APPENDIX 7.2: BAT ACTIVITY REPORT

Appendix 7.2

Cuadrilla Balcombe Ltd

Bat Survey Report

Lower Stumble Exploration Site, Balcombe

857001

OCTOBER 2017

RSK GENERAL NOTES

Project No.: 857001

Title: Lower Stumble Exploration Site, Balcombe - Bat Survey Report

Client: Cuadrilla Balcombe Ltd

Date: October 2017

Office: Hemel Hempstead

Status: Final

This report has been prepared by a professional ecologist and reviewed by an Associate Director. Both are members of the Chartered Institute of Ecology and Environmental Management (CIEEM). Names have been omitted from this report for confidentiality reasons but can be provided on request.

EXECUTIVE SUMMARY

1. This report provides details of bat surveys carried out in connection with the planned works at the 2z borehole hydrocarbon exploration site south of the village of Balcombe.

2. The site comprises an area of hard-standing (previously used as a drilling platform) with an associated access road (hereon referred to as the “works footprint”). The works footprint is surrounded by suitable bat roosting and foraging habitat including coniferous plantation woodland, broadleaved woodland and rough grassland.

3. Bat activity and static bat detector surveys were carried out in spring (May), summer (June) and autumn (September) 2017.

4. During May, June and September, the highest levels of bat activity recorded during the transect surveys were associated with the woodland edge habitat and the grassland paths bordering and dissecting the wooded areas.

5. At least five species of bat were recorded and the highest levels of bat activity were recorded in June 2017, which is to be expected as this coincides with the maternity season when bat populations everywhere will be at their highest levels.

6. Measures have been included to help minimise effects to local bat populations from the proposed development. These include measures to minimise light spill and also recommendations on the timing of the works, in terms of the daily working hours and the months of the year that the works take place. Where possible works should be planned to occur outside of the active season for bats (November to April)to avoid disturbance to foraging and commuting bats.

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TABLES

FIGURES

1 INTRODUCTION

1.1 Purpose of report

This report contains details of bat surveys and static bat detector surveys carried out in 2017 for the proposed works at the 2z borehole hydrocarbon exploration site south of the village of Balcombe (centred at National Grid reference TQ 31007 29251). *Figure 1* shows the site location and boundary.

Planning permission was granted in 2014 for flow testing and monitoring of an existing borehole drilled in 2013. This permission expired in May 2017 without the works being completed. A new planning application for temporary permission for the same scope of works is being submitted to WSCC, and this report forms part of the planning application package.

The proposed flow testing and monitoring works of the existing borehole on the site will consist of the following three stages:

1. Exploration borehole testing and pressure monitoring operations;
2. Plug and abandonment of the borehole; and
3. Demobilisation and site restoration to its former use.

It is estimated that these works will take no longer than six months to complete.

1.2 Ecological context

The site lies to the south of Balcombe; a village in West Sussex. It comprises an area of hard-standing (previously used as a drilling platform) with an associated access road (hereon referred to as the "works footprint"). The drilling platform is c. 0.5ha with the existing exploratory borehole at the centre and 2 m high security fencing around its perimeter. The site was last used in September 2013 as an exploration well. The area immediately surrounding the works footprint comprises planted broadleaved and coniferous trees, scrub, grassland paths and hedgerows. There are patches of Ancient Semi-Natural Woodland (ASNW) (which form part of Lower Stumble Wood and Lower Beanham Wood) to the north and south of the survey area, a railway line to the east and London Road B0236 to the west.

Although the works footprint comprises solely hard-standing with some encroaching early successional herbaceous plants, it is surrounded by habitat which is suitable for bats.

1.3 Structure of the Report

The remainder of this report is structured as follows:

- *Section 2* describes the survey and assessment methods;
- *Section 3* presents the survey results;
- *Section 4* gives an evaluation of the results;
- *Section 5* lists the references; and
- *Section 6* provides figures.
- *Appendix 1* provides legislation regarding bats.

2 METHODS

2.1 Personnel

Bat activity surveys were by led by an RSK Consultant Ecologist assisted by an RSK Assistant Ecologist. The Consultant Ecologist holds a Class 2 Natural England licence allowing the disturbance of bats for the purposes of survey in all counties of England and has over 4 years' experience in ecological consultancy. The Assistant Ecologist is experienced in surveys of this type and has over 2 years' experience in ecological consultancy.

2.2 Habitats

Habitats were assessed for their suitability for foraging and commuting bats during a preliminary ecological appraisal undertaken by RSK in April 2017. Areas of particular interest vary between bat species, but generally include sheltered areas and habitats with good numbers of insects such as woodland edges, hedgerows, watercourses and species-rich or rough grassland. Both Noctule bats (*Nyctalus noctula*) (Mackie and Racey, 2017) and Common pipistrelles *(Pipistrellus pipistrellus*) (Davidson-Watts and Jones, 2006) preferentially select deciduous woodland habitats and edges for foraging.

Habitats of particular interest to foraging and commuting bats that are present on the site are:

- woodland and scrub edges;
- tree lines; and
- grass footpaths surrounding the site.

2.3 Transect Surveys

Bat surveys followed methodology outlined in published guidelines (Collins, 2016) to identify any areas of high commuting and/or foraging activity and also to confirm the species involved (large roosts can sometimes also be identified from patterns of activity). Survey visits were undertaken in May, June and September 2017.

This approach, which was comprised of three survey visits during spring, summer and autumn was deemed acceptable to support the new planning application by the County Ecologist for West Sussex County Council in email communications with Cuadrilla dated 02/05/2017.

Transects consisted of 2 hour-long dusk surveys across the site. These included walking sections of a pre-defined transect (continuously recording any signs of bat activity) and stopping for five minutes at pre-determined locations before continuing along the transect route. Monitoring locations were chosen to include areas with high

quality habitat where bats were likely to be encountered if present. Transect maps can be seen in *Figure 2.* On each visit, the transect route was walked in suitable weather (above 10°C with little or no rain and no strong winds) using a Bat Logger M bat detector. Targeted and continuous recordings of bat calls were made during the survey in time expansion and frequency division formats. The direction of each transect alternated between each visit to take into account changes in activity across the site throughout the season. Bat passes were marked on a map so that statistics on passes and numbers of bats could later be calculated.

Table 1 details the dates and survey times for each activity survey completed. Weather conditions recorded at the beginning and end of each survey were also recorded. These are provided in *Table 2.*

Table 1: Survey dates and timings for each transect surveys.

Date	Survey Type	Sunset Time	Start Time	End Time
30.05.2017	Dusk	21:03	21.03	23.03
26.06.2017	Dusk	21:07	21:07	23.07
11.09.2017	Dusk	19:23	19:23	21.23

Table 2: Weather conditions recorded at the beginning and end of each transect survey.

Date	Air Temperature (℃)	Cloud Cover (%)	Wind Speed (Beaufort)	Precipitation
30.05.2017	18	2	2	0
26.06.2017	19	0	0	0
11.09.2017	16	5	2	25%

The survey transect consisted of five walking sections and five minute monitoring stops. Levels of bat activity were quantified by the number of bat passes recorded during each walking section or monitoring stop. A single pass by a bat was defined by a gap of one second or more between the end of one call and beginning of the next bat call. Species were identified either in the field or through the analysis of recordings using BatExplorer® and Kaleidoscope® software programs.

2.4 Static Surveys

A Wildlife Acoustics Song Meter 2 Bat+ (SM2) detector was installed within the drilling platform to monitor activity in the vicinity of the works footprint (see *Figure 2*). The SM2s provided complementary data collected over a minimum of five consecutive nights in accordance with Collins (2016) guidelines.

SM2s were deployed in May, June and September 2017 for at least five consecutive nights as shown on *Table 3*. Survey dates were selected when the predicted weather forecast indicated suitable weather conditions for foraging and commuting bats (*i.e.* air temperature above 7°C, the absence of strong winds and no precipitation). Surveys were designed to provide information on the level of bat activity and composition of bat species using the site, the relative importance of features and locations and how patterns of bat activity may change throughout the year.

Table 3. Survey dates for static detector deployment

Survey Night	May 2017	June 2017	September 2017
1	30.05.2017	26.06.2017	11.09.2017
2	31.05.2017	27.06.2017	12.09.2017
3	01.06.2017	28.06.2017	13.09.2017
4	02.06.2017	29.06.2017	14.09.2017
5	03.06.2017	30.06.2017	15.09.2017
6	04.06.2017	01.07.2017	16.09.2017
7	05.06.2017	02.07.2017	17.09.2017
8	06.06.2017	03.07.2017	18.09.2017
9	07.06.2017	04.07.2017	*
10	*	05.07.2017	*
11	*	02.07.2017	*

* SM2 battery failed at this point but the five nights of data had already been gathered.

The units were set up to continuously record from 30 minutes before sunset until 30 minutes after sunrise. Microphones were mounted on extension cables at least 3m off the ground. All recordings were stored on memory cards and analysed using the Kaleidoscope Pro® software program. All automated identifications, noise and no ID

files from the software were double checked by an experienced ecologist for quality assurance purposes. Echolocation calls were identified down to species or genus level depending on the type of bat encountered (*i.e.* it is not possible to reliably identify species belonging to the genus *Myotis* and *Plecotus* and *Nyctalus* species) and the quality of the recording.

The level of bat activity was quantified by the number of files (passes) and pulses (individual echolocation pulses within a call) recorded for each recorded species for each night and monitoring period. The Kaleidoscope analysis software produced a single file for each pass made by an echolocating bat. The number of pulses within each file also gives a quantifiable measure for the approximation of the level of foraging and commuting activity.

2.5 Survey constraints

During transect surveys, bats and their direction of flight were easiest to observe during the period just after sunset when light levels were still high. As the light fades, visual observation often becomes less reliable and "heard not seen" records are more frequently made. When this occurred, only the location of the bat pass could be recorded and not the direction of flight.

Any SM2 battery failures encountered were after a full five nights of data in suitable conditions had been collected so were not an issue.

3 RESULTS

The following sections provide the findings of bat surveys completed in May, June and September 2017.

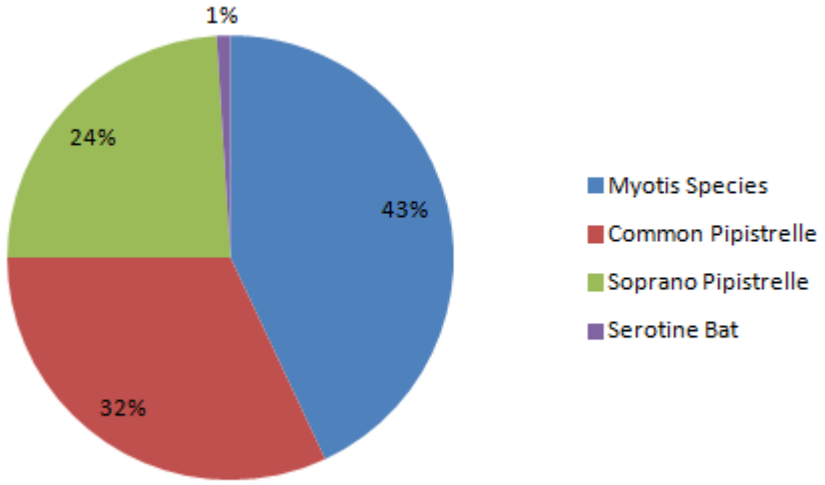
3.1 Transect Surveys

Table 4 describes the total number of bat passes recorded for each transect. At least four different species of bat were recorded during the surveys. Over the course of three surveys, *Myotis* species attributed to 43% of all activity recorded (foraging and commuting) on the site as shown in Chart 1. This was closely followed by Soprano Pipistrelle (*Pipistrellus pygmaeus*) (32%), Common Pipistrelle (*Pipistrellus pipistrellus*) (24%) and there was a single record of a Serotine Bat (*Eptesicus serotinus*) passing (<1%).

Table 4. Total number of bat passes recorded during each transect survey

Species	May Dusk	June Dusk	September	Total
Pipistrellus pipistrellus	27	31	59	**117**
Pipistrellus pygmaeus	29	125	0	**154**
Myotis species	31	93	85	**209**
Eptesicus serotinus	0	1	0	**1**
TOTAL	**87**	**250**	**144**	**481**

Chart 1. Species contributions to total level of bat activity recorded across the site.



The dusk activity survey in June had the highest level of total bat activity recorded (a total of 250 passes), which is likely because of bat activity progressively increasing during spring and early summer due to the formation of maternity colonies.
The highest levels of bat activity were along the woodland boundaries, particularly to the north and north-east of the works footprint where there are rough grassland paths forming linear clearings suitable for bats to forage along. Bat activity was comparatively lower along the south-eastern boundary of the works footprint close to the London Road B0236 and along the access track where only a few bat passes were recorded during the surveys. Both commuting and foraging activity was recorded during the surveys; with Pipistrelle and *Myotis* bat species being regularly noted flying along the north and north-west of the transect route. This made it clear that these species regularly used these paths bordering the adjacent woodland as both commuting and foraging habitat. Transect survey results for each section and stop are illustrated in *Figures 3 – 5.*

3.2 Static Surveys

A summary of the results from each seasonal survey is presented in *Table 5*. Throughout the survey period, a total of four bat species were recorded; Common Pipistrelle, Soprano Pipistrelle, Noctule bat, and *Myotis* species. Common Pipistrelle was the most frequent across all seasons and on a nightly basis. This was followed by Noctule, Myotis and then Soprano Pipistrelle.

The same as the transect surveys, June had the highest level of total bat activity recorded using the static bat detector. This is likely because of bat activity progressively increasing during spring and early summer due to the formation of maternity colonies.

The column “Number of Files” represents the number of passes per species (intervals of one second between bat calls represents a new pass). The column titled “Number of Pulses” represents the number of calls emitted per bat species – this varies between species due to their different calls.

Table 5. Summary of results from the seasonal static surveys

Species	May		June		September	
	Number of Files	Number of Pulses	Number of Files	Number of Pulses	Number of Files	Number of Pulses
Common Pipistrelle (*Pipistrellus pipistrellus)*	0	0	61	805	1	2
Myotis sp. *(Myotis* sp.*)*	0	0	5	35	1	0
Noctule (*Nyctalus noctula*)	0	0	9	76	0	0
Soprano Pipistrelle (*Pipistrellus pygmaeus)*	0	0	1	4	0	0
TOTAL	**0**	**0**	**76**	**920**	**2**	**2**

4 EVALUATION AND CONCLUSIONS

4.1 Habitats

Habitats within the immediate surroundings of the works footprint were found to provide suitable foraging and commuting opportunities for bats during the activity and static surveys which recorded at least five bat species using the site.

Optimum habitat occurs all around the boundary of the works area and comprises woodland and scrub edge habitat with linear grass clearings (foot paths). The woodland that the works footprint is situated within is connected to further suitable habitat off site with large blocks of woodland to the north and south of the works footprint and to the west on the other side of the London Road B0236. In addition there is good connectivity to the Ardingly reservoir to the east via woodland and hedgerows. The reservoir represents optimal foraging habitat for potential *Myotis* bat species in the area such as Daubenton's Bat (*Myotis daubentonii*).

During the transect surveys, peak bat foraging and commuting activity was recorded in connection with the woodland edges and rough grassland paths that bordered and dissected wooded areas.

A static bat detector was also deployed at a single point within the drilling platform works footprint and peak bat activity was recorded during the June with the number of passes by all bat species on the static detector being highest during that deployment, potentially as a result of the formation of maternity colonies and young emerging from these colonies (Russ *et al.*, 2003).

4.2 Species

At least five different bat species have been recorded on the site. The five bat species recorded were Common Pipistrelle, Soprano Pipistrelle, *Myotis* species, Noctule bat, and a single record of a Serotine bat.

On a nightly basis, the most frequently encountered species were *Myotis* species closely followed by Soprano Pipistrelle (*Pipistrellus pygmaeus*), Common Pipistrelle (*Pipistrellus pipistrellus*), and there was a single record of a Serotine Bat pass (*Eptesicus serotinus*) passing. Noctule bats were only recorded on the static bat detectors and not during the transect surveys.

4.3 Potential Impacts of Development

4.3.1 Habitat loss

The works footprint is comprised entirely of crushed concrete hard-standing with some minor colonisation by scattered early successional herbaceous plants and therefore the habitat within the works footprint is of very limited value for bat species.

The high quality habitat (*e.g.* woodland edges and rough grassland paths surrounding the works footprint) will not be physically impacted by the planned works. Therefore it is highly unlikely that the habitat lost will be detrimental to the local bat population, especially given the amount of adjacent higher quality foraging and commuting habitat that will not be affected (*e.g.* woodland edges).

4.3.2 Lighting

All species of bat are nocturnal and artificial lighting of areas in which bats are active is likely to disturb their normal activities. For example, light falling on a roost exit point will at least delay bats from emerging. This shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence could mean that this vital time for feeding is missed. At worst, bats may abandon the roost all together which could have a significant effect on the future success of the colony. This is likely to be deemed as a breach of the national and European legislation that protects bats and their roosts from disturbance.

In addition to causing disturbance to a roost, artificial lighting can also affect the feeding behaviour of bats and their commuting routes via the attraction of insects to lights with short wavelengths (UV and blue light), and via the illumination of important foraging and commuting habitats.

Illumination of foraging areas can prevent or reduce foraging activity, causing bats to pass quickly through the lit area or avoid it completely. Lighting can disrupt the composition and abundance of insect prey and can effectively cause a loss of foraging areas for some bat species. This can have negative effects on bat communities by potentially causing competitive exclusion of less tolerant species (*e.g.* Long-eared Bat and *Myotis sp.*) as more light tolerant species (*e.g. Pipistrellus sp.)* may out-compete them for insect prey. *Myotis* species were frequently recorded during the bat surveys.

Some bat species actively forage at lights due to the higher numbers of insects (particularly moths) attracted to street lights, in particular low wavelength light (Eisenbeis 2006; van Langevelde *et al.* 2011). Fast flying bat species adapted to forage in open areas (particularly *Eptesicus, Pipistrellus* and *Nyctalus* species) may benefit from the increased foraging opportunities provided at lamps which attract high densities of insects. However bats foraging at street lights may be subject to increased mortality risk because juveniles may be at higher risk of predation due to their slower and less agile flight (Racey & Swift, 1985). In addition, the insect prey of bats may be

attracted away from dark areas, potentially reducing prey availability for species that do not forage in lit areas.

Although total absence of light is best for bats this may not always be possible due to the necessity for 24 hour operations during "Stage 1: Exploration well testing operations" which is likely to last for around 60 days and the current plan of working up until 22:00 during the plug and abandonment stage. It is not currently known whether the works will be taking place during the active season for bats (generally considered to be between May and October) therefore there is potential for disturbance to occur if works are scheduled within that period of time. Mitigation has been suggested in the instance that works are carried out between May and October.

4.4 Mitigation

4.4.1 Timing of works

The client will endeavour to carry out the most disturbing works to bats (*i.e.* works which require night time lighting) outside the active season for bats (November to April) however where this is not possible the following mitigation measures will be put in place and detailed within a lighting plan for the works.

4.4.2 Lighting

The lighting plan should seek to keep areas where high bat activity was recorded (*i.e.* surrounding woodland boundaries) as dark as possible.

Plug and abandonment of the site will take place over an 8 week period and during this time Cuadrilla plan to work between the hours of 07:30 and 22:00 which will require lighting in the evening and therefore has the potential to disturb bats depending on the timing of works. If the planned works take place during the active bat season it may be appropriate to change these standard working hours to reduce / remove the necessity for lighting. The precise details of any changes to the standard working hours to minimise impacts on bats will depend on when the work is planned and the sunset time during that period.

During the flow testing operations (maximum 14 days) and borehole pressure monitoring (maximum 60 days) the site will be operational over 24 hours and may require some minor night time lighting of the working areas; however minimal human activity is expected during this time so lighting requirements are likely to be very temporary and brief and impacts upon bats would be negligible. To minimise the potential disturbance to bats during these periods of 24 hour working all operational areas of the drilling platform will be lit with task-based lighting e.g. SMC TL90 lighting towers, which will be inward facing to avoid light spill to areas outside of the works footprint and therefore minimising the potential for negative impacts to bats. Lighting cowls should be utilised to further reduce light spillage to areas outside of the works footprint. This is particularly important for bat species that are less tolerant of artificial

light such as Myotis sp. which were frequently encountered during the site surveys so are known to use the habitats surrounding the works footprint.

4.4.3 Enclosed Flare

An enclosed flare with a maximum height of 13.7m will be located on the site as this is an essential part of the testing equipment and is necessary to burn off any associated gas produced during the seven-day flow testing period.

The flare will be situated within the stone drilling platform fenced compound which offers negligible potential for foraging and commuting bats which will likely utilise the habitats surrounding the works footprint. Additionally, this area will also be lit during the testing phase which will further dissuade bats from entering the working footprint. This combination of factors will limit the potential for bats to be disturbed by the light produced by the flare. The potential impact of the flare on bat species in the area is therefore deemed to be negligible.

5 REFERENCES

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6 FIGURES

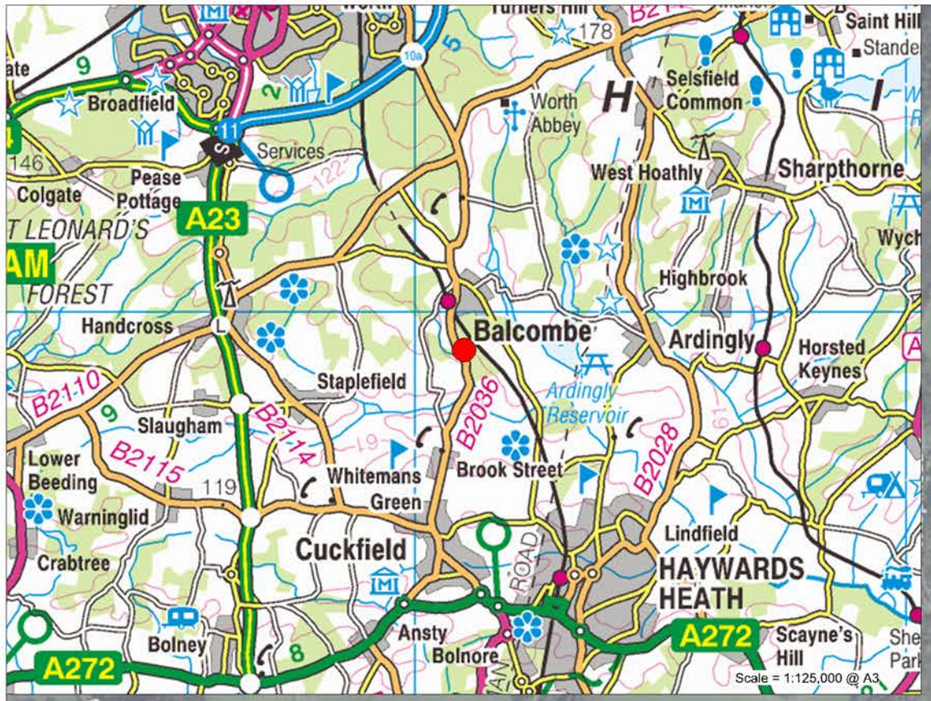
Figure 1 – Site location plan

Figure 2 – Bat transect route and SM2 location

Figure 3 – May 2017 transect results map

Figure 4 – June 2017 transect results map

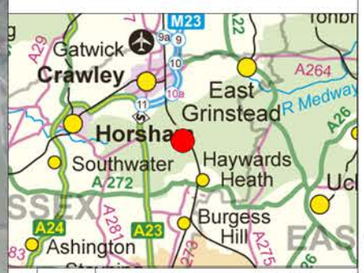
Figure 5 – September 2017 transect results map



Above ground work site boundary

Below ground works site boundary

Survey Area



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Balcombe 2z Hydrocarbon Well Testing

Figure 1

Site Location Plan

0 300

Metres

Scale = 1:10,000 @ A3

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Above ground work site boundary
Below ground works site boundary
Survey area
Transect route
SM2 static bat detector location

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Balcombe 2z Hydrocarbon Well Testing

Figure 2

Bat Transect Route and Static Detector Location

0 30
metres
Scale = 1:1,000 @ A3

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Above ground work site boundary
Below ground works site boundary
Survey area
Transect route
Common Pipistrelle Bat
Soprano Pipistrelle Bat
Myotis Bat Species

Rev	Date	Description
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Balcombe 2z Hydrocarbon Well Testing

Figure 3

Bat Transect Survey
May 2017

0 30
metres
Scale = 1:1,000 @ A3

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Balcombe 2z Hydrocarbon Well Testing

Figure 4

Bat Transect Survey
June 2017

0 30
metres
Scale = 1:1,000 @ A3

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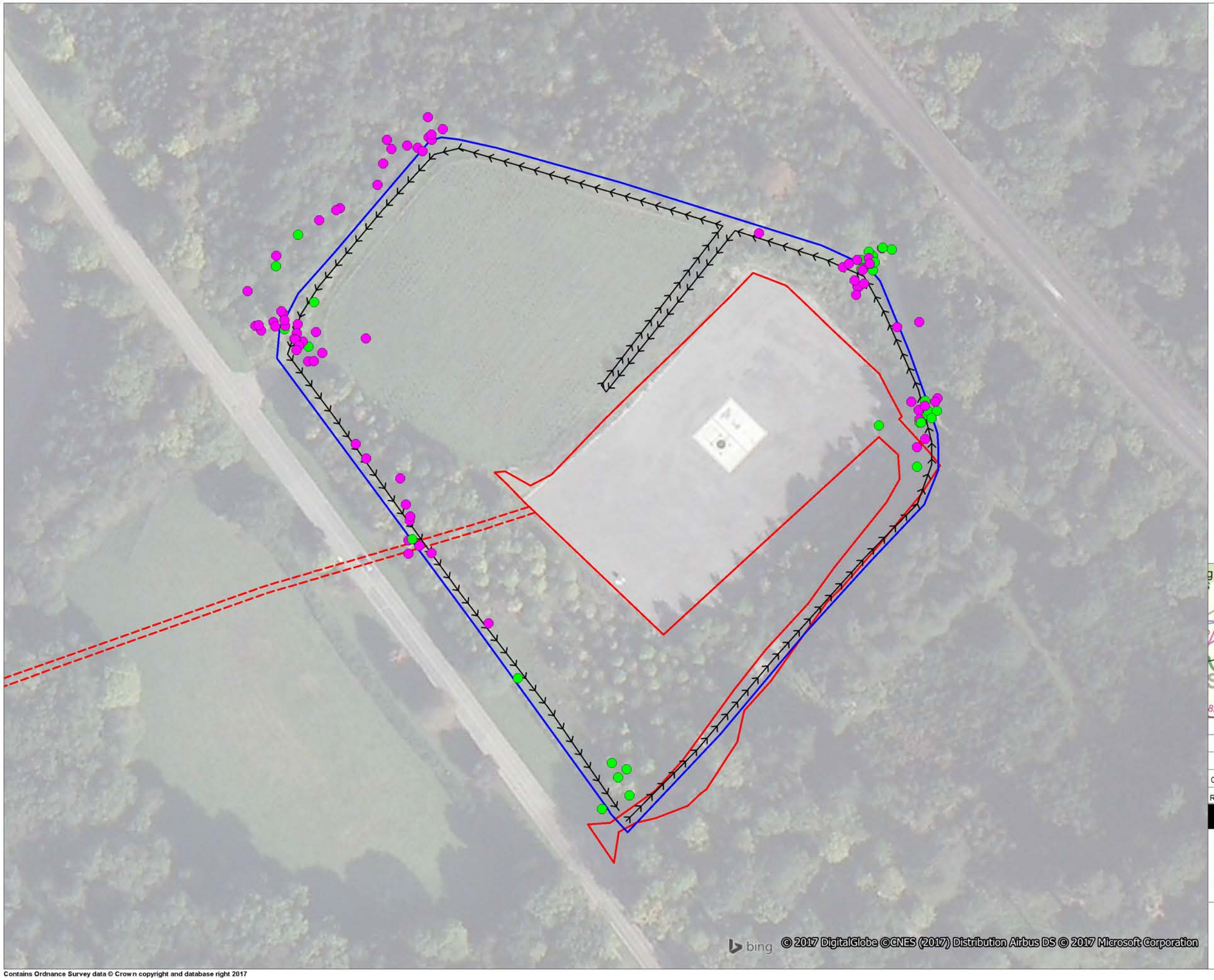

Above ground work site boundary
Below ground works site boundary
Survey area
Transect route
Common Pipistrelle Bat
Myotis Bat Species

Rev	Date	Description
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Balcombe 2z Hydrocarbon Well Testing

Figure 5

Bat Transect Survey
September 2017

0 30
metres
Scale = 1:1,000 @ A3

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7 APPENDIX 1 – BAT LEGISLATION

All species of British bat are protected by The Wildlife and Countryside Act 1981 (as amended) extended by the Countryside and Rights of Way Act 2000. This legislation makes it an offence to:

- intentionally kill, injure or take a bat;
- possess or control a bat;
- intentionally or recklessly damage, destroy or obstruct access to a bat roost; and
- intentionally or recklessly disturb a bat whilst is occupies a bat roost.
- Bats are also European Protected Species listed on The Conservation (Natural Habitats, & c.) Regulations 1994 (as amended). This legislation makes it an offence to:
- deliberately capture, injure or kill a bat;
- deliberately disturb a bat (in such a way as to be likely to significantly affect: (i) the ability of a significant group of bats to survive, breed or rear/nuture their young; or (ii) the local distribution or abundance of the species concerned);
- damage or destroy a breeding site or resting place of a bat; and
- possess, control, transport, sell, exchange a bat, or offer a bat for sale or exchange.

All bat roosting sites receive legal protection even when bats are not present.

Where it is necessary to carry out an action that could result in an offence under The Conservation (Natural Habitats, & c.) Regulations 2010 (as amended) it is possible to apply for a European Protected Species (EPS) licence from Natural England. Licences are only issued where Natural England are satisfied that there is no satisfactory alternative, works are for overriding reasons of public interest and that the favourable conservation status of bat populations will not be detrimentally affected.