Knoll CWS	2.4	TL037383, TL040381	This site lies approximately 1.6 km to the east of the Survey Site and comprises semi-improved neutral and acid grassland with scattered trees and shrubs.
Ampthill Tunnel CWS	2.2	TL021377	This CWS is located approximately 1.3 km to the south of the Survey Site and contains unimproved neutral and acid grassland. The northern end of the site contains scrub with mature oaks present on the eastern site boundary. It contains good examples of neutral grassland and greensand grassland. Common lizards are present on this site.
Marston Bypass RNR	0.7	SP989410	This site is located approximately 1.5 km to the west of the Survey Site and consists of a road verge sowed with wildflower seeds.

CWS = County Wildlife Site, RNR = Roadside Nature Reserve

Appendix 3: Target Notes

Target Note 1

A parcel of plantation broadleaved woodland located on the south-eastern corner of Rookery Clay Pit CWS.

Common Name	Scientific Name	DAFOR (Frequency)
Trees/shrubs		
Alder	*Alnus glutinosa*	A
Scots pine	*Pinus sylvestris*	F
Silver birch	*Betula pendula*	F
Pedunculate oak	*Quercus robur*	F
Ash	*Fraxinus excelsior*	O
Dog rose	*Rosa canina agg.*	O
Hazel	*Corylus avellana*	O
Hawthorn	*Crataegus monogyna*	O
Field maple	*Acer campestre*	O
Herbs		
Lords and ladies	*Arum maculatum*	O
Common nettle	*Urtica dioica*	O
Bramble	*Rubus fruticosus agg.*	O

Target Note 2

A semi-mature broadleaved woodland plantation, located towards the western boundary of the Survey Site to the south of South Pillinge Farm. Evidence of recent management included tree thinning that had created a glade (semi-improved neutral grassland) with adjoining scattered scrub.

Common Name	Scientific Name	DAFOR (Frequency)
Trees/shrubs		
Poplar sp.	*Populus* sp.	A
Ash	*Fraxinus excelsior*	F
Norway maple	*Acer platanoides*	O
Field maple	*Acer campestre*	O
Beech	*Fagus sylvatica*	O
Scot's pine	*Pinus sylvestris*	O
Silver birch	*Betula pendula*	O
Hawthorn	*Crataegus monogyna*	O
Pedunculate oak	*Quercus robur*	O
Wych elm	*Ulmus glabra*	O
Herbs		
False oat-grass	*Arrhenatherum elatius*	A
Perennial rye grass	*Loolium perenne*	A
Annual meadow grass	*Poa annua*	F
Creeping buttercup	*Ranunculus repens*	F
Creeping thistle	*Cirsium arvense*	F
Cow parsley	*Anthriscus sylvestris*	O
Lords and Ladies	*Arum maculatum*	O

Hogweed	*Heracleum sphondylium*	O
Cleavers	*Galium aparine*	O
Wood avens	*Geum urbanum*	O
Bramble	*Rubus fruticosus* agg.	O
Curled dock	*Rumex crispus*	O
Cow Parsley	*Arthriscus sylvestris*	O
Common hogweed	*Heracleum sphondylum*	O
Teasel	*Dipsacus fullonum*	O
White clover	*Trifolium repens*	O
Common nettle	*Urtica dioica*	O

Target Note 3

Young plantation broadleaved woodland located at the corner of an arable field between Millbrook Road and the railway line. Unimproved neutral grassland had established beneath the planted trees, presumably following relaxation of intensive farmland management pressure.

Common Name	Scientific Name	DAFOR (Frequency)
Trees/shrubs		
Pedunculate oak	*Quercus robur*	F
Ash	*Fraxinus excelsior*	F
Field maple	*Acer campestre*	F
Hazel	*Corylus avellana*	F
Dog rose	*Rosa canina agg.*	O
Hawthorn	*Crataegus monogyna*	O
Ground flora (grasses and herbs)		
Common fleabane	*Pulicaria dysenterica*	A
Bramble	*Rubus fruticosus agg.*	F
Yorkshire fog	*Holcus lanatus*	F
False oat-grass	*Arrhenatherum elatius*	F
Common knapweeed	*Centaurea nigra*	F
Wild carrot	*Daucus carota*	F
Ribwort plantain	*Plantago lanceolata*	F

Target Note 4

The access track to the north of the Survey Site was formed of compacted soil, rubble & rail ballast that was exposed bare ground due to the frequency of vehicular movement along the track. Either side of the track was a mosaic of scrub, tall ruderal vegetation, short perennial / ephemeral vegetation and narrow fringes of rabbit grazed neutral grassland. It is understood from the landowner that this area is regularly sprayed with herbicide in order to keep vegetation under control in areas previously cleared of great crested newts. The more species-rich area of this habitat mosaic was located at the gateway / entrance to the far north of the Survey Site, and in the area marked by the Target Note.

Common Name	Scientific Name	DAFOR (Frequency)
Creeping cinquefoil	*Potentilla reptans*	A
American willowherb	*Epilobium ciliatum*	F
Ground ivy	*Glechoma hederacea*	F
Yellow-wort	*Blackstonia perfoliata*	F
Common centaury	*Centaurium erythraea*	F
Perforate St. John's-wort	*Hypericum perforatum*	F
Blue fleabane	*Erigeron acer*	F

Bristly oxtongue	*Helminthotheca echioides*	F
Weld	*Reseda luteola*	F
Smooth hawksbeard	*Crepis capillaris*	F
Canadian fleabane	*Conyza canadensis*	F
Scentless mayweed	*Tripleurospermum inodorum*	F
Common nettle	*Urtica dioica*	F
Butterfly bush	*Buddleja davidii*	LA
Alder	*Alnus glutinosa*	LA
Silver birch	*Betula pendula*	LA
Bramble	*Rubus fruticosus agg.*	LF
Spear thistle	*Cirsium vulgare*	O
Creeping thistle	*Cirsium arvense*	O
Hoary willowherb	*Epilobium parviflorum*	O
Self-heal	*Prunella vulgaris*	O
Black medick	*Medicago lupulina*	O
Teasel	*Dipsacus fullonum*	O
Colt's-foot	*Tussilago farfara*	O
Scarlet pimpernel	*Anagallis arvensis*	O
Creeping bent	*Agrostis stolonifera*	O
Bird's-foot-trefoil	*Lotus corniculatus*	O
Fern-grass	*Catapodium rigidum*	O
Ribwort plantain	*Plantago lanceolata*	O
Yarrow	*Achillea millefolium*	O
Red bartsia	*Odontites vernus*	O
Annual meadow-grass	*Poa annua*	O
Yorkshire fog	*Holcus lanatus*	O
Common cudweed	*Filago vulgaris*	O
Square-stalked St. John's-wort	*Hypericum tetrapterum*	O
Greater plantain	*Plantago major*	O
Narrow-leaved bird's-foot-trefoil	*Lotus glaber*	R

Target Note 5

An area of unimproved species-rich neutral grassland to the north of the Survey Site (south east of Rookery Clay Pit CWS). The grassland sits on a plateau next to the railway line. The ground slopes steeply to the west into the pit.

Common Name	**Scientific Name**	**DAFOR (Frequency)**
Agrimony	*Agrimonia eupatoria*	F
Yellow-wort	*Blackstonia perfoliata*	F
Common centaury	*Centaurium erythraea*	F
Smooth hawksbeard	*Crepis capillaris*	F
Blue fleabane	*Erigeron acer*	F
Red fescue	*Festuca rubra*	F
Yorkshire fog	*Holcus lanatus*	F
Bird's-foot-trefoil	*Lotus corniculatus*	F
Black medick	*Medicago lupulina*	F
Creeping cinquefoil	*Potentilla reptans*	F

Bramble	*Rubus fruticosus agg.*	F
Yellow oat-grass	*Trisetum flavescens*	F
Spear thistle	*Cirsium vulgare*	O
Hawthorn	*Crataegus monogyna*	O
Hairy St. John's-wort	*Hypericum hirsutum*	O
Square-stalked St. John's-wort	*Hypericum tetrapterum*	O
Red bartsia	*Odontites vernus*	O
Dog rose	*Rosa canina*	O
Ragwort	*Senecio jacobaea*	O

Target Note 6

Swamp vegetation associated with the base of the southern pit at Rookery Clay Pit CWS. This habitat was steadily shrinking as water levels receded in response to prolonged pumping out of water to promote the implementation of the LLRS by the end of 2014.

Common Name	Scientific Name	DAFOR (Frequency)
Common reed	*Phragmites australis*	D
Wood small-reed	*Calamagrostis epigejos*	F
Marsh dock	*Rumex palustris*	F
Jointed rush	*Juncus articulatus*	O
Creeping bent	*Agrostis stolonifera*	O
Soft-stemmed bulrush	*Schoenoplectus tabernaemontani*	O
False-fox sedge	*Carex otrubae*	O
New Zealand pigmyweed	*Crassula helmsii*	O

Target Note 7

Three ponds within the Survey Site, located to the east and positioned centrally in arable fields. The ponds were buffered by wide (2 to 3 m wide) grassy borders. All ponds were approximately 1 m deep and were mostly open; with only one pond shaded (in part) by scrub. Vegetation associated with the ponds included amphibious bistort *Persicaria amphibia*, bittersweet *Solanum dulcumara*, branched bur-reed *Sparganium erectum*, reedmace *Typha latifolia* and soft rush *Juncus effusus*. One pond had a covering of broad-leaved pondweed *Potamogeton natans* at the centre of the pond.

Target Note 8

A section of ditch, approximately 700 m long that runs from east to west and is mostly unshaded. Unlike other ditch sections across the Survey Site, this section had more gently sloping banks, dominated by coarse grasses with patches of blackthorn *Prunus spinosa* and hawthorn *Crataegus monogyna* scrub, and a varied assemblage of marginal plants, which included: abundant fool's watercress *Apium nodiflorum*, great willowherb *Epilobium hirsutum* and water mint *Mentha aquatica*; with occasional meadowsweet *Filipendula ulmaria* and false-fox sedge *Carex otrubae.*

Appendix 4: Photographs

Photo 1: Typical arable field boundary; comprising a species poor hedgerow and a field margin of coarse grasses, lacking in herbs.

Photo 2: Plantation woodland at Target Note 1, showing sparse ground flora.

Photo 3: Access track north west of the Survey Site. Dense, continuous scrub and patches of scattered scrub line the flanks of the track.

Photo 4: Species-rich neutral grassland, showing the Rookery South Pit in the background.

Photo 5: A more noteworthy field ditch and margin along the edge of an arable field in the northern half of the Survey Site.

Photo 6: Ephemeral vegetation and bare ground near the gateway / entrance along the access road to the far north of the Survey Site.

Photo 7: Base of the southern pit (Rookery Clay Pit CWS), here showing a mosaic of ephemeral vegetation and bare ground in the south west part of the CWS.

Photo 8: Vegetation associated with Rookery Clay Pit CWS (South Pit). Foreground shows ephemeral vegetation on sloping bank, whilst a mosaic of swamp, ephemeral vegetation and bare ground occurs at the base of the Pit.

Photo 9: One of three ponds within the Survey Site, to the east of the railway corridor.

8.2 – Invertebrate Report

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Millbrook Power Project

Invertebrate Survey Interim Report

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	Name	**Position**	**Date**
Originated	Jim Fairclough	Principal Ecologist	04 August 2014
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Contents

1 Summary

1.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

1.2 MPL commissioned BSG Ecology to undertake invertebrate surveys of suitable habitats within the red-line of the Project Site, as reported in the Project Scoping Report (the 'Survey Site'). The purpose of the surveys was to inform and support an application for Development Consent for the Power Generation Plant. A supporting desk study and literature review was also conducted, which covered the Project Site and land up to 2 km from this point.

1.3 The desk study revealed the presence of a significant (county value) invertebrate fauna associated with The Rookery. It is understood that habitats within Rookery South Pit (which occupies the southern half of the Rookery Clay Pit CWS) is currently the subject of an ongoing Low Level Restoration Scheme (LLRS) by the landowner. Towards the end of 2014, the base of Rookery South Pit it is expected to comprise just bare earth following bulk movement of soils that are required for the LLRS.

1.4 A total of 271 species were recorded from the Survey Site. Many of the species recorded are common and widespread across England. However, three of these are nationally scarce and eleven of these are Species of Principal Importance, albeit only on account of their population declines over recent decades, which, according to the JNCC (2010) require further research.

2 Introduction

2.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

Site Description

2.2 The Project Site, as identified in the Project Scoping Report comprises the Power Generation Plant Area within Rookery South Pit, and the Gas and Electrical Connection Areas which extend from The Rookery into the surrounding agricultural land to the south and east. The approximate centre of the Project Site lies at grid reference 501373, 240734, which is situated between Bedford and Milton Keynes.

2.3 The Survey Site is restricted to the best examples of suitable habitat within the red-line boundary of the Project Site as reported in the Project Scoping Report (as determined by an experienced entomologist). The Survey Site is shown in Figure 1 Appendix 2. The main habitats within the Survey Site are arable fields, delineated by hedgerows, ditches and minor roads and lanes. To the north, an area of land exists that is in the process of being restored as part of a Low Level Restoration Scheme (LLRS) by the landowner. At the time of survey, in spring and summer of 2014, this area included sparsely vegetated ground, swamp and bare earth. Towards the end of 2014, it is expected to comprise just bare earth following bulk movement of soils that are required for the LLRS.

Description of Project

2.4 The Power Generation Plant would operate as a Simple Cycle Gas Turbine (SCGT) peaking plant and would be designed to provide an electrical capacity of up to 299 Megawatts (MW). It would be fuelled by natural gas, supplied by a new underground gas pipeline connecting the Power Generation Plant to the existing National Grid Gas (NGG) National Transmission System (NTS). It will connect to the National Grid Electrical Transmission System (NETS) via underground cable or overhead lines.

2.5 BSG Ecology was appointed as the ecological consultant to undertake a preliminary ecology survey, which included a desk study and Extended Phase 1 Habitat Survey. This identified the need to undertake a suite of Phase 2 surveys in order to fully assess the nature conservation value of the Project Site, including invertebrate surveys. These baseline surveys will be included in an appendix to an ecology chapter of an Environmental Statement, which will be submitted, as an integral part of the application for Development Consent.

Aims of Study

2.6 The aims of the invertebrate survey were to identify whether any rare, scarce or nationally threatened species of invertebrate, including Species of Principal Importance were present, and if present, to evaluate their likely coverage across the Survey Site.

2.7 This report is an interim report. Further surveys are programmed for late August and early September 2014; targeting late summer terrestrial invertebrates (including moths and butterflies), and aquatic invertebrates of the three ponds in the Survey Site.

3 Methods

Desk Study

3.1 Existing ecological information regarding protected species was requested from the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BRMC) covering the Project Site and land up to 2 km from the Project Site boundary. In addition, on-line resources including the Multi Agency Geographic Information for the Countryside (MAGIC, www.magic.gov.uk) website and aerial photography of the area were also reviewed.

3.2 This information was supplemented by previous survey and mitigation work undertaken by BSG Ecology on The Rookery Clay Pit County Wildlife Site (CWS), including land within and immediately north of the Survey Site (PBA, 2009).

Habitat Potential Assessment

3.3 On 8 May 2014, the Survey Site (shown on Figure 1) was assessed by Dr Ian Fairclough MCIEEM, an experienced entomologist, for its suitability to support important invertebrate communities.

3.4 Notes were made of the habitats present, which were documented in a photographic record. Habitats were assessed for their potential to support important invertebrate communities. To enable a full characterisation of the Survey Site for invertebrates this included observations of features that might limit invertebrate interest as well as those which might be of particular value for invertebrates. In particular, emphasis was placed on the following features (where present):

- Mature open grown trees and veteran trees: especially those with large volumes of standing dead wood;
- Woodland edge and scrub: especially where there is a diverse vegetation structure and species composition;
- Species-rich grassland: especially that in association with scrub, with a high proportion of plants providing nectar and pollen, and with a varied vegetation structure;
- Early successional habitat: (e.g. cliff faces, quarries, eroded banks, periodically disturbed bare or sparsely vegetated ground) especially on free-draining ground where there is a high proportion of exposed bare earth; and
- Wetland: including watercourses (e.g. ditches, flushes and seepages), standing water or waterbodies (e.g. ponds, lakes and swamp) and associated terrestrial habitat (e.g. wet heath and marshy grassland).

3.5 A number of habitats were identified during the survey with the potential to support important invertebrate communities (which are described further in the results section). Subsequent invertebrate surveys were designed, to target key indicator groups of invertebrates within the Survey Site, namely Lepidoptera (butterflies and moths), Coleoptera (beetles) and Hemiptera (true bugs), associated with ditches, forb-rich grassland, and grassland and scrub matrix assemblages. Three ponds that occur within the Survey Site were also surveyed to determine their importance to aquatic invertebrates.

3.6 The results of these targeted surveys were used to assess the main groups of invertebrate present within the Survey Site, and to provide an indication of the relative species diversity within the targeted groups.

Targeted Survey for Terrestrial Invertebrates (non-Lepidoptera)

3.7 Features within the Survey Site that provided the most suitable habitat for these taxonomic orders were selected for targeted survey. These included a range of typical, yet more suitable vegetation structures, including: transitional habitat along well established field margins close to ditch margins and hedgerows. Across these, the following sampling methods were employed: pitfall traps, sweep netting, beating and grubbing. These methods are described below. Whilst Coleoptera and Hemiptera formed the focus of the survey, incidental records of other invertebrate taxa were also

recorded. Surveys were conducted on 9 and 20 May, 22 August and 3 September 2014 by Dr Ian Fairclough.

Pitfall Traps

3.8 Pitfall traps were set out in clusters of three, at two locations within the Survey Site (shown on Figure 1). Pitfall trapping involved the use of circular plant pot trays (24 cm diameter x 5 cm depth) that were sunk into a circular hole that was excavated using a spade. The trays were installed such that the tray rims were flush with the surrounding ground level. Preserving fluid, comprising 1 part ethylene glycol (antifreeze) to 3 parts water, was poured into the trays until they were half full. A drop of detergent was added to the fluid to break the surface tension and lastly, a layer of mesh (aperture size 2 cm x 1 cm) was balanced over the tray to prevent capture of small mammals, amphibians and reptiles. Photograph 1 (Appendix 1) shows a pitfall trap deployed within the Survey Site. The traps were operational in late spring during the period from 9 and 20 May 2014, and again in late summer during the period 22 August and 3 September 2014. Pitfall trapping is considered to be an effective method for the sampling of ground dwelling beetles, particularly those belonging to the family Carabidae (ground beetles).

Sweep Netting

3.9 Sweep netting involved walking at a steady pace through the vegetation and passing an entomologist's sweep net back and forth through vegetation in a figure of eight motion. This method is particularly suitable for capturing phytophagous (foliage-feeding) families such as Curculionidae (weevils), Chrysomelidae (leaf or flea beetles), Nitidulidae (pollen beetles) and Cantharidae (soldier beetles). Sweep netting is also an effective method for collecting many families of bugs, although the Miridae (capsid bugs) can often be the most numerous both in number of individuals and number of species.

Beating

3.10 Beating is a useful technique for extracting beetles from overhanging branches. This method involves placing a beating tray beneath a branch before delivering several sharp blows to the branch and sending any dislodged invertebrates into the beating tray for inspection. This method may uncover a diverse array of beetle families (similar to those found during the sweeping), and occasionally producing a Cerambycid (longhorn beetle) or Elaterid (click beetle). The Pentatomidae and Acanthosomatidae (shield bugs) are two of many Hemipteran families recorded using this method.

Grubbing

3.11 Grubbing is the name generally applied to the extraction of invertebrates by hand from a variety of mediums such as denser grass tussocks, where a thatch has developed, often with patches of pleurocarpous (spreading and branched) mosses. To assist in the detection of small beetles (e.g. Staphylinidae (rove beetles)), moss and leaf litter were sieved or placed in a bucket of water to capture invertebrates struggling to the surface.

Weather Conditions

Late spring

3.12 For both survey visits the weather had been warm if slightly unsettled in the preceding weeks. On the day of the survey conducted on 9 May 2014, the weather was dry, cloudy and warm (maximum temperature 20°C), with a light wind. During the survey visit undertaken on 20 May 2014 the weather was dry, fairly hot (maximum temperature 23°C) and overcast with occasional sunny spells, with a light wind. The weather conditions were optimal for both surveys.

Late summer

3.13 The weather conditions in 2014 deteriorated considerably in August, which meant that the earliest date during which to conduct the surveys was towards the end of the month, when conditions showed signs of recovery. For both survey visits the weather had been wet and mild the preceding weeks. On the day of the survey conducted on 22 August 2014, the weather was dry, cloudy and

fairly warm (maximum temperature 18°C), with light to moderate wind. During the survey visit undertaken on 3 September 2014 the weather was dry, warm (maximum temperature 22°C) and overcast with occasional sunny spells (especially in the afternoon), with a light to moderate wind. The weather conditions were optimal for both surveys.

Sample Sorting and Identification

3.14 Whilst some species could be identified in the field, the majority of specimens were stored in 70% methanol solution for later identification, using a stereoscopic microscope with the aid of identification literature. Experienced entomologist, Don Stenhouse FRES, assisted in the identification of terrestrial invertebrates collected from the field.

Targeted Survey for Butterflies

3.15 On 30 July 2014 and 3 September 2014, Dr Jim Fairclough visited the Survey Site to conduct a walked butterfly transect survey.

3.16 A transect route was selected that covered a large proportion of the typical habitats of the whole of the Survey Site (encompassing the more suitable areas for butterflies) and took approximately two and a half hours to complete. This transect route is shown on Figure 1. The method used an adapted protocol for the UK Butterfly Monitoring Scheme (UKBMS). Thus:

- Timed counts were made between 10:00 and 16:30 hours, and only carried out in warm, bright and dry weather, with no more than moderate winds.
- A transect route was devised (Figure 1), which was split into sections, each section being of similar length and covering habitat typical of the Survey Site.
- Each section was walked at a slow, steady pace counting all butterflies seen within a fixed distance, 2.5 m either side of the transect line and 5 m ahead.
- Care was taken to maintain a steady pace and avoid waiting at favoured hotspots to improve the count and bias the results.
- Butterfly numbers and % sunshine in each section were recorded using the standard UKBMS proforma. Wind speed was estimated using the Beaufort scale (0 - no wind, 6 - very strong wind).

3.17 During the July survey the wind speed was measured as 2 (light wind – wind felt on face) and the average temperature was 25°C.

3.18 During the September survey the wind speed was measured as 3 (light / moderate wind – leaves in slight motion) and the average temperature was 21°C.

Targeted Survey for Moths

3.19 On 18 June 2014, and 22 August 2014, a night-time moth survey was undertaken. The June survey was conducted by Peter Newbold MCIEEM and Ross Crates MCIEEM, and the August survey was conducted by Dr Jim Fairclough MCIEEM and Ross Crates MCIEEM; all ecologists competent in moth surveys and identification. On each of the two survey events two Robinson moth traps were used, each fitted with mercury vapour bulbs to attract as many moths as possible. The traps were positioned in areas within the Survey Site that were expected to give the greatest range of species, yet in locations that were typical of the types of habitat prevailing at the Survey Site (notably field margins close to hedgerows and ditches) (see Figure 1 for trap locations).

3.20 Weather conditions during the June survey were optimal; warm and humid (overnight low of 16°C) and with little or no wind. During the August survey the conditions were within acceptable limits, with an overnight low of 12^0C and a light wind.

3.21 For each survey event the lights were switched on at dusk and remained lit until the generator powered down after at least four hours running time. The traps were checked periodically throughout the night to log any new arrivals. Any species hard to identify from external markings alone, and those requiring further confirmation, were retained and dissected if necessary to ascertain their identity.

Targeted Survey for Aquatic Invertebrates

3.22 The aquatic invertebrate survey focussed on the three ponds present within the site. Ponds Q, R and T were surveyed. The survey was undertaken on 22 August 2014 by Dr Jim Fairclough MCIEEM, a skilled freshwater ecologist, with assistance from Ross Crates MCIEEM.

3.23 Benthic macroinvertebrates were collected at the three ponds using standard 3-minute kick sample methodology (Biggs *et al.*, 1998) using a 1 mm mesh hand net. One minute of hand searching (of rocks, logs, leaf packs and other submerged debris) was then carried out in search of invertebrates (e.g. caddis larvae, pond skaters and whirligig beetles) that might otherwise have be missed during the net sampling.

3.24 Invertebrates were separated from detritus and bed material in the field and preserved immediately in 70% Industrial Methylated Spirit (IMS) for subsequent laboratory analysis.

3.25 The weather during the survey was fairly warm (18°C) and dry, with a light wind. The location of each of the ponds surveyed is shown in Figure 1.

Laboratory Identification

3.26 All aquatic macroinvertebrate individuals (excluding fly larvae and worms) collected in the field were identified to species-level under a stereoscopic microscope (up to 70x magnification) using the most up-to-date identification keys available. Identification of aquatic macroinvertebrates was completed by Dr Jessica Frame of BSG Ecology who is an experienced freshwater ecologist with a PhD in freshwater ecology.

Survey Limitations

3.27 Seasonal surveys such as those carried out at the Survey Site are liable to be biased, to some extent, by the life histories of the invertebrate species themselves, a proportion of which may be found in spring, or in autumn, for example. The prevailing state of the vegetation will also play an important role. In the present case, much of the determination of interest depends on the quality of established field margin habitat, either specifically or as part of a wider mosaic with other boundary features, and the appearance and apparent value of vegetation can vary over the course of a year, as different plant species grow and come into flower, and as the exact nature of management, and its consequences for invertebrates, become apparent. For example, it is unlikely that identical conclusions may have been drawn from a survey conducted in early-spring, or early-autumn.

3.28 Allied to this, two or three visits targeting two or three insect orders can only detect a proportion of the total species pool using a site. However, it does provide the opportunity to investigate the assemblage types present and to gauge where the most important parts of the Survey Site for invertebrates are most likely to be found. Furthermore, the setting of pitfall traps, to some extent, helps negate restricted survey effort (especially for ground dwelling invertebrates), since the traps are operational and collecting target groups over a prolonged period of time.

4 Results and Interpretation

Desk Study

4.1 An invertebrate scoping survey followed by nine site visits to collect invertebrates was undertaken by BSG Ecology during 2008 (PBA, 2009). This suite of surveys identified 483 species of invertebrates within Rookery Clay Pit County Wildlife Site (CWS), some of which were of conservation importance. The Rookery Clay Pits CWS includes the southern clay pit of The Rookery, which falls within the Survey Site. Three species were classified as SPIs (Species of Principal Importance, NERC Act 2006); the small heath *Coenonympha pamphilus*, shaded broad-bar moth *Scotopteryx chenopodiata* and cinnabar moth *Tyria jacobaeae*. All three are still widespread and common though declining. Amongst the 483 species recorded, 44 hold a Red Data Book or Nationally Scarce conservation status or merit one. The survey revealed Rookery Pits CWS as a site of county importance for invertebrate conservation and one of the best invertebrate sites in Bedfordshire. Most of the areas and habitat components sampled by the survey yielded Red Data Book or Nationally Scarce invertebrates. Aquatic and wetland habitats were richest in Red Data Book or Nationally Scarce invertebrate species but many species were associated with the grassland habitats and the bare and sparsely-vegetated ground, and some with a stand of poplars.

4.2 The desk study produced records of eighteen species of butterfly, all from within or adjacent to the Survey Site. These included the small heath, dingy skipper *Erynnis tages*, the wall *Lasiommata megera* and the grizzled skipper *Pyrgus malvae,* all of which are classified as SPI's. In addition, records of 40 species of moth were obtained. The majority of these species were either recorded on site or within a 200 m radius of the Survey Site. Most of these species of moth are classified as SPIs.

4.3 All species of invertebrate recorded from the Survey Site that are of conservation significance (i.e. rare, scarce or nationally threatened species of invertebrate, including Species of Principal Importance) are listed in Appendix 3.

Habitat Potential Assessment

4.4 The majority of the Survey Site comprised intensively managed agricultural land, characterised by large arable fields, grass-covered field margins and fairly recent, species-poor, yet intact hedgerows (dominated by hawthorn *Crataegus monogyna*) (see Photograph 2, Appendix 1). These were discounted from further study on the basis of the habitat being of poor suitability for invertebrates. Only common and widespread species might be expected to occur in association with such habitat.

4.5 The main exception to this agricultural land is the area that lies to the north of the Survey Site. This comprised the access track that was a mosaic of bare ground with ephemeral vegetation and scrub at varying density. Also to the north, within Rookery South Pit was a patchy mosaic of bare ground, ephemeral vegetation and swamp vegetation in the form of drying reedbed dominated by stunted common reed *Phragmites australis*. These areas north of the Survey Site, notably within Rookery South Pit are being restored as part of a Low Level Restoration Scheme (LLRS) by the landowner. Accordingly, despite these areas maintaining a high level of interest for invertebrates at the time of survey, they were discounted from further investigation for the present study as it was assumed that the baseline for this area will be set as the future baseline (at the end of 2014), which is likely to a remodelled landform of compacted bare earth.

4.6 Notwithstanding the above, there were several habitat types of potential interest to invertebrates within the Survey Site. These formed the focus of the surveys and are summarised below.

Established Boundary Features

4.7 As mentioned earlier, the hedgerows, which were more numerous in the east of the Survey Site, were of a uniform structure, species-poor and therefore lacking any defining character that would make them of significant value to invertebrates. The margins were generally species-poor, being dominated by grasses and lacking in forbs. However, there were several field boundaries,

particularly in the northern and western parts of the Survey Site, which are of slightly greater value (see Photographs 3, 4 and 5). In most cases, these included hedgerows and / or ditch banks with south-facing aspects and a wider variety of forbs, including species that are good pollen and nectar sources such as common fleabane *Pulicaria dysenterica*, wild carrot *Daucus carota*, bramble *Rubus fruticosa* agg, hogweed *Heracleum sphondylium* and great willowherb *Epilobium hirsutum*. Hedgerows at these locations were generally more complex and well-structured providing a permanent feature for hibernating invertebrates. Furthermore, they would have broken up the fields to add additional heterogeneity, and potentially warmth, at least close to the ground, which would likely to have been of particular benefit to butterflies. The ditches also contributed to the diversity of microhabitats for invertebrates, offering a more humid environment at the ditch bases, for ground beetles and rove beetles and, supporting a different assemblage of plants (e.g. watercress *Rorippa nasturtium-aquaticum*, water mint *Mentha aquatica* and meadowsweet *Filipendula ulmaria*), which in turn can support a wider range of phytophagous (foliage feeding) invertebrates, such as weevils and various true bugs.

Wooded Copses (Plantations)

4.8 There were several wooded copses across the Survey Site. Some were very recent, so were established on grassland habitat which was still prevalent. Others were somewhat older, yet still betrayed their origin as plantation woodland, due to a typically shaded and poorly developed ground flora and understorey, and a single age structure of trees. Pheasant were reared in some, which can also be detrimental to invertebrates as the pheasants will scour the ground feeding on ground dwelling invertebrates and nipping at young vegetation, stunting its growth. Copses fitting these descriptions would generally be of limited importance for terrestrial invertebrates. They have no features of antiquity such as a large volume of standing and fallen dead wood, rot holes, sap runs and cavities that would attract a more specialised dead wood (saproxylic) invertebrate fauna.

4.9 However, the most established copses within the Survey Site such as that immediately south of South Pillinge Farm (close to Butterfly Transect BT8, see Figure 1) could be expected to act as reservoirs, supporting more invertebrates than would be found in the wider intensively farmed landscape. Here the woodland was complemented with grassland where a ride cut through the woodland, and patches of ruderal vegetation (including nettle, thistles and umbellifers) provided transition zones that would often be rich in invertebrates, due to the structural diversity. The added height and often permanency of these features makes them important refuges for invertebrates especially during winter when penetrating frosts may otherwise have adverse consequences. The scrub which was also prevalent in this area would have been an important food source. In early and mid-spring, blackthorn and hawthorn are valuable reservoirs of nectar and pollen for bees, wasps, moths and beetles. Later in summer / early autumn they provide a source of food (fruit) for fruit feeding species.

Ponds

4.10 There were three ponds within the Survey Site (see, for example, Photograph 6). These were located to the east and were positioned centrally in arable fields. Whilst being quite isolated, these ponds are still likely to have been important reservoirs for invertebrates. The wide field margins surrounding the ponds offered a buffer to the drift of chemicals used by the farmer, and the ponds themselves were mature, yet still with plenty of open water and marginal vegetation. This included species such as amphibious bistort *Persicaria amphibia*, bittersweet *Solanum dulcumara*, reedmace *Typha latifolia* and soft rush *Juncus effusus*. The range of species potentially associated with ponds is unequalled, with such habitat typically well represented by a range of snails, diving beetles (Dytiscidae), water beetles (Hydrophilidae), dragonflies (Odonata) and caddisflies (Trichoptera).

Terrestrial Invertebrates (non-Lepidoptera)

4.11 In total 135 invertebrate taxa were identified to species level. Beetles made up most of the records (89 species). The next most recorded order was the true bugs followed by the bees, wasps and ants (Hymenoptera). The full list of invertebrates recorded within the Survey Site is displayed in

tabular format in Appendix 4. The results of the survey were analysed by measuring the number of locally rare, nationally notable and IUCN red-list / RDB[1] species.

4.12 Overall, the majority of the insects recorded are widely distributed and common, with 27 regarded as more local and three of Notable status. These notable species are discussed further in Table 1, below.

Table 1: Summary of Beetle Species Status and Habitat Requirements

Scientific Name	Status	Notes on Habitat Requirements
Platydracus latebricola (a rove beetle)	Nationally Scarce (Notable B)	This species prefers dry soils on insolated sites, although its habitat preferences are not well understood. It is recorded mainly from the midlands and south-east of England. It was taken from a pitfall trap, positioned along a field boundary (close to a ditch) to the north.
Microplontus triangulum (a weevil)	Nationally Scarce (Notable B)	Records are mainly from the east and south-east of England with a few records found as far north as Cumbria. It has been recorded from roadside verges, field margins, grassland and disturbed ground. According to Morris (2008) it is '*Notable B (hardly reflecting its rarity)*' suggesting that he regards it as rarer, although as it is found on the very common yarrow *Achillea millefolium* it could be expected to be more common. It was taken during sweeping of field margin vegetation to the north of the Survey Site (sweep net area 1; Figure 1).
Ophonus ardosiacus (a	Nationally Scarce	The usual habitat for this species is open ground in chalky or sandy areas both inland and on the coast. It is a seed

[1] **Status Definitions and Criteria of Invertebrate Groups**: for many invertebrate groups, species rarity has often been gauged by the number of national 10km grid squares in which they occur. The fewer the "spots on a map", the rarer it is. This, however, does not exactly equate with how threatened a species is, since some species may be naturally confined to very few localities but are very abundant where they do occur and under no immediate threat of extinction. The matter of how threatened the "rarest" species are has been addressed in a series of Red Data Books (RDB), such as for insects (Shirt, 1987). Here, the listing as RDB1 (Endangered), RDB2 (Vulnerable) and RDB3 (Rare) is an assessment of how threatened or endangered the species is in Britain, rather than how scarce it is in terms of map spot counting.

Over the last decade the RDB categories are slowly being replaced by IUCN red-list categories (Critically Endangered, Endangered and Vulnerable), which use different criteria to those developed for the RDBs. However, this process is slow, and IUCN categories are not available for all groups. Accordingly, wherever IUCN categories have been allocated, these are also shown.

Below RDB status, less rare but still significant species can be defined as Nationally Scarce (formerly called Nationally Notable), which is often sub-divided into Na (scarce), Nb (less scarce). These sub-categories are based on 10 kilometre square spot counting for the Great Britain grid system. The Na sub-category represents scarce taxa that are thought to occur in 30 or fewer 10 km squares of the Great Britain grid system. The Nb sub-category represents less scarce taxa that occur in 31 to 100 10 km squares. Taxa in the N- sub-category are those listed as 'Notable', but not always distinguished into sub-category Na or Nb in the relevant review. These species are thought to occur in 16 to 100 10 km squares of the National Grid but are too poorly known for their status to be more precisely estimated.

The concept of 'Local' is less well defined, but comprises species of distinctly limited or restricted distribution, with such limitations being brought about by climate controls, dependency on a scarce habitat type, host (in the case of parasitic species) or similar ecological factor. In this present study, the Local status of species is as per the Recorder database package developed by JNCC.

Scientific Name	Status	Notes on Habitat Requirements
ground beetle	(Notable B)	eater and as such has a fondness for the seed heads of wild carrot *Daucus carota*. Current distribution maps suggest that it is confined mainly to the south of England with a presence in South Wales (Luff, 2007).

Butterflies

4.13 Eighteen butterfly and two day-flying moth species were observed during the course of the two transect surveys. A summary of the transect survey results are shown in Table 2 below and the route of the transect survey is shown in Figure 1. Copies of the original survey proformas can be found in Appendix 5.

Table 2: Summary of Transect Survey Results

Common Name	Latin Name	No. of sightings on 30 July	No. of sightings on 3 September
Small Copper	*Lycaena phlaeas*	0	2
Common Blue	*Polyommatus icarus*	7	5
Brown Argus	*Aricia agestis*	1	6
Gatekeeper	*Pyronia tithonus*	48	0
Meadow Brown	*Maniola jurtina*	26	3
Speckled Wood	*Pararge aegeria*	0	10
Ringlet	*Aphantopus hyperantus*	3	0
Peacock	*Inachis io*	10	2
Comma	*Polygonia c-album*	2	1
Red Admiral	*Vanessa atalanta*	0	7
Painted Lady	*Vanessa cardui*	0	1
Small Tortoiseshell	*Aglais urticae*	1	5
Essex Skipper	*Thymelicus lineola*	7	0
Small Skipper	*Thymelicus sylvestris*	1	0
Large White	*Pieris brassicae*	25	8
Small White	*Pieris rapae*	0	1
Green-Veined White	*Pieris napi*	2	8
Small Heath	*Coenonympha pamphilus*	0	6
6-Spot Burnet (moth)	*Zygaena filipendulae*	3	0
Shaded Broad-Bar (moth)	*Scotopteryx chenopodiata*	1	0

4.14 The diversity of butterfly species is typical for a site of this type and location. The species recorded are generally considered to be common and widespread across central and southern England.

4.15 The most notable species recorded during the two surveys were as follows:

- The shaded broad-bar is a geometrid moth that occupies a wide range of habitats including dunes, downs, waste ground and grassland. The larvae feed on vetches and clovers. Whilst this is regarded as a widespread and moderately common species, it's inclusion on Section 41 of the NERC Act 2006 relates to a reported decline of 73% over 35 years for this species, which is triggering the need for further research into its decline (JNCC, 2010).

- Small heath is a butterfly that typically occurs in well-drained grassland habitats where it lays its eggs on fine grasses such as fescues *Festuca* spp., meadow grasses *Poa* spp. and bents *Agrostis* spp. Despite being a fairly widespread species, the small heath is listed on Section 41 of the NERC Act 2006, and is regarded by Butterfly Conservation (Fox *et al.*, 2010) as being in the Near Threatened category, which reflects its decline in the British countryside over recent decades.

Moths

4.16 The night-time surveys produced 104 taxa of moth, 103 of which were recognisable as species (see Appendix 4).

4.17 Nine species collected were particularly noteworthy, due to their status either as a nationally notable species, or their inclusion as a SPI (S. 41; NERC Act 2006). Table 3, below gives more detailed information about each species and their habitat requirements.

Table 3: Summary of Moth Species Status and Habitat Requirements

Scientific Name	Status	Notes on Habitat Requirements
Mouse moth Amphipyra tragopoginis	SPI: Decline of 73% over 35 years; research needed (JNCC, 2010)	Waring & Townsend (2003) describe this species as being common and widespread throughout England. It is associated with a range of herbaceous plants so would have been well suited to the field margins within the Survey Site.
Large nutmeg *Apamea anceps*	SPI: Decline of 88% over 35 years; research needed (JNCC, 2010)	According to Waring & Townsend (2003), this species has a localised distribution, although it is particularly well distributed and locally abundant on well drained farmland in south east and central southern England. The moth is associated with grasses, so it would have been well suited to the field margins within the Survey Site.
Dusky brocade *Apamea remissa*	SPI: Decline of 76% over 35 years; research needed (JNCC, 2010)	According to Waring & Townsend (2003), this species is common across England. The moth is associated with grasses, so it would have been well suited to the field margins within the Survey Site.
mottled rustic *Caradrina morpheus*	SPI: Decline of 73% over 35 years; research needed (JNCC, 2010)	According to Waring & Townsend (2003), this species is common across England. The moth is associated with a variety of herbaceous plants (e.g. nettle, docks and willows), so it would have been well suited to the hedgerows and copses within the Survey Site.
rustic *Hoplodrina blanda*	SPI: Decline of 75% over 35 years; research needed (JNCC, 2010)	According to Waring & Townsend (2003), this species is common across England. The moth is associated with a variety of herbaceous plants (e.g. chickweed, docks and plantains), so it would have been well suited to the field margins within the Survey Site.
lackey *Malacosoma neustria*	SPI: Decline of 90% over 35 years; research needed (JNCC, 2010)	According to Waring & Townsend (2003), this species is common across southern England. The moth is associated with a variety of broadleaved trees and shrubs (e.g. hawthorn, blackthorn, apple and oak), so it would have been well suited to the hedgerows and copses within the Survey Site.
giant water veneer *Schoenobius gigantella*	SPI: Decline of 90% over 35 years; research needed (JNCC, 2010)	According to Sterling & Parsons (2012), this species has a very localised distribution, principally across south east England. The moth is associated with reedbeds, especially coastal reedbeds, although gravel pits are also favoured. The larvae feed internally on the young shoots of common reed and reed sweet-grass. The discovery of this species at the Survey Site will most

Scientific Name	Status	Notes on Habitat Requirements
		certainly have been in association with the swamp in The Rookery, most likely Rookery South Pit, which was closest to the moth traps.
blood vein *Timandra comae*	SPI: Decline of 79% over 35 years; research needed (JNCC, 2010)	According to Waring & Townsend (2003), this species is common across England. The moth is associated with a variety of herbaceous plants, but docks in particular, so it would have been well suited to the field margins, hedgerows and copses within the Survey Site.
cinnabar *Tyria jacobaeae*	SPI: Decline of 83% over 35 years; research needed (JNCC, 2010)	According to Waring & Townsend (2003), this species is common across England. The moth is almost exclusively associated with common ragwort, so it would have been well suited to better established field margins within the Survey Site.

Aquatic Invertebrates

4.18 A description of each of the ponds surveyed is provided in Table 4 below and photographs of the ponds are provided in Appendix 1.

Table 4: Pond Habitat Descriptions.

Pond Ref.	Pond Description
Q	This pond covered an area of approximately 70 m^2 with a depth exceeding 1 m. The aquatic plant community in this pond included abundant common bulrush *Typha latifolia* and branched bur-reed *Sparganium erectum*, with a floating mat of common duckweed *Lemna minor* and ivy-leaved duckweed *Lemna trisulca*.
R	This pond covered an area of approximately 170 m^2 with a depth of approximately 1 m. The central section of the pond was heavily shaded by scrub. Marginal vegetation included abundant branched bur-reed and great willowherb *Epilobium hirsutum*.
T	This pond covered an area of approximately 160 m^2 with a depth exceeding 1 m. The aquatic plant community in this pond was dominated by branched bur-reed around the margins, and broad-leaved pondweed *Potamogeton natans* creating a floating carpet across the central part of the pond. Fish (stickleback) were numerous.

4.19 51 taxa were recorded across all three ponds. Pond Q supported the highest diversity of aquatic macroinvertebrates, with total of 42 taxa recorded. Ponds R and T supported fewer taxa (19 and 16 respectively). The samples were generally dominated by beetles (25 unique taxa), 23 of which were in Pond Q. No scarce or threatened aquatic invertebrates were identified within the samples. A complete list of all the macroinvertebrate taxa recorded from the ponds can be found in Appendix 4.

4.20 Table 5 summarises the results of the aquatic invertebrate survey.

Table 5: Aquatic Macroinvertebrate Results Summary

	Pond Q	Pond R	Pond T
No. of taxa	42	19	16
No. of beetle taxa	23	4	5
No. of water bug taxa	6	5	3
No. of mayfly taxa	2	1	1
No. of caddis taxa	0	0	0
No. of dragonfly / damselfly taxa	2	0	1
No. of snail / bivalve taxa	4	3	1
Threatened / Nationally Scarce Species	None	None	None

5 References

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Appendix 1: Photographs

Photo 1: Pitfall trap deployed at the Survey Site.

Photo 2: Example of field margin of negligible value to terrestrial invertebrates (typical of eastern side of Survey Site).

Photo 3: More structurally diverse field margin, in this instance delineated by a hedgerow.

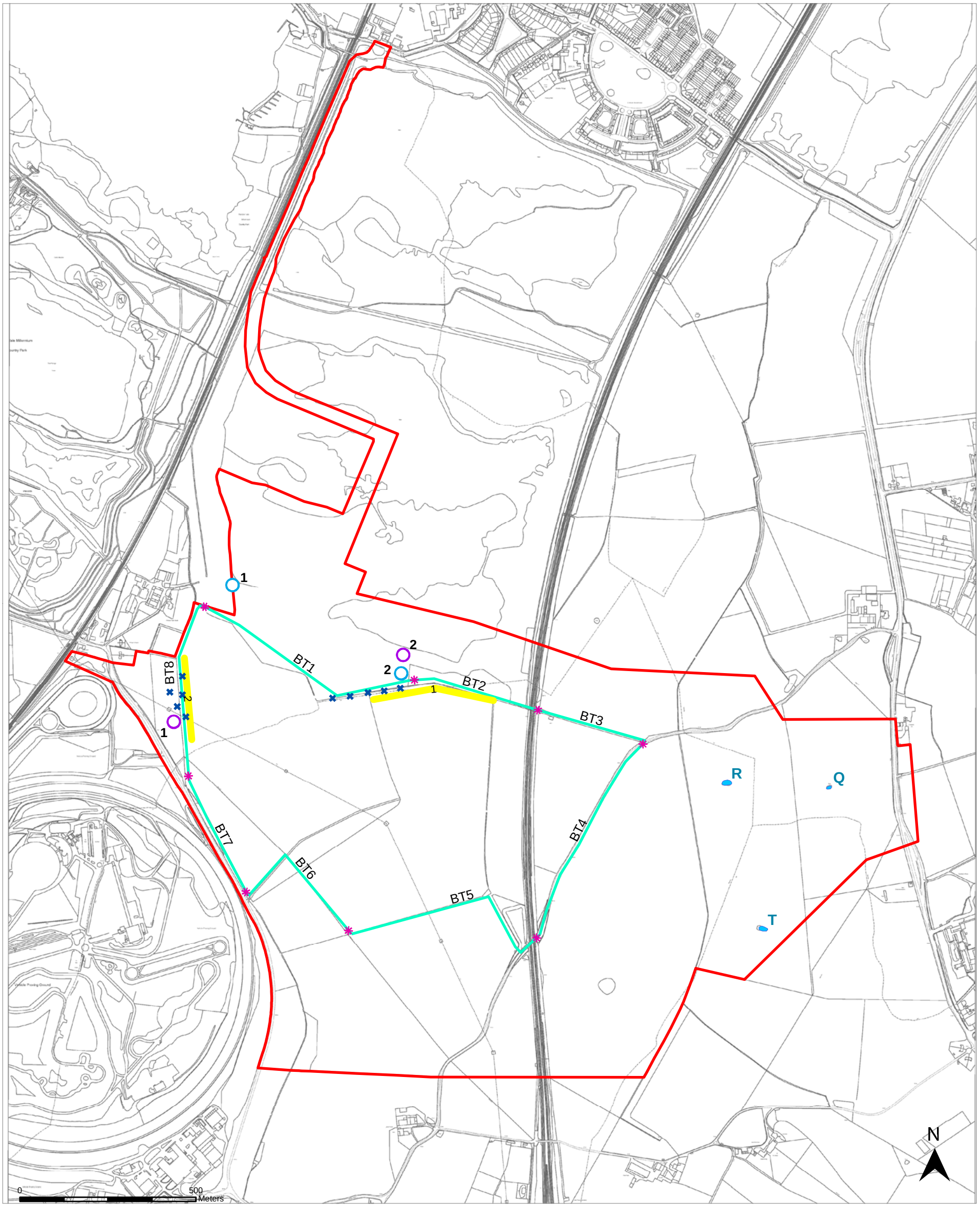
Photo 4: More structurally diverse field margin, in this instance delineated by a ditch.

Photo 5: More structurally diverse field margin, in this instance delineated by a hedgerow & wooded copse.

Photo 6: Pond Q. Note the wide grassland margin.

	
Photo 7: Pond R. A third of the banks are surrounded by scrub and there is an extensive area of marginal vegetation to the eastern side.	Photo 8: Pond T. This pond had a dense covering of broad-leaved pondweed and a wide fringe of marginal vegetation.

Appendix 2: Figures



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PROJECT TITLE
MILLBROOK POWER PROJECT

DRAWING TITLE
Figure 1: Invertebrate Survey Methods

DATE: 27.10.2014 CHECKED: JF SCALE: 1:11,000
DRAWN: COH APPROVED: JF STATUS: FINAL

LEGEND

- Project Site at the time of Scoping Report submission
- BT1 — Butterfly transect
- 1 — Area of targeted sweeping, grubbing and beating
- Pitfall trap location
- 1 — Location of moth trap (18 June 2014)
- 1 — Location of moth trap (22 August 2014)
- Pond surveyed for aquatic invertebrates
- Q — Pond reference

Appendix 3: Species of Conservation Concern Recorded from the Desk Study

Order	Scientific Name	Conservation Status
Araneae	*Pardosa agrestis*	Nationally Scarce (Nb)
Araneae	*Alopecosa barbipes*	Vulnerable
Coleoptera	*Dacrila fallax*	Nationally Scarce
Coleoptera	*Dryops similaris*	Nationally Scarce (Na)
Coleoptera	*Limnichus pygmaeus*	Nationally Scarce (Na)
Coleoptera	*Longitarsus parvulus*	Nationally Scarce (Na)
Coleoptera	*Achenium humile*	Nationally Scarce (Nb)
Coleoptera	*Anacaena bipustulata*	Nationally Scarce (Nb)
Coleoptera	*Berosus signaticollis*	Nationally Scarce (Nb)
Coleoptera	*Catapion pubescens*	Nationally Scarce (Nb)
Coleoptera	*Cercyon sternalis*	Nationally Scarce (Nb)
Coleoptera	*Chaetarthria seminulum sens.lat.*	Nationally Scarce (Nb)
Coleoptera	*Chlaenius nigricornis*	Nationally Scarce (Nb)
Coleoptera	*Cypha discoidea*	Nationally Scarce (Nb)
Coleoptera	*Demetrias imperialis*	Nationally Scarce (Nb)
Coleoptera	*Elaphropus parvulus*	Nationally Scarce (Nb)
Coleoptera	*Enochrus quadripunctatus*	Nationally Scarce (Nb)
Coleoptera	*Graptodytes granularis*	Nationally Scarce (Nb)
Coleoptera	*Helophorus nanus*	Nationally Scarce (Nb)
Coleoptera	*Hydroglyphus geminus*	Nationally Scarce (Nb)
Coleoptera	*Hygrotus parallelogrammus*	Nationally Scarce (Nb)
Coleoptera	*Ilybius chalconatus*	Nationally Scarce (Nb)
Coleoptera	*Limnebius nitidus*	Nationally Scarce (Nb)
Coleoptera	*Limnebius papposus*	Nationally Scarce (Nb)
Coleoptera	*Longitarsus dorsalis*	Nationally Scarce (Nb)
Coleoptera	*Notaris scirpi*	Nationally Scarce (Nb)
Coleoptera	*Orthochaetes setiger*	Nationally Scarce (Nb)
Coleoptera	*Pterostichus gracilis*	Nationally Scarce (Nb)
Coleoptera	*Ochthebius nanus*	Near Threatened
Coleoptera	*Ochthebius pusillus*	Near Threatened
Coleoptera	*Neobisnius procerulus*	Red Data Book (Insufficiently Known)
Diptera	*Oxycera morrisii*	Nationally Scarce
Diptera	*Pipizella virens*	Nationally Scarce
Diptera	*Stratiomys singularior*	Nationally Scarce
Hemiptera	*Microvelia pygmaea*	Nationally Scarce (Nb)
Hymenoptera	*Hylaeus cornutus*	Nationally Scarce (Na)
Hymenoptera	*Nomada fucata*	Nationally Scarce (Na)
Hymenoptera	*Hoplitis claviventris*	Nationally Scarce (Nb)
Hymenoptera	*Hylaeus signatus*	Nationally Scarce (Nb)
Hymenoptera	*Lasioglossum malachurum*	Nationally Scarce (Nb)
Hymenoptera	*Lasioglossum puncticolle*	Nationally Scarce (Nb)

Order	Scientific Name	Conservation Status
Hymenoptera	*Sphecodes crassus*	Nationally Scarce (Nb)
Lepidoptera	*Sesia apiformis*	Nationally Scarce (Nb)
Lepidoptera	*Coenonympha pamphilus*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Erynnis tages*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Lasiommata megera*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Pyrgus malvae*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Acronicta rumicis*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Acronicta psi*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Acronicta rumicis*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Amphipyra tragopoginis*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Apamea anceps*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Apamea remissa*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Arctia caja*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Atethmia centrago*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Blepharita adusta*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Caradrina morpheus*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Diarsia rubi*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Ecliptopera silaceata*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Ennomos erosaria*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Eulithis mellinata*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Euxoa tritici*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Hemistola chrysoprasaria*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Hepialus humuli*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Hoplodrina blanda*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Hydraecia micacea*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Lycia hirtaria*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Malacosoma neustria*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Melanchra persicariae*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Melanchra pisi*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Mythimna comma*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Nemophora fasciella*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Scotopteryx chenopodiata*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Spilosoma lubricipeda*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Spilosoma luteum*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Tholera cespitis*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Tholera decimalis*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Timandra comae*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Tyria jacobaeae*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Watsonalla binaria*	SPI (s. 41 NERC Act 2006)
Lepidoptera	*Xanthia icteritia*	SPI (s. 41 NERC Act 2006)
Orthoptera	*Conocephalus discolor*	Nationally Scarce (Na)

Appendix 4: Species List (2014 Surveys of Survey Site)

Order	Scientific Name	Conservation Status
Araneae	*Dysdera erythrina*	Common
Coleoptera	*Acilius sulcatus*	Common
Coleoptera	*Agabus bipustulatus*	Common
Coleoptera	*Agabus sturmii*	Common
Coleoptera	*Agriotes obscurus*	Common
Coleoptera	*Aleochara intricata*	Common
Coleoptera	*Altica palustris*	Common
Coleoptera	*Amara aulica*	Common
Coleoptera	*Amara plebeja*	Common
Coleoptera	*Amara similata*	Common
Coleoptera	*Anacaena globulus*	Common
Coleoptera	*Anacaena lutescens*	Common
Coleoptera	*Anaspis maculata*	Common
Coleoptera	*Anotylus sculpturatus*	Common
Coleoptera	*Anthonomus rubi*	Common
Coleoptera	*Aphodius sphacelatus*	Common
Coleoptera	*Atheta aquatica*	Common
Coleoptera	*Badister bullatus*	Common
Coleoptera	*Barypeithes araneiformis*	Common
Coleoptera	*Barypeithes pellucidus*	Common
Coleoptera	*Bembidion properans*	Common
Coleoptera	*Bembidion quadrimaculatum*	Common
Coleoptera	*Berosus affinis*	Local
Coleoptera	*Brachypterus glaber*	Common
Coleoptera	*Brachypterus urticae*	Common
Coleoptera	*Bradycellus verbasci*	Common
Coleoptera	*Calathus fuscipes*	Common
Coleoptera	*Cantharis lateralis*	Local
Coleoptera	*Carabus nemoralis*	Local
Coleoptera	*Carabus problematicus*	Common
Coleoptera	*Carabus violaceus*	Common
Coleoptera	*Cercyon melanocephalus*	Common
Coleoptera	*Chaetocnema concinna*	Common
Coleoptera	*Cionus alauda*	Local
Coleoptera	*Cionus scrophulariae*	Common
Coleoptera	*Coccinella septempunctata*	Common
Coleoptera	*Coelostoma orbiculare*	Local
Coleoptera	*Cordylepherus viridis*	Local
Coleoptera	*Cyphon padi*	Local
Coleoptera	*Drusilla canaliculata*	Local
Coleoptera	*Enochrus testaceus*	Local

Order	Scientific Name	Conservation Status
Coleoptera	*Grammoptera ruficornis*	Common
Coleoptera	*Graptodytes pictus*	Local
Coleoptera	*Haliplus immaculatus*	Common
Coleoptera	*Haliplus lineatocollis*	Common
Coleoptera	*Haliplus ruficollis*	Common
Coleoptera	*Harpalus rubripes*	Local
Coleoptera	*Harpalus rufipes*	Common
Coleoptera	*Hydaticus seminiger*	Local
Coleoptera	*Hydrobius fuscipes*	Common
Coleoptera	*Hydroporus memnonius*	Common
Coleoptera	*Hydroporus palustris*	Common
Coleoptera	*Hydroporus planus*	Common
Coleoptera	*Hypera rumicis*	Common
Coleoptera	*Hypera zoilus*	Common
Coleoptera	*Hyphydrus ovatus*	Common
Coleoptera	*Laccobius bipunctatus*	Common
Coleoptera	*Laccobius sinuatus*	Local
Coleoptera	*Laccophilus minutus*	Common
Coleoptera	*Lathrobium brunnipes*	Common
Coleoptera	*Leistus ferrugineus*	Common
Coleoptera	*Longitarsus suturellus*	Common
Coleoptera	*Loricera pilicornis*	Common
Coleoptera	*Malachius bipustulatus*	Common
Coleoptera	*Malthodes marginatus*	Common
Coleoptera	*Megasternum concinnum*	Common
Coleoptera	*Meligethes aeneus*	Common
Coleoptera	*Microcara testacea*	Common
Coleoptera	*Microplontus triangulum*	Nationally Scarce (Nb)
Coleoptera	*Nebria brevicollis*	Common
Coleoptera	*Neocoenorrhinus germanicus*	Local
Coleoptera	*Neocrepidodera transversa*	Common
Coleoptera	*Noterus clavicornis*	Common
Coleoptera	*Ochthebius minimus*	Common
Coleoptera	*Oedemera lurida*	Local
Coleoptera	*Oedemera nobilis*	Common
Coleoptera	*Onthophagus coenobita*	Local
Coleoptera	*Onthophagus joannae*	Local
Coleoptera	*Ophonus ardosiacus*	Nationally Scarce (Nb)
Coleoptera	*Oxypoda brachyptera*	Local
Coleoptera	*Perapion violaceum*	Common
Coleoptera	*Philonthus politus*	Common
Coleoptera	*Phyllobius oblongus*	Common
Coleoptera	*Phyllobius pomaceus*	Common
Coleoptera	*Phyllobius roboretanus*	Common
Coleoptera	*Phyllodrepa floralis*	Common

Order	Scientific Name	Conservation Status
Coleoptera	*Phyllotreta diademata*	Local
Coleoptera	*Platydracus latebricola*	Nationally Scarce (Nb)
Coleoptera	*Poecilus cupreus*	Local
Coleoptera	*Polydrusus pterygomalis*	Common
Coleoptera	*Propylea quattuordecimpunctata*	Common
Coleoptera	*Psylliodes chrysocephala*	Local
Coleoptera	*Psyllobora vigintiduopunctata*	Common
Coleoptera	*Pterostichus madidus*	Common
Coleoptera	*Pterostichus melanarius*	Common
Coleoptera	*Pterostichus niger*	Common
Coleoptera	*Quedius molochinus*	Common
Coleoptera	*Quedius semiobscurus*	Common
Coleoptera	*Rhagonycha femoralis*	Common
Coleoptera	*Rhyzobius litura*	Common
Coleoptera	*Sciaphilus asperatus*	Common
Coleoptera	*Sitona lineatus*	Common
Coleoptera	*Sphaeroderma testaceum*	Common
Coleoptera	*Tachyporus nitidulus*	Common
Coleoptera	*Tasgius morsitans*	Local
Coleoptera	*Trechus quadristriatus*	Common
Coleoptera	*Tytthaspis sedecimpunctata*	Local
Coleoptera	*Xantholinus elegans*	Local
Coleoptera	*Xantholinus linearis*	Common
Dermaptera	*Forficula auricularia*	Common
Diptera	*Chrysops relictus*	Common
Diptera	*Dilophus febrilis*	Common
Diptera	*Helophilus pendulus*	Common
Diptera	*Melanostoma mellinum*	Common
Diptera	*Sarcophaga carnaria*	Common
Diptera	*Sphaerophoria scripta*	Common
Ephemeroptera	*Cloeon dipterum*	Common
Gastropodae	*Ancylus fluviatilis*	Common
Gastropodae	*Hippeutis complanatus*	Local
Gastropodae	*Lymnaea peregra*	Common
Gastropodae	*Planorbis planorbis*	Common
Glomerida	*Armadillidium vulgare*	Common
Glomerida	*Glomeris marginata*	Common
Hemiptera	*Acanthosoma haemorrhoidale*	Common
Hemiptera	*Aelia acuminata*	Local
Hemiptera	*Aphrophora alni*	Common
Hemiptera	*Cercopis vulnerata*	Common
Hemiptera	*Corizus hyoscyamii*	Local
Hemiptera	*Hesperocorixa linnaei*	Common
Hemiptera	*Hesperocorixa sahlbergi*	Common
Hemiptera	*Heterogaster urticae*	Common

Order	Scientific Name	Conservation Status
Hemiptera	*Ilyocoris cimicoides*	Common
Hemiptera	*Nabis lineatus*	Local
Hemiptera	*Notonecta glauca*	Common
Hemiptera	*Palomena prasina*	Common
Hemiptera	*Physatocheila dumetorum*	Common
Hemiptera	*Plea minutissima*	Common
Hemiptera	*Plesiodema pinetella*	Common
Hemiptera	*Rhopalus parumpunctatus*	Local
Hemiptera	*Stenodema calcarata*	Common
Hemiptera	*Stenodema laevigata*	Common
Hemiptera	*Anoscopus flavostriatus*	Local
Hemiptera	*Stygnocoris sabulosus*	Common
Hemiptera	*Taphropeltus contractus*	Common
Hirudinidae	*Theromyzon tessulatum*	Common
Hymenoptera	*Lasioglossum calceatum*	Common
Hymenoptera	*Lasioglossum malachurum*	Common
Hymenoptera	*Myrmica rubra*	Common
Hymenoptera	*Myrmica ruginodis*	Common
Hymenoptera	*Myrmica scabrinodis*	Common
Hymenoptera	*Pachyprotasis rapae*	Common
Hymenoptera	*Priocnemis sp*	Common
Hymenoptera	*Selandria serva*	Common
Hymenoptera	*Temnothorax nylanderi*	Local
Hymenoptera	*Vespula vulgaris*	Common
Isopoda	*Asellus aquaticus*	Common
Isopoda	*Asellus meridianus*	Common
Isopoda	*Oniscus asellus*	Common
Julida	*Brachyiulus pusillus*	Common
Julida	*Ophyiulus pilosus*	Common
Lepidoptera	*Abrostola tripartita*	Common
Lepidoptera	*Trachycera advenella*	Common
Lepidoptera	*Agapeta hamana*	Common
Lepidoptera	*Aglais urticae*	Common
Lepidoptera	*Agriphila inquinatella*	Common
Lepidoptera	*Agriphila selasella*	Local
Lepidoptera	*Agriphila tristella*	Common
Lepidoptera	*Agrotis clavis*	Common
Lepidoptera	*Agrotis exclamationis*	Common
Lepidoptera	*Agrotis segetum*	Common
Lepidoptera	*Aliemma loeflingiana*	Common
Lepidoptera	*Amphipyra tragopoginis*	Common (SPI (s. 41 NERC Act 2006))
Lepidoptera	*Apamea anceps*	Local (SPI (s. 41 NERC Act 2006))
Lepidoptera	*Apamea lithoxylaea*	Common
Lepidoptera	*Apamea monoglypha*	Common

Order	Scientific Name	Conservation Status
Lepidoptera	*Apamea remissa*	Common (SPI (s. 41 NERC Act 2006))
Lepidoptera	*Apamea sordens*	Common
Lepidoptera	*Aphantopus hyperantus*	Common
Lepidoptera	*Apotomis betuletana*	Common
Lepidoptera	*Archips podana*	Common
Lepidoptera	*Aricia agestis*	Common
Lepidoptera	*Axylia putris*	Common
Lepidoptera	*Cabera exanthemata*	Common
Lepidoptera	*Campaea margaritata*	Common
Lepidoptera	*Caradrina morpheus*	Common (SPI (s. 41 NERC Act 2006))
Lepidoptera	*Celypha lacunana*	Common
Lepidoptera	*Cerura vinula*	Common
Lepidoptera	*Chrysoteuchia culmella*	Common
Lepidoptera	*Cidaria fulvata*	Common
Lepidoptera	*Cnephasia asseclana*	Common
Lepidoptera	*Cochylis atricapitana*	Common
Lepidoptera	*Cochylis hybridella*	Common
Lepidoptera	*Coenonympha pamphilus*	Common (SPI (s. 41 NERC Act 2006))
Lepidoptera	*Crambus pasquella*	Common
Lepidoptera	*Crambus perlella*	Common
Lepidoptera	*Cydia splendana*	Common
Lepidoptera	*Diachrysia chrystis*	Common
Lepidoptera	*Diachrysia chrysitis f. Juncta*	Common
Lepidoptera	*Discestra trifolii*	Common
Lepidoptera	*Drepana falcataria*	Common
Lepidoptera	*Eilema lurideola*	Common
Lepidoptera	*Epinotia ramella F. Costana*	Common
Lepidoptera	*Eudonia lacustrata*	Common
Lepidoptera	*Eupithecia assimilata*	Common
Lepidoptera	*Eupithecia centaureata*	Common
Lepidoptera	*Geometra papillonaria*	Common
Lepidoptera	*Hedya nubiferana*	Common
Lepidoptera	*Hedya pruniana*	Common
Lepidoptera	*Hoplodrina blanda*	Common (SPI (s. 41 NERC Act 2006))
Lepidoptera	*Hydrella flammeolaria*	Common
Lepidoptera	*Hypena proboscidalis*	Common
Lepidoptera	*Idaea aversata*	Common
Lepidoptera	*Idaea fuscovenosa*	Local
Lepidoptera	*Inachis io*	Common
Lepidoptera	*Lacanobia oleracea*	Common
Lepidoptera	*Laothoe populi*	Common
Lepidoptera	*Laspeyria flexula*	Local

Order	Scientific Name	Conservation Status
Lepidoptera	*Lomographa temerata*	Common
Lepidoptera	*Luperina testacea*	Common
Lepidoptera	*Lycaena phlaeas*	Common
Lepidoptera	*Malacosoma neustria*	Common (SPI (s. 41 NERC Act 2006))
Lepidoptera	*Maniola jurtina*	Common
Lepidoptera	*Mesapamea secalis*	Common
Lepidoptera	*Mythimna impura*	Common
Lepidoptera	*Mythimna pallens*	Common
Lepidoptera	*Noctua comes*	Common
Lepidoptera	*Noctua fimbriata*	Common
Lepidoptera	*Noctua janthe*	Common
Lepidoptera	*Noctua pronuba*	Common
Lepidoptera	*Nola cucullatella*	Common
Lepidoptera	*Notodonta ziczac*	Common
Lepidoptera	*Ochropleura plecta*	Common
Lepidoptera	*Opisthograptis luteolata*	Common
Lepidoptera	*Pandemis cerasana*	Common
Lepidoptera	*Pararge aegeria*	Common
Lepidoptera	*Peribatodes rhomboidaria*	Common
Lepidoptera	*Phalera bucephala*	Common
Lepidoptera	*Pheosia gnoma*	Common
Lepidoptera	*Phoesia tremula*	Common
Lepidoptera	*Pieris brassicae*	Common
Lepidoptera	*Pieris napi*	Common
Lepidoptera	*Pieris rapae*	Common
Lepidoptera	*Polygonia c-album*	Common
Lepidoptera	*Polyommatus icarus*	Common
Lepidoptera	*Pterostoma palpina*	Common
Lepidoptera	*Ptilodon cucullina*	Common
Lepidoptera	*Pyronia tithonus*	Common
Lepidoptera	*Rusina ferruginea*	Common
Lepidoptera	*Schoenobius gigantella*	Nationally Scarce (Nb)
Lepidoptera	*Scotopteryx chenopodiata*	Common
Lepidoptera	*Sphinx ligustri*	Common
Lepidoptera	*Swammerdamia caesiella*	Common
Lepidoptera	*Thalpophila matura*	Common
Lepidoptera	*Thymelicus lineola*	Common
Lepidoptera	*Thymelicus sylvestris*	Common
Lepidoptera	*Timandra comae*	Common (SPI (s. 41 NERC Act 2006))
Lepidoptera	*Tortrix viridana*	Common
Lepidoptera	*Tyria jacobaeae*	Common (SPI (s. 41 NERC Act 2006))
Lepidoptera	*Vanessa atalanta*	Common
Lepidoptera	*Vanessa cardui*	Common

Order	Scientific Name	Conservation Status
Lepidoptera	*Xestia c-nigrum*	Common
Lepidoptera	*Xestia triangulum*	Common
Lepidoptera	*Xestia xanthographa*	Common
Lepidoptera	*Zygaena filipendulae*	Common
Lithobiomorpha	*Lithobius forficatus*	Common
Orthoptera	*Conocephalus discolor*	Local (formerly Nationally Scarce (Na))
Orthoptera	*Metrioptera roeselii*	Local (formerly Nationally Scarce (Nb))
Orthoptera	*Tetrix subulata*	Local
Polydesmida	*Brachydesmus superus*	Common
Polydesmida	*Polydesmus coriaceus*	Common
Pulmonata	*Trochulus hispidus*	Common

Appendix 5 Survey Proforma

F2: BUTTERFLY TRANSECT WEEKLY FIELD RECORDING FORM

UKBMS · CEH · Butterfly Conservation

SITE NAME	Millbrook	RECORDER	Jim FAIRCLOUGH
YEAR	2014	DATE	30 July
WEEK NO.	Wk 1 = 1st-7th April; Wk 2 = 8th-14th April etc:		/
START	13.45	FINISH	16.30
AVERAGE TEMP. (°C)	25	AVERAGE WIND SPEED (0-6)	0 smoke rises vertically; 1 slight smoke drift; 2 wind felt on face; 3 leaves in slight motion; 4 dust raised & small branches move; 5 small trees in leaf sway; 6 large branches move & trees sway: 2
WIND DIRECTION	W		

SECTION		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL
Small skipper	120	1															
Essex skipper	119	11	11				11		1								
Small / Essex skipper	124																
Large skipper	58																
Dingy skipper	46																
Grizzled skipper	110																
Clouded yellow	34																
~~Brimstone~~	94																
Large white	98																
Small white	100																
Green-veined white	99		1			1											
Orange tip	2																
Green hairstreak	22																
Purple hairstreak	116																
Small copper	68																
Small blue	96																
Brown argus	20		1														
Common blue	105	1111	11						1								
Chalkhill blue	71																
Holly blue	27																
White admiral	64																
Red admiral	122																
Painted lady	123																
Small tortoiseshell	2	1															
Peacock	84	111	111				11		11								
Comma	106	1							1								
Dark green fritillary	12																
Silver-washed fritillary	17																
Speckled wood	93																
Wall	94																
Marbled white	76																
~~Grayling~~ Gatekeeper	48																
Gatekeeper	76	1111	1111		1111	1111	11	1	1111								
Meadow brown	75	1111	1111 111	1	1	1		11	1111								
Ringlet	8		1				11										
Small heath	39																
6-spot burnet		1	1		1												
shaded broad bar							1										
TOTAL																	
SECTION		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	AVERAGE SUNSHINE
% SUNSHINE		100	100	90	90	80	80	80	80								90

NOTES:

PLEASE SEND COPIES OF YOUR RECORDING FORMS TO YOUR LOCAL CO-ORDINATOR (DETAILS AVAILABLE ON THE BC & UKBMS WEBSITES) BY THE END OF OCTOBER. DATA IN TRANSECT WALKER FORMAT SHOULD BE SENT IN BY THE END OF NOVEMBER.

www.butterfly-conservation.org **www.ukbms.org**

8.3 – Reptile and Great Crested Newt Report

BSG | ecology

Millbrook Power Project

Herpetofauna Report

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BSG | ecology

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Client	Millbrook Power Limited
Job	Millbrook Power Plant
Report title	Herpetofauna Report
Draft version/final	FINAL
File reference	7393.03_MPL- Appendix 8 3_ Herp Report MC ER JW JF 021214

	Name	**Position**	**Date**
Originated	John Woods	Ecologist	04 August 2014
Reviewed	Jim Fairclough	Principal Ecologist	05 August 2014
2nd Draft Reviewed	Jim Fairclough	Principal Ecologist	13 August 2014
Updated	John Woods	Ecologist	11 November 2014
Approved for issue to client	Jim Fairclough	Principal Ecologist	02 December 2014
Issued to client	Jim Fairclough	Principal Ecologist	02 December 2014

Contents

1 Summary

1.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

1.2 MPL commissioned BSG Ecology to undertake great crested newt *Triturus cristatus* (GCN) surveys, of ponds within the red-line boundary of the Project Site (as reported in the Project Scoping Report), and to a distance of up to 250 m from this (the 'Survey Site'). The Survey Site for the reptile surveys comprised suitable habitat within the Project Site. The purpose of the surveys was to inform and support an application for Development Consent for the Power Generation Plant. A supporting desk study and literature review was also conducted, which covered the Project Site and land up to 2 km from this.

Great Crested Newts

1.3 The desk study revealed the presence of a large population of GCN associated with Rookery North Pit. This population is formed from GCN that are being translocated from Rookery South Pit, which is currently the subject of an ongoing Low Level Restoration Scheme (LLRS) by the landowner, under licence to Natural England. It is understood that the translocation of GCN from Rookery South Pit will be completed in 2014.

1.4 Thirteen ponds were surveyed in total as part of the field survey. These excluded the ponds in Rookery North Pit, for which current data exists confirming a large population in this area. The survey revealed the presence of GCN in eight of 13 ponds surveyed. These are represented by four separate populations, all with medium or small populations, which are broadly located in the east, south and west of the Survey Site.

Reptiles

1.5 The desk study revealed the presence of a low population of grass snakes *Natrix natrix* and a medium population of common lizards *Zootoca vivipara* associated with The Rookery Clay Pit CWS. Reptiles are being translocated from Rookery South Pit, which is currently the subject of an ongoing LLRS. Again, it is understood that the translocation of reptiles from Rookery South Pit will be completed in 2014.

1.6 Surveys identified the presence of common lizard *Zootoca vivipara* and grass snake *Natrix natrix* within the Project Site, specifically along the Bletchley to Bedford railway corridor and land to the west of this. Peak adult counts of common lizard and grass snake were eight and three respectively.

2 Introduction

2.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

Site Description

2.2 The Project Site, as identified in the Project Scoping Report comprises the Power Generation Plant Area within Rookery South Pit, and the Gas and Electrical Connection Areas which extend from The Rookery into the surrounding agricultural land to the south and east. The approximate centre of the Project Site lies at grid reference 501373, 240734, which is situated between Bedford and Milton Keynes.

2.3 The Survey Site includes all ponds (water bodies) within the red-line of the Project Site, as reported in the Project Scoping Report and to a distance of 250 m from this, as shown on Figure 1, Appendix 1. The Survey Site for the reptile surveys includes representative areas of habitat with suitability for reptiles within the Project Site, as shown on Figure 3. The main habitats within the Survey Site are arable fields, delineated by hedgerows, ditches and minor roads and lanes. To the north, an area of land exists that is in the process of being restored as part of a Low Level Restoration Scheme (LLRS) by the landowner. At the time of survey, in spring and summer of 2014, this area included sparsely vegetated ground, swamp and bare earth. Towards the end of 2014, it is expected to comprise just bare earth following bulk movement of soils that are required for the LLRS.

Description of Project

2.4 The Power Generation Plant would operate as a Simple Cycle Gas Turbine (SCGT) peaking plant and would be designed to provide an electrical capacity of up to 299 Megawatts (MW). It would be fuelled by natural gas, supplied by a new underground gas pipeline connecting the Power Generation Plant to the existing National Grid Gas (NGG) National Transmission System (NTS). It will connect to the National Grid Electrical Transmission System (NETS) via underground cable or overhead lines.

2.5 BSG Ecology was appointed as the ecological consultant to undertake a preliminary ecology survey, which included a desk study and Extended Phase 1 Habitat Survey. This identified the need to undertake a suite of Phase 2 surveys in order to fully assess the nature conservation value of the Project Site, including GCN and reptile surveys. These baseline surveys will be included in an appendix to an ecology chapter of an Environmental Statement, which will be submitted, as an integral part of the application for Development Consent.

Aims of Study

2.6 The aims of surveys were to identify whether:

- Great crested newts (GCNs) were present in the ponds within the Survey Site, and if present, to estimate the population size; and
- Reptiles were present in suitable habitats within the Survey Site, and if present, to identify the species assemblage.

3 Methods

Desk Study

3.1 Existing ecological information regarding protected species was requested from the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BRMC) covering the Survey Site and land up to 2 km away. In addition, on-line resources including the Multi Agency Geographic Information for the Countryside (MAGIC, www.magic.gov.uk) website and aerial photography of the area were also reviewed.

3.2 This information was supplemented by previous survey and mitigation work undertaken by BSG Ecology on The Rookery Clay Pit CWS, including land within and immediately north of the Survey Site (PBA, 2009; BSG Ecology, 2013).

Great Crested Newt

The Survey Site

3.3 The Survey Site includes all ponds within the red-line boundary of the Project Site, as reported in the Project Scoping Report, and to a distance of 250 m from this, which is shown on Figure 1. Guidance from Natural England (derived from the most recent Method Statement spreadsheet; Natural England, 2013) states that a 500 m search radius can be required in certain circumstances, which is normally when **all** the following conditions are met:

a. *maps, aerial photos, walk-over surveys or other data indicate that the pond(s) has potential to support a large great crested newt population*,

b. *the footprint contains particularly favourable habitat, especially if it constitutes the majority available locally,*

c. *the development would have a substantial negative effect on that habitat, and*

d. *there is an absence of dispersal barriers.'*

3.4 In considering these conditions, it can be concluded that a 250 m search radius from the Project Site is appropriate, since not all the conditions are met, as described below.

a. *maps, aerial photos, walk-over surveys or other data indicate that the pond(s) has potential to support a large great crested newt population*. This condition is met as a large population is present at Rookery North Pit (Section 4.0 provides further details).

b. *the footprint* [Project Site] *contains particularly favourable habitat, especially if it constitutes the majority available locally*. The Project Site largely comprises intensively managed arable fields of low suitability to GCN. To the north (within Rookery South Pit) the Project Site includes land that is presently being restored as part of a LLRS. On completion of the restoration this land will be of low suitability for GCN. Outside the Project Site, particularly to the west, there are significant areas of semi-natural habitat that constitute excellent habitat for GCN. This includes habitat at the Vehicle Proving Ground, along the railway embankments / cuttings, and the Marston Vale Millennium Country Park. Accordingly, this condition is not met, and therefore no further consideration to the remaining two conditions is relevant.

3.5 In consideration of the Survey Site and the selection of ponds to a 250 m radius from the Project Site, it is also relevant to note that there are many suitable ponds in the surrounding landscape (up to 250 m from the Project Site) yet very few beyond this, therefore suggesting a lack of connectivity between such ponds (clustering) and limited opportunities for associated dispersal of GCN into the wider landscape.

3.6 In connection with the above point, where pond clustering occurs whereby a pond inside the 250 m radius from the Project Site is less than 250 m from a pond outwith the Project Site, the Survey Site has been extended to include this outer pond. This approach accords with the guidelines, and enables a full representation of the population size to be made, on the basis that GCN are assumed to readily move between ponds at this distance apart (English Nature, 2001).

Field Survey

Habitat Suitability Assessment

3.7 During the field survey a HSI assessment of all ponds within the Survey Site was undertaken. Information on the physical features and characteristics of each pond were collected in order to allow a GCN HSI score to be derived for each pond by applying the scoring system developed by Oldham *et al.* in 2000 and updated by the Herpetological Conservation Trust in 2008 (HCT, 2008). The Habitat Suitability Index is calculated by allocating scores to features associated with each pond; these include size, quality of surrounding habitat and presence of fish. These scores are then used to calculate the overall HSI for each pond as a number between 0 and 1, with 0 being the least suitable and 1 being the most suitable. The HSI score allows each pond to be placed in one of five pre-defined categories defining its suitability for GCN as follows:

- <0.5 = poor
- 0.5 – 0.59 = below average
- 0.6 – 0.69 = average
- 0.7 – 0.79 = good
- >0.8 = excellent

Amphibian Survey

3.8 Surveys were undertaken in accordance with survey techniques described in the Great Crested Newt Mitigation Guidelines (English Nature, 2001). Observations of GCN and other amphibian species of principal importance (S. 41; NERC Act 2006) were recorded. Three survey methods were employed on each of the 13 ponds during each survey, in accordance with standard methodology. These were a combination of bottle trapping, netting, torch light searches and/or egg searches, which are further described below.

3.9 *Torch surveys*: This method involved searching for GCN after sunset using 1 million candle power torches. All accessible parts of a pond were slowly walked and searched.

3.10 *Bottle trapping*: Where water depth and bank side access allowed, bottle traps (constructed from 2 litre plastic drinks bottles) were set in suitable parts of a pond at dusk and left in place overnight. Bottle traps were checked for amphibians the following morning within 12 hours of setting and any animals caught were released at the point of capture.

3.11 *Netting*: A long-handled dip-net was used for sampling suitable parts of a pond for amphibians. Where access permitted, all suitable parts of the pond were searched for GCN. Results from netting are only useful for indicating presence/likely absence, and not population size.

3.12 *Egg search*: Egg searches were conducted in order to determine whether GCN were breeding in the ponds. This involved searching marginal and aquatic vegetation for the distinctive leaf folding pattern and egg of GCN. Results from egg searches are only useful for indicating presence/likely absence, and not population size. The presence of GCN eggs is also a measure of attempted breeding at a pond.

Great Crested Newt Population Assessment Survey

3.13 In order to estimate the population size class for ponds containing GCN, the peak adult count per pond per visit recorded through either torching or bottle-trapping must be determined. Where ponds supporting GCN occur within 250 m of each other, and are not separated by a significant barrier to dispersal, the population size class is indicated by the peak adult count summed across all connected ponds on a single survey visit through either torching or bottle-trapping. Populations can then be classed as:

- ‘small’ for maximum counts of up to 10 adults;
- ‘medium’ for maximum counts between 11 and 100; or
- ‘large’ for maximum counts exceeding 100 adults.

Amphibian Survey Details

3.14 The surveys were conducted over a period of approximately eight weeks with four visits undertaken in the period mid-April to mid-May. They were conducted by Dr Jim Fairclough (JF) MCIEEM (GCN Licence Number: CLS001611), Peter Newbold (PN) MCIEEM (GCN Licence Number: CLS001717), Greg Chamberlain (GHC) MCIEEM, Dr Angie Julian (AJ) (GCN Licence Number: CLS02421), John Woods (JW) GradCIEEM, Elly Pattullo (EP), Ross Crates (RC), Francesca Morini (FM), Tom Chapman (TM) and Klare Chamberlain (KC). Table 1, below, summarises the dates on which the surveys were undertaken and weather conditions, which were favourable during all surveys.

Table 1: Timetable and conditions of GCN surveys

Visit no.	Date	Surveyors	Temp (ºC)	Rain
1	22/04/2014	JF, PN, RC, TC, FM	10	None
2	30/04/2014	JF, GHC, AJ, JW	15	None
3	08/05/2014	GHC, KC, TC, RC	12-13	None
4	19/05/2014	GHC, KC, JF, EP	16	None
5	30/06/2014	GHC, KC	14	None
6	18/06/2014	GHC, PN, RC	13	None

Limitations of Study

3.15 No survey of Pond J was undertaken during visit 1 due to access restrictions. Given that three (of five) surveys of Pond J were undertaken during the period mid-April to mid-May, the period within which GCN counts are expected to peak, and in accordance with the Great Crested Newt Mitigation Guidelines (English Nature, 2001), the population size-class assessment based on the survey results of Pond J is considered to be robust. Furthermore, the peak GCN count in Pond J was 28 adults (visit 4). An additional survey would have been highly unlikely to identify a large population size-class (GCN count exceeding 100).

Reptiles

Field Survey

3.16 The reptile survey was undertaken in accordance with good practice guidance, including that set out in the Herpetofauna Worker's Manual (Gent *et al*., 2003) and Reptile Survey Guidance (Froglife, 1999).

3.17 The presence/likely absence of reptiles at the Survey Site was established through the use of artificial refugia in combination with a visual search of the Survey Site, as described below.

Artificial Refugia

3.18 Artificial refugia (roofing felt or corrugated metal sheets measuring c. 0.5 m x 0.5 m or c. 0.5 m x 1.0 m) were placed in locations assessed during the Phase 1 Habitat survey as being suitable for use by basking reptiles. Refugia were placed in a variety of aspects to enable survey findings to be indicative of use of the Survey Site by reptiles at different times of day, but where possible, favouring southerly aspects that would remain warm all day.

3.19 Suitable habitat for reptiles within the Survey Site is limited to a network of hedgerows and ditches, rough grassland, tall ruderal vegetation, patchy scrub and woodland edges. This was calculated to be approximately 20 ha in total. Accordingly, a total of 200 refugia were deployed: 180 on 17th April 2014, 13 days ahead of the first survey visit; and an additional 20 on 30th May, incorporated into the survey from visit 4 onwards to reflect revisions to the Survey Site boundary. The average refugia density in areas of suitable reptile habitat was approximately 10 per hectare. This accords with the best practice recommended refugia density of 5-10 refugia per hectare (Froglife, 1999), enabling a robust assessment of the presence/likely absence of reptiles and an approximate estimate of the population size to be made.

3.20 During each survey visit, the refugia were inspected for any reptiles basking on the upper surface, then lifted and checked for sheltering animals beneath before being carefully replaced. Potential reptile refuges already present on the Survey Site, such as discarded wood and large debris, were also inspected for the presence of reptiles.

Visual Search

3.21 A visual search for reptiles within suitable habitats across the Survey Site was also undertaken during each survey visit. This helped to ensure that all areas were fully considered in the survey and helped eliminate a bias towards those reptile species more likely to use refugia. Visual searches involved walking slowly around the Survey Site in order to systematically search potential basking areas for reptiles in the areas between artificial refugia locations (Froglife, 1999).

Reptile Survey Details

3.22 The following information was recorded during each reptile survey visit: species present; number of individuals present; approximate life stage (e.g. adult); location (refugia number or marked on map if visual encounter); date, survey start and finish times; and weather conditions.

3.23 Surveys were carried out during suitable weather conditions. Dates of the survey visits along with survey timings and weather conditions are provided in Table 2. Visits were undertaken on seven occasions in total, by Dr Jim Fairclough (JF) MCIEEM, Greg Chamberlain (GHC) MCIEEM, and John Woods (JW) Grad CIEEM (Table 1). (Note that the seventh and final survey visit is yet to be undertaken).

Table 2: 2014 Survey Details

Visit No.	Date	Surveyor	Start / End	Time	Weather				
					Wind	Rain	Sun	Cloud (okta's)	Temp (°C)
1	30/04/14	JF and JW	Start	14.40	Light	None	Strong	2	20
			End	16.52	Light	None	Strong	2	18
2	14/05/14	JW	Start	11:30	Light	None	Strong	2	17
			End	14:30	Light	None	Strong	3	20
3	19/05/14	GHC and JW	Start	08:45	Light	None	Strong	0	19
			End	10.30	Light	None	Strong	0	25
4	03/06/14	GHC	Start	13.55	Still	None	Occasional	5	17
			End	17.25	Still	None	Occasional	6	17
5	19/06/14	GHC	Start	12.55	Light	None	Milky	8	16
			End	16.00	Light	None	Milky	8	16
6	23/07/14	GHC and JW	Start	6.40	Light	None	Milky	8	15.5
			End	10.30	Light	None	Milky	7	20
7	03/09/14	GHC and JF	Start	14.00	Still	None	Occasional	5	21
			End	16.30	Still	None	Occasional	5	21

Limitations to Methods

3.24 There were no limitations to the reptile survey.

4 Results and Interpretation

Great Crested Newts

Desk Study

4.1 Surveys for GCN were undertaken in and around the Rookery Clay Pit CWS in 2008 (PBA, 2009). The presence of a large population of GCN was subsequently confirmed during these surveys. Trapping and translocation of newts has since taken place under a mitigation licence issued by Natural England in 2011. This has affected the southern half of the Rookery Clay Pit CWS incorporating the southern portion of the proposed access track and a proportion of the arable land in the north of the Survey Site, and had yielded over 6,000 GCNs (up to the end of July 2014), which were subsequently moved to receptor areas in the north of the Rookery Clay Pit CWS (400 m east of the proposed access track) and a receptor area named Stewartby Way 2 (SW2) to the east of the Bletchley to Bedford railway corridor. At the present time, the translocation programme is continuing in the south of the Rookery Clay Pit CWS (Rookery Pit South) and is expected to be completed by November 2014.

Habitat Suitability Assessment

4.2 During the field survey, 13 ponds were identified within the Survey Site. The locations and HSI scores attributed to these ponds are shown on Figure 1 (Appendix 1). A full description of each of the ponds, along with HSI scores, is included in Appendix 2.

Amphibian Surveys

4.3 Eight ponds were found to contain GCN (Figure 2, Appendix 1). Evidence of egg-laying, which indicates breeding activity, was found in each of these ponds. In addition, eight ponds were found to support common toad *Bufo bufo*, a species of principal importance (s. 41; NERC Act 2006). A summary of the survey results can be found in Table 3 below, along with a note on the presence of common toad. Full survey results are detailed in Appendix 3 and selected photographs (referenced in Table 3) in Appendix 4.

4.4 Table 3: Summary of Great Crested Newt Survey Results

Pond	**Maximum Adult Peak Count Per Survey Visit***						**GCN Eggs**	**Common Toad present**
	1	**2**	**3**	**4**	**5**	**6**		
A (Photo 1)	4	5	0	0	0	1	Yes	No
C	0	0	0	4	1	1	Yes	Yes
H	0	0	1	0	0	1	Yes	No
I	0	0	0	0	0	0	No	No
J (Photo 2)	-	15	12	28	2	1	Yes	Yes
K	3	1	7	2	0	0	Yes	No
L	0	0	0	0	0	0	No	No
O	0	0	0	0	0	0	No	Yes
P	0	0	0	0	0	0	No	Yes
Q (Photo 3)	0	4	2	0	1	0	Yes	Yes
R	0	0	1	0	0	0	Yes	Yes
S (Photo 4)	0	5	0	1	0	0	Yes	Yes
T (Photo 5)	0	0	0	0	0	0	No	Yes

*For either torching or bottle trapping

Great Crested Newt Population Size Class Assessment

4.5 Four population clusters were identified, whereby a 'population' is defined as a collection of ponds where there is reasonable certainty of regular interchange of individuals between ponds (typically, within 250 m of each other and with an absence of barriers to dispersal) (English Nature, 2001). These included three small size-class and one medium size-class GCN populations, as shown on Figure 2. Results of the assessment are summarised in Table 4, below.

4.6 Table 4. Population size class assessment results.

Population ID	Ponds included	Peak Adult GCN count	Population size class
Population A	Pond C	4	Small
Population B	Pond A	5	Small
Population C	Ponds R, Q and S	9	Small
Population D	Ponds H, J and K	30	Medium

Reptiles

Desk Study

4.7 The desk study revealed the presence of a low population of grass snakes *Natrix natrix* and a medium population of common lizards *Zootoca vivipara* associated with The Rookery Clay Pit CWS. Reptiles are being translocated from Rookery South Pit, which is currently the subject of an ongoing LLRS.

Reptile Surveys

4.8 Two common species of reptile were recorded at the Survey Site, namely common lizard and grass snake. No other reptile species have been recorded. The results of the surveys are summarised in Table 5 below and the locations at which common lizards and grass snakes were recorded are shown in Figure 3, Appendix 1. Full survey results are included in Appendix 5.

4.9 Table 5: Reptiles recorded at the Survey Site during each visit.

Date of Survey	Visit No.	Common lizards		Grass snakes	
		Adult	Juvenile	Adult	Juvenile
30/04/14	1	8	1	1	1
14/05/14	2	5	0	0	0
19/05/14	3	3	0	2	0
03/06/14	4	4	0	3	0
19/06/14	5	0	0	1	1
23/07/14	6	2	1	2	1
03/09/14	7	0	5	1	1

4.10 A total of 22 adult and seven juvenile common lizard observations were made throughout the survey visits, with a peak count of eight adults on visit one. Of these, 11 adult and two juvenile common lizard observations were made in Zone 11, a rough grassland field margin bordered to the north by a wooded copse and adjacent to the Bletchley to Bedford railway corridor that divides the Survey Site (Figure 3, Appendix 1). Common lizards were also observed in Zones 16 and 17 (immediately south of the Project Site, adjacent to the railway corridor), Zone 2 (adjacent to the railway corridor), Zone 7 (along the southern edge of a wooded plantation), Zones 3 and 4 (along to a wide, heavily vegetated ditch with structurally diverse bankside vegetation) and Zone 5 (along the eastern edge of a semi-natural broadleaved woodland plantation).

4.11 Ten adult and four juvenile grass snakes were observed during the survey visits, with a peak count of three adults on visit 4. Of these, five adult and three juvenile grass snake observations were made in Zone 5. Grass snake observations were also made at Zones 3, 7, 12, 16 and 17 (juvenile).

4.12 With the exception of Zone 17, which was immediately east of the railway corridor, no common lizards or grass snakes were observed to the east of the railway corridor that divides the Survey Site. Potential reptile habitat on land to the east of the railway corridor was less suitable and limited to field boundaries typically consisting of species poor hedgerows, wet ditches and uniform grassland field margins (see for example photograph 6 (Appendix 4)).

5 References

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Oldham R.S., Keeble J., Swan M.J.S. and Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal* **10** (4), 143-155.

Peter Brett Associates (PBA) LLP (2009) *The Rookery Low Level Restoration Scheme – Environmental Statement Volume 1.*

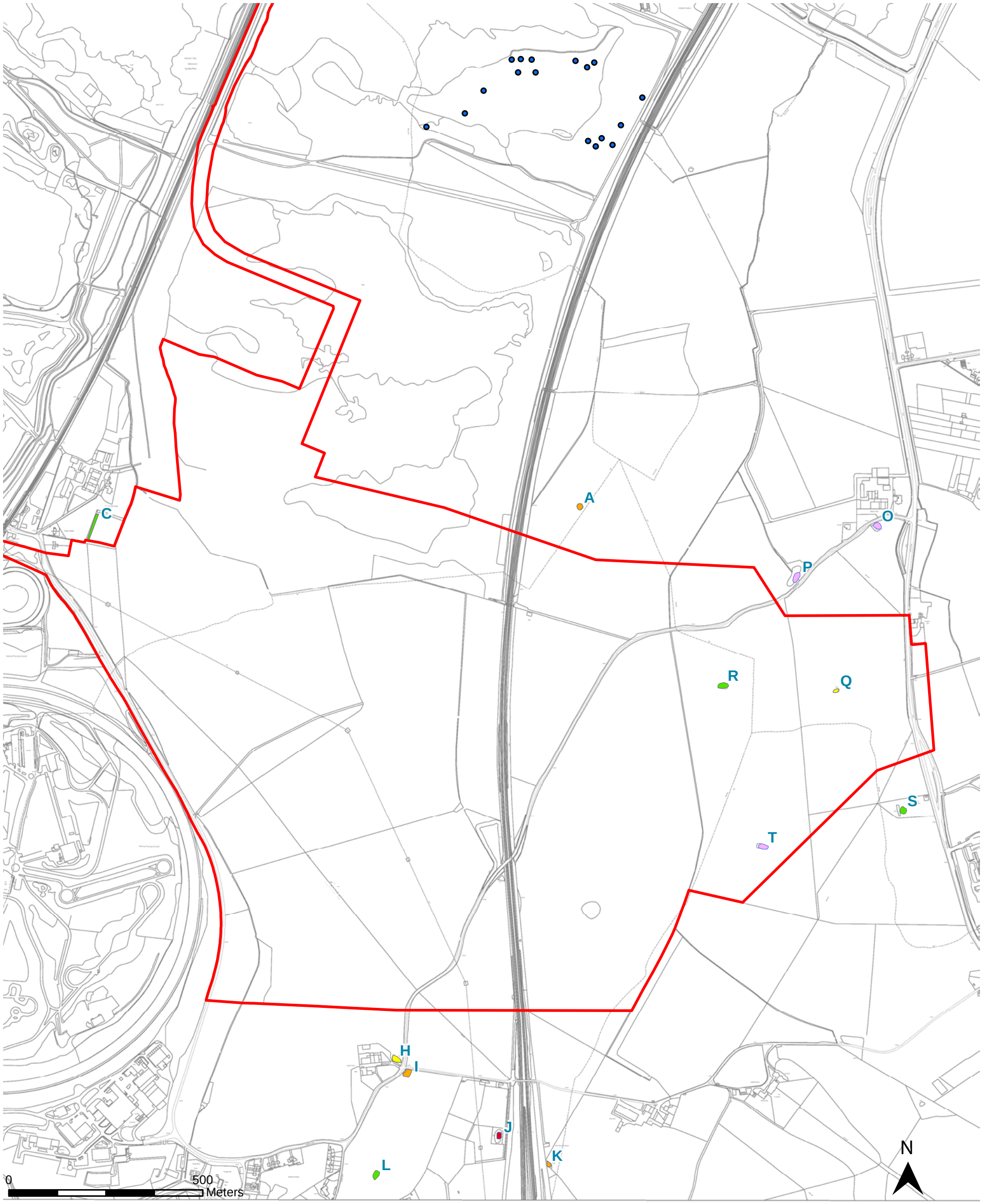
Appendix 1: Figures

(overleaf)

Figure 1: Great crested newt pond HSI assessment

Figure 2: Great crested newt population size-class assessment

Figure 3: Reptile survey results



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PROJECT TITLE
MILLBROOK POWER PROJECT

DRAWING TITLE
Figure 1: Great Crested Newt Pond HSI Assessment

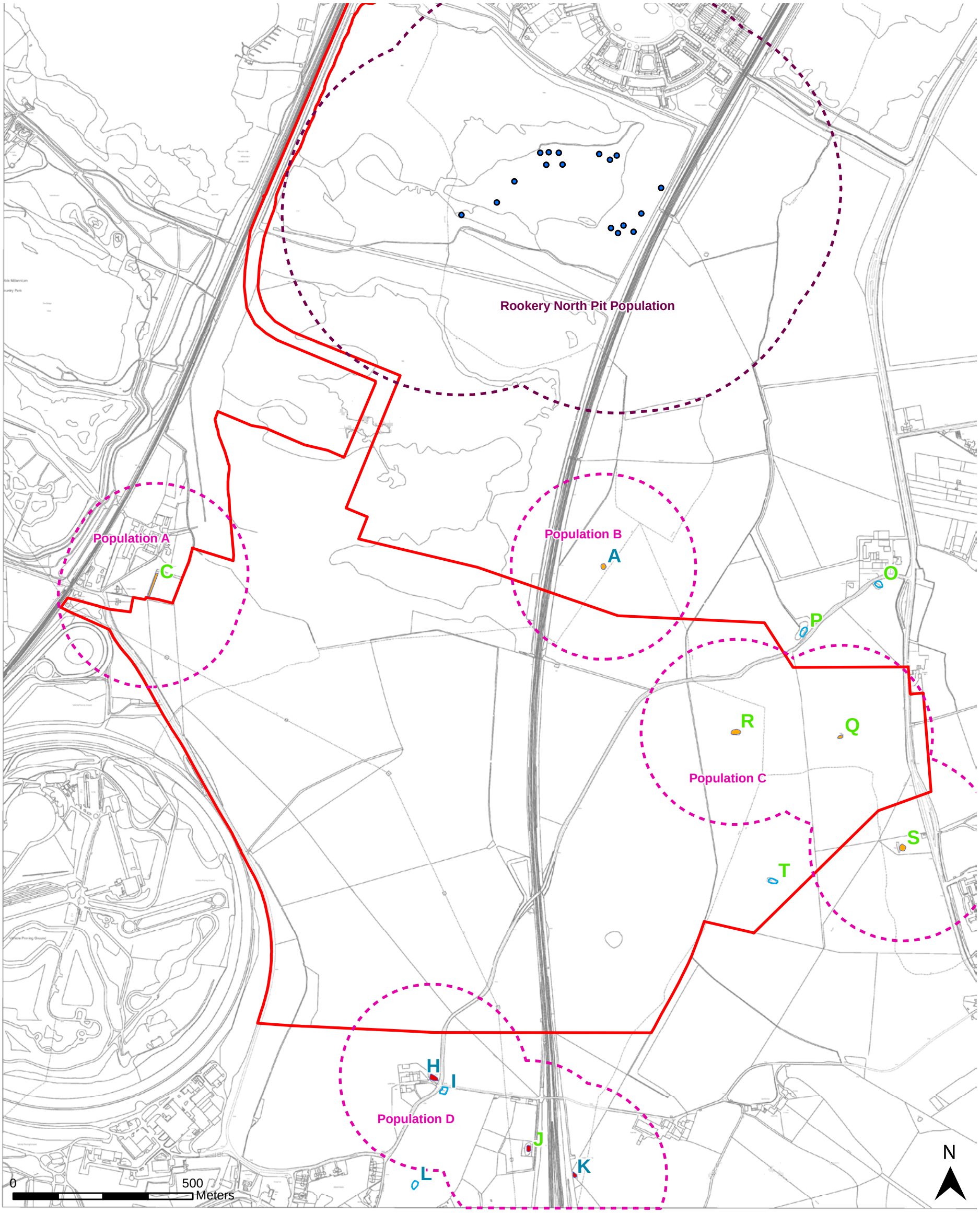
DATE: 29.07.2014 CHECKED: JW SCALE: 1:10,000
DRAWN: COH APPROVED: JF STATUS: FINAL

LEGEND

- Project Site at the time of Scoping Report submission
- Great crested newt pond (Rookery North Pit)

Ponds surveyed and their suitability to support great crested newts

- Excellent
- Good
- Average
- Below average
- Poor
- A — Pond ID



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PROJECT TITLE
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DRAWING TITLE
Figure 2: Great Crested Newt Population Size-class Assessment

DATE: 29.07.2014 CHECKED: JW SCALE: 1:11,000
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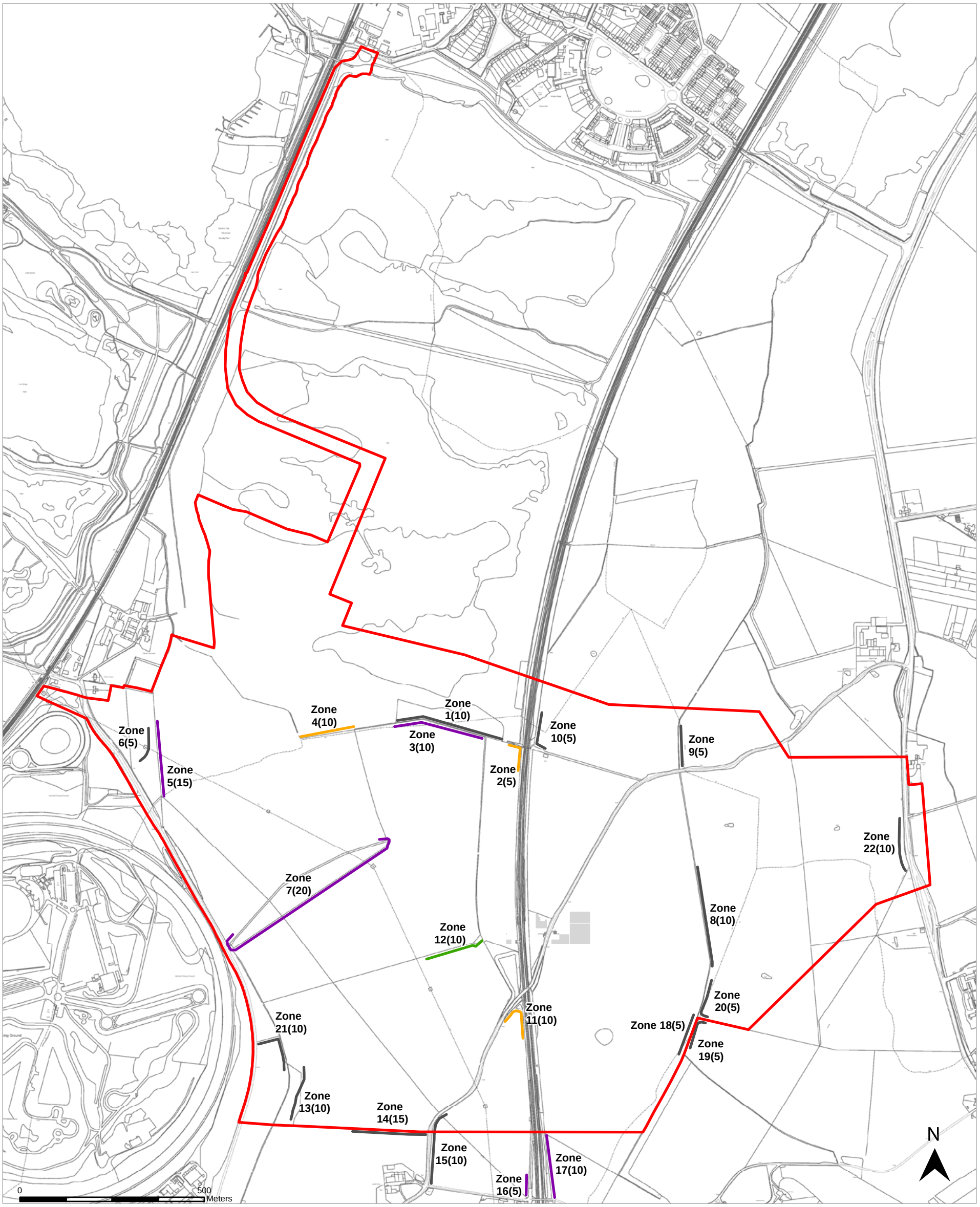
LEGEND

- Project Site at the time of Scoping Report submission
- Great crested newt pond (Rookery North Pit)
- 500m buffer from Rookery North Pit GCN ponds

Amphibian Survey

- GCN absent
- Medium population
- Small population
- A — Pond ID - common toad not recorded
- A — Pond ID - common toad present
- 250m buffer from great crested newt population



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PROJECT TITLE

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DRAWING TITLE

Figure 3: Reptile Survey Results

DATE: 02.12.2014 CHECKED: JW SCALE: 1:10,500

DRAWN: COH APPROVED: JF STATUS: FINAL

LEGEND

- Project Site at the time of Scoping Report submission
- No reptiles found
- Grass snake recorded
- Common lizard recorded
- Grass snake and common lizard recorded
- Zone 1 (10) — Zone ID (number of refugia)

Appendix 2: Great Crested Newt Habitat Suitability Index (HSI) Assessment Scores

ID	SI Scores (Oldham *et al*, 2000)											Suitability Class	Grid Ref
	Location	**Area**	**Permanence**	**Water Quality**	**Shading**	**Water fowl**	**Fish**	**Density**	**Terrestrial Habitat**	**Macrophyte Cover**	**HSI Score**		
A	1	0.6	0.5	0.67	1	1	1	0.84	0.33	0.6	0.71	Good	TL021405
	This pond covers an area of approximately 310 m^2 and ranged between 50cm and 1m in depth. Vegetation in this pond consisted of bulrush *Typha latifolia* with occasional common reed *Phragmites australis*. This pond is located to the north-east of the Survey Site within an arable field offering limited sheltering opportunities for newts in its immediate surrounding area.												
C	1	0.4	0.5	0.67	0.3	0.67	0.67	1	0.67	0.3	0.57	Below average	TL009405
	This pond is located within the grounds of South Pillinge Farm. This pond ranges from 30-50 cm in depth and is heavily shaded by hazel, alder and willow trees. It is possible that GCN could use the fallen leaves from these trees as egg laying material. This pond is surrounded by sheep grazed pasture.												
H	1	0.5	0.9	0.33	0.3	1	0.67	0.95	0.67	0.4	0.61	Average	TL017391
	A pond adjacent to Lower Farm in the south of the Survey Site. This pond covers an area of approximately 250 m^2 and is between 50 cm and 1 m in depth and supports small stands of bulrush. This pond is surrounded by scrub and scattered planted trees offering some potential sheltering habitat for newts. An inflow brings water into this pond from the adjacent road.												
I	1	0.8	+1	0.67	0.8	1	0.33	1	0.67	0.3	0.70	Good	TL017393
	This pond lies on the opposite side of the road to Pond H described above. This pond covers an area of approximately 400 m^2 and is also between 50 cm and 1 m in depth. Patches of duckweed *Lemna minor* are present on this pond whilst the submerged curled pondweed *Potomogeton crispus* is also present. This pond is bordered by a ditch, access track and road.												
J	1	0.5	0.5	0.67	0.7	1	1	1	1	0.9	0.8	Excellent	TL019389
	This pond lies within a small woodland copse approximately 20 m west of a wooded railway cutting and contains water to a depth of 0.6 m. Aquatic vegetation includes abundant floating sweet-grass *Glyceria fluitans*, water starwort *Callitriche* sp. and watercress *Nasturtium officinale*.												
K	1	0.3	0.5	0.67	0.4	1	1	0.95	1	0.9	0.71	Good	TL020388
	This pond lies adjacent to the railway cutting. This pond was relatively shallow and is likely to periodically dry. However, it supported dense mats of watercress and was surrounded by a small woodland copse likely to provide high quality terrestrial habitat for GCN.												
L	1	0.1	1	0.33	0.4	1	1	1	1	0.4	0.59	Below average	TL016388

ID	SI Scores (Oldham *et al*, 2000)											Suitability Class	Grid Ref
	Location	**Area**	**Permanence**	**Water Quality**	**Shading**	**Water fowl**	**Fish**	**Density**	**Terrestrial Habitat**	**Macrophyte Cover**	**HSI Score**		
	This pond lies in an arable field in the south of the Survey Site and covers an area of approximately 150-200m^2 and is over 1 m in depth. Ruderal vegetation and scrub surrounds this pond offering some potential sheltering habitat to newts. Common duckweed was present on the pond and it is likely that run off from the surrounding field feeds into the pond possibly adversely affecting water quality.												
O	1	0.9	0.9	0.33	0.3	1	0.01	0.8	0.67	0.33	0.38	Poor	TL029405
	This pond, in the north east of the Survey Site, lies adjacent to the north of an arable field and adjacent to a small wooded copse. Aquatic vegetation is limited due to heavy shading. The bed of the pond contains abundant leaf litter and other detritus.												
P	1	0.2	0.9	0.33	0.8	0.67	0.01	0.8	0.33	0.3	0.40	Poor	TL027404
	This pond, in the north east of the Survey Site, lies between an arable field and a small wooded copse and contains water to a depth of over 1 m. Aquatic vegetation includes abundant curled pondweed *Potamogeton crispus*. There was evidence of coarse fish in the pond, which is likely to be well stocked.												
Q	1	0.2	1	0.67	1	0.67	1	0.8	0.33	0.8	0.67	Average	TL028401
	This pond lies within an arable field and contains water to a depth of approximately 1 m. The margins of the pond are dominated by bulrush.												
R	1	0.2	1	0.67	0.6	1	0.33	0.8	0.33	0.55	0.57	Below average	TL025401
	This pond lies within an arable field and contains water to a depth of approximately 1 m depth. The central section of the pond is heavily shaded by scrub. Marginal vegetation includes abundant bulrush *Typha latifolia*, and frequent amphibious bistort *Persicaria amphibia* and bittersweet *Solanum dulcamara*.												
S	1	0.05	0.5	0.33	0.8	1	1	0.8	0.33	0.9	0.52	Below average	TL030398
	This pond in the south east of the Survey Site, contains water to a depth of 0.8 m and supports a dense cover of aquatic macrophytes including reedmace and watercress. It is enclosed within a habitat patch containing a mosaic of recently planted scrub and broadleaved trees. Beyond this habitat patch is arable farmland.												
T	1	0.4	1	0.67	1	1	0.01	0.9	0.33	0.5	0.46	Poor	TL026397
	This pondlies within an arable field and contains water to of approximately 1 m depth. Marginal vegetation is dominated by branched bur-reed *Sparganium erectum.* Fish (stickleback) are known to be numerous in this pond.												

Appendix 3: Great Crested Newt Survey Results

Pond A		Survey Details				Torch Survey			Bottle Trapping			Netting				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	3	1	30	3	1	0	0	0	0	-	-	-	Y	N
2	30/04/2014	15	3	3	30	3	0	0	4	1	0	-	-	-	-	N
3	08/05/2014	12	3	2/3	25	0	0	0	0	0	0	-	-	-	-	N
4	19/05/2014	16	3	2	25	0	0	0	0	0	0	-	-	-	-	N
5	03/06/2014	14	2	2	25	0	0	0	0	0	0	-	-	-	-	N
6	18/06/2014	13	3	1	25	0	1	0	0	0	0	-	-	-	-	N

Pond C		Survey Details				Torch Survey			Bottle Trapping			Netting				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	1	2	10	0	0	0	0	0	0	-	-	-	Y	N
2	30/04/2014	15	2	2	20	0	0	0	0	0	0	-	-	-	-	N
3	08/05/2014	12	1	3	10	0	0	0	0	0	0	-	-	-	-	N
4	19/05/2014	16	1	3	20	0	0	0	0	4	0	-	-	-	-	N
5	03/06/2014	14	1	2	20	0	0	0	1	0	0	-	-	-	-	N
6	18/06/2014	13	1	3	20	0	0	0	0	1	0	-	-	-	-	Y

Pond H		Survey Details				Torch Survey			Bottle Trapping			Netting				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	1	2	25	0	0	0	0	0	0	-	-	-	N	N
2	30/04/2014	15	1	2	20	0	0	0	0	0	0	-	-	-	N	N
3	08/05/2014	12	2	3	15	1	0	0	0	0	0	-	-	-	Y	N
4	19/05/2014	16	2	3	20	0	0	0	0	0	0	-	-	-	-	N
5	03/06/2014	14	2	5	20	0	0	0	0	0	0	-	-	-	-	N

6	18/06/2014	13	3	3	20	0	0	0	1	0	0	-	-	-	-	N

Pond I		**Survey Details**				**Torch Survey**			**Bottle Trapping**			**Netting**				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	1	2	20	0	0	0	0	0	0	-	-	-	N	N
2	30/04/2014	15	1	3	20	0	0	0	0	0	0	-	-	-	N	N
3	08/05/2014	12	2	2	20	0	0	0	0	0	0	-	-	-	N	N
4	19/05/2014	16	3	2	20	0	0	0	0	0	0	-	-	-	N	N

Pond J		**Survey Details**				**Torch Survey**			**Bottle Trapping**			**Netting**				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	No access – pond not surveyed														
2	30/04/2014	15	4	0	10	8	7	0	0	0	0	-	-	-	Y	N
3	08/05/2014	12	3	1	20	1	0	0	6	6	0	-	-	-	-	N
4	19/05/2014	16	3	1	10	15	13	0	2	2	1	-	-	-	-	N
5	03/06/2014	14	4	2	15	2	0	0	0	2	0	-	-	-	-	N
6	18/06/2014	13	3	1	15	1	0	0	1	0	0	-	-	-	-	Y

Pond K		**Survey Details**				**Torch Survey**			**Bottle Trapping**			**Netting**				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	3	1	15	2	1	0	0	0	0	0	-	-	-	N
2	30/04/2014	15	4	0	5	1	0	0	0	0	0	0	-	-	-	N
3	08/05/2014	12	3	1	5	1	6	0	0	0	0	0	-	-	-	N
4	19/05/2014	16	3	2	0	1	1	0	-	-	-	-	-	-	-	Y
5	03/06/2014	14	4	2	5	0	0	0	0	0	0	0	-	-	-	-
6	18/06/2014	13	4	3	5	0	0	0	0	0	0	0	-	-	-	-

Pond L		Survey Details				Torch Survey			Bottle Trapping			Netting				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	3	1	20	0	0	0	0	0	0	-	-	-	N	N
2	30/04/2014	15	4	1	20	0	0	0	0	0	0	-	-	-	N	N
3	08/05/2014	12	4	2	5	0	0	0	0	0	0	-	-	-	N	N
4	19/05/2014	16	5	2	15	0	0	0	0	0	0	-	-	-	N	N

Pond O		Survey Details				Torch Survey			Bottle Trapping			Netting				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	0	5	15	0	0	0	0	0	0	-	-	-	N	N
2	30/04/2014	15	2	3	15	0	0	0	0	0	0	-	-	-	N	N
3	08/05/2014	12	2	3	15	0	0	0	0	0	0	-	-	-	N	N
4	19/05/2014	16	2	4	15	0	0	0	0	0	0	-	-	-	N	N

Pond P		Survey Details				Torch Survey			Bottle Trapping			Netting				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	1	4	25	0	0	0	0	0	0	-	-	-	N	N
2	30/04/2014	15	2	3	20	0	0	0	0	0	0	-	-	-	N	N
3	08/05/2014	12	2	3	25	0	0	0	0	0	0	-	-	-	N	N
4	19/05/2014	16	1	4	25	0	0	0	0	0	0	-	-	-	N	N

Pond Q		Survey Details				Torch Survey			Bottle Trapping			Netting				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	2	0	15	0	0	0	0	0	0	-	-	-	N	N
2	30/04/2014	15	2	1	15	0	0	0	3	1	0	-	-	-	N	N
3	08/05/2014	13	4	1		1	1	0	0	0	0	-	-	-	N	N
4	19/05/2014	16	3	1	17	0	0	0	0	0	0	-	-	-	Y	N

5	03/06/2014	14	2	0	15	0	0	0	0	1	0	-	-	-	-	N
6	18/06/2014	13	3	4	15	0	0	0	0	0	0	-	-	-	-	N

Pond R		**Survey Details**				**Torch Survey**			**Bottle Trapping**			**Netting**				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	2	2	20	0	0	0	0	0	0	-	-	-	N	N
2	30/04/2014	15	4	2	20	0	0	0	0	0	0	-	-	-	N	N
3	08/05/2014	13	3	1	20	0	0	0	0	1	0	-	-	-	Y	N
4	19/05/2014	16	3	1	20	0	0	0	0	0	0	-	-	-	-	N
5	03/06/2014	14	2	2	20	0	0	0	0	0	0	-	-	-	-	N
6	18/06/2014	13	3	1	20	0	0	0	0	0	0	-	-	-	-	N

Pond S		**Survey Details**				**Torch Survey**			**Bottle Trapping**			**Netting**				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	3	0	10	0	0	0	0	0	0	-	-	-	Y	N
2	30/04/2014	15	4	2	20	0	0	0	3	2	0	-	-	-	-	N
3	08/05/2014	13	2	3	20	0	0	0	0	0	0	-	-	-	-	N
4	19/05/2014	16	3	2	20	0	0	0	0	1	0	-	-	-	-	N
5	03/06/2014	14	4	3	15	0	0	0	0	0	0	-	-	-	-	N
6	18/06/2014	13	2/3	1	15	0	0	0	0	0	0	-	-	-	-	N

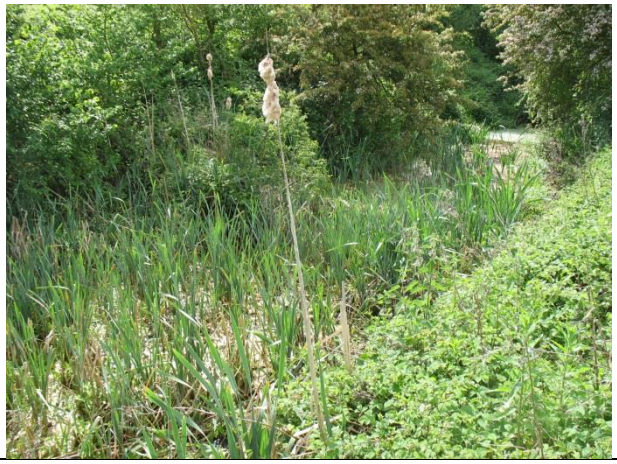
Pond T		**Survey Details**				**Torch Survey**			**Bottle Trapping**			**Netting**				
Visit No.	**Date**	**Air temp**	**Veg cover**	**Turbidity**	**No. Bottles**	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	***Male***	***Female***	***Imm.***	**Eggs**	**Larvae**
1	22/04/2014	10	3	2	20	0	0	0	0	0	0	-	-	-	N	N
2	30/04/2014	15	3	2	20	0	0	0	0	0	0	-	-	-	N	N
3	08/05/2014	12	3	3		0	0	0	0	0	0	-	-	-	N	N
4	19/05/2014	16	3	3	20	0	0	0	0	0	0	-	-	-	N	N

Appendix 4: Photographs

Photograph 1: Pond A

Photograph 2: Pond J

Photograph 3: Pond Q



Photograph 4: Pond S

Photograph 5: Pond T

Photograph 6: Typical field margin habitat of land to the east of the railway corridor.

Appendix 5: Reptile Survey Results

Survey Date	30/04/2014		14/05/2014		18/05/2014		03/06/2014		19/06/2014		23/07/2014		03/09/2014	
Zone	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard
1														
2														2 juv.
3											1 adult		1 adult	1 juv.
4		2 adult												
5					1 adult	1 adult	2 adult	1 adult	1 adult 1 juv.		1 adult 1 juv.	2 adult	1 juv.	1 juv.
6														
7		1 adult			1 adult									
8														
9														
10														
11		5 adult 1 juv.		5 adult		1 adult								1 juv.
12							1 adult							
13														
14														
15														
16	1 Adult					1 adult		3 adult						
17	1 Juv.											1 juv.		
18														
19														
20														
21														
22														
Total	1	8	0	5	2	3	3	4	1	0	2	2		

Survey Date	30/04/2014		14/05/2014		18/05/2014		03/06/2014		19/06/2014		23/07/2014		03/09/2014	
Zone	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard	Grass snake	Common lizard
adult														
Total juv.	1	1	0	0	0	0	0	0	1	0	1	1		

8.4 – Breeding Birds Report

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Millbrook Power Plant

Breeding Bird Survey

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Client	Millbrook Power Limited
Job	Millbrook Power Plant
Report title	Breeding Bird Survey
Draft version/final	FINAL
File reference	MPL Appendix 8 4 breeding bird report MC ER JF 021214

	Name	**Position**	**Date**
Originated	Peter Newbold	Senior Ecologist	06 August 2014
Reviewed	Jim Fairclough	Principal Ecologist	07 August 2014
2nd Draft Reviewed	Jim Fairclough	Principal Ecologist	19 August 2014
3rd Draft Reviewed	Jim Fairclough	Principal Ecologist	26 August 2014
4th Draft Reviewed	Jim Fairclough	Principal Ecologist	02 December 2014
Approved for issue to client	Jim Fairclough	Principal Ecologist	02 December 2014
Issued to client	Jim Fairclough	Principal Ecologist	02 December 2014

Contents

1 Summary

1.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

1.2 MPL commissioned BSG Ecology to undertake breeding bird surveys of all habitats within the red-line boundary of the Project Site, as reported in the Project Scoping Report, plus a 50m buffer (the 'Survey Site'). The purpose of the surveys was to inform and support an application for Development Consent for the Power Generation Plant. A supporting desk study and literature review was also conducted, which covered the Project Site and land up to 2 km from this.

1.3 The desk study returned records of 158 birds of conservation importance, the great majority of which were derived from the Rookery Clay Pit County Wildlife Site (CWS).

1.4 The breeding bird survey revealed 65 bird species that were breeding (or potentially breeding) within the Survey Site. Thirty-one of these appear on one or more schedules or lists of species of conservation importance. Bearded tit, gadwall, redshank and ringed plover are all associated with the reedbed habitat and open water within the clay pits (Rookery Clay Pits CWS). The land where these birds were recorded (the southern clay pit) is in the process of being restored as part of a Low Level Restoration Scheme (LLRS) by the landowner. Towards the end of 2014, the base of Rookery South Pit it is expected to comprise just bare earth following bulk movement of soils that are required for the LLRS and therefore, would not be expected to support these birds beyond the end of 2014.

1.5 During a bat survey a single barn owl was incidentally observed hunting. No evidence of breeding was found on site, but they are likely to be breeding in the local area and occasionally using the Survey Site for foraging.

2 Introduction

Background to Commission

2.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

Site Description

2.2 The Project Site, as identified in the Project Scoping Report comprises the Power Generation Plant within Rookery South Pit, and the Gas and Electrical Connection Areas extending from The Rookery into the surrounding agricultural land to the south and east. The approximate centre of the Project Site lies at grid reference 501373, 240734, which is situated between Bedford and Milton Keynes.

2.3 The Survey Site comprises the habitats within the red-line of the Project Site, as reported in the Project Scoping Report, along with a 50m buffer, as illustrated on Figure 1 Appendix 1. The main habitats within the Survey Site are arable fields, delineated by hedgerows, ditches and minor roads and lanes. To the north, an area of land exists that is in the process of being restored as part of a Low Level Restoration Scheme (LLRS) by the landowner. At the time of survey, in spring and summer of 2014, this area included sparsely vegetated ground, swamp and bare earth. Towards the end of 2014, it is expected to comprise just bare earth following bulk movement of soils that are required for the LLRS.

Description of Project

2.4 The Power Generation Plant would operate as a Simple Cycle Gas Turbine (SCGT) peaking plant and would be designed to provide an electrical capacity of up to 299 Megawatts (MW). It would be fuelled by natural gas, supplied by a new underground gas pipeline connecting the Power Generation Plant to the existing National Grid Gas (NGG) National Transmission System (NTS). It will connect to the National Grid Electrical Transmission System (NETS) via underground cable or overhead lines.

2.5 BSG Ecology was appointed as the ecological consultant to undertake a preliminary ecology survey, which included a desk study and Extended Phase 1 Habitat Survey. This identified the need to undertake a suite of Phase 2 surveys in order to fully assess the nature conservation value of the Project Site, including breeding bird surveys. These baseline surveys will be included in an appendix to an ecology chapter of an Environmental Statement, which will be submitted, as an integral part of the application for Development Consent.

Aims of Study

2.6 The objective of the survey was to evaluate the bird assemblage using the Survey Site and identify key areas of habitat used by breeding birds, with particular attention to rare and notable bird species. This report aims to provide a list of bird species encountered and their breeding status (i.e. confirmed, probable or possible breeding on the Survey Site), and an estimate of the likely number of territories/colonies of bird species breeding on or close to the Survey Site.

3 Methods

Desk Study

3.1 Existing ecological information regarding protected and otherwise notable species was requested from the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BRMC) covering the Survey Site and land up to 2 km away.

3.2 This information was supplemented by previous survey and mitigation work undertaken by BSG Ecology on The Rookery Clay Pit CWS, including land within and immediately north of the Survey Site (PBA, 2009).

Field Survey

3.3 The Survey Site was split into three sections; northern (comprising the existing access track, reedbed and disused clay pit (Rookery South Pit) and associated buffer), south-eastern and south-western (both comprising predominantly arable farmland and small woodland copses to the east and west of the railway respectively). Three visits to each section were undertaken in the early morning by an experienced ornithologist, Ross Crates. Survey duration on each visit was between 3 and 5 hours.

3.4 In addition, two dusk surveys were conducted in peak breeding season to locate any crepuscular/nocturnal species such as barn owl *Tyto alba*, which may have been breeding or foraging on site. A building inspection of South Pillinge Farm was also conducted to survey for any barn owls potentially breeding in the farm buildings.

3.5 Dates of survey and weather conditions recorded during the surveys are summarised in Table 1.

Table 1: Dates of Survey Visits and Weather Conditions.

Visit No.	Date	Purpose of visit	Time of visit	Weather conditions at start	Weather conditions at finish
1.1	19/04/14	BBS	06:30-09:30	Temp 6°C; wind BF1, cloud 7/8, rain 0mm. Visibility very good.	Temp 12°C; wind BF1, cloud 6/8, rain 0mm. Visibility very good.
1.2	21/04/14	BBS	06:15-11:15	Temp 7°C; wind BF1, cloud 8/8, rain 0mm. Visibility 75m at start, clearing after 2 hours.	Temp 12°C; wind BF2 E, cloud 3/8, rain 0mm. Visibility very good.
1.3	22/04/14	BBS	05:45-08:00	Temp 8°C, wind BF1, cloud 6/8, rain 0mm. Visibility very good	Temp 13°C, wind BF2-4E, cloud 6/8, rain 0mm. Visibility very good
Cr.1	18/05/14	Crepuscular survey	19:00-22:00	Temp 23°C, BF3-5SE, cloud 1/8, rain 0mm. Visibility very good	Temp 19°C, cloud 1/8, rain 0mm, wind BF2-4SE, visibility very good.
2.1	19/05/14	BBS	04:45-09:00	Temp 13°C, cloud 4/8, wind BF1-2SE, rain 0mm. Visibility very good.	Temp 18°C, cloud 5/8, wind BF 2-4SE, rain 0mm. Visibility very good.
Cr.2	20/05/14	Crepuscular survey	19:30-22:30	Temp 18°C, cloud 7/8, rain 0mm, wind BF2-3SE, visibility very good.	Temp 15°C, cloud 5/8, rain 0mm, wind BF1-2SE, visibility very good.

Visit No.	Date	Purpose of visit	Time of visit	Weather conditions at start	Weather conditions at finish
2.2	20/05/14	BBS	04:40-07:30	Temp 14°C, cloud 4/8, rain- 1 heavy shower for 15min, Wind BF1-2 SE, Visibility good.	Temp 18°C, cloud 6/8, rain 0mm, wind BF2-3 SE. Visibility good.
2.3	21/05/14	BBS	04:55-07:55	Temp 8°C, cloud 3/8, rain 0mm, wind BF1SE, visibility very good.	Temp 14°C, cloud 4/8, rain 0mm, wind BF2-4 SE, visibility very good.
3.1	16/06/14	BBS	04:55-08:55	Temp 11°C, wind BF3-6 NNE, cloud 6/8, rain 0mm, visibility very good.	Temp 14°C, wind BF3-6NNE, cloud 5/8, rain 0mm, visibility very good.
3.2	17/06/14	BBS	04:30-07:30	Temp 15°C, cloud 8/8 wind BF2-4 NNE, rain light intermittent drizzle. Visibility good.	Temp 16°C, cloud 7/8, wind BF2-4 NNE, rain 0mm, visibility good.
3.3	18/06/14	BBS	04:30-07:30	Temp 10°C, cloud 1/8, wind BF1, rain 0mm. Visibility very good.	Temp 12°C, cloud 3/8, wind BF1, rain 0mm. Visibility very good.

3.6 During each visit the Survey Site was walked at a slow pace to enable all birds detected to be identified and located. Frequent stops were made to scan suitable habitats and to listen for singing and calling birds. All accessible areas of suitable breeding habitat within the Survey Site boundary and immediately adjacent areas were approached to within 50 m.

3.7 During the survey the location and activity of each bird detected (including those seen or heard) was recorded and mapped using standard two-letter BTO species codes combined with activity symbols.

3.8 Birds exhibiting breeding behaviour were assigned to one of three categories: possible breeding, probable breeding or confirmed breeding. These are defined below (based on BTO criteria):

- Possible breeding: birds heard singing or alarm calling or simply present in suitable breeding habitat on one of the survey visits;
- Probable breeding: a pair of birds present in suitable breeding habitat; a repeat observation of territorial behaviour (song or alarm calling) on two or more different visits in the same location; courtship behaviour or display in suitable breeding habitat; birds apparently visiting a nest site; or, evidence of nest building (including excavation of a hole);
- Confirmed breeding: one or more adults undertaking a distraction display; the presence of a used nest or eggshells; the presence of recently fledged or downy young (that are clearly of local origin); apparently incubating adults or adults commuting to and from a nest hole; adult birds carrying faecal sacs or food for young; or, a nest with eggs or young present.

3.9 Internal inspections of all buildings around South Pillinge Farm were also undertaken. Records were taken of any evidence of breeding barn owls, this can include:

- Droppings (white vertical streaks on roof beams and large white splashes on floors)
- Pellets. Barn owls generally swallow their prey whole and regurgitate the indigestible parts (bones, fur etc.) as pellets. The colour and condition of pellets can give an indication as to when a site was last used by barn owls.
- Feathers. Barn owl nestlings begin their initial moult at 11 months. Adult barn owls tend to shed their largest and most noticeable feathers (wing feathers) in the summer.

- Nest debris. Barn owls do not build nests but nesting areas may contain nestling fluff and pellet debris.
- Potential entrance points. The minimum hole size required for barn owls to gain access to a building is 7 cm by 7 cm.
- Suitable nesting platforms. Barn owls need a level area to lay their eggs usually over 3 metres in length and over 3 metres off the ground. Typical nesting places include tops of walls, between bales and attic floors.

3.10 To inform the assessment in this report, the numbers of potential territories identified, the abundance of species at the county and national level, the quality of the habitat present and the geographical range of the birds concerned have been considered, based on national and regional accounts. The Bedfordshire Bird Report (Nightingale, 2012) was consulted to assess the local population and distribution of each individual bird species.

3.11 Due to the relative abundance of ornithological data, it is often possible to derive population estimates within a defined geographical area (e.g. county). A 1 % threshold can then be applied to indicate importance (e.g. 1 % of the county population is equivalent to county importance). There is no fundamental biological basis for the 1 % threshold, but it does follow the rational for site selection set out within the Ramsar Convention 1971 (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), and the Joint Nature Conservation Committee's SPA selection guidelines (JNCC, 2014). It has also been adopted for the purposes of defining thresholds of importance of waterfowl at the European and UK level by the BTO in their Wetland Bird Survey reporting (BTO 2014a). The 1% threshold is therefore considered to provide a reasonable and defensible basis for the evaluation of bird populations.

Limitations to Methods

3.12 As with all breeding bird surveys following this technique, the process is open to some subjectivity in interpretation except where active nests are located. Therefore, these 'territories' will be classed as putative and their mapped locations will indicate the 'centre' of a territory and not necessarily the breeding location.

3.13 All visits were conducted in suitable weather conditions and during the optimal period for breeding bird surveys. It is therefore not considered that any significant constraints were encountered.

4 Results and Interpretation

Desk Study

4.1 Records of 158 birds of conservation importance have been recorded from within a 2 km radius of the Survey Site, which are presented in Appendix 2. Thirty-seven of these are Schedule 1 species (Wildlife and Countryside Act 1981 (as amended)), and are highlighted by the use of italics for the common name in the table included at Appendix 2. The great majority of the records are derived from the Rookery Clay Pit CWS. Of the 37 Schedule 1 species, the following 11 species have potential to be associated with the Survey Site as suitable nesting habitat is present:

- Barn owl *Tyto alba* – This species tends to forage upon tussocky grassland with a good litter layer providing habitat for their preferred prey species (field voles). The semi-improved grassland and tall ruderal vegetation mosaic on the periphery of the Survey Site is therefore considered to provide some foraging habitat for barn owls. In addition, it is possible that some of the outbuildings associated with South Pillinge Farm could support this species.
- Bittern *Botaurus stellari* – Bitterns have been recorded within the reedbed in the lake in the north of the Rookery Clay Pit CWS (adjacent to the proposed access track). The dense reedbed on the periphery of the lake in the north of the Rookery Clay Pit CWS (adjacent to the proposed access track) continues to provide suitable nesting and foraging habitat for this species.
- Bearded tit *Panurus biarmicus* – The bearded tit is found almost exclusively within dense reedbeds. The dense reedbed on the periphery of the lake in north of the Rookery Clay Pit CWS (adjacent to the proposed access track) provides suitable nesting and foraging habitat for this species.
- Cetti's warbler *Cettia cetti* – This species nests in dense scrub and reedbed habitats and was recorded within reed habitat adjacent to the proposed access track in January 2014.
- Firecrest *Regulus ignicapillus* – The plantation woodland within the Survey Site is considered to offer some, yet limited potential nesting and foraging habitat for firecrest.
- Garganey *Anas querquedula* – This species of duck nests in dense vegetation including reedbed. Suitable nesting habitat for this species is therefore also present within the dense reedbed on the periphery of the lake to the north of the Rookery Clay Pit CWS.
- Hobby *Falco subbuteo* – This species has been observed foraging over the water-bodies within the Rookery Clay Pit CWS during great crested newt translocation works in 2011 and 2013 (Steven Foot, pers comm.). The more established, mature trees present within and adjacent to the Survey Site have some potential to be used as nesting habitat for this spring/summer migrant.
- Little-ringed plover *Charadrius dubius* – This species breeds on man-made habitats close to fresh water. Sand and gravel quarries are regularly used as breeding sites. This species was recorded nesting on site in 2011 and 2013 upon clay habitats adjacent to the water-bodies in the Rookery Clay Pit CWS (Steven Foot, pers comm.). Accordingly, there remains suitable habitat for this species to the north of the Survey Site.
- Mediterranean gull *Larus melanocephalus* – This species is known to breed near inland lakes and wetlands. The water-bodies in the Rookery Clay Pit CWS provide suitable nesting habitat for this species.
- Marsh harrier *Circus aeruginosus* – This species nests in dense reedbed and has been recorded foraging over the reedbed present in the northern and south-eastern areas of the Rookery Clay Pit CWS in 2011 and 2013 (Steven Foot, pers comm.).

- Red kite *Milvus milvus* – This species was recorded circling above the Survey Site during the preliminary ecology survey (BSG Ecology, 2014). The more established, mature trees present within and adjacent to the Survey Site have potential to be used as nesting habitat for this species.

4.2 A number of bird Species of Principal Importance (Natural Environment and Rural Communities Act (NERC) 2006 (s. 41)) were also shown to be present within 2 km of the Survey Site in the results of the desk study. Of these, the following could potentially nest within the Survey Site as suitable habitat is present for these species: dunnock *Prunella modularis*, house sparrow *Passer domesticus*, starling *Sturnus vulgaris,* reed bunting *Emberiza schoeniculus,* skylark *Alauda arvensis*, song thrush *Turdus philomelos,* bullfinch *Pyrrhula pyrrhula*, yellowhammer *Emberiza citronella*, cuckoo *Cuculus canorus* and yellow wagtail *Motacilla flava flavissima*.

Field Survey

4.3 A total of 54 bird species that could be breeding within the Project Site were recorded during the three survey visits combined. These are summarised in Table 2 together with an estimated number of confirmed, probable or possible breeding territories/nest sites. The indicative central point of each territory or location of individual bird records is shown in Appendix 1, Figure 2 (northern half of the Survey Site) and Figure 3 (southern half of the Survey Site).

Table 2: Summary results of breeding bird survey.

Common name	Species	Breeding status within Survey Site			Total Pairs
		Confirmed	Probable	Possible	
Sparrowhawk	*Accipiter nisus*			1	**1**
Reed warbler	*Acrocephalus scirpaceus*		5	1	**6**
Long-tailed tit	*Aegithalos caudatus*	3	3		**6**
Skylark	*Alauda arvensis*		9	1	**10**
Mallard	*Anas platyrhynchos*		1	1	**2**
Gadwall	*Anas strepera*			1	**1**
Tufted duck	*Aythya fuligula*		2		**2**
Canada goose	*Branta canadensis*	1			**1**
Buzzard	*Buteo buteo*			1	**1**
Linnet	*Carduelis cannabina*		7	3	**10**
Goldfinch	*Carduelis carduelis*	2	4		**6**
Greenfinch	*Carduelis chloris*		4		**4**
Treecreeper	*Certhia familiaris*			1	**1**
Ringed plover	*Charadrius hiaticula*		1	2	**3**
Stock dove	*Columba oenas*		3		**3**
Woodpigeon	*Columba palumbus*		10	4	**14**
Carrion crow	*Corvus corone*	1	1	1	**3**
Rook	*Corvus frugilegus*			1	**1**
Jackdaw	*Corvus monedula*			1	**1**
Cuckoo	*Cuculus canorus*		2	1	**3**
Blue tit	*Cyanistes caeruleus*	19	8	1	**28**
Great spotted woodpecker	*Dendrocopos major*		1	1	**2**
Yellowhammer	*Emberiza citrinella*	2	8	2	**12**
Reed bunting	*Emberiza schoeniclus*		3	3	**6**
Robin	*Erithacus rubecula*	18	2	1	**21**
Chaffinch	*Fringilla coelebs*	6	18	8	**32**

Common name	Species	Breeding status within Survey Site			Total Pairs
		Confirmed	Probable	Possible	
Coot	*Fulica atra*	2	2		**4**
Moorhen	*Gallinula chloropus*	1	1		**2**
Jay	*Garrulus glandarius*		2		**2**
Pied wagtail	*Motacilla alba*	1	2		**3**
Bearded tit	*Panurus biarmicus*		1		**1**
Great tit	*Parus major*	10	1	1	**12**
Grey partridge	*Perdix perdix*		1	1	**3**
Pheasant	*Phasianus colchicus*		1	3	**4**
Chiffchaff	*Phylloscopus collybita*		6		**6**
Willow warbler	*Phylloscopus trochilus*		6		**6**
Magpie	*Pica pica*		1	1	**2**
Green woodpecker	*Picus viridis*			1	**1**
Great crested grebe	*Podiceps cristatus*	1			**1**
Dunnock	*Prunella modularis*	1	11	2	**14**
Bullfinch	*Pyrrhula pyrrhula*	1	1	1	**3**
Goldcrest	*Regulus regulus*		2		**2**
Collared dove	*Streptopelia decaocto*		1		**1**
Turtle dove	*Streptopelia turtur*		1		**1**
Blackcap	*Sylvia atricapilla*	2	19	1	**22**
Whitethroat	*Sylvia communis*	2	16		**18**
Lesser white throat	*Sylvia curruca*	1	2		**3**
Little grebe	*Tachybaptus ruficollis*		1		**1**
Redshank	*Tringa totanus*	1	1		**2**
Wren	*Troglodytes troglodytes*	3	12	2	**17**
Blackbird	*Turdus merula*	18	6	2	**26**
Song thrush	*Turdus philomelos*	1	3	1	**5**
Mistle thrush	*Turdus viscivorus*		2		**2**
Lapwing	*Vanellus vanellus*	3	2		**5**

4.4 A further nine additional species were recorded breeding outside the Project Site but within the Survey Site. Three additional species were assumed to be breeding within the wider area but were of relevance to this report due to their conservation significance. These are summarised in Table 3 together with an estimated number of territories/nest sites. The indicative central point of each territory or location of individual bird records is also shown where appropriate in Appendix 1, Figure 2.

Table 3: Breeding bird species recorded outside the Project Site

Common name	Species name	Breeding within Survey Site	Breeding outside of Survey Site but notable
Sedge warbler	*Acrocephalus schoenobaenus*	1 Confirmed	
Red-legged partridge	*Alectoris rufa*	4 Confirmed	
Pochard	*Aythya ferina*	2-3 Confirmed	
Kestrel	Falco tinnunculus	1 Possible	
Barn Swallow	*Hirundo rustica*	3+ Confirmed	
Yellow wagtail	*Motacilla flava flavissima*	1 Confirmed	
House sparrow	*Passer domesticus*	3 Probable	

Common name	Species name	Breeding within Survey Site	Breeding outside of Survey Site but notable
Coal tit	*Periparus ater*	1 Confirmed	
Bittern	*Botaurus stellaris*		1 Possible
Common tern	*Sterna hirundo*		4 Probable
Barn owl	*Tyto alba*		1 Confirmed

4.5 In addition to the above, a further twelve bird species were recorded during the survey visits for which no evidence of breeding within the Survey Site was noted. This included individuals flying over the Survey Site or species which may breed locally but for which suitable nesting habitat either does not occur on the Survey Site, or where no behaviour suggesting breeding was recorded. These species are summarised in Table 4 below together with notes on use of the Survey Site.

Table 4: Non-breeding Bird Species recorded

Common name	Species name	Notes
Meadow pipit	*Anthus pratensis*	One non-breeding bird recorded on visit 1, one flyover heard on visit 3
Swift	*Apus apus*	10 birds observed feeding/commuting over site on visit 3
Grey heron	*Ardea cinerea*	A single individual flying over the Survey Site on all three surveys
House martin	*Delichon urbicum*	Total of 16 birds recorded feeding in and around the Survey Site
Peregrine	*Falco peregrinus*	A single individual perched on electricity pylon on visit 2, flying N to adjacent pylon and then flew further N
Kingfisher	*Alcedo atthis*	A single kingfisher was recorded flying into bankside vegetation in the northern clay pit on the boundary of the Survey Site, during the crepuscular survey. The banks at this location were not vertical or overhung (which is preferred by kingfisher), so it is unlikely that kingfisher would breed here.
Herring gull	*Larus argentatus*	A single individual flying over the site on visit 1
Lesser black-backed gull	*Larus fuscus*	Single individuals flying over site on visits 2 and 3
Black-headed gull	*Larus ridibundus*	Four individuals flying over on visit 2
Red kite	*Milvus milvus*	Single individuals observed flying low N over site on visits 2 and 3
Cormorant	*Phalacrocorax carbo*	Two individuals flying over on visit 3
Sand martin	*Riparia riparia*	Flock of 15 feeding on visit 3
Starling	*Sturnus vulgaris*	Mixed flock of adults and juveniles feeding on site on visit 3

4.6 Of the 65 species of bird recorded as breeding (confirmed, possible, or probable) within or adjacent to the Survey Site, 31 appear on one or more schedules or lists of species of conservation importance, as follows:

- Schedule 1, Wildlife and Countryside Act 1981, as amended.
- Species of Principal Importance for the Conservation of Biodiversity in England as listed in accordance with section 41 of the Natural Environment and Rural Communities Act (NERC) 2006 (s. 41);
- Species of high conservation concern (red list species) included in Birds of Conservation Concern 3 (BOCC) (Eaton *et al*, 2009); and

- Species of medium conservation concern (amber list species) included in Birds of Conservation Concern 3 (BOCC) (Eaton *et al*, 2009).

4.7 These 31 species together with an indication of their relevant status are included in Table 4. The status of each species in Bedfordshire (Nightingale, 2012) is also provided. The paragraphs following Table 4 provide an account of where the birds were recorded and information on their habitat preferences. This can be viewed alongside Figure 2 (Appendix 1).

Table 4: Status of Birds of Conservation Importance Breeding at the Survey Site.

Common name	Species name	WCA Sch. 1	s.41	Red List	Amber List	Status in Beds.
Barn owl	*Tyto alba*	✓			✓	Uncommon but widespread
Bearded tit	*Panurus biarmicus*	✓			✓	Scarce migrant
Bittern	*Botaurus stellaris*	✓	✓	✓		Scarce winter visitor
Bullfinch	*Pyrrhula pyrrhula*		✓		✓	Widespread
Common tern	*Sterna hirundo*				✓	Common Breeder
Cuckoo	*Cuculus canorus*		✓	✓		Widespread but declining
Dunnock	*Prunella modularis*		✓		✓	Very common
Gadwall	*Anas strepera*				✓	Breeding in small numbers (approx. 17 sites)
Green woodpecker	*Picus viridis*				✓	Common resident
Grey partridge	*Perdix perdix*		✓	✓		Common but declining resident
House sparrow	*Passer domesticus*		✓	✓		Common but declining
Kestrel	*Falco tinnunculus*				✓	Widespread
Lapwing	*Vanellus vanellus*		✓	✓		Common but declining
Linnet	*Carduelis cannabina*		✓	✓		Locally common
Little grebe	*Tachybaptus ruficollis*				✓	Common and widespread
Mallard	*Anas platyrhynchos*				✓	Common but declining
Mistle thrush	*Turdus viscivorus*				✓	Widespread
Pochard	*Aythya ferina*				✓	Breeding at 11 known sites
Redshank	*Tringa totanus*				✓	Scarce breeder
Reed bunting	*Emberiza schoeniclus*		✓		✓	Fairly common
Ringed plover	*Charadrius hiaticula*				✓	Uncommon localised breeder
Skylark	*Alauda arvensis*		✓	✓		Widespread
Song thrush	*Turdus philomelos*		✓	✓		Common
Stock dove	*Columba oenas*				✓	Widespread and common
Swallow	*Hirundo rustica*				✓	Widespread and

Common name	Species name	WCA Sch. 1	s.41	Red List	Amber List	Status in Beds.
						common
Tufted duck	*Aythya fuligula*				✓	Common breeder
Turtle dove	*Streptopelia turtur*		✓	✓		Fast declining breeder
Whitethroat	*Sylvia communis*				✓	Common
Willow warbler	*Phylloscopus trochilus*				✓	Widespread but declining
Yellow wagtail	*Motacilla flava*		✓	✓		Localised breeder
Yellowhammer	*Emberiza citrinella*		✓	✓		Fairly common

4.8 Barn owl. During a bat survey a single bird was observed hunting. No evidence of breeding was found within the Survey Site, including during the building inspection of South Pillinge Farm, but they are likely to be breeding in the local area and occasionally using the Survey Site for foraging. In general the Survey Site is very low quality foraging habitat for barn owls, predominantly consisting of large arable fields with very small field margins. The areas of higher quality foraging habitat include the areas of rank grassland along the margins of the woodland copses, the grassland surrounding South Pillinge Farm and the railway corridors.

4.9 Bearded tit. This is a species of extensive reedbed, principally in more coastal counties. During the surveys at least two birds were heard amongst common reed *Phragmites australis* (their breeding habitat) just outside the 50 m buffer zone to north-east of the Survey Site. A further pair was heard in the reedbed within the clay pit in the north-east of the site.

4.10 Bittern. A single male was heard booming to the north east, beyond the Survey Site boundary. There is currently no breeding habitat suitable for bittern within the Survey Site. The reedbed in the clay pit within the Project Site is currently drying out as the water is pumped away from this area to promote the implementation of the LLRS by the end of 2014, so the Project Site, or indeed, the Survey Site is unlikely to support suitable habitat for bittern by 2015.

4.11 Bullfinch. The bullfinch is a generalist species that normally breeds within dense hedges (Snow and Perrins, 1998; RSPB, 2014; BTO, 2014). One confirmed pair had fledged young near the road bridge over the railway. The second probable pair bred in bushes near the northern entrance track. The final possible pair could have bred in the wooded copse to the west of the Survey Site. The site had one confirmed, one probable and one possible breeding pair.

4.12 Common tern. No evidence of breeding tern was found within the Survey Site, but four pairs are estimated to be breeding in the local area.

4.13 Cuckoo. The cuckoo's favoured habitat is open woodland but females lay their eggs in the nest of other species (Dunnock, Reed Warbler and Meadow Pipit are favoured 'hosts') (Snow and Perrins, 1998; RSPB, 2014; BTO, 2014). The Survey Site had two probable and one possible breeding pairs.

4.14 Dunnock. The dunnock is a generalist that will breed in any hedgerow or dense scrub. The Survey Site had one confirmed, 11 probable and two possible breeding pairs.

4.15 Gadwall. The Gadwall strongly prefers fairly shallow, eutrophic or standing open water, with plenty of cover from emergent vegetation and dry banks or islands for nesting (Snow and Perrins, 1998; RSPB, 2014; BTO, 2014). The Survey Site had one possible breeding pair in the pools to the north of the Survey Site. Water is being pumped away from the area of pooled water in the clay pit within the Project Site to promote the implementation of the LLRS. The Project Site, or indeed, the Survey Site is unlikely to support suitable habitat for Gadwall by 2015.

4.16 Green woodpecker. The green woodpecker's favoured habitat is woodland edge, but will breed in any suitable mature tree (Snow and Perrins, 1998). The Survey Site had one possible breeding pair near the Bletchley to Bedford railway to the north east of the Survey Site

4.17 Grey partridge. Grey partridge prefers short grassland (not longer than 15 cm) with patches of scrub or hedgerows for them to nest at the base of and to provide cover (Snow and Perrins, 1998). There were one probable and one possible breeding pair spread across the Survey Site.

4.18 House sparrow. The house sparrow is a species that nests in loose colonies often utilising holes and crevices within buildings, but will also nest within dense hedgerows which is a very common habitat at the Survey Site. The Survey Site had three probable breeding pairs near the buildings on the western boundary.

4.19 Kestrel. There was a single pair breeding within the Survey Site but these were only seen foraging with no evidence of breeding within the Survey Site.

4.20 Lapwing. Lapwings breed on lowland farmland and unimproved pasture and meadows (RSPB, 2014). The Survey Site had three confirmed and two probable breeding pairs concentrated in the southern clay pit to the north of the Survey Site.

4.21 Linnet. The linnet is a generalist, found where there are abundant sources of seed (typically associated with lowland farmland). It will nest in dense, thorny hedgerows or areas of scrub. There were seven probable and three possible breeding pairs spread across the Survey Site.

4.22 Little grebe. The little grebe prefers small shallow water bodies (less than 1m), with muddy bottoms and a dense submerged aquatic vegetation. One probable pair was breeding in the pool within the southern clay pit.

4.23 Mallard. The mallard is extremely adaptable to a wide range of habitats, but essentially prefers still and shallow water (less than 1m) with ample plant growth such as the small ponds around the site (Snow and Perrins, 1998; RSPB, 2014; BTO, 2014). The Survey Site had one probable pair in a pond to the east of the railway and a second possible breeding pair in the lake margin in the clay pit.

4.24 Mistle thrush. The mistle thrush is a generalist species which breeds in a variety of habitats including gardens and farmland (Snow and Perrins, 1998; RSPB, 2014; BTO, 2014). The Survey Site had two probable breeding pairs in the woodland to the west.

4.25 Pochard. The pochard requires several hectares of shallow (1 - 2.5 m) of open water, uncluttered with floating vegetation but prolific with submerged plant and animal food (Snow and Perrins, 1998). Two to three pairs were potentially breeding within the lake, beyond the Survey Site. The small pools being drained that are found within the Project Site (southern clay pit) are not large enough to support breeding pochard.

4.26 Redshank. The inland breeding habitat of redshank is limited to depressions, lakes and river basins, and other wetlands free of tall dense aquatic vegetation or closed stands of shrubs and trees (Snow and Perrins, 1998). A small flock was heard on visit 1, estimated to be approximately 10 birds. Two pairs probably breeding were recorded within the Survey Site. Outside the Survey Site (but within the southern clay pit) a pair was confirmed breeding by the presence of young, and another pair probably breeding was recorded.

4.27 Reed bunting. The breeding habitat of reed bunting is restricted to low, dense vegetation, such as the reed beds and oilseed rape fields across the Survey Site. They will avoid open country as well as closed forests. (Snow and Perrins, 1998; RSPB, 2014; BTO, 2014). There were three confirmed and three possible breeding pairs spread across the Survey Site.

4.28 Ringed plover. Ringed plover breeding habitat is limited to wide sandy or shingle lake margins (Snow and Perrins, 1998). One pair was probably breeding and two possibly breeding within the southern clay pit in the north of the Survey Site.

4.29 Skylark. Skylarks are ground nesting birds preferring open surfaces of firm, level or unobstructed soils preferably well clothed in grasses or cereals (Snow & Perrins, 1998). There were nine probable and one possible breeding pairs spread across the Survey Site.

4.30 Song thrush. The song thrush is a generalist species that will nest in any suitable cover including scrub or hedgerows (Snow & Perrins, 1998). The Survey Site supported one confirmed, three probable and one possible breeding pairs.

4.31 Stock dove. The stock dove is a generalist species that nests in holes in trees, buildings and sometimes in abandoned rabbit warrens (Snow & Perrins, 1998). There were three probable breeding pairs in the small wooded copses across the Survey Site.

4.32 Barn Swallow. Swallows were not recorded breeding on the Survey Site, but more than three pairs were recorded within the farm buildings just beyond the Survey Site and were using the Survey Site to forage.

4.33 Tufted duck. The tufted duck is extremely adaptable to a wide range of water habitats, but prefer more open freshwater habitats not encroached by vegetation (Snow and Perrins, 1998; RSPB, 2014; BTO, 2014). The Survey Site had two probable breeding pairs on the pools being drained at the southern clay pit.

4.34 Turtle dove. The turtle dove prefers undisturbed habitat and will not breed in or very near towns. Although it is predominantly a ground feeder they are largely arboreal and will breed in small trees, shrubs or tall mature hedges (Snow and Perrins, 1998; RSPB, 2014; BTO, 2014). On the Survey Site a singing male was observed singing to the south end of the access track (northern part of the Survey Site), meaning a probable pair.

4.35 Whitethroat. Whitethroat is a generalist species that requires dense scrub or hedgerows for nesting. There were two confirmed and 16 probable breeding pairs spread across the Survey Site.

4.36 Willow warbler. Willow warbler is a generalist species that requires scrub, hedgerows or woodland but nests within the dense vegetation at the base of these features (Snow & Perrins, 1998). The Survey Site had six probable breeding pairs mainly around the scrub adjacent to the railway corridors.

4.37 Yellow wagtail. In the breeding season yellow wagtail is confined to lowlands, occupying fringes of wetlands, such as rivers, lakesides and moist pastures (Snow and Perrins, 1998). It is a ground nesting bird using dense vegetation such as the reedbed on and adjacent to the Survey Site. Although there was potential for breeding on site no evidence was found. There was a single pair possibly breeding to the north east, beyond the Survey Site.

4.38 Yellowhammer. Yellowhammer is found on a wide variety of farmland types but is most common on lowland arable farmland. It nests at the base of dense hedgerows (occasionally on the ground earlier in the season) (Snow and Perrins, 1998). There were two confirmed, eight probable and two possible breeding pairs spread across the Survey Site.

Distribution and abundance of Breeding Birds using the Survey Site

4.39 A total of 65 bird species were recorded breeding within the Survey Site, 31 of these appear on one or more schedules or lists of species of conservation importance.

4.40 The majority of the Survey Site is of limited value for breeding birds with large arable fields, delineated by hedgerows and ditches. The majority of the species are generalist species, breeding within the hedgerows, scrub and small wooded copses within the Survey Site with only skylark recorded breeding in the open fields.

4.41 The main interest feature within the Survey Site for breeding birds is the Rookery Clay Pits CWS. The southern half of this clay pit that lies within the Project Site presently includes sparsely vegetated ground, reedbed and bare earth. This southern clay pit is presently being restored as part of a LLRS by the landowner, so will have little value to the majority of the breeding birds observed here by the end of 2014. The northern clay pit, which is outside the Survey Site also includes reedbed habitat, but this is healthier and is found in association with open water. Accordingly, it is suitable for a more diverse range of breeding birds, which included a male booming bittern, bearded tit and pochard.

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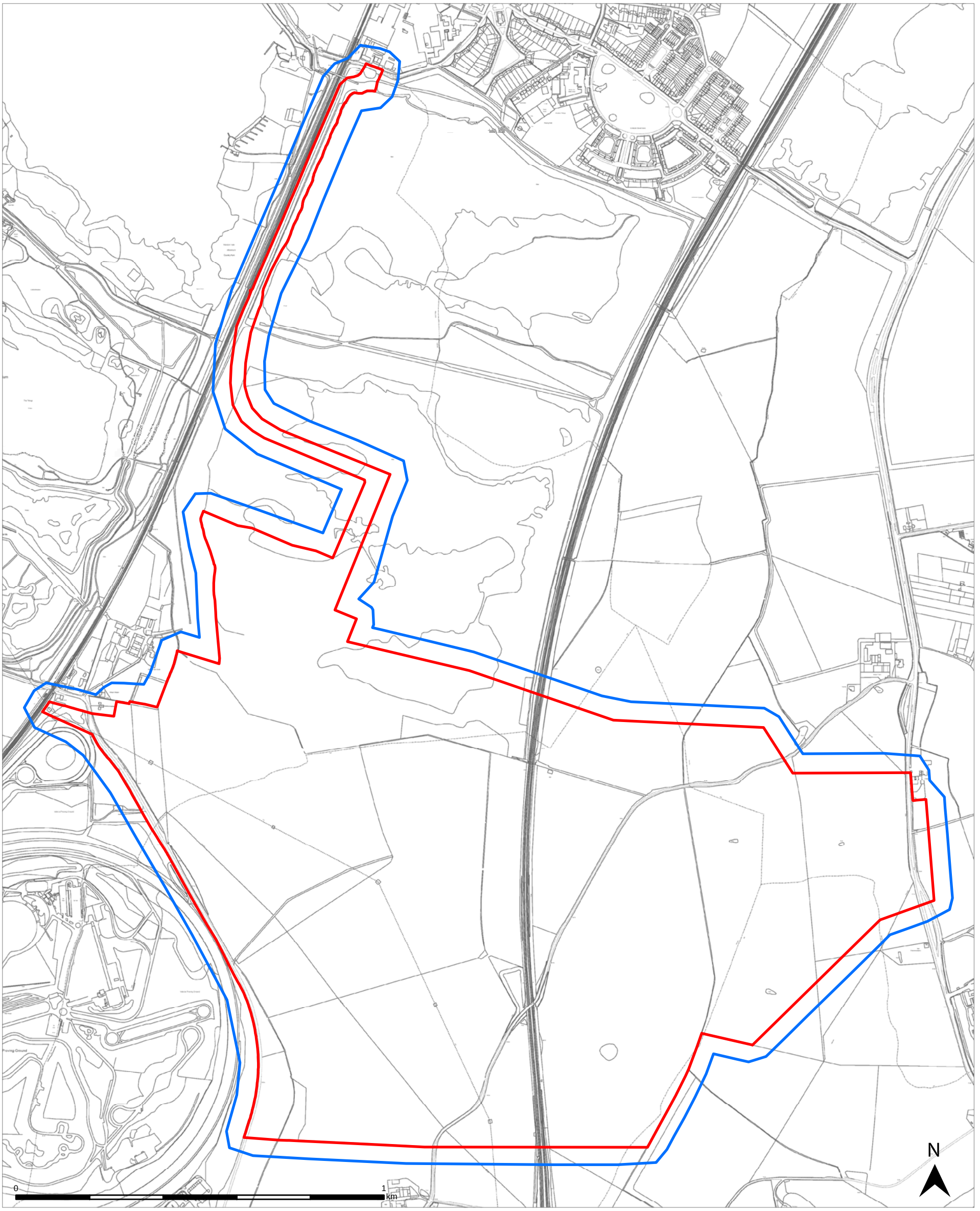
Appendix 1: Figures



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DRAWING TITLE

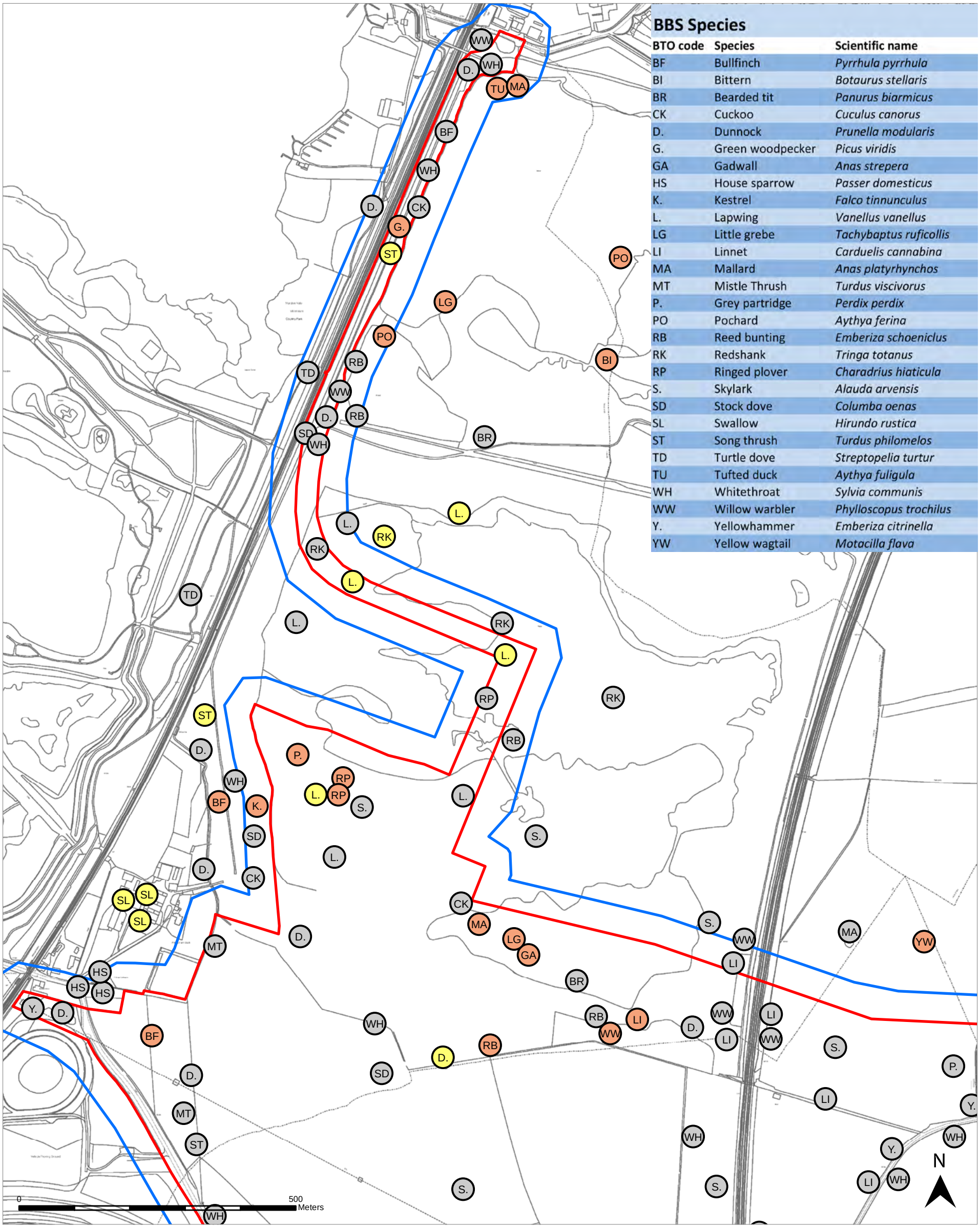
Figure 1: Breeding Bird Survey Site and Project Site Boundary

LEGEND

- Project Site at the time of Scoping Report submission
- Survey Site Boundary

DATE: 06/08/2014 CHECKED: PN SCALE: 1:10,500

DRAWN: COH APPROVED: JF STATUS: FINAL



BBS Species

BTO code	Species	Scientific name
BF	Bullfinch	*Pyrrhula pyrrhula*
BI	Bittern	*Botaurus stellaris*
BR	Bearded tit	*Panurus biarmicus*
CK	Cuckoo	*Cuculus canorus*
D.	Dunnock	*Prunella modularis*
G.	Green woodpecker	*Picus viridis*
GA	Gadwall	*Anas strepera*
HS	House sparrow	*Passer domesticus*
K.	Kestrel	*Falco tinnunculus*
L.	Lapwing	*Vanellus vanellus*
LG	Little grebe	*Tachybaptus ruficollis*
LI	Linnet	*Carduelis cannabina*
MA	Mallard	*Anas platyrhynchos*
MT	Mistle Thrush	*Turdus viscivorus*
P.	Grey partridge	*Perdix perdix*
PO	Pochard	*Aythya ferina*
RB	Reed bunting	*Emberiza schoeniclus*
RK	Redshank	*Tringa totanus*
RP	Ringed plover	*Charadrius hiaticula*
S.	Skylark	*Alauda arvensis*
SD	Stock dove	*Columba oenas*
SL	Swallow	*Hirundo rustica*
ST	Song thrush	*Turdus philomelos*
TD	Turtle dove	*Streptopelia turtur*
TU	Tufted duck	*Aythya fuligula*
WH	Whitethroat	*Sylvia communis*
WW	Willow warbler	*Phylloscopus trochilus*
Y.	Yellowhammer	*Emberiza citrinella*
YW	Yellow wagtail	*Motacilla flava*

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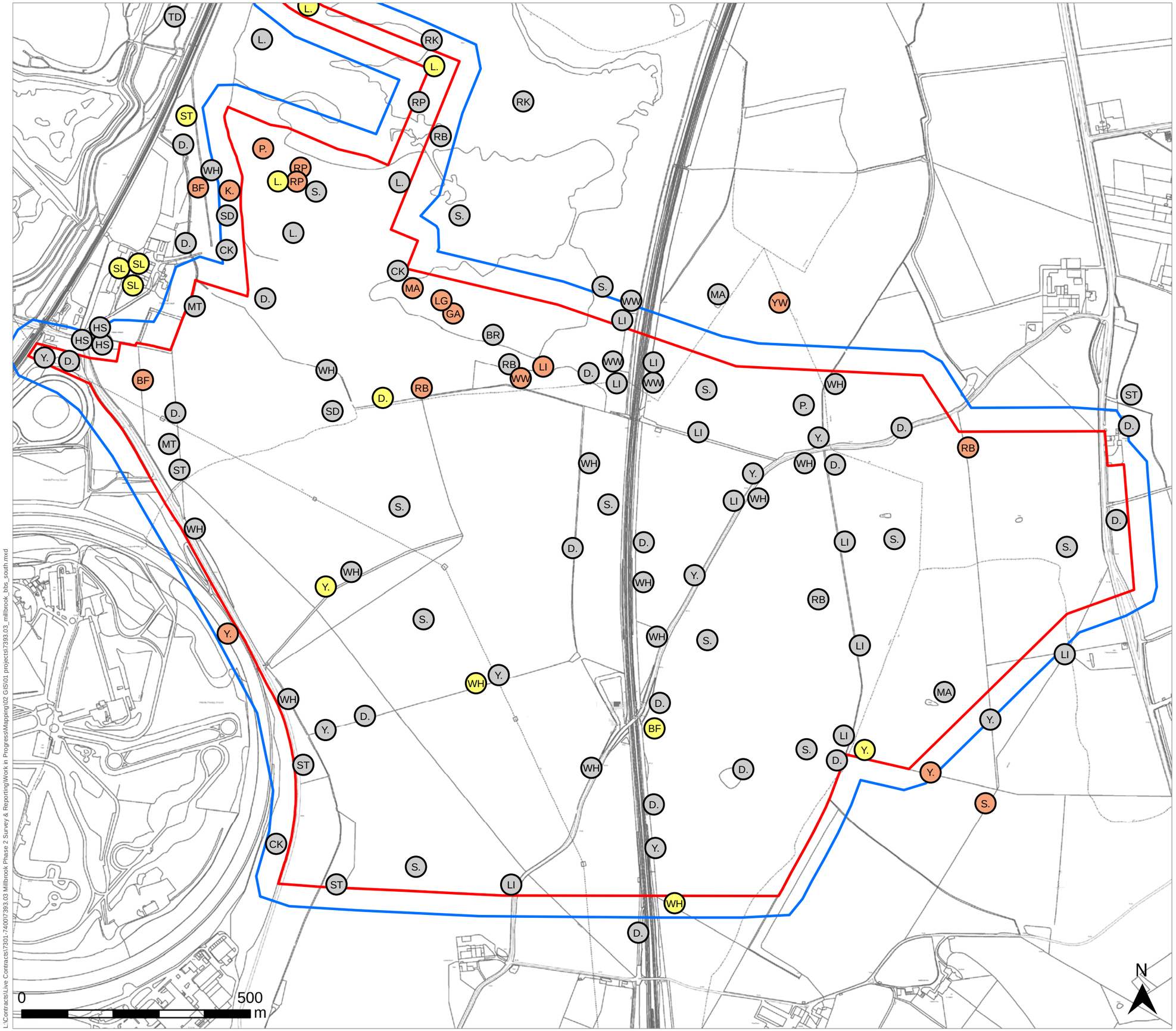
Figure 2: Breeding bird survey results (north)

DATE: 06/08/2014 CHECKED: PN SCALE: 1:7,000
DRAWN: COH APPROVED: JF STATUS: FINAL

LEGEND

- Project Site at the time of Scoping Report submission
- Survey Site Boundary
- Possible breeding
- Probable breeding
- Confirmed breeding



LEGEND

- Project Site at the time of Scoping Report submission
- Survey Site Boundary
- Possible breeding
- Probable breeding
- Confirmed breeding

BBS Species

BTO code	Species	Scientific name
BF	Bullfinch	*Pyrrhula pyrrhula*
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G.	Green woodpecker	*Picus viridis*
GA	Gadwall	*Anas strepera*
HS	House sparrow	*Passer domesticus*
K.	Kestrel	*Falco tinnunculus*
L.	Lapwing	*Vanellus vanellus*
LG	Little grebe	*Tachybaptus ruficollis*
LI	Linnet	*Carduelis cannabina*
MA	Mallard	*Anas platyrhynchos*
MT	Mistle Thrush	*Turdus viscivorus*
P.	Grey partridge	*Perdix perdix*
PO	Pochard	*Aythya ferina*
RB	Reed bunting	*Emberiza schoeniclus*
RK	Redshank	*Tringa totanus*
RP	Ringed plover	*Charadrius hiaticula*
S.	Skylark	*Alauda arvensis*
SD	Stock dove	*Columba oenas*
SL	Swallow	*Hirundo rustica*
ST	Song thrush	*Turdus philomelos*
TD	Turtle dove	*Streptopelia turtur*
TU	Tufted duck	*Aythya fuligula*
WH	Whitethroat	*Sylvia communis*
WW	Willow warbler	*Phylloscopus trochilus*
Y.	Yellowhammer	*Emberiza citrinella*
YW	Yellow wagtail	*Motacilla flava*

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Figure 3: Breeding bird survey results (south)

DATE: 06.08.2014 CHECKED: PN SCALE: 1:8,000
DRAWN: COH APPROVED: JF STATUS: FINAL

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Appendix 2: Species of Conservation Importance Recorded from the Desk Study

Common Name	Scientific Name	Date	Grid Ref.	Location and Distance from Site
Sparrowhawk	*Accipiter nisus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Common sandpiper	*Actitis hypoleucos*	2006	TL015407	On site (Rookery Clay Pit CWS)
Skylark	*Alauda arvensis*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Kingfisher	*Alcedo atthis*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Pintail	*Anas acuta*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Shoveller	*Anas clypeata*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Teal	*Anas cracca*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Wigeon	*Anas penelope*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Mallard	*Anas platyrhynchos*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Garganey	*Anas querquedula*	2008	TL0141	On site (Rookery Clay Pit CWS)
Gadwall	*Anas strepera*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Greylag goose	*Anser anser*	2008	TL0141	On site (Rookery Clay Pit CWS)
Meadow pipit	*Anthus pratensis*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Tree pipit	*Anthus trivialis*	2006	TL0140	On site (Rookery Clay Pit CWS)
Swift	*Apus apus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Grey heron	*Ardea cinerea*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Turnstone	*Arenaria interpres*	2008	TL0142	On site (Rookery Clay Pit CWS)
Short-eared owl	*Asio flammeus*	2008	TL0041	Adjacent to the west of the Survey Site.
Long-eared owl	*Asio otus*	2008	TL0041	Adjacent to the west of the Survey Site.
Little owl	*Athene noctua*	2004	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Pochard	*Aythya ferina*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Tufted duck	*Aythya fuligula*	2013	TL0140	On site (Rookery Clay Pit CWS)*

Common Name	Scientific Name	Date	Grid Ref.	Location and Distance from Site
Greater scaup	*Aythya marila*	2007	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Ferruginous duck	*Aythya nyroca*	2003	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Waxwing	*Bombycilla garrulus*	2005	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Bittern	*Botaurus stellaris*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Barnacle goose	*Branta leucopsis*	2007	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Goldeneye	*Bucephala clangula*	2008	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Buzzard	*Buteo buteo*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Sanderling	*Calidris alba*	2005	TL0140	On site (Rookery Clay Pit CWS)
Dunlin	*Calidris alpina*	2006	TL0140	On site (Rookery Clay Pit CWS)
Knot	*Calidris canutus*	2006	TL0140	On site (Rookery Clay Pit CWS)
Curlew sandpiper	*Calidris ferruginea*	2003	TL0041	Adjacent to the west of the Survey Site.
Little stint	*Calidris minuta*	2006	TL027430	Coronation Pit CWS, 1.1km to the north-east of the Survey Site.
Lesser redpoll	*Carduelis cabaret*	2005	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Linnet	*Carduelis cannabina*	2005	TL0041	Adjacent to the west of the Survey Site.
Goldfinch	*Carduelis carduelis*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Greenfinch	*Carduelis chloris*	2008	TL0141	On site (Rookery Clay Pit CWS)
Common redpoll	*Carduelis flammea*	2005	TL026385	In Ampthill Park CWS approximately 160m to the east of the Survey Site.
Siskin	*Carduelis spinus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Tree creeper	*Certhia familiaris*	2007	SP9938	Approximately 580m to the south-west of the Survey Site.
Cetti's warbler	*Cettia cetti*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Little ringed plover	*Charadrius dubius*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Ringed plover	*Charadrius hiaticula*	2008	TL0141	On site (Rookery Clay Pit CWS)
Black tern	*Chlidonias niger*	2008	TL0141	On site (Rookery Clay Pit CWS)
Black-headed gull	*Chroicocephalus ridibundus*	2013	TL0140	On site (Rookery Clay Pit CWS)*

Common Name	Scientific Name	Date	Grid Ref.	Location and Distance from Site
Marsh harrier	*Circus aeruginosus*	2014	TL0141	On site (Rookery Clay Pit CWS)*
Hen harrier	*Circus cyaneus*	2008	TL0142	On site (Rookery Clay Pit CWS)
Hawfinch	*Coccothraustes coccothraustes*	2005	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Stock dove	*Columba oenas*	2008	TL0141	On site (Rookery Clay Pit CWS)
Raven	*Corvus corax*	2008	TL015407	On site (within Rookery Clay Pit).
Quail	*Coturnix coturnix*	2006	TL0041	Adjacent to the west of the Survey Site.
Cuckoo	*Cuculus canorus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Whooper swan	*Cygnus columbianus*	2005	TL015407	On site (within Rookery Clay Pit).
Mute swan	*Cygnus olor*	2014	TL0140	On site (Rookery Clay Pit CWS)
House martin	*Delchion urbicum*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Great spotter woodpecker	*Dendrocopus major*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Lesser spotted woodpecker	*Dendrocopus minor*	2007	TL029381	In Ampthill Park CWS approximately 160m to the east of the Survey Site.
Little egret	*Egretta garzetta*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Corn bunting	*Emberiza calandra*	2004	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Yellowhammer	*Emberiza citronella*	2008	TL015407	On site (within Rookery Clay Pit).
Reed bunting	*Emberiza schoeniclus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Merlin	*Falco columbarius*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Hobby	*Falco subbuteo*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Kestrel	*Falco tinnunculus*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Red-footed falcon	*Falco vespertinus*	2012	TL0140	On site (Rookery Clay Pit CWS)
Pied flycatcher	*Motacilla alba*	2003	TL0041	Adjacent to the west of the Survey Site.
Brambling	*Fringilla montifringilla*	2006	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Fulmar	*Fulmarus glacialis*	2008	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Snipe	*Gallinago gallinago*	2014	TL0140	On site (Rookery Clay Pit CWS)*

Common Name	Scientific Name	Date	Grid Ref.	Location and Distance from Site
Moorhen	*Gallinula chloropus*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Black-throated diver	*Gavia arctica*	2007	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Great northern diver	*Gavia immer*	2006	TL004417	Adjacent to the west of the Survey Site.
Oystercatcher	*Haemotopus ostralegus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Swallow	*Hirundo rustica*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Little gull	*Hydrocoloeus minutus*	2008	TL0041	Adjacent to the west of the Survey Site.
Caspian tern	*Hydroprogne caspia*	2007	TL0041	Adjacent to the west of the Survey Site.
Great grey shrike	*Lanius excubitor*	2003	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Herring gull	*Larus argentatus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Common gull	*Larus canus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Lesser black-backed gull	*Larus fuscus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Iceland gull	*Larus glaucoides*	2007	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Glaucous gull	*Larus hyperboreus*	2007	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Great black-backed gull	*Larus marinus*	2004	TL015407	On site (within Rookery Clay Pit).
Mediterranean gull	*Larus melanocephalus*	2007	TL015407	On site (within Rookery Clay Pit).
Yellow-legged gull	*Larus michahellis*	2007	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Bar-tailed godwit	*Limosa lapponica*	2004	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Black-tailed godwit	*Limosa limosa*	2006	TL015407	On site (within Rookery Clay Pit).
Grasshopper warbler	*Locustella naevia*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Nightingale	*Luscinia megarhynchos*	2005	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Common scoter	*Melanitta nigra*	2004	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Smew	*Mergellus albellus*	2005	TL004417	Adjacent to the west of the Survey Site.
Goodsander	*Mergus merganser*	2003	TL004417	Adjacent to the west of the Survey Site.

Common Name	Scientific Name	Date	Grid Ref.	Location and Distance from Site
Red kite	*Milvus milvus*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Gannet	*Morus bassanus*	2004	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Pied wagtail	*Motacilla alba*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Grey wagtail	*Motacilla cinerea*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Yellow wagtail	*Motacilla flava flavissima*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Spotted flycatcher	*Muscicapa striata*	2006	TL004417	Adjacent to the west of the Survey Site
Red crested pochard	*Netta rufina*	2006	TL004417	Adjacent to the west of the Survey Site
Curlew	*Numenius arquata*	2005	TL015407	On site (within Rookery Clay Pit).
Whimbrel	*Numenius phaeopus*	2008	TL0141	On site (Rookery Clay Pit CWS)
Wheatear	*Oenanthe oenanthe*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Osprey	*Pandion haliaetus*	2006	TL015407	On site (within Rookery Clay Pit).
Bearded tit	*Panurus biarmicus*	2004	TL004417	Adjacent to the west of the Survey Site.
Tree sparrow	*Passer montanus*	2003	TL004417	Adjacent to the west of the Survey Site.
House sparrow	*Passer domesticus*	2008	TL0141	On site (Rookery Clay Pit CWS)
Grey partridge	*Perdix perdix*	2007	TL0141	On site (Rookery Clay Pit CWS)
Coal tit	*Periparus ater*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Shag	*Phalacrocorax aristotelis*	2005	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Cormorant	*Phalacrocorax carbo*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Grey phalrope	*Phalaropus fulicarius*	2007	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Ruff	*Philomachus pugnax*	2005	TL015407	On site (within Rookery Clay Pit).
Black redstart	*Phoenicurus ochruros*	2003	TL03	Within 2km of the Survey Site.
Redstart	*Phoenicurus phoenicurus*	2006	TL015407	On site (within Rookery Clay Pit).
Willow warbler	*Phylloscopus trochilus*	2013	TL0140	On site (Rookery Clay Pit CWS)*

Common Name	Scientific Name	Date	Grid Ref.	Location and Distance from Site
Green woodpecker	*Picus viridis*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Snow bunting	*Plectrophenax nivalis*	2007	TL0142	On site (Rookery Clay Pit CWS)
Golden plover	*Pluvialis apricaria*	2005	TL015407	On site (within Rookery Clay Pit).
Grey plover	*Pluvialis squatarola*	2007	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Slavonian grebe	*Podiceps auritus*	2004	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Great crested grebe	*Podiceps cristatus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Black-necked grebe	*Podiceps nigricollis*	2006	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Marsh tit	*Poecile palustris*	2006	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Dunnock	*Prunella modularis*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Bullfinch	*Pyrrhula pyrrhula*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Water rail	*Rallus aquaticus*	2005	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Avocet	*Recurvirostra avosetta*	2004	TL015407	On site (within Rookery Clay Pit).
Firecrest	*Regulus ignicapilla*	2004	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Goldcrest	*Regulus regulus*	2006	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Sand martin	*Riparia riparia*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Kittiwake	*Rissa tridactyla*	2004	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Whinchat	*Saxicola rubetra*	2006	TL015407	On site (within Rookery Clay Pit).
Stonechat	*Saxicola torquata*	2005	TL026385	In Ampthill Park CWS approximately 160m to the east of the Survey Site.
Woodcock	*Scolopax rusticola*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Nuthatch	*Sitta europaea*	2007	SP9938	Approximately 580m to the south-west of the Survey Site
Common tern	*Sterna hirundo*	2014	TL0140	On site (Rookery Clay Pit CWS)*

Common Name	Scientific Name	Date	Grid Ref.	Location and Distance from Site
Arctic tern	*Sterna paradisaea*	2006	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Sandwich tern	*Sterna sandvicensis*	2008	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Little tern	*Sternula albifrons*	2005	TL015407	On site (within Rookery Clay Pit).
Turtle dove	*Streptopelia turtur*	2012	TL0140	On site (Rookery Clay Pit CWS)*
Tawny owl	*Strix aluco*	2005	TL008425	Stewartby Lake CWS adjacent to the west of the Survey Site.
Starling	*Sturnus vulgaris*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Whitethroat	*Sylvia communis*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Little grebe	*Tachybaptus ruficollis*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Shelduck	*Tadorna tadorna*	2006	TL015407	On site (within Rookery Clay Pit CWS).
Spotted redshank	*Tringa erythropus*	2005	TL015407	On site (within Rookery Clay Pit CWS).
Wood sandpiper	*Tringa glareola*	2004	TL015407	On site (within Rookery Clay Pit CWS).
Greenshank	*Tringa nebularia*	2005	TL015407	On site (within Rookery Clay Pit CWS).
Green sandpiper	*Tringa ochropus*	2005	TL015407	On site (within Rookery Clay Pit CWS).
Redshank	*Tringa totanus*	2005	TL015407	On site (within Rookery Clay Pit CWS).
Redwing	*Turdus iliacus*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Song thrush	*Turdus philomelos*	2008	TL0141	On site (Rookery Clay Pit CWS)
Fieldfare	*Turdus pilaris*	2014	TL0140	On site (Rookery Clay Pit CWS)*
Ring ouzel	*Turdus torquatus*	2008	TL0042	Stewartby Lake CWS adjacent to the west of the Survey Site.
Mistle thrush	*Turdus viscivorus*	2013	TL0140	On site (Rookery Clay Pit CWS)*
Barn owl	*Tyto alba*	2006	TL004417	Adjacent to the west of the Survey Site
Lapwing	*Vanellus vanellus*	2014	TL0140	On site (Rookery Clay Pit CWS)*

* = Species incidentally recorded during great crested newt survey and translocation works undertaken at the Rookery Pit between 2011 and 2014.

8.5 – Bats, Otter, Badger and Water Voles Report

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Mammal Survey Report

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Client	Millbrook Power Limited
Job	Millbrook Power Plant
Report title	Mammal Survey Report
Draft version/final	FINAL
File reference	7393.03_MPL- Appendix 8 5_ Mammal Report MC ER JW JF 021114

	Name	**Position**	**Date**
Originated	John Woods	Ecologist	31 July 2014
Reviewed	Jim Fairclough	Principal Ecologist	13 August 2014
Updated	John Woods	Ecologist	03 November 2014
Approved for issue to client	Jim Fairclough	Principal Ecologist	02 December 2014
Issued to client	Jim Fairclough	Principal Ecologist	02 December 2014

Contents

1 Summary

1.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

1.2 MPL commissioned BSG Ecology to undertake a suite of mammal surveys, specifically badger, bats, otter and water vole, in habitats within the red-line boundary of the Project Site as reported in the Project Scoping Report (the 'Survey Site') and for bats, extended to include South Pillinge Farm. The purpose of the surveys was to inform and support an application for Development Consent for the Power Generation Plant. A supporting desk study and literature review was also conducted, which covered the Project Site and land up to 2 km from this.

1.3 The desk study revealed the presence badger, otter and water vole activity around The Rookery Clay Pit CWS and roosting bats in buildings at South Pillinge Farm.

1.4 The badger survey identified the presence of a 6-entrance main / subsidiary badger sett within the Survey Site.

1.5 Evidence of bat activity was widely recorded across the Survey Site; however, the access track to the north of the Survey Site returned the highest number of records, primarily from the automated detector surveys. Several small, non-breeding summer roosts of common and soprano pipistrelle bats and brown long-eared bat were identified at South Pillinge Farm.

1.6 No evidence of otter or water vole activity was found within the Survey Site.

2 Introduction

2.1 Millbrook Power Limited (MPL) is promoting a new Power Generation Plant, with the Power Generation Plant Site located primarily on land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land to the south and east.

Site Description

2.2 The Project Site, in which the Project would be located, comprises land within former clay pits known as 'The Rookery', and the Gas and Electrical Connections extending from The Rookery into the surrounding agricultural land. The approximate centre of the Project Site lies at grid reference 501373, 240734, which is situated between Bedford and Milton Keynes.

2.3 The Survey Site for the badger survey comprised the red-line boundary of the Project Site as reported in the Project Scoping Report (see Figure 1). The Survey Site for the otter and water vole survey included all watercourses or ditches within the Project Site (see Figure 5). The Survey Site for the bat surveys included the red-line boundary of the Project Site, extended to include South Pillinge Farm, located close to the north western boundary of the Project Site (see Figures 2a and 2b and Figure 3). The main habitats within the Survey Site are arable fields with boundaries delineated by hedgerows, ditches, minor roads and lanes. To the north, an area of land exists that is in the process of being restored as part of a Low Level Restoration Scheme (LLRS) by the landowner. At the time of survey, in spring and summer of 2014, this area included sparsely vegetated ground, swamp and bare earth. Towards the end of 2014, it is expected to comprise just bare earth following bulk movement of soils that are required for the LLRS.

Description of Project

2.4 The Power Generation Plant would operate as a Simple Cycle Gas Turbine (SCGT) peaking plant and would be designed to provide an electrical capacity of up to 299 Megawatts (MW). It would be fuelled by natural gas, supplied by a new underground gas pipeline connecting the Power Generation Plant to the existing National Grid Gas (NGG) National Transmission System (NTS). It will connect to the National Grid Electrical Transmission System (NETS) via underground cable or overhead lines.

2.5 BSG Ecology was appointed as the ecological consultant to undertake a preliminary ecology survey, which included a desk study and Extended Phase 1 Habitat Survey. This identified the need to undertake a suite of Phase 2 surveys in order to fully assess the nature conservation value of the Project Site, including mammal (badger, bat, otter and water vole) surveys. These baseline surveys will be included in an appendix to an ecology chapter of an Environmental Statement, which will be submitted, as an integral part of the application for Development Consent.

Aims of Study

2.6 The aims of the mammal surveys were to identify whether protected or noteworthy[1] mammal species, specifically badger, bats, otter and water vole, are present within the Survey Site, and where present, to obtain an understanding of abundance and distribution.

[1] e.g. brown hare, hedgehog and harvest mouse (all listed at s. 41; NERC Act 2006)

3 Methods

Desk Study

3.1 Existing ecological information regarding protected and notable species was requested from the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BRMC) covering the Survey Site and land up to 2 km away. This information was supplemented by previous survey and mitigation work undertaken by BSG Ecology on The Rookery Clay Pit CWS, including land within and immediately north of the Survey Site (PBA, 2009; BSG Ecology 2013).

Badgers

3.2 A dedicated badger survey was conducted by Greg Chamberlain and Dr Jim Fairclough on 30 July 2014. Where possible all areas of the Survey Site (see Figure 1, Appendix 1) were accessed. The survey involved walking over the Survey Site, searching for evidence of badgers and badger activity. Evidence searched for included sett entrances, latrine pits, foraging holes, paw prints, pathways in vegetation and badger hairs caught on fencing or vegetation. The dedicated survey conducted on 30 July 2014 was also supplemented with incidental records, taken during other species surveys (e.g. reptile surveys) conducted on a number of occasions in 2014.

3.3 Once a sett was discovered, an indication of the level of activity (following Neal and Cheeseman, 1996) was also made, as follows:

- Active – active sett entrances contain no debris or vegetation, are obviously regularly used and often show signs of having been recently excavated.
- Partially used – partially used entrances are those not in regular use, and which may have debris (leaf litter, twigs, moss, etc.) around the entrance. However, they could potentially be used regularly in the future with minimal clearance necessary.
- Disused – disused sett entrances show signs of not having been used for a considerable period of time and would not be used again without extensive clearance by a badger.

3.4 Several categories of badger setts have been identified (Neal and Cheeseman, 1996). These are described as follows:

- Main setts are defined as setts with five or more entrance holes and which show evidence of use throughout the year. Main setts are associated with large spoil heaps and well-trodden paths.
- Annexe setts – These setts are intermediate-sized and may be used by breeding badgers. These setts are normally close to a main sett (within 150 m of the main sett and connected to it by obvious paths).
- Subsidiary setts – These are similar to annexe setts but are likely to be further away (at least 150 m from the main sett and not as well connected to the main sett as annexe setts).
- Outlier setts – Outlier setts are small setts with one or two entrance holes which are used sporadically by badgers as a temporary refuge. There may be several outlier setts within one badger social group's territory.

3.5 In addition to badger setts, other evidence of badgers was also recorded. This included:

- live or dead badgers;
- foraging scrapes (distinctive excavations made by badgers when searching for food);
- badger dung;
- dung pits (a badger will often deposit its dung within a small excavated pit);
- latrines (a collection of dung pits);
- badger guard hairs;
- pathways; and

- badger tracks (footprints).

Limitations to Methods

3.6 For health and safety reasons it was not possible to access Bletchley to Bedford rail land to check for badger activity close to the railway line. It is not thought that this presents a significant constraint, as likely presence of badgers could be confirmed through evidence such as large spoil heaps, latrines and pathways adjacent to (or beneath) the railway boundary fence.

Bats

3.7 The arable habitats covering the majority of the Survey Site are considered to provide limited foraging opportunities for bats; however, the hedgerows, wooded copses and ditches were identified as being likely to provide a suitable commuting and foraging resource for bats in the wider landscape. Overall, the Survey Site has been assessed as being of 'Low Habitat Quality' according to the current best practice bat survey guidelines (Hundt, 2012). Therefore a range of methods were used at the appropriate level of survey effort as recommended by the guidelines:

- Walked transects; and
- Automated detector surveys.

3.8 In addition, buildings at South Pillinge Farm were surveyed for presence / likely absence of bats, and where present, to characterise the type of roost (e.g. number and species of bat using the roost). The following methods were used:

- Internal and external building inspection; and
- Dusk emergence and pre-dawn re-entry roost surveys.

Bat Activity Surveys

Walked transects

3.9 Seasonal walked surveys of two pre-determined transect routes (northern and southern) were undertaken in May (spring), July (summer) and September (autumn) 2014. Each transect started 15 minutes before sunset and took approximately 2-3 hours to complete. The timing of the surveys therefore covers the bat emergence period and the period of most intense foraging activity when invertebrate prey is most abundant (Altringham, 2003).

3.10 The same transect route was walked on each survey visit with the start points and direction changed on each visit to ensure that different parts of the Survey Site were surveyed at different times of the night. This approach was adopted to remove any bias that could be introduced into the survey data if each transect was walked in the same direction. This bias could otherwise have resulted in any given point on the transect route being visited at approximately the same interval after sunset. Static recording points were selected for each of the transects. At these points the surveyor stood for 3 minutes to listen and record all bat passes, using bat detectors.

3.11 Bat activity was recorded using Anabat hand-held electronic bat detectors. This model of detector automatically records all the bat passes they detect, which significantly reduces the chances that bats could be missed due to human error. Wherever possible, surveyors recorded the observed behaviour and numbers of bats onto a field proforma. This was to aid identification and also to provide additional detail on the behaviour of observed bats. Field notes included a record of the time of each bat encounter, allowing results to be cross-referenced with the recorded data.

3.12 Details of the walked transect surveys are summarised in Table 1. A map of walked transect routes is presented in Figures 2a and 2b (Appendix 1). The main aim of the transect walks was to determine the location of areas of high bat activity, such as foraging areas and/or commuting routes (e.g. ditches and hedgerows). Accordingly, the selected transect routes focussed on such areas.

3.13 All walked transects avoided heavy rain, strong winds and dusk temperatures below 10^{o}C as recommended in the BCT guidelines (Hundt, 2012). Dates of the survey visits along with survey timings and weather conditions are provided in Table 2. Surveys were undertaken by Dr Tom Flynn

(TF) MCIEEM, Greg Chamberlain (GHC) MCIEEM, John Woods (JW) GradCIEEM, Peter Newbold (PN) MCIEEM Tom Chapman (TC), Stuart Elsom (SE), David Kent (DK), Francesca Morini (FM) and Ross Crates (RC) (Table 1).

Table 1: Survey dates, times, personnel and weather conditions recorded during the bat activity transect surveys.

Date of transect	Time		Rain		Cloud Oktas scale (0-8)		Temperature ºC		Wind	
	Start	End	Start	End	Start	End	Start	End	Start	End
19 May 2014	20:53	23:08	N	N	3	3	20	17	Light	Light
Personnel	TF, JW, SE and RC									
22 July 2014	20:30	23:07	N	N	2	2	17	16	Mode-rate	Mode -rate
Personnel	GHC, JW, TC and SE									
17 September 2014	18:58	21:13	N	N	5	5	18	17	Light	Light
Personnel	JW, PN, DK and FM									

Automated detector surveys

3.14 In addition to the transect surveys, automated detector surveys were conducted using Wildlife Acoustics Song Meter 2 (SM2) bat detectors. These detectors are also full spectrum detectors that are triggered automatically to record bat echolocation calls. These detectors can be deployed and left to remotely record bat activity for a period of several nights.

3.15 Two SM2 detectors (Statics 1 and 2) were deployed, to assess bat activity along the vehicular track in the north west of the Survey Site and a section of scattered scrub approximately 100 m to the east of South Pillinge Farm, to supplement data from the transect surveys. The locations of Statics 1 and 2 are shown on Figure 2a (Appendix 1).

3.16 The detectors were deployed for four consecutive nights at each of the locations, which allowed continuous monitoring to take place during the period when bats are active, i.e. sunset to sunrise. They were programmed to begin recording from half an hour before sunset until half an hour after sunrise. Survey hours varied throughout the survey season according to daylight hours and have been calculated for each recording session in order to accurately calculate activity indices.

3.17 The automated detectors were deployed for the following dates: 30 May to 3 June 2014, 22 to 26 July 2014 and 17 to 21 September 2014. This corresponded to approximately 202 survey hours.

Bat call analysis

3.18 Recorded bat calls were analysed using Analook software to confirm the identity of the bats present. Where possible, the bat was identified to species level. Records of long-eared bats *Plecotus* sp. were not identified to species level due to the overlapping call parameters of the two native species but were assumed to refer to brown long-eared bats. It is possible that grey long-eared bat *Plecotus austriacus* may occasionally occur in the region, but given the species' known distribution (Swift & Entwistle 2008), it is highly unlikely. In addition, no records of this species were found from the desk study. Species of the genus *Myotis* were grouped together due to many of the species having overlapping call parameters making species identification problematic (Hundt, 2012).

3.19 For *Pipistrellus* species the following criteria, based on measurements of peak frequency, were used to classify calls:

- Common pipistrelle ≥42 and <49 kHz
- Soprano pipistrelle ≥51 kHz
- Nathusius' pipistrelle <39 kHz
- Common pipistrelle / soprano pipistrelle ≥49 and <51 kHz

- Common pipistrelle / Nathusius' pipistrelle ≥39 and <42 kHz

3.20 In addition, the following categories were used for calls which could not be identified with confidence due to the overlap in call characteristics between species or species groups:

- *Myotis* sp./brown long-eared bat;
- *Nyctalus* sp. (either Leisler's bat or noctule); and
- *Eptesicus*/*Nyctalus* sp. (either serotine, noctule or Leisler's bat).

3.21 The Analook software enables analysis of the relative activity of different species of bats by counting the minimum number of bats recorded within discrete sound files. For the purposes of this analysis, the recording of one or more passes by a single species of bat within a 15 second sound file is counted as a single bat pass (B). During analysis of sound files, it was possible to estimate the minimum number of bats recorded on individual sound files but not whether consecutive sound files had recorded, for example, a number of individual bats passing as they commute to a feeding habitat or one bat calling repeatedly as it flies up and down a hedgerow, for instance. Therefore, relative abundance of bats cannot be estimated from this analysis, but the number of bat passes does reflect the relative importance of a feature/habitat to bats by assigning a level of bat activity that is associated with that feature, regardless of the type of activity. In this analysis, bat passes per hour (B/h) has been used as a measure of 'relative activity'.

Limitations to methods

3.22 The aim of automated detector monitoring was to collect 4 nights of data in each season (spring, summer and autumn). However, during the summer survey in July the SM2 unit located at static position 2 (S2) failed during the third night of monitoring. Given that the measure of 'relative activity' used in this analysis is bat passes per hour, it was still possible to extract useful data, albeit based on a reduced sample size. This is therefore not considered a significant constraint.

Roost Surveys

Internal and external building Inspection

3.23 On 19 May 2014 an internal and external building inspection survey was undertaken at South Pillinge Farm by Laura Grant (Natural England Bat Licence no. CLS001496). Ten buildings (Buildings B1 – B10) (see Figure 3, Appendix 1) were inspected to assess their potential to support roosting bats and to search for evidence of bat activity.

3.24 During the survey a thorough search was made of the buildings including all accessible areas and crevices for bats, their droppings, food remains or characteristic grease marks at potential roost exit/entrance points. The exterior of the buildings were searched, paying particular attention to window ledges, where droppings can gather undisturbed, and under potential roost access points, such as loose tiles and gaps between boarding. Where possible, internal inspections were also undertaken.

3.25 Signs of bat activity searched for included:

- Live bats;
- Droppings;
- Urine spots;
- Feeding remains (e.g. discarded wings of flying invertebrates);
- Oil staining;
- Smell;
- Daytime vocalisations;
- Absence of cobwebs (a well-used bat roost and its access points are typically clear of cobwebs);
- Scratching;

- Dead bats; and
- Tracks in dust (by a roost).

3.26 All buildings were assigned a category defining their potential to support roosting bats in accordance with Table 2 below.

Table 2: Categories of bat potential of buildings

Level of Bat Potential	Rationale
Negligible	Building with no or very limited roosting opportunities for bats, no evidence of use by bats and where the feature is isolated from foraging habitat.
Low	Building with a limited number of roosting opportunities, no evidence of current use by bats and with poor connectivity to foraging habitat.
Medium	Building with some roosting opportunities, with no evidence of current use by bats and with connectivity to moderate – high quality foraging habitat.
High	Building with multiple roosting opportunities for one or more species of bat, and with good connectivity to high quality foraging habitat.
Confirmed Roost	Presence of bats or evidence of recent use by bats.

Bat emergence and re-entry surveys

3.27 In order to establish the presence/likely absence of bat roosts within the buildings, and to establish the species and number of bats using the buildings, one dusk emergence and one pre-dawn re-entry survey was undertaken. These surveys covered those buildings where either a bat roost had been found or where the building was assessed as having medium or high potential to support roosting bats. Surveys involve ecologists watching and listening for bats leaving their roosts at dusk (emerging) and / or returning to a roost pre-dawn (re-entry).

3.28 From the inspection survey two buildings were found to contain bat roosts / have high potential to support bat roosts and three buildings were deemed to have medium potential to support roosting bats. In order to adequately survey these five buildings, eight surveyors were utilised for the surveys. Surveyors were positioned outside the buildings at points where potential bat access points could be observed.

3.29 Surveyors were equipped with an Anabat bat detector to enable the bat calls to be recorded to assist with species identification. The recorded calls were then analysed using Analook sonogram software.

3.30 Dates of the survey visits along with survey timings and weather conditions are provided in Table 3. Surveys were led by Laura Grant (LG) (Natural England Bat Licence no. CLS001496) and Hannah Bilston (HB) (Natural England Bat Licence no. CLS00548). The survey team comprised Dr Jim Fairclough (JF) MCIEEM, Greg Chamberlain (GHC) MCIEEM, John Woods (JW) Grad CIEEM, Tom Chapman (TC), Stuart Elsom (SE), Francesca Morini (FM), David Kent (DK), Glyn Brown (GB), Jamie Peacock (JP) and Ross Crates (RC) (Table 1).

Table 3. Emergence and re-entry survey details.

Survey	Date	Personnel	Start Time	End Time	Weather
Pre-dawn re-entry	23 July 2014	LG, JW, GHC, TC, SE, RC, FM and GB	03.10	05.10	Temp ºC: 21 Wind: light Rain: none Cloud cover: none
Dusk emergence	30 July 2014	HB, JF, GHC, JP, SE, RC, FM, DK,	20.41	22.56	Temp ºC: 21 Wind: light

					Rain: none Cloud cover: none

Limitations to Methods

3.31 During the pre-dawn re-entry survey on 23 July 2014, one Anabat failed. As a result, one surveyor (Laura Grant, positioned at VP2) used a BatBox Duet detector and, in the absence of a recording device, undertook species identification in the field. Laura Grant is a highly experienced, licenced bat worker, skilled in species identification. As such, an absence of bat call recordings is not considered a significant constraint.

Otter and Water Vole

Otter and water vole survey

3.32 An otter and water vole survey was undertaken at the site on 19 May 2014, which coincides with the spring peak levels of activity for water vole (Strachan *et al.*, 2011). The survey was undertaken by Dr Jim Fairclough MCIEEM, assisted by Greg Chamberlain MCIEEM and John Woods GradCIEEM. The weather during the survey was dry, with intermittent sun and a light wind.

3.33 Ditches present across the Survey Site were surveyed for water vole and otter. This included an assessment of the suitability of each section of ditch for water vole. The survey covered approximately 2.3 km of ditch, as shown on Figure 5 (Appendix 1). Each ditch was searched for evidence of water vole following best practice guidance provided in the *Water Vole Conservation Handbook* (Strachan *et al*., 2011). This included visual searches for the following signs:

- Latrines - comprising a concentration of droppings in discrete locations, often near nest sites, at range boundaries or at places used to enter and exit the water;
- Feeding stations - comprising neat piles of chewed lengths of vegetation, usually up to 10 cm in length, on pathways or haul-out locations;
- Burrows - these are typically found along the water's edge and on top of the bank (up to 5 m from the water's edge) and are 4-8 cm in diameter. Holes on top of the banks often have 'lawns' around them (areas of grazed vegetation); and
- Footprints - located in soft mud or silt.

3.34 In addition, any evidence of otter, such as droppings ('spraints'), runs, holts and footprints, was recorded.

3.35 One section of ditch within the Survey Site, north west of Ditch 2b (see Figure 5, Appendix 1), was not surveyed during the present (2014) surveys. This is due to the ditch being within the area being restored as part of the LLRS. Water vole was not recorded as being present in this ditch section during surveys completed in 2008 and 2009 (PBA, 2009).

Other Notable Mammal Species

3.36 During surveys targeted at other species, incidental observations of other notable mammal species of principal importance (s. 41; NERC Act 2006) were recorded.

4 Results and Interpretation

Badger

Desk study

4.1 BSG Ecology undertook badger surveys in September 2008 (PBA, 2009). These surveys identified the presence of badger latrines within The Rookery Clay Pit CWS; however, no evidence of badger setts were identified.

4.2 A foraging badger was noted within scrub between the northern and southern halves of the Rookery Clay Pit CWS approximately 500 m to the east of the proposed access track, during great crested newt surveys of Rookery North Pit in 2013 (BSG Ecology, 2013).

Badger survey

4.3 An active badger sett comprising six well-used entrances was identified within a small copse within the Survey Site, as shown on confidential Figure 1, Appendix 1. Given the absence of other badger setts within the Survey Site, this is likely to be a main or subsidiary sett. Mammal tracks of indeterminable origin, and therefore possibly attributable to badger, and two atypical latrines (probably badger) were also identified within the Survey Site, as shown on confidential Figure 1, Appendix 1.

Bats

Desk study

4.4 In 2008, BSG Ecology undertook activity surveys, building and tree inspection surveys and dusk emergence/dawn return to roost surveys for bats at The Rookery Clay Pit CWS and the surrounding area (PBA, 2009). The activity surveys recorded an assemblage of eight species of bat foraging and/or commuting within and around the northern half of the Rookery Clay Pit CWS. These species included common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus* and Nathusius' pipistrelle *Pipistrellus nathusii*; noctule *Nyctalus noctula*; serotine *Eptesicus serotinus*; barbastelle *Barbastella barbastellus*; Leisler's bats *Nyctalus leisleri* and a *Myotis* spp. Buildings at South Pillinge Farm were also assessed to determine the presence / likely absence of roosting bats.

4.5 Of the buildings that were surveyed, five were found to contain evidence of the presence of bats. The farmhouse was found to support a brown long-eared *Plecotus auritus* roost in the loft. A small number of bats were seen during the survey, and droppings were found that were thought to be from this species only (PBA, 2008).

4.6 The desk study (BRMC) also provided records of nine species of bats from within a 2 km radius of the Survey Site. The closest of these were a noctule bat found on a tree 150 m to the west of the Survey Site in 2012 and a Daubenton's bat *Myotis daubentonii* from 300 m to the west in 2009.

Walked transects

4.7 A least six bat species were recorded during the walked transect surveys (walked transects) undertaken to date. The confirmed species or species groups include:

- *Myotis* spp.;
- Noctule;
- Barbastelle;
- Nathusius' pipistrelle;
- Common pipistrelle; and
- Soprano pipistrelle.

4.8 Bat passes recorded during the transect surveys each month are summarised in Table 4 below. Locations of bat passes recorded during the walked transects are summarised (i.e. only one point is displayed where multiple passes of the same species were heard at one location) on Figures 2a and 2b.

Table 4: Bat species recorded (and number of soundfiles) during two walked transects (Northern and Southern) per survey (month)

Species	**May**		**July**		**September**		**Total**	**%**
	Northern	**Southern**	**Northern**	**Southern**	**Northern**	**Southern**		
Noctule	0	1	7	8	0	0	16	5.1
Barbastelle	0	0	0	0	2	0	2	0.6
Myotis spp.	3	0	2	2	2	2	11	3.5
Nathusius' pipistrelle	0	0	5	0	1	0	6	1.9
Nathusius' / common pipistrelle	0	0	0	0	3	3	6	1.9
Common pipistrelle	17	14	15	19	22	61	148	47.1
Common / soprano pipistrelle	0	0	0	0	9	28	37	11.8
Soprano pipistrelle	6	20	16	15	21	10	88	28.0
Total	**26**	**35**	**45**	**44**	**60**	**104**	**314**	**100**

4.9 The northern transect focussed on the access track that runs along the western edge of The Rookery Clay Pit CWS, the wet ditch and plantation edge to the south of The Rookery Clay Pit CWS, South Pillinge Farm and an area of plantation woodland to the south of this (Figure 2a, Appendix 1). The southern transect focused on field margins and hedgerows within the central section of the Survey Site (Figure 1b, Appendix 1). Relative activity levels were similar on both transects.

4.10 During the transect surveys, common and soprano pipistrelle bats were the most frequently recorded bat species accounting for 47.1% and 28% of all the bat calls recorded respectively. These were encountered commuting across the Survey Site and foraging along hedgerows and plantation woodland edges. Six Nathusius' pipistrelle calls were recorded, 5 of which were detected at South Pillinge Farm and one of which was detected near the northernmost point of the Survey Site.

4.11 Calls of species other than pipistrelles were only recorded in very low numbers during the walked transect surveys. The patterns of activity of these species recorded during the walked transects are discussed in the following paragraphs.

4.12 Noctule were recorded in May and July and account for 5.1% of all recorded calls. Most of the noctule calls were recorded in July, these were bats commuting over the site.

4.13 *Myotis* species were also recorded in May, July and September, with 3, 4 and 4 calls recorded respectively, accounting for 3.5% of the total calls recorded. *Myotis* calls were encountered scattered in pockets throughout the Survey Site including along the access track to the west of The Rookery Clay Pit CWS, near the woodland plantation to the south of The Rookery Clay Pit CWS and near South Pillinge Farm.

4.14 Barbastelle account for 0.6% of all recorded calls, with only two passes being recorded, Both barbastelle passes were recorded in September on the northern transect on the access track to the west of The Rookery Clay Pit CWS.

4.15 Most of the species were recorded outside typical roost emergence times (see Table 5, below). Some *Myotis* species calls during the July transect were recorded before 70 minutes after sunset which is within the typical emergence period for this species group (typically between 30 and 70 minutes after sunset) indicating the species may be roosting within or near to the Survey Site (Hundt, 2012).

Table 5. Proximity of first bat passes to sunset.

Species	Typical Emergence Time (Hundt, 2012)	Minutes after sunset of closest bat call to sunset.
Pipistrelle species bat	From approximately 30 mins after sunset	52 minutes
Noctule	Early evening in daylight, to sunset	35 minutes
Myotis species	Typically between 30 and 70 minutes after sunset	67 minutes
Barbastelle	Typically between 20 and 60 minutes after sunset	116 minutes

Automated detector surveys

4.16 The two static bat detectors were deployed in the following locations across the Survey Site as shown on Figure 2a, Appendix 1:

- Static (S) S1 on a section of scattered scrub approximately 100 m to the east of South Pillinge Farm;
- Static (S) S2 on the vehicular track in the north west of the Survey Site.

4.17 A total of at least nine bat species were recorded during the periods of static detector monitoring. These species were as follows:

- Barbastelle;
- Long-eared species;
- *Myotis* spp.;
- Noctule;
- Leisler's;
- Serotine;
- Nathusius' pipistrelle
- Common pipistrelle; and
- Soprano pipistrelle.

4.18 The bat data recorded during the automated detector monitoring periods for each survey period are summarised in Table 6 below.

Table 6. Automated detector survey results.

Species/species group	Relative activity (Bat passes/hour)						Total number of passes
	May		July		September		
	Static 1	Static 2	Static 1	Static 2	Static 1	Static 2	

Barbastelle		0.63			0.11	0.11	29
Noctule		0.33	0.68	3.02	0.15	0.26	104
Leislers' bat			0.06	0.23		0.02	7
Nyctalus sp.			0.18		0.02	0.07	10
Serotine		0.03				0.04	3
Long-eared bat			0.28	0.34	0.07	0.13	24
Long-eared bat / serotine		0.03	0.03	0.06			3
Long-eared bat / *Myotis* sp. bat		0.10	0.06	0.57		0.15	22
Myotis sp. bat		8.40	0.06	0.91	0.30	0.91	329
Nathusius' pipistrelle		0.03	0.06	0.06		0.07	7
Nathusius' / common pipistrelle		0.07		0.06	0.02		4
Common pipistrelle		63.89	4.78	11.69	2.06	21.11	3369
Common / soprano pipistrelle		5.99	0.80	0.63	0.26	1.28	290
Soprano pipistrelle		141.90	3.91	30.4	2.45	7.69	5437
Species unidentified		0.13					4
Passes/hour	**0**	**221.39**	**10.91**	**47.97**	**5.44**	**31.83**	
Total number of passes	**0**	**6723**	**354**	**841**	**251**	**1469**	**9638**

4.19 As with the transect survey findings, the static monitoring survey data clearly show that common and soprano pipistrelle bats were the bat species most frequently recorded, accounting for 9,096 (3,369 common pipistrelle, 5,437 soprano pipistrelle and 290 either common or soprano pipistrelle) out of 9,638 bat calls from the static detectors combined, which equates to over 94% of the total bat calls recorded during automated detector surveys.

4.20 *Myotis* species were the second most frequent bat species/groups recorded during static monitoring. However, compared with the common pipistrelle, the level of activity recorded by static detectors was much lower with an overall total of 329 calls accounting for 3.4% of the total activity.

4.21 The next most frequently recorded species were noctule, barbastelle and long-eared bat sp. with a total of 104, 29 and 24 calls recorded across the whole monitoring period accounting for 1.1%, 0.3% and 0.2% respectively, of all calls recorded during the static surveys. Noctule bats and possibly long-eared (only long-eared species calls with parameters overlapping with serotine and *Myotis sp*. bats were recorded during the May period) were recorded in all months, albeit in low numbers. Barbastelle were only recorded during the May and September survey periods.

4.22 Nathusius' pipistrelle, Leisler's bat and serotine each accounted for less than 0.1% of all calls recorded, with 7, 7 and 3 calls recorded respectively.

4.23 Bat activity was considerably higher at S2 than at S1. During the May survey period, bat passes (of all species) occurred at a rate of 221.39 passes per hour at S2, whereas as no passes were recorded at S1. During the July survey period, whilst overall bat activity was lower than in May, bat activity at S2 (47.97 passes per hour) was again higher than at S1 (10.91). During the September survey period overall bat activity was lower than in July or May. Bat activity at S2 (31.83 passes per hour) was higher than at S1 (5.44 passes per hour). This is largely due to significantly higher common and soprano pipistrelle bat activity at S2 than S1.

Internal and external building inspection

4.24 The assessment of roosting potential for each of the buildings located at South Pillinge Farm is shown in Figure 3, Appendix 1. The findings of the external, and where applicable internal inspection, are described in Table 7 below.

4.25 Two buildings (Buildings B5 and B6) were assessed as offering high potential to support roosting bats due to multiple roosting opportunities and immediate connectivity with suitable foraging habitat. Buildings B5 and B6 both contained evidence of use by bats. Building B5 offers a large number of external roosting opportunities and access to open internal roof structures. Building B6 offers external roosting opportunities and potential access to an internal roost space. Whilst no internal inspection was undertaken in Building B6, the desk study revealed that a brown long-eared bat roost was present in the loft (PBA, 2009). Discussion with the farmer indicated that, at the time of survey, this roost was still present.

4.26 Three buildings (Buildings B3, B8 and B10) were assessed as offering a medium potential to support roosting bats due to several roosting opportunities and immediate connectivity with suitable foraging habitat. A further four buildings were assessed as offering a low potential to support roosting bats due to a limited number of features suitable for roosting bats (Buildings B1, B2, B4 and B7).

4.27 One building (Building B9) was assessed as offering negligible potential to support roosting bats due to a lack of features capable of supporting roosting bat.

Table 7: Results of the Bat Building Inspection

Building Ref.	Building Description	Features with potential to support roosting bats	Evidence of bat use?	Overall Assessment of Roost Potential
B1	Steel-framed barn with pitched, corrugated concrete roof and cladding on upper sections of wall. Walls constructed from galvanised steel. Lean-to (single storey height) attached to southern gable end. Northern end of building of brick construction.	One small gap in brickwork near south east corner of northern section.	Two pipistrelle droppings attached/stuck to eastern wall. One pipistrelle dropping found on pile of bricks stacked adjacent to eastern wall of barn.	Low
B2	Steel-framed barn with pitched, corrugated concrete/asbestos roof. East gable end of brick cavity wall construction.	Cobweb filled gaps in east gable end brickwork. No obvious roost features with signs of use by bats.	None	Low
B3	Wooden barn / shed. Wooden clad walls and roof. Broken soffit box on north east corner of building. Wooden cladding on northern gable end in state of disrepair.	Access to cavity, which may extend up to roof height, behind wooden cladding on northern gable end. Cavity under ridge 'tiles' if access is available.	Collection of moth wings on floor beneath joist. Five pipistrelle droppings on stored materials to east of building 3.	Medium
B4	Brick walled barn with corrugated concrete/asbestos roof and steel frame. Large access to interior (open sliding door), large open windows	None	Five pipistrelle droppings on white sheet inside barn at northern end of building interior. Likely to be from light sampling / foraging bats.	Low
B5	Barn of brick construction with pitched, tiled roof lined with wooden sarking boards. The building extends eastwards in four places, creating three 'courtyard' areas. These 'extensions' contain open sections of wall. Some sections of roof contained a raised central section to allow for narrow ventilation slots, each measuring 1 m wide by 0.1 m high.	Some slightly raised ridge and roof tiles. Gaps present at the end of joists, between wooden sarking and in mortar on south east corner (accessed from building interior). On the external side of the south east corner there was a brick missing. Some windows replaced with iron grills: access point to	One pipistrelle dropping on tarpaulin in 'garage' within north west corner of building. In central section, c. 30 relatively fresh, most likely from spring 2014, scattered *Myotis* sp. bat droppings. Urine splashes and *Myotis* sp. and pipistrelle bat droppings on corrugated plastic leant against internal wall. A pipistrelle dropping located at ground level below clean gap in brickwork.	High / Confirmed Roost

		building interior.	Five pipistrelle droppings attached to wall below clean gap between wooden cladding and brick wall. In room in south west corner of the building; unidentified bat droppings scattered by the base of the internal side of the western gable end. About 20 droppings on the floor under the ridge beam by partition wall. Where ridge beam intersected partition wall, scratch marks and staining on both sides of ridge beam. Also some bat droppings and moth wings attached to wall / caught in cobwebs.	
B6	Two-storey farmhouse of brick construction with tiled roof.	Loose roof tiles, brick missing in wall on northern end.	Pipistrelle-sized dropping below cobweb free gap in brickwork. *Desk study and anecdotal evidence indicate presence of brown long-eared bat roost in loft space.*	High / Confirmed Roost
B7	Farmhouse outbuilding of brick construction. Unlined tiled roof.	Small gaps around brickwork.	None	Low
B8	Brick building with corrugated concrete/asbestos roof. Separate roof with access point at eastern side. Roof void 1-2 m in height.	Access into ridge via uncapped ridge tile at western end. Clean gap into soffit.	None	Medium
B9	Wide span steel framed barn with corrugated concrete / asbestos roof. Very airy internal space.	No obvious suitable features.	None	Negligible
B10	Wooden barn / shed with pitched corrugated concrete / asbestos roof and timber clad wall. Window frames empty.	Gaps in timber cladding at southern gable: access to cavity behind.	None	Medium

Bat emergence and re-entry surveys

4.28 During the emergence / re-entry surveys undertaken at South Pillinge Farm, bats were observed emerging from or re-entering to roost within three of the buildings, Buildings B5, B6 and B8. No other buildings were found to support roosting bats. Survey findings are described below and likely roost access points are shown on Figure 4, Appendix 1.

Building B5

4.29 During the re-entry survey on 23 July 2014, a soprano pipistrelle bat was observed re-entering a roost, accessed through a gap between bricks where a piece of mortar was missing in the western wall, at 04.41 (29 minutes before sunrise). In addition a pipistrelle species bat was observed re-entering a roost within the western elevation of the building at 04.35, 35 minutes before sunrise. Later inspection of the wall revealed the probable roost access point to be a clean gap in the corner of a damaged brick.

4.30 On 30 July, during the emergence survey, a pipistrelle species bat exited the building at 21.27, 31 minutes after sunrise, from the northern-most window on the western elevation of the building. This bat is likely to have been roosting in an internal building feature. Also at 21.27, a common pipistrelle bat was observed as having emerged from beneath a ridge tile located in the extension to the south side of the central (of three) courtyard area. Two minutes later a common pipistrelle bat exited the central section of building B5 through the barn door, having likely emerged from a roost located within the building's interior.

4.31 A brown long-eared bat returned to roost at 04.22 on 23 July 2014, 48 minutes before sunrise, within the northern end of the building via an access point (slots in a partially covered window space) located near the northern end of the western wall. Prior to this, a *Myotis* sp. bat was seen flying towards the north west corner of the building at roof height at 04.04, 66 minutes before sunrise. Given the direction of flight and proximity to sunrise, it is possible that this Myotis sp. bat re-entered a roost

4.32 These findings indicate that Building B5 supports a number of small, non-breeding summer roosts of common and soprano pipistrelle bats, a brown long-eared bat and possibly a *Myotis* sp. bat.

Building B6

4.33 During the re-entry survey a common pipistrelle bat re-entered a roost, accessed under a loose roof tile, at 04.39, 31 minutes before sunrise. During the emergence survey a pipistrelle species bat and a soprano pipistelle bat emerged from under loose tiles. The pipistrelle species bat emerged at 21.09, 13 minutes after sunset, from a roost exit point located near the roof apex near the eastern side of the building. At 21.30, 34 minutes after sunset, a soprano pipistrelle bat emerged from a roost exit point located on the western side of the roof.

4.34 Four brown long-eared bats were observed flying close to the roof of Building B6 during the re-entry survey between 04.35 and 04.39, 35 – 31 minutes before sunrise. Given the proximity of these observations to sunrise and of the flights to the roof, it is probable that these long-eared bats re-entered the farmhouse to roost via access points in the roof. During the emergence survey, a long-eared bat is likely to have emerged from an access point located in the roof on the western side of the building at 21.25, 29 minutes after sunset.

4.35 These findings indicate that the Building B6 supports a number of small, non-breeding summer roosts of common and soprano pipistrelle bats and for brown long-eared bats.

Building B8

4.36 Two pipistrelle species bats re-entered a roost between 04.35 and 04.37, 35 – 33 minutes before sunrise. Access was gained via a slot behind a barge board on the western elevation.

4.37 These findings indicate that Building B8 supports a non-breeding summer roost for a pipistrelle bat species.

Otter and water vole

Desk study

Water vole

4.38 The survey carried out by BSG Ecology in October 2008 identified the presence of a water vole latrine, a large feeding cache and several runs (PBA, 2009). These signs were found on the northern fringe of the largest waterbody in the Rookery Clay Pit CWS and provide direct evidence of water voles presence in close proximity to the Survey Site. No signs of water vole activity were found during a subsequent survey carried out in May 2009 (PBA, 2009). During this survey, areas of vegetation were located that had been disturbed by wildfowl, in particular geese, and deer. There were also frequent signs of fox activity and possible signs of mink presence. The closest most recent record of water vole in the desk study was from 1.5 km to the north of the Survey Site in 2012.

Otter

4.39 During surveys undertaken in 2008 a single otter print was recorded on a clay bank in the south-east of the Rookery Clay Pit CWS (PBA, 2009). No other evidence of otter activity was recorded during the survey. The large water-body in the north of the Rookery Clay Pit CWS (adjacent to the proposed access) supports a healthy fish population and it is likely that otters regularly use this water-body and the adjacent Stewartby Lake CWS as a foraging resource.

Otter and water vole survey

4.40 No evidence of water vole presence was found. Ditches within the Survey Site, as shown on Figure 5 (Appendix 1) and summarised in Table 8, below, had poor to sub-optimal habitat suitability for water vole.

Table 8: Habitat suitability of water-bodies surveyed for water vole.

Waterbody ID	Description	Habitat Suitability
Ditch 1	Shallow ditch (flows both sides of road), water c. 3 cm deep, gravel-silt bottom. Steep sides (near vertical to trapezoidal, especially where bank has slumped). Channel cut to ca. 1.5 m. Channel base ca. 40 cm in width. Vegetated with tall coarse grasses (*Arrhenatherum elatius* dominant), frequent common nettle *Urtica dioica*, cow parsley *Anthriscus sylvestris*, hemlock *Conium maculatum*, cleavers *Gallium aparine* and hogweed *Heracleum sphondylium*. Hedge on western bank. Wetland plants infrequent but include great willowherb *Epilobium hirsutum*, fools watercress *Apium nodiflorum* and water figwort *Scrophularia auriculata*. Sub-optimal due to shallow water depth. Forage/cover and bank profile both good.	Sub-optimal
Ditch 2a	Trapezoidal shape, base ca. 50 cm in width, channel cut to depth of 1.5 m, ca. 5 cm water depth. Next to hedgerow, mostly shaded but occasional gaps with abundant marginal vegetation. Shaded sections sparse beneath. Open sections (which are few) include abundant fool's watercress and great willowherb and frequent coarse grasses. Poor suitability, in most part due to lack of forage and shallow depth.	Poor
Ditch 2b	Trapezoidal shape, base c. 50 cm in width, channel cut to depth of 1 m, c. 5 – 20 cm water depth. Open ditch for most part (small patches of scrub and hedge by eastern end of northern bank). Wetland vegetation includes abundant fool's watercress, watermint *Mentha aquatica* and great willowherb, frequent hard rush *Juncus inflexus* and occasional false fox sedge *Carex otrubae*. Three indeterminate burrows, small voles confirmed but no latrines of water vole (or rat). Sub-optimal due to shallow water	Sub-optimal - Optimal

	depth. Forage/cover and bank profile both optimal.	
Ditch 3	Trapezoidal to near vertical sides. Base 40 – 60 cm in width. Channel cut to depth of 1.7 m. Water depth 5 – 20 cm. Ditch bordered on east by intact hedgerow. Several indeterminate burrows. Sub-optimal due to shallow water depth. Forage / cover and bank profile optimal.	Sub-optimal - Optimal
Ditch 4	Adjacent to woodland. U-shaped ditch, ca. 5 m wide from bank to bank with a channel depth of c. 2 m. Contains flowing water to a depth of ca. 5 cm. Heavily shaded on both sides by a shrub layer dominated by hawthorn, *Crataegus monogyna* and mature trees, including frequent ash *Fraxinus excelsior* and occasional apple *Malus* sp. No emergent macrophytes. Common nettle *Urtica dioica* only on banks. Poor suitability, in most part due to lack of forage and shallow depth.	Poor
Ditch 5	Ditch adjacent to Lombardy Poplar *Populus nigra* plantation. Variable shape, ca. 6 m from bank to bank with a channel depth of c. 2 m. Contains flowing water to a depth of 15 – 20 cm. Ditch heavily shaded on west side with mature Lombardy poplar. Common nettle dominates both banks. Bank vegetation also includes frequent great willowherb and occasional hogweed. Poor suitability, in most part due to lack of forage and shallow depth.	Poor

4.41 No evidence of otter presence was found. There are few foraging opportunities for otter within the Survey Site, which supports generally intensively managed habitats with few places that otters could use as resting sites. The only exception would be along the access road (northern part of the Survey Site, adjacent to the large water-filled lagoon of Rookery Clat Pit CWS (northern lagoon). It is also relevant that ditches within the Survey Site have limited connectivity to suitable habitats in the wider area.

Other protected and notable mammal species

4.42 Records for all of the following species have been revealed during the desk study, and are listed as Species of Principal Importance on s. 41 of the NERC Act 2006. During the surveys conducted in 2014 surveyors were vigilant to the potential presence of these species across the Survey Site. Accordingly, when any of these animals (or evidence of the presence of an animal) was seen a record was duly made, the results of which are annotated on Figure 6 (Appendix 1).

Brown hare

4.43 Three brown hare *Lepus europaeus* were recorded on site during an initial walkover survey of the Survey Site (BSG Ecology, 2014).

4.44 During the targeted surveys in spring and summer 2014, a further nine records of brown hare were made within the Survey Site, and one approximately 100 m to the south. These records were made over four different survey visits: 17 April (5 observations), 14 May (1 observation), 19 May (1 observation) and 30 July (3 observations).

4.45 This species is common and widespread in the UK where they are most common in arable areas where cereal growing predominates (Harris & Yalden, 2008). The majority of the records made were of animals within arable fields, albeit close to field margins, near hedgerows or the railway corridor.

Hedgehog

4.46 The closest record of a hedgehog *Erinaceus europaeus* provided in the results of the desk study was approximately 190 m to the west of the Survey Site. Hedgehogs are found in most lowland habitats but have a preference for grassland in close proximity to woodland, scrub or hedgerows (Harris & Yalden, 2008).

4.47 No incidental observations of hedgehog were made during the 2014 surveys.

Harvest Mouse

4.48 The harvest mouse *Micromys minutus* favours areas of tall, dense grassy vegetation with breeding nests often constructed in cereal crops, long grass, reed beds, rushes and bramble patches (Harris & Yalden, 2008). This species was identified in the north of the Survey Site during clearance of the arable/ruderal habitats in autumn 2012 as part of the great crested newt licence works (Steven Foot, pers comm).

4.49 Some of the denser marginal vegetation adjacent to the proposed access track, the field margins and within the understorey of the plantation mixed woodland in the centre of the Survey Site has the potential to support this species; however, no incidental observations of harvest mouse were made during the 2014 surveys.

5 References

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BSG Ecology (2014) *Millbrook Power Project, Bedfordshire. Ecological Appraisal.*

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Hundt, L. (2012) *Bat Surveys: Good Practice Guidelines*, 2nd edition. Bat Conservation Trust.

Neal, E., and Cheeseman, C. (1996). *Badgers*. T & AD Poyser Natural History Ltd, London.

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Appendix 1: Figures

Figure 1: Badger Survey Results (CONFIDENTIAL)

Figure 2a: Bat Activity Results - North: May, July and September

Figure 2b: Bat Activity Results - South: May, July and September

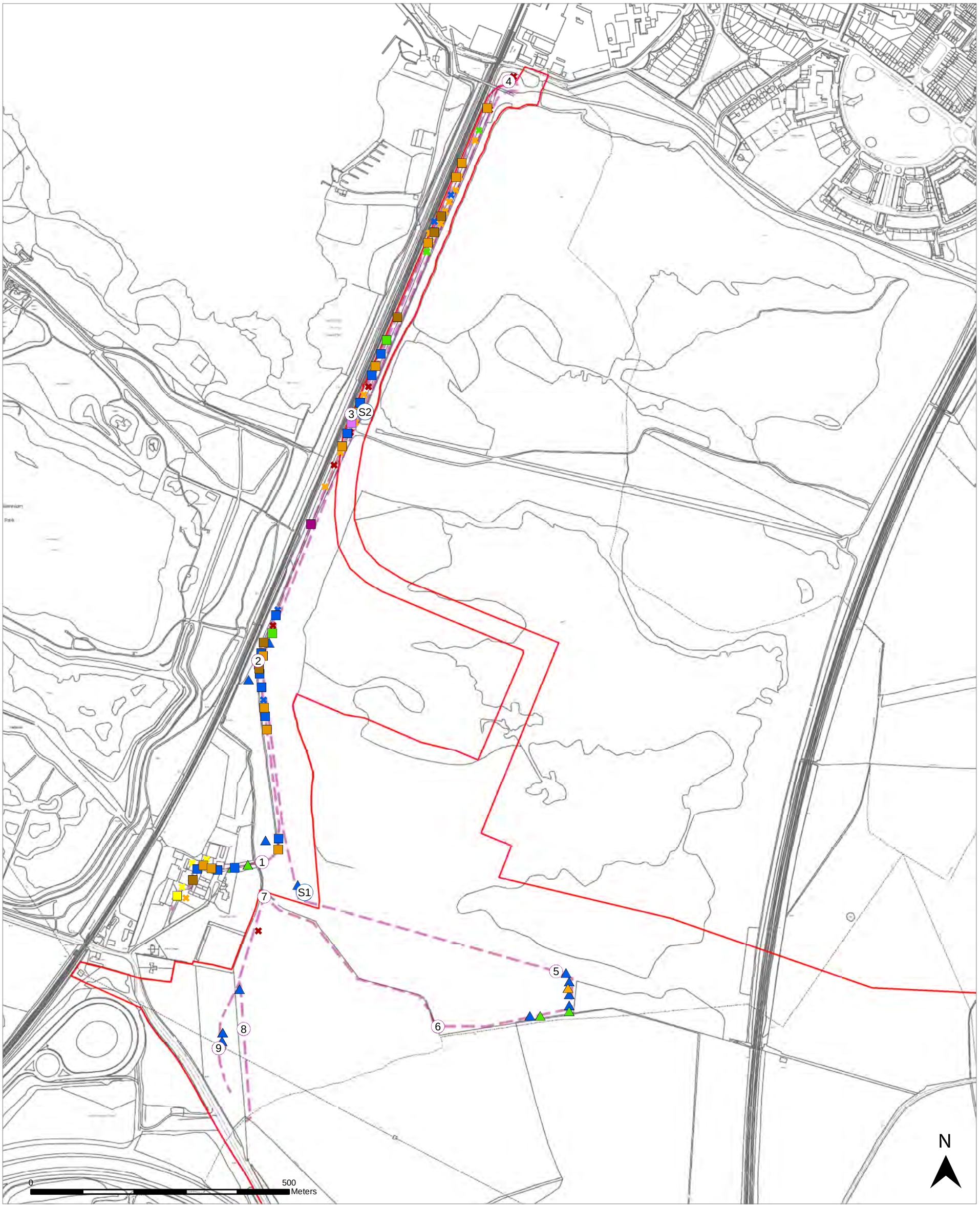
Figure 3: Building Inspection Results

Figure 4: Bat Emergence/Re-entry Survey Results South Pillinge Farm

Figure 5: Ditches Surveyed for Otter and Water Vole

Figure 6: Incidental Records of Other Notable Mammal Species

Figure 1: Confidential map provided separately**.**



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PROJECT TITLE
MILLBROOK POWER PROJECT

DRAWING TITLE
Fig 2a: Bat Activity Results - North: May and July

DATE: 02.12.2014 CHECKED: IJF SCALE: 1:7,500
DRAWN: JW APPROVED: IJF STATUS: FINAL

LEGEND

- Project Site at the time of Scoping Report submission
- Bat Activity Transect - North
- 1 Transect Stopping Point
- S1 Statics Detector Location

Locations of bat passes recorded during the walked transects are summarised (i.e. only one point is displayed where multiple passes of the same species were heard at one location).

Bat Activity Transect: May

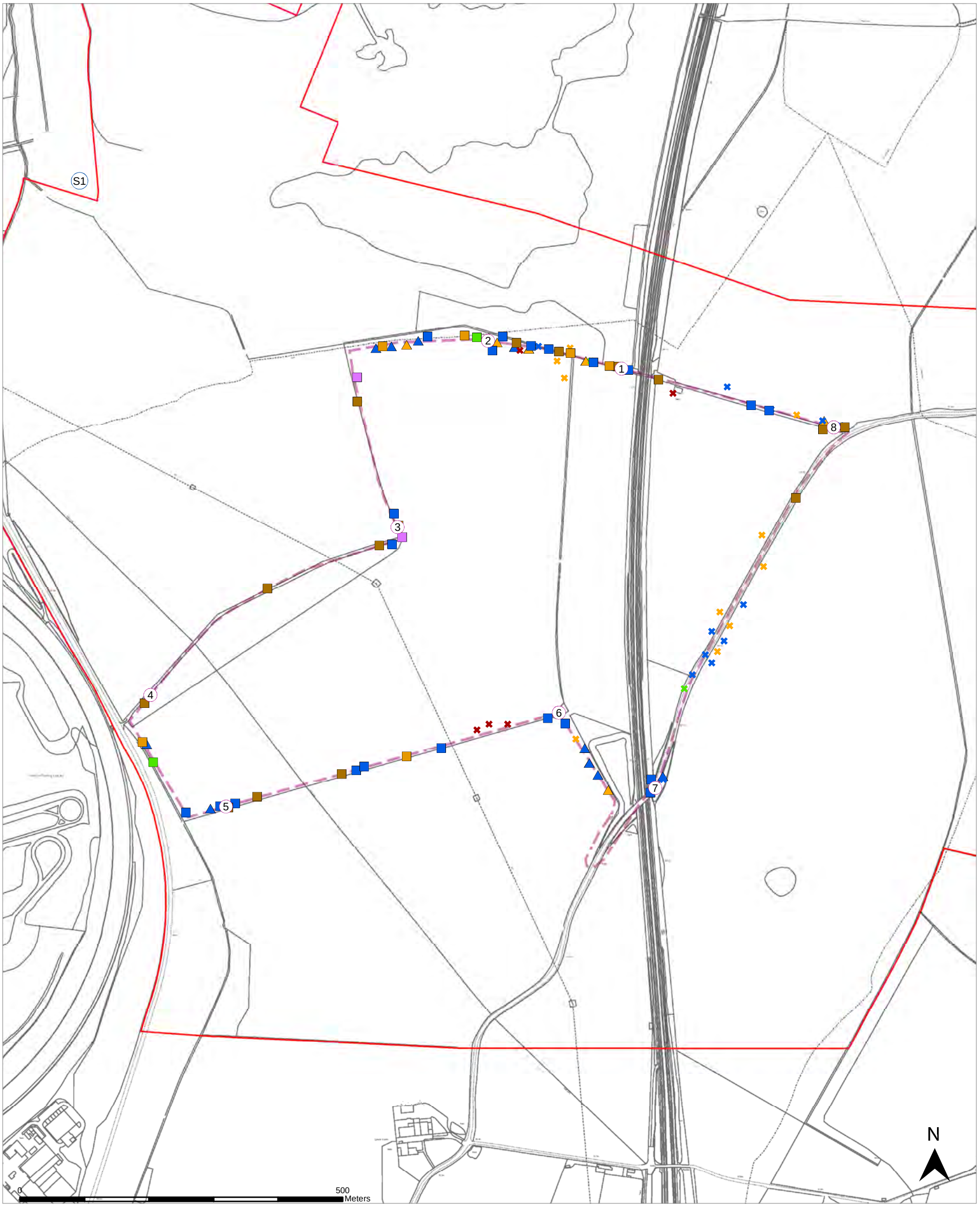
- *Myotis* species (3)
- Common pipistrelle (17)
- Soprano pipistrelle (6)

Bat Activity Transect: July

- *Myotis* species (2)
- Nathusius' pipistrelle (5)
- Common pipistrelle (15)
- Soprano pipistrelle (16)
- Noctule (7)

Bat Activity Transect: September

- *Myotis* species (2)
- Barbastelle (2)
- Nathusius' pipistrelle (1)
- Nathusius'/common pipistrelle (3)
- Common pipistrelle (22)
- Common/soprano pipistrelle (9)
- Soprano pipistrelle (21)



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DRAWING TITLE
Figure 2b: Bat Activity Results - South: May and July

DATE: 02.12.2014 CHECKED: IJF SCALE: 1:6,000
DRAWN: JW APPROVED: IJF STATUS: FINAL

LEGEND

- Project Site at the time of Scoping Report submission
- Bat Activity Transect - South
- 1 Transect Stopping Point
- S1 Statics Detector Location

Locations of bat passes recorded during the walked transects are summarised (i.e. only one point is displayed where multiple passes of the same species were heard at one location).

Bat Activity Transect: May

- Common pipistrelle (14)
- Soprano pipistrelle (20)

Bat Activity Transect: July

- *Myotis* species (2)
- Common pipistrelle (19)
- Soprano pipistrelle (15)
- Noctule (8)

Bat Activity Transect: September

- *Myotis* species (2)
- Nathusius'/common pipistrelle (3)
- Common pipistrelle (61)
- Common/soprano pipistrelle (28)
- Soprano pipistrelle (10)

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Figure 3: Building Inspection Results

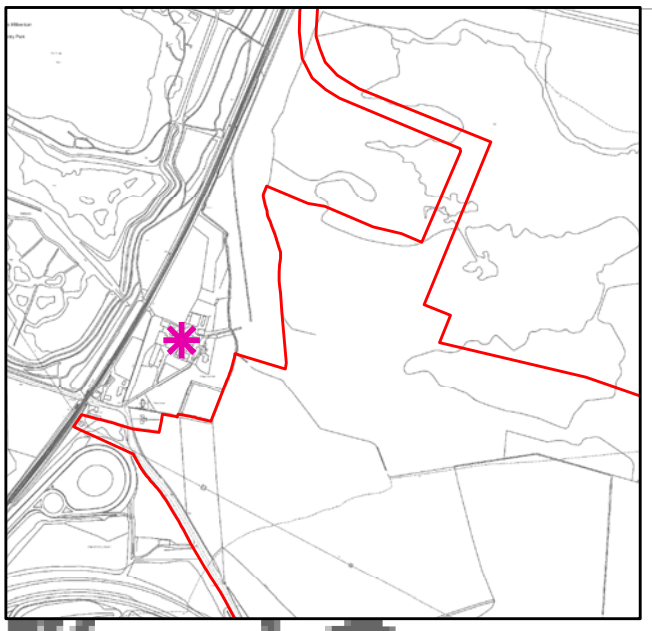
DATE: 06.08.2014 CHECKED: IJF SCALE: 1:750
DRAWN: JW APPROVED: IJF STATUS: FINAL

LEGEND

- Project Site at the time of Scoping Report submission
- Location of South Pillinge Farm

Suitability of Buildings to Support Roosting Bats

- High / Confirmed Roost
- Medium
- Low
- Negligible



B9
B10
B2
B3
B8
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B4
B7
B1
B6
Pillinge Farm South
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PROJECT TITLE
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DRAWING TITLE
Figure 4: Bat Emergence/Re-entry Survey Results
South Pillinge Farm

DATE: 11.08.2014 CHECKED: JW SCALE: 1:750
DRAWN: COH APPROVED: IJF STATUS: FINAL

LEGEND

- Project Site at the time of Scoping Report submission
- Location of South Pillinge Farm
- B1 Building reference and outline
- 1 Vantage point/surveyor location
- Roost emergence/re-entry (confirmed)
- Roost emergence/re-entry (probable)

Roost re-entry points (23/07/14)

- *Myotis* sp.
- Long-eared bat
- Common pipistrelle
- Soprano pipistrelle
- Pipistrelle species bat

Roost emergence points (30/07/14)

- Long-eared bat
- Common pipistrelle
- Soprano pipistrelle
- Pipistrelle species bat

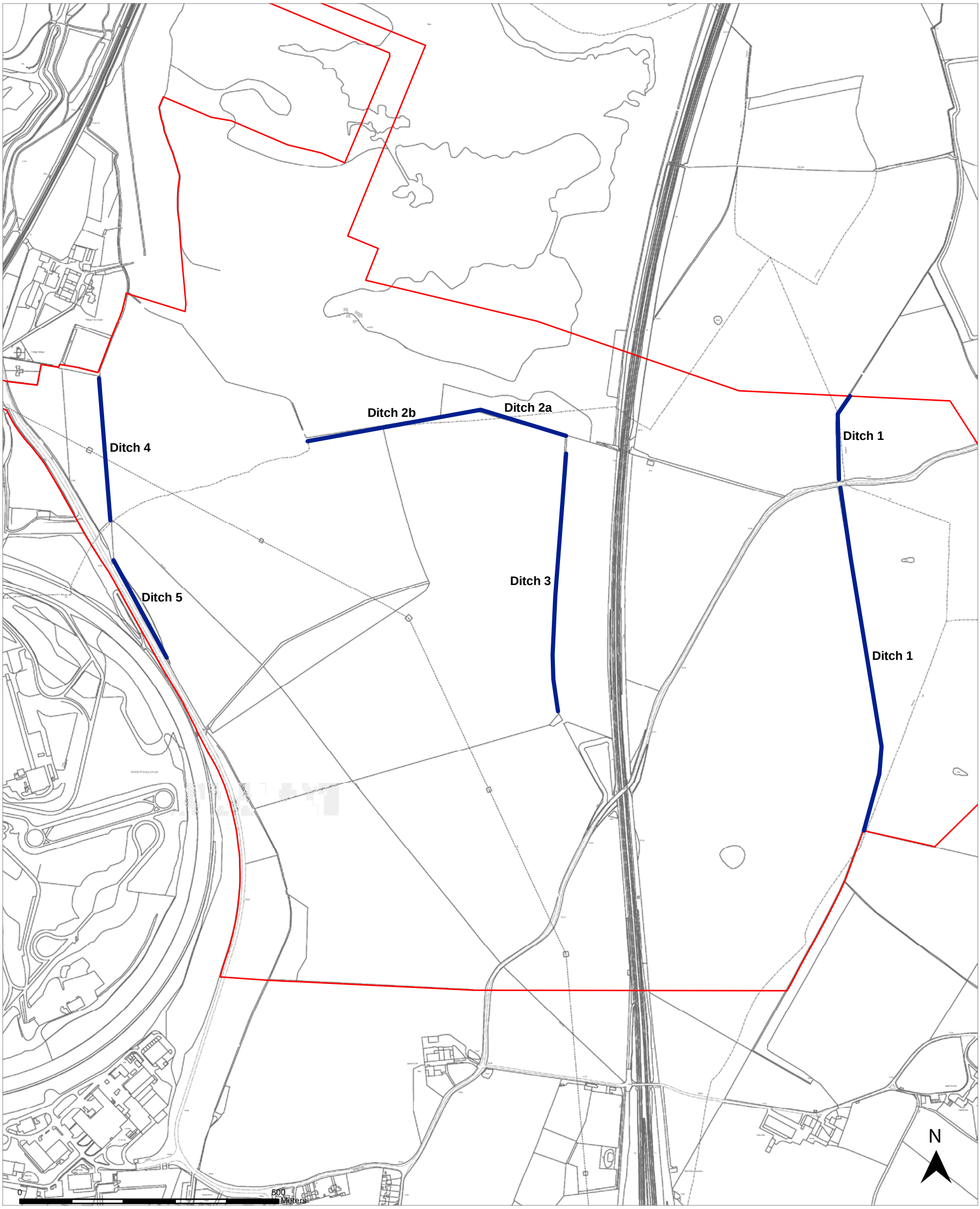

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Figure 5: Ditches Surveyed for Otter and Water Vole

LEGEND

- Project Site at the time of Scoping Report submission and Survey Site Boundary
- Ditch surveyed for otter and water vole

DATE: 23.09.2014 CHECKED: IJF SCALE: 1:7,500

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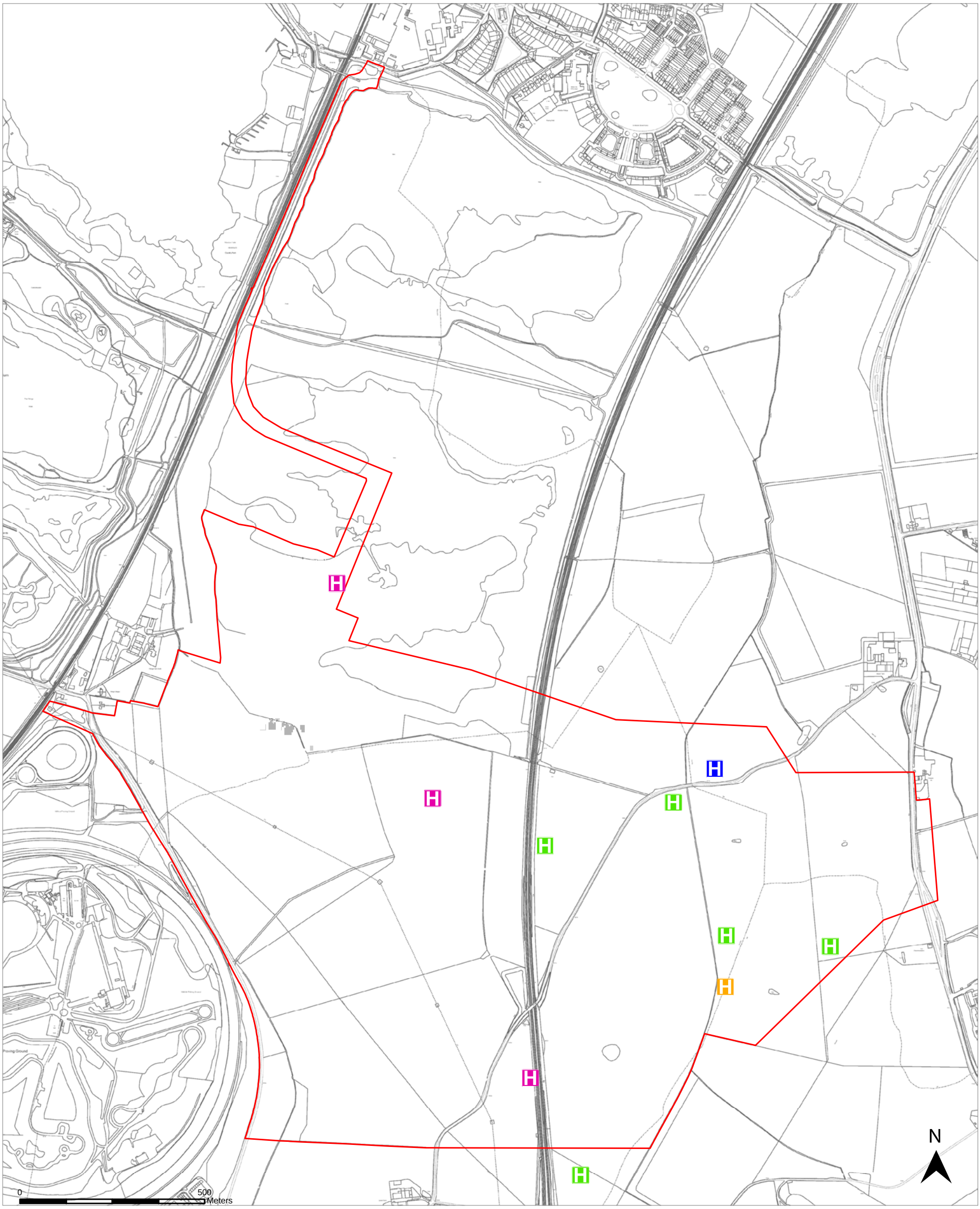

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Figure 6: Incidental Records of Other Notable Mammal Species

DATE: 23.09.2014 CHECKED: IJF SCALE: 1:10,500

DRAWN: JW APPROVED: IJF STATUS: FINAL

LEGEND

Project Site at the time of Scoping Report submission and Survey Site boundary

Incidental brown hare records and date of observation

- 17 April 2014
- 14 May 2014
- 19 May 2014
- 30 July 2014

8.6 - No Significant Effects Report

Millbrook Power Project

Habitat Regulations Assessment: No Significant Effects Report

On behalf of **Millbrook Power Limited**

Project Ref: 31116/001 | Rev: AA | Date: March 2015

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Contents

Appendices

Figures

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1 Background

1.1 Overview

1.1.1 This document comprises a Habitat Regulations Assessment: No Significant Effects Report, relating to the proposed Millbrook Power Project (hereafter referred to as the "Project"). It has been prepared by Peter Brett Associates LLP (PBA) on behalf of Millbrook Power Limited (MPL), (the "Applicant").

1.1.2 The Project is proposed at the former clay extraction pit named Rookery South Pit, near Stewartby, Bedfordshire with the approximate centre of the site at grid reference 501373, 240734 (the "Project Site"). The boundary of the Project Site falls within both Central Bedfordshire Council (CBC) and Bedford Borough Council (BBC) areas. The Project constitutes a Nationally Significant Infrastructure Project (NSIP) pursuant to the Planning Act 2008 (the "Act") and therefore requires development consent under the Act.

1.1.3 The application for the DCO is being made to the Planning Inspectorate pursuant to the Planning Act 2008 and in accordance with the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 (the "APFP Regulations").

1.1.4 Before the Secretary of State can decide to grant a DCO for the Project he must determine whether it will have a significant effect on a European site (whether alone or in combination with other plans or projects), in view of that site's conservation objectives. This requirement is set down in Regulation 61 of the Conservation of Habitats and Species Regulations 2010 (as amended) (the "Habitats Regulations").

1.1.5 APFP Regulation 5(2)(g) requires that the Application should be accompanied by a report which identifies any site that may be affected by the development and to which Regulation 61 of the Habitats Regulations applies. These sites are commonly referred to as 'European Sites'. European Sites include Special Areas of Conservation (SACs) (including candidate SACs) and Special Protection Areas (SPAs), which together, form the Natura 2000 network, which aims to assure the long-term survival of Europe's most valuable and threatened habitats.

1.1.6 In accordance with paragraph 118 of the National Planning Policy Framework (NPPF), potential SPAs being considered by the Secretary of State for classification as a SPA, should be given the same protection as a fully classified SPA. In addition, Ramsar Sites and proposed Ramsar Sites (wetlands of international importance listed under the Ramsar convention) should be given the same protection as European sites.

1.1.7 This report is intended to provide the information necessary for the Secretary of State to make his assessment and it has been prepared in accordance with PINS Advice Note 10. It has been prepared in accordance with the

methodology for HRA set out in The Habitats Regulations Assessment Handbook (DTA Publications Ltd, 2016[1)].

1.2 The Project

1.2.1 The Project would comprise:

- a new Power Generation Plant in the form of an OpenCycle Gas Turbine (OCGT) peaking power generating station, fuelled by natural gas with a rated electrical output of between 50 and 299 Megawatts (MW). This is measured as the output of the generating station as a whole, measured at the terminal points of the Generating Equipment. The Power Generation Plant comprises:
    - generating equipment including one Gas Turbine Generator, one exhaust gas flue stack and Balance of Plant (together referred to as the 'Generating Equipment'), which are located within the 'Generating Equipment Site';
    - a new purpose built access road from Green Lane to the Generating Equipment Site (the 'Access Road);
    - a temporary construction compound required during construction only (the 'Laydown Area');
- a new gas pipeline connection to bring natural gas to the Generating Equipment from the National Transmission System (NTS) (the 'Gas Connection'). This element incorporates an Above Ground Installation (AGI) at the point of connection to the NTS; and
- a new electrical connection to export power from the Generating Equipment to the National Grid Electricity Transmission System (NETS) (the 'Electrical Connection'). This element could be delivered in one of two ways:
    - The first option would involve one underground double circuit Tee-in. This would require one new tower (which will replace an existing tower and be located in the existing Grendon – Sundon transmission route corridor, thereby resulting in no net additional towers). This option would also require two SECs, one located on each side of the existing transmission line, and both circuits would then be connected via underground cables approximately 500 metres in length to a new substation (the 'Substation'). This is hereafter referred to as "Option 1".
    - The second option is similar to Option 1 and would involve an underground single circuit turn in (requiring two cable circuits, one into and one out of the substation). This would require one new tower (which will again replace an existing tower and be located in

[1] DTA Publications Ltd (2016) The Habitats Regulations Assessment Handbook. DTA Publications Ltd, Nottingham

the existing Grendon – Sundon transmission route corridor, thereby resulting in no net additional towers). This option would also require one larger SEC, which could be located on either side of the existing transmission line, and both circuits would then be connected via underground cables approximately 500 metres in length to a new substation (the 'Substation'). This is hereafter referred to as "Option 2".

1.2.2 The Generating Equipment, Access Road and Laydown Area are together known as the 'Power Generation Plant' and are located within the 'Power Generation Plant Site'.

1.2.3 The Power Generation Plant, Gas Connection, and Electrical Connection, together with all access requirements are referred to as the 'Project' and are all integral to the generation of electricity and subsequent export of that electricity to the NETS. The land upon which the Project would be developed, or which would be required in order to facilitate the development of the Project, is referred to as the 'Project Site'.

1.2.4 The Project Site and all elements of the Project listed above are shown on Figure 1.2 of the PEIR for the Project.

1.2.5 The Power Generation Plant Site is located primarily on land within former clay pits known as 'The Rookery', with the Gas and Electrical Connections extending from The Rookery into adjacent agricultural land to the south.

1.2.6 The total construction programme will be approximately 22 months, with a start date of 2020 and an end date of 2022. The operational life of the Power Generation Plant will be 25 years.

1.2.7 The decommissioning phase will be similar in duration to the construction phase. The Generating Equipment will be decommissioned and removed at the end of its operational life. The Gas Pipeline will be made safe and left in situ.

1.3 Project Site and Surroundings

The Rookery

1.3.1 The Project Site is partially located within 'The Rookery'. The Rookery comprises two former clay pits (Rookery North and Rookery South (both shown on Figure 1.2) covering an area of some 210 ha, separated by an east-west spine of unexcavated clay. The Rookery is situated in the Marston Vale between Milton Keynes and Bedford. It lies predominantly within the administrative area of Central Bedfordshire Council (CBC) although it also falls, in part, within the administrative area of the adjacent Bedford Borough Council (BBC).

1.3.2 The Generating Equipment Site, Laydown Area and parts of the Access Road, Gas Connection and Electrical Connection would be located within part of

Rookery South Pit which is approximately 95 ha in area and is bound by steep clay banks that are varied in nature and substrate. The level of the pit base currently varies between approximately 10 and 15 m below ground level and includes open water, reed beds, pools and bare inundated clay. The land that remains at the original ground level, approximately 42 m above ordnance datum (AOD) immediately around the periphery of Rookery South Pit is predominantly bare ground that has been previously cleared of vegetation and subsequently maintained in this state over approximately the last 28 years.

1.3.3 The Gas Connection and Electrical Connection would extend from Rookery South Pit into farmland to the south as shown on Figure 1.2. Part of the Access Road would lie within Rookery North Pit.

Low Level Restoration Scheme (LLRS)

1.3.4 The Rookery is the subject of an ongoing LLRS being undertaken by the landowner pursuant to a separate planning consent (application number - BC/CM/2000/8) in order to restore the former clay workings (i.e. below pre-excavation ground levels) to low-intensity agricultural land, with measures included in the restoration to enhance biodiversity and landscape. This restoration work is taking place independently of the Project, although a five year option agreement, which is extendable to seven under certain conditions, has been put in place between the Applicant and the landowner of Rookery Pit. Included in the agreement is a clause which ensures that the elements of the LLRS as set out below at 3.1.5 will be completed prior to the commencement of the development of the Project (anticipated to be in 2020). The HRA assessment assumes that the following LLRS works for Rookery South Pit have been completed:

- the re-profiling of the base of the pit involving the extraction of soils and clays from the permitted extraction area on the southern side with re-grading of the base of the pit to an approximate level of 15mbgl;
- implementation of surface water drainage measures and construction of an attenuation pond and pumping station in order to facilitate a managed surface water drainage strategy;
- a landscape strategy to include planting on the boundary of the [Rookery South Pit] and the margins of the attenuation pond;
- provision of buttresses to the southern, eastern and northern slopes to ensure the long-term stability of those slopes, and re-grading through excavation;
- provision of a series of permissive footpaths around the perimeter of Rookery North Pit and around the attenuation pond within Rookery South Pit;

- provision of an access ramp into Rookery South Pit from Rookery North Pit which connects to Green Lane, Stewartby via an existing track along the western side of Rookery North Pit. Note that the ramp and existing track are both of an agricultural standard; and

- provision of a further, smaller access track into and out of Rookery South Pit from the south side of the pit connecting with Station Lane, near Millbrook Station.

1.3.5 To facilitate the proposed LLRS works, extraction of clay from a currently un-worked area situated directly to the south of the existing extent of Rookery South Pit will be undertaken. This area covers approximately 25 ha and forms part of the existing minerals extraction consent boundary, but has not historically been subject to excavation works. Deposits won from this area will provide material for use in the restoration, re-profiling and buttressing work to Rookery South Pit together with the implementation of a landscape and ecology strategy, which will integrate with ecological mitigation works and strategic landscape planting in Rookery North Pit.

1.3.6 The LLRS works will be completed prior to the commencement of construction works for the Project, with the possible exception of buttressing and re-profiling to the eastern side of Rookery South Pit, which has no bearing on the Project as it lies outside the boundary of the Project Site.

1.3.7 Once the LLRS works are completed, Rookery South Pit will be approximately 15 m below the surrounding ground level in the vicinity of the Generating Equipment Site, Laydown Area and the Substation.

1.4 European Sites in the Vicinity of the Project

1.4.1 There are no specific criteria in PINS Advice Note 10 for the Screening of effects on European Sites. The study area for Screening is dependent upon the scale and nature of the project and European Site, and the surrounding environment where the potential for significant effects could reasonably be considered to occur.

1.4.2 The nearest European Site to the Project Site is Chiltern Beechwoods SAC, which is located approximately 27 km to the south-west. The nearest SPA/ Ramsar Site is the Upper Nene Valley Gravel Pits SPA/ Ramsar Site, which is 28km away to the north-west of the Project Site. There are no proposed SPA/ Ramsar Sites or candidate SACs in the vicinity of the Project Site.

1.4.3 The locations of the European Sites in relation to the Project Site are illustrated on Figure 1. The study area for European sites was discussed and agreed during consultation with Natural England.

1.5 HRA process

1.5.1 A Habitats Regulations Assessment is a step-wise process involving a series of tests undertaken in a strict order so as to ensure a correct and robust determination that accords with the Regulations. The requirements of the Habitats Directive comprise four distinct stages:

Stage 1: Screening is the process which initially identifies the likely impacts upon a European Site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts may be significant. It is important to note that the burden of evidence is to show, on the basis of objective information, that there will be no significant effect; if the effect may be significant, or is not known, that would trigger the need for an Appropriate Assessment. There is European Court of Justice case law to the effect that unless the likelihood of a significant effect can be ruled out on the basis of objective information, then an Appropriate Assessment must be made.

Stage 2: Appropriate Assessment is the detailed consideration of the impact on the integrity of the European Site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's conservation objectives and its structure and function. This is to determine whether or not there will be adverse effects on the integrity of the site. This stage also includes the development of mitigation measures to avoid or reduce any possible impacts.

Stage 3: Assessment of alternative solutions is the process which examines alternative ways of achieving the objectives of the project or plan that would avoid adverse impacts on the integrity of the European Site, should avoidance or mitigation measures associated with the proposed project be unable to cancel out adverse effects.

Stage 4: Assessment where no alternative solutions exist and where adverse impacts remain. Should no alternative solutions be available, at Stage 4 an assessment is made with regard to whether or not the development is necessary for imperative reasons of overriding public interest (IROPI) and, if so, of the compensatory measures needed to maintain the overall coherence of the Natura 2000 network.

1.5.2 This HRA No Significant Effects Report (Stage 1) has assessed effects resulting from the Project in order to determine whether these are likely to result in a significant effect on any one of the European Sites in the vicinity of the Project Site. If the assessment concludes the Project is likely to have significant effects on a European site, the process of assessment will then progress to Stage 2 (Appropriate Assessment) to consider, in consultation with Natural England, whether the proposal will adversely affect the integrity of any one of the European Sites identified, either alone or in combination with other projects. However, if the assessment concludes the Project will have no likely significant effect(s) on the interest features of the European sites, no further HRA assessment is required, allowing the Project to proceed, subject to other relevant regulatory controls.

2 Description of European Sites

2.1 Chiltern Beechwoods SAC

2.1.1 Chiltern Beechwoods SAC supports a large area of ancient semi-natural beech forest and species-rich calcareous grassland and scrub mosaic. It qualifies under Article 4(4) of Directive (92/43/EEC) for supporting the following Annex I Habitats:

- 9130 *Asperulo-Fagetum* beech forests - which is a Primary Reason for Selection of the site;
- 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates *(Festuco-Brometalia)* (* important orchid sites).

2.1.2 The standing and fallen deadwood habitats within the SAC support saproxylic invertebrates. It qualifies under Article 4(4) of Directive (92/43/EEC) for supporting the following Annex II species:

- 1083 Stag Beetle *Lucanus cervus*.

2.1.3 The integrity of the SAC is vulnerable to a lack of appropriate woodland management to promote structural and species diversity, and damage to young trees by grey squirrel (Natura 2000 Standard Data Form).

2.1.4 The conservation objectives for the Chiltern Beechwoods SAC, published by Natural England (30 June 2014), are to: "*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*

- *The extent and distribution of qualifying natural habitats and habitats of qualifying species*
- *The structure and function (including typical species) of qualifying natural habitats*
- *The structure and function of the habitats of qualifying species*
- *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely*
- *The populations of qualifying species, and,*
- *The distribution of qualifying species within the site*."

2.2 Upper Nene Valley Gravel Pits SPA

2.2.1 The Upper Nene Valley Gravel Pits SPA comprises an extensive area of disused sand and gravel pits adjacent to the River Nene in Northamptonshire. The shallow and deep open waters, marginal features, (including sparsely-vegetated islands, gravel bars and shorelines) and other habitats (including reedswamp, marsh, wet ditches, rush pasture, rough grassland and scattered scrub) provide foraging and roosting habitat for assemblages of wetland birds of international importance during the non-breeding season.

2.2.2 The SPA qualifies under Article 4.1 of Directive 2009/147/EC as it is used regularly by 1% or more of the Great Britain populations of the Annex I species (wintering) listed in Table 1 below.

Table 1: Qualifying features of SPA (Article 4.1)

Annex I species	Count and season	Period	% of GB population
Bittern *Botaurus stellaris*	2 individuals – wintering	5 year peak mean 1999/2000 – 2003/04	2.0%
Golden plover *Pluvialis apricaria*	5,790 individuals – wintering	5 year peak mean 1999/2000 – 2003/04	2.3%

2.2.3 The site qualifies under Article 4.2 of Directive 2009/147/EC as it is used regularly by 1% or more of the biogeographical populations of the regularly occurring migratory species (other than those listed in Annex I) (wintering) listed in Table 2 below.

Table 2: Qualifying features of SPA (Article 4.2)

Migratory species	Count and season	Period	% of sub-species/ population
Gadwall *Anas strepera*	773 individuals – wintering	5 year peak mean 1999/2000 – 2003/04	2.0% *A. strepera*, NW Europe (breeding)

2.2.4 The site qualifies under Article 4.2 of the Directive (Directive 2009/147/EC) as it is used regularly by over 20,000 waterbirds (waterbirds as defined by the Ramsar Convention) in any season:

- In the non-breeding season, the area regularly supports 23,821 individual waterbirds (5 year peak mean 1999/2000 – 2003/04), including wigeon *Anas penelope*, gadwall *Anas strepera*, mallard *Anas platyrhynchos*, shoveler *Anas clypeata*, pochard *Aythya ferina*, tufted duck *Aythya fuligula*, great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo*, bittern *Botaurus stellaris*, golden plover *Pluvialis apricaria*, lapwing *Vanellus vanellus* and coot *Fulica atra*.

2.2.5 The conservation objectives for the Upper Nene Valley Gravel Pits SPA, published by Natural England (30 June 2014), are to: "*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:*

- *The extent and distribution of the habitats of the qualifying features;*
- *The structure and function of the habitats of the qualifying features;*
- *The supporting processes on which the habitats of the qualifying features rely;*
- *The population of each of the qualifying features; and,*
- *The distribution of the qualifying features within the site*."

2.3 Upper Nene Valley Gravel Pits Ramsar Site

2.3.1 The Upper Nene Valley Gravel Pits Ramsar Site follows the same boundary as the Upper Nene Valley Gravel Pits SPA. As for the SPA, the Ramsar Site supports a series of active and disused sand and gravel pits and associated habitats which provide nesting and foraging resources for wintering waterbirds. The site qualifies under Criterion 5 because it regularly supports 20,000 or more waterbirds: "in the non-breeding season, the site regularly supports 23,821 individual waterbirds (5 year peak mean 1999/2000 – 2003/04)".

2.3.2 The site qualifies under Criterion 6 because it regularly supports 1% of the individuals in the populations of the species or subspecies of waterbird in any season, listed in Table 3 below.

Table 3: Qualifying features of Ramsar (Criterion 6)

Species	Count and season	Period	% of sub-species/ population
Mute swan *Cygnus olor*	629 individuals - wintering	5 year peak mean1999/2000 – 2003/04	1.7% Britain
Gadwall *Anas strepera*	773 individuals – wintering	5 year peak mean 1999/2000 – 2003/04	2.0% strepera, NW Europe (breeding)

3 Screening

3.1 Methodology

3.1.1 European Commission guidance (2001)[2] recommends that screening should fulfil the following steps:

> 1. Determine whether the plan (or policy) is directly connected with or necessary for the management of Natura 2000 sites.
>
> 2. Describe the plan and describe and characterise any other plans or projects which, in combination, have the potential for having significant effects on Natura 2000 sites.
>
> 3. Identify the potential effects on Natura 2000 sites.
>
> 4. Assess the likely significance of any effects on Natura 2000 sites.

3.1.2 The first part of the screening process therefore requires consideration of the project or plan in respect of whether it is directly connected with or necessary for the management of European Sites. 'Directly' in this context means solely conceived for the conservation management of a site and 'management' in this context refers to the management measures required in order to maintain in favourable condition the features for which the European Site has been designated.

3.1.3 The Project is not directly connected with, or necessary for, the management of Chiltern Beechwoods SAC or the Upper Nene Valley Gravel Pits SPA or Ramsar Site.

3.1.4 The screening assessment for the Project, which addresses the other three steps of the process, is presented in matrix form in Section 3.2 (below). In addition, screening matrices provided within the Planning Inspectorate Advice Note 10 are included as Appendix A1 to A3 of this NSER.

3.1.5 A critical part of the HRA screening process is determining whether or not the proposals are likely to have a significant effect on European Sites and, therefore, if they will require an Appropriate Assessment. Judgements regarding significance should be made in relation to the qualifying interests for which the site is of European importance and also its conservation objectives. A significant effect is defined as being any effect that would undermine the conservation objectives for a European site.

[2] European Commission (2001) *Assessment of plans and projects significantly affecting Natura 2000 sites*

3.2 Screening assessment

3.2.1 The Chiltern Beechwoods SAC is 27km from the Project Site and is the nearest European Site. It is separated from the Project Site by extensive areas of agricultural land, the M1 motorway and the urban areas of Dunstable and Luton. There are no watercourses or other natural features which directly connect the SAC to the Project Site.

3.2.2 The Upper Nene Valley Gravel Pits SPA and the Upper Nene Valley Gravel Pits Ramsar Site follow the same boundary. The SPA and Ramsar Site are located approximately 28km to the north-west of the Project Site. These sites are separated from the Project Site by the town of Bedford and other urban areas, the River Great Ouse, and extensive areas of agricultural land.

3.2.3 The consideration of potential impacts on Chiltern Beechwoods SAC, and Upper Nene Valley Gravel Pits SPA and Ramsar Site, as a result of the Project, is detailed in the screening assessment in Table 4 below.

Table 4: Consideration of impacts in the Screening Assessment

Description of project	
Description of any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the European Site by virtue of:	
Size and scale	Due to the distance of the Project Site away from the SAC, SPA and Ramsar Sites (which are located approximately 27km and 28km away, respectively), no impacts as a result of the scale and size of the Project are expected. The maximum area for the Generating Equipment Site will be 4 ha. The equipment to be installed includes a gas turbine, an emission stack of up to 35m in height, buildings associated with operation and maintenance, and Gas and Electrical Connection infrastructure. A temporary Laydown Area for the storage of plant and equipment during construction would also be provided adjacent to the Generating Equipment Site. In addition, an existing access track will be upgraded to agricultural standard.
Land take	There will be no land-take in the SAC, SPA or Ramsar Site.
Distance from the European Site or key features of the site (from Project boundary)	Chiltern Beechwoods SAC is located approximately 27km to the south-west of the Project Site. It is separated from the Project Site by extensive areas of agricultural land, the M1 motorway, a railway line, and the

	urban areas of Dunstable and Luton. The Upper Nene Valley Gravel Pits SPA and the Upper Nene Valley Gravel Pits Ramsar Site follow the same boundary. The SPA and Ramsar Site are located approximately 28km to the north-west of the Project Site. These sites are separated from the Project Site by the town of Bedford and other urban areas, the River Great Ouse, and extensive areas of agricultural land.
Resource requirements (from the European Site or from areas in proximity to the site, where of relevance to consideration of impacts)	No resource requirements from the SAC, SPA or Ramsar Site or in proximity to these sites are required.
Emissions (e.g. polluted surface water runoff both soluble and insoluble pollutants, atmospheric pollution)	An assessment of potential impacts on Air Quality as a result of the Project has been included as part of the Environmental Impact Assessment. This included consideration of potential impacts on ecological receptors, including European Sites. During this process, the potential for significant effects on the SAC, SPA and Ramsar Site was 'scoped out' of further assessment, in accordance with the Institute of Air Quality Management's 'Guidance on the assessment of dust from demolition and construction' (IAQM, 2016), and the Environment Agency's 'Air Emissions Risk Assessment for your Environmental Permit. Further information is provided in Section 6.6 of the PEIR for the Project. Under these guidelines, the screening distances for construction and decommissioning dust effects for ecological receptors are: 50m from the boundary of the site or 50m from the routes used by construction vehicles on the public highway, within 500m of the site entrance. During Operation, the screening distance for European Sites, is 10 km from the approximate centre of the Generating Equipment Site. As such, given that the SAC and SPA are located 27km and 28km away from the Project Site respectively, no significant effects as a result of the Project are expected. Even for those ecological receptors (that are not associated with the SAC, SPA or Ramsar Site) and which fall within the screening distances, the assessment concluded that the Project will not result in any likely significant effects in relation to air quality either as a

	standalone project or cumulatively with other projects. Potential effects were identified as: 'Increase in NOx concentrations and nitrogen and acid deposition' during operation and maintenance. However, all of the predicted nitrogen and deposition rates are insignificant when compared to the critical loads for the habitats under consideration, and no specific mitigation is required. There are no water bodies which connect the Project Site with the SAC, SPA or Ramsar Site. There are therefore no conceivable effect pathways via the water environment as a result of the Project. [For those waterbodies located within and adjacent to the Project Site, a Construction Environmental Management Plan (CEMP) will include best practice working methods to prevent water pollution; an outline CEMP will be submitted alongside the ES as part of the DCO Application. In addition, the most appropriate best practice crossing methods will be used for watercourses in the construction of the Gas and Electrical Connection. Precautions will also be undertaken to ensure that silt laden runoff, arisings or chemicals are not allowed to enter watercourses.]
Excavation requirements (e.g. impacts on local hydrogeology)	There are no excavation requirements within the SAC, SPA or Ramsar Site. All excavation works that are required (detailed below) are confined within the Project Site, which is located approximately 27km and 28km away from the SAC and SPA/ Ramsar Site respectively. There are therefore no conceivable effect pathways due to excavations as a result of the Project. To facilitate the proposed Low Level Restoration Scheme (LLRS) of The Rookery, extraction of clay from a currently un-worked area situated directly to the south of the existing extent of Rookery South Pit will be undertaken. These works will be completed prior to the commencement of construction works for the Project. During the construction period for the Project, excavation works will be undertaken within the Project Site for: plant and building foundations, underground services, cable draw pits, site roads, and gas pipeline trenches. During construction of the Gas and Electrical Connection, best practice working methods will be utilised at all watercourse crossings to ensure that there are no adverse

	impacts on flow or drainage and that no contamination is allowed to enter waterbodies within the vicinity of the Project Site. The CEMP will include best practice working methods to prevent pollution to the ground and ground water; an outline CEMP will be provided with the ES and submitted with the DCO Application.
Transportation requirements	There are no conceivable impacts on the SAC, SPA or Ramsar Site as a result of transportation requirements. No 'affected roads' have been identified in accordance with criteria in the Department for Transport 'Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3, Part 1: Air Quality', as a result of the Project. An 'affected road' is defined as a road where: • Road alignment will change by 5 m or more; or • Daily traffic flows will change by 1,000 or more; or • Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or • Daily average speed will change by 10 km/hr or more; or • Peak hour speed will change by 20 km/hr or more. The potential for significant effects due to vehicle emissions has therefore been scoped out of the assessment; see Section 6.7 of the PEIR for the Project. A Construction Traffic Management Plan (CTMP) will be prepared by the Contractors prior to construction. This plan will contain information such as timing and routing of traffic.
Duration of construction, operation, etc.	The total construction programme will be approximately 22 months, with a start date of 2020 and an end date of 2022. The operational life of the Power Generation Plant will be 25 years. The decommissioning phase will be similar in duration to the construction phase. The Generating Equipment will be

	decommissioned and removed at the end of its operational life. The Gas Pipeline will be made safe and left in situ.
Other	None
Description of avoidance and/ or mitigation measures	
Nature of proposals	No impacts have been identified on the SAC, SPA or Ramsar Site as a result of the Project, so there is no requirement for specific avoidance or mitigation measures. In any event, a CEMP will be produced by the Contractor prior to the start of construction to ensure that best practice working methods are implemented to avoid potential pollution events in the local environment.
Location	None required (no impacts identified).
Evidence for effectiveness	None required (no impacts identified).
Mechanism for delivery	None required (no impacts identified).
Assessment Criteria Individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Site:	
The Project comprises a new Power Generating Plant and associated Gas and Electrical Connections. The Project involves the potential generation of dust during construction, emissions to air during operation, construction site noise, operational noise, and the potential for incidental pollution/ siltation of surface and ground water. The following other projects are located within the vicinity of the Project Site: • Covanta RRF Project - immediately adjacent to the Generating Equipment Site; • Integrated Waste Management Operations at Rookery South - immediately adjacent to the Generating Equipment Site; • land at Moreteyne Farm at Wood End in Marston Moretaine proposed for residential properties – 2km west of the Project Site; • land at Warrant Farm on Flitwick Road in Ampthill proposed for residential properties – 3.5km south of Gas Connection AGI; • land East and West of Broadmead Road, Stewartby proposed for residential properties (under construction) – 500m north of closest point of the Access Road; and • new settlement at Wixams (under construction) – 5km north-east of closest point of Access Road. • Land off Marston Road, Lidlington – proposed residential development of 31 dwellings	

- approximately 2km west of Electrical Connection;

- Land opposite The Lane & Lombard Street, East of Marston Road, Lidlington – proposed residential development of 40 dwellings approximately 2km west of Electrical Connection;
- Lower Shelton Road, Marston Moretaine - proposed residential development of 15 dwellings approximately 4km north of Access Road;
- Land to the rear of Cowlgrove Parade, Steppingley Road, Flitwick – Multi-storey car park to provide 232 parking spaces – approximately 4km south of Gas Connection;
- Land East of Ampthill Road and North of Bedford Road, Houghton Conquest - proposed mixed use development including 650 dwellings approximately 4km north-east of Generating Facility;
- Land off Chapel End Road, Houghton Conquest – proposed residential development of 125 dwellings approximately 4km north-east of Generating Facility; and
- Land South of Fields Road and East of Cranfield Road, Wootton – proposed residential development of 600 dwellings – approximately 5k north of Access Road.

Due to the distance of the Project Site away from the SAC, SPA and Ramsar Site (approximately 27km and 28km respectively), and given the lack of effect pathways via the water environment; these elements of the Project (either alone or in combination with the other projects listed above) are not likely to give rise to impacts on the European Sites.

Likely changes to the site arising as a result of:	
Reduction in habitat area	None – due to the distance away from the Project Site, there will be no direct impacts on habitats in the SAC, SPA or Ramsar Site. No indirect impacts on habitats within the European Sites (such as through effects on water or air quality) have been identified.
Disturbance to key species	Due to the distance of the Project Site away from the SAC, SPA and Ramsar Sites (which are located approximately 27km and 28km away, respectively), no disturbance to key species as a result of noise and vibration is expected. In any case, all construction activities will be undertaken in accordance with requirements attached to the DCO and the recommendations of BS 5228 ‘Noise and Vibration Control on Construction and Open Sites’.
Habitats or species fragmentation	None – the Project will not fragment (either directly or indirectly) any habitat features, which connect the European Sites with the wider environment.

Reduction in species density	None – the Project will not affect (either directly or indirectly) the availability of resources within the SAC, SPA or Ramsar Site. Due to the distance away from the Project Site, no disturbance effects have been identified.
Changes in key indicators of conservation value (water quality etc.)	None – there are therefore no conceivable effect pathways via the water environment as a result of the Project. The potential for significant effects associated with air quality in the SAC, SPA or Ramsar Site has been scoped out of the assessment. Due to the distance away from the Project Site, there will be no direct impacts on habitats in the SAC, SPA or Ramsar Site.
Climate change	None – no direct or indirect impacts on the SAC, SPA or Ramsar Site have been identified. The Project will not fragment any habitat features, which connect the European Sites with the wider environment; and will not result in any changes in local hydrology or air quality.
Likely impacts on the European Site as a whole in terms of:	
Interference with the key relationships that define the structure of the site	None. The Project will not fragment any habitat features, which connect the European Sites with the wider environment; will not result in any changes in local hydrology or air quality.
Interference with the key relationships that define the function of the site	None. The Project will not fragment any habitat features, which connect the European Sites with the wider environment; will not result in any changes in local hydrology or air quality.
Significance of the impacts set out above:	
Reduction in habitat area	Not significant (no impacts identified)
Disturbance to key species	Not significant (no impacts identified)
Habitat or species fragmentation	Not significant (no impacts identified)
Reduction in species density	Not significant (no impacts identified)

Changes in key indicators of conservation value (water quality etc.)	Not significant (no impacts identified)
Climate change	Not significant (no impacts identified)
Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	
Due to the distance of the Project Site away from the SAC, SPA and Ramsar Site (approximately 27km and 28km respectively), and given the lack of conceivable effect pathways via the water environment; there are no elements of the Project, or combination of elements, which are likely to result in impacts on the European Sites.	
Outcome of screening stage	Not likely to be significant effects.
Are the appropriate statutory environmental bodies in agreement with this conclusion	Yes (see correspondence in Appendix B).

4 Outcome

4.1.1 There will be no loss or fragmentation of habitat within or associated with the SAC, SPA or Ramsar Site, or deterioration in habitat quality as a result of the Project. There will be no disturbance to habitats or species for which the SAC, SPA or Ramsar Site is designated, and no reduction in species density is anticipated.

4.1.2 Neither the construction, operation or decommissioning of the Project will interfere with any of the key relationships that define the structure or function of the SAC, SPA or Ramsar Site, as none of the habitats or species will be directly or indirectly affected.

4.1.3 Based on the results of the screening exercise the Project will not result in any likely significant effects on Chiltern Beechwoods SAC, Upper Nene Valley Gravel Pits SPA, or Upper Nene Valley Gravel Pits Ramsar Site, and no scientific doubt remains.

4.1.4 There are no likely significant effects on the European sites, either alone or in combination with other plans or projects and no scientific doubt remains. On this basis no further assessment in the form of an Appropriate Assessment (Stage 2) is necessary (in accordance with PINs Advice note 10).

4.1.5 Consultation was undertaken with Natural England as part of the 2014 PEIR and agreement reached with the findings of this assessment, that no likely significant effects on any European Sites are anticipated as a result of the Project (see Appendix B Correspondence with Natural England). Natural England will be consulted again to confirm that they are still in agreement. This agreement will be included in the Statement of Common Ground, to be submitted as part of the DCO application.

Figures

Upper Nene Valley Gravel Pits

Chilterns Beechwoods SAC

Legend

- Project Site
- 30km Radii Around Project Site
- Special Protection Areas (SPA)
- Special Areas of Conservation (SAC)
- Ramsar Sites

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READING
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Millbrook Power

0 5 10 Km

N

HRA: No Significant Effects Report
Location of European Sites

Date	25/02/2015
Scale	1:235,000 @ A3
Drawn By	HF
Checked By	HS
Revision Number	01
Figure Number	**Figure 1**

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Appendix A Advice Note 10 Screening Matrices

The Planning Inspectorate

EST 1909

Advice Note 10

Habitat Regulations Assessment for nationally significant infrastructure projects

Appendix 1: Template for Screening Matrices

Potential Impacts

Potential impacts upon the European site(s)* which are considered within the submitted Habitats Regulations Assessment report Habitats Regulations Assessment: No Significant Effects Report (PBA, January 2015) are provided in the table below. Impacts have been grouped where appropriate for ease of presentation.

Impacts considered within the screening matrices

Designation	Impacts in submission information	Presented in screening matrices as
Chiltern Beechwoods SAC (UK 0012724) **Upper Nene Valley Gravel Pits SPA (UK9020296)** **Upper Nene Valley Gravel Pits Ramsar (UK11083)**	• Noise and visual disturbance to key species during construction • Loss of habitat/ fragmentation • Potential reduction in air quality associated with dust and particulate matter emissions	• Disturbance/ displacement • Habitat loss/ alteration

* As defined in Advice Note 10.

STAGE 1: SCREENING MATRICES

The European Sites included within the Applicant's assessment are:

Chiltern Beechwoods SAC

Upper Nene Valley Gravel Pits SPA

Upper Nene Valley Gravel Pits Ramsar Site

Evidence for likely significant effects on their qualifying features is detailed within the footnotes to the screening matrices below.

Matrix Key:

✓ = Likely significant effect **cannot** be excluded
✗ = Likely significant effect **can** be excluded

C = construction
O = operation
D = decommissioning

Where effects are not applicable to a particular feature they are greyed out.

HRA Screening Matrix A1: Chiltern Beechwoods SAC

Name of European site: Chiltern Beechwoods SAC												
EU Code: UK0012724												
Distance to NSIP 27km												
European site features	**Likely Effects of NSIP**											
Effect	*Disturbance/ displacement*			*Habitat loss/ alteration*			*Effect 3*			*In-combination effects*		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Asperulo-Fagetum beech forests	×a	×a	×a	×a	×a	×a				×a	×a	×a
Semi-natural dry grasslands and scrubland facies: on calcareous substrates	×a	×a	×a	×a	×a	×a				×a	×a	×a
Stag Beetle	×a	×a	×a	×a	×a	×a				×a	×a	×a

Evidence supporting conclusions

a. Please see Chapter 3 of this No Significant Effects Report. There will be no land-take, no resource requirements and no excavation works within the boundary of the designated site. Due to the distance of the Project Site away from the SAC, no impacts on air quality are anticipated, in accordance with statutory guidelines. There are no water bodies which connect the Project Site with the SAC, and there are therefore no conceivable effect pathways via the water environment as a result of the Project. The Project will not fragment any habitat features, which connect the SAC with the wider environment.

HRA Screening Matrix A2: Upper Nene Valley Gravel Pits SPA

Name of European site: Upper Nene Valley Gravel Pits SPA												
EU code: UK9020296												
Distance to NSIP 28km												
European site features	**Likely Effects of NSIP**											
Effect	*Disturbance/ displacement*			*Habitat loss/ alteration*			*Effect 3*			*In-combination effects*		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Bittern *Botaurus stellaris*	×a	×a	×a	×a	×a	×a				×a	×a	×a
Golden plover *Pluvialis apricaria*	×a	×a	×a	×a	×a	×a				×a	×a	×a
Gadwall *Anas strepera*	×a	×a	×a	×a	×a	×a				×a	×a	×a
In the non-breeding season, the area regularly supports 23,821 individual waterbirds (5 year peak mean 1999/2000 – 2003/04)	×a	×a	×a	×a	×a	×a				×a	×a	×a

Evidence supporting conclusions

a. Please see Chapter 3 of this No Significant Effects Report. There will be no land-take, no resource requirements and no excavation works within the boundary of the designated site. Due to the distance of the Project Site away from the SPA, no impacts on air quality are anticipated (in accordance with statutory guidelines); and there are no anticipated disturbance effects due to noise. There are no water bodies which connect the Project Site with the SPA, and there are therefore no conceivable

effect pathways via the water environment as a result of the Project. The Project will not fragment any habitat features, which connect the SPA with the wider environment.

HRA Screening Matrix A3: Upper Nene Valley Gravel Pits Ramsar

Name of European site: Upper Nene Valley Gravel Pits Ramsar												
EU Code: UK11083												
Distance to NSIP 28km												
European site features	**Likely Effects of NSIP**											
Effect	*Disturbance/ displacement*			*Habitat loss/ alteration*			*Effect 3*			*In-combination effects*		
Stage of Development	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*	*C*	*O*	*D*
Mute swan *Cygnus olor*	×a	×a	×a	×a	×a	×a				×a	×a	×a
Gadwall *Anas strepera*	×a	×a	×a	×a	×a	×a				×a	×a	×a
In the non-breeding season, the site regularly supports 23,821 individual waterbirds (5 year peak mean 1999/2000 – 2003/04)	×a	×a	×a	×a	×a	×a				×a	×a	×a

Evidence supporting conclusions

a. Please see Chapter 3 of this No Significant Effects Report. There will be no land-take, no resource requirements and no excavation works within the boundary of the designated site. Due to the distance of the Project Site away from the Ramsar Site, no impacts on air quality are anticipated (in accordance with statutory guidelines); and there are no anticipated disturbance effects due to noise. There are no water bodies which connect the Project Site with the Ramsar Site, and there are therefore no conceivable effect pathways via the water environment as a result of the Project. The Project will not fragment any habitat features, which connect the Ramsar Site with the wider environment.

Appendix B Correspondence with Natural England

Elaine Richmond

From: Chris Leach
Sent: 02 March 2015 12:01
To: Elaine Richmond
Subject: FW: Millbrook Power NSER

Elaine,

Please see below for your records.

Best Regards,

Chris.

Dr. Chris Leach
BSc MSc PhD
Associate

For and on behalf of Peter Brett Associates LLP
e cleach@peterbrett.com
m:07880242454
w www.peterbrett.com

Hannah, Reed and Associates Limited is now part of the PBA Group


From: Holdgate, Ross (NE) [mailto:Ross.Holdgate@naturalengland.org.uk]
Sent: 02 March 2015 11:50
To: Nick Johnson
Cc: Chris Leach
Subject: RE: Millbrook Power NSER

Dear Nick

To confirm I am in agreement with the conclusions of the No Significant Effects Report provided; i.e. that there would be no likely significant effects to any European Site, either alone or in combination with other plans or projects, from the Millbrook Power project.

Kind regards, Ross

Ross Holdgate
Lead Planning and Conservation Adviser
Essex, Herts, Beds, Cambs & Northants Area Team
Eastbrook, Shaftsbury Road, Cambridge, CB2 8DR

Tel: 0300 060 4657
www.naturalengland.org.uk

We are here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

In an effort to reduce Natural England's carbon footprint, I will, wherever possible, avoid travelling to meetings and attend via audio, video or web conferencing.

Natural England is accredited to the Cabinet Office Customer Service Excellence Standard

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From: Nick Johnson [mailto:NJohnson@stagenergy.com]
Sent: 18 February 2015 08:11
To: Holdgate, Ross (NE)
Cc: Jackson, John (NE); Chris Leach
Subject: Millbrook Power NSER

Ross,

We are aiming to submit our DCO application in early March and would very much appreciate any comments on the attached No Significant Effects Report. I believe Elaine Richmond, our ecologist at PBA, has been in close contact with NE throughout the process of preparing our documents so I don't think there will be anything new here.

I very much look forward to hearing from you shortly,

Best regards,
Nick

Nick Johnson
Project Manager, Millbrook Power
0131 550 3380
07712 805 912

From: Jackson, John (NE) [mailto:John.Jackson@naturalengland.org.uk]
Sent: 10 November 2014 10:53
To: Nick Johnson
Cc: Holdgate, Ross (NE)
Subject: RE: meeting to discuss millbrook power station

Hello Nick,
Many thanks for your message, just to let you know that my colleague Ross Holdgate is now leading on this case.

Best Regards

John

From: Nick Johnson [mailto:NJohnson@stagenergy.com]
Sent: 10 November 2014 10:51
To: Jackson, John (NE)
Subject: RE: meeting to discuss millbrook power station

John,

Just wanted to give you a quick update now that we have some more detail regarding the PINS outreach meeting. It will be held between 11:30 and 13:00 on Wednesday 26th November at the Marston Vale Forest Centre near Marston Moretaine.

It will include a brief update from MPL and summary of our consultation responses, followed by a presentation from PINS outlining how the pre-application and examination phase of a DCO application work. Please could you let me know if you are available to attend.