

# Coedely A4119 Dualling

## BAT SURVEY REPORT

May 2020





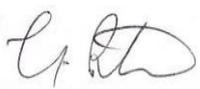
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**CLIENT:** Rhondda Cynon Taf County Borough Council

**A4119 Coedely Dualling  
Bat Survey Report**

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### **ISSUE RECORD**

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# Non-Technical Summary

Site Location:	A4119 (Ely Valley Road), between Coed Ely and Ynysmaerdy (central Ordnance Survey grid reference: ST 02116 85420 to ST 03192 84601).
Proposed Development:	Proposed dualling of the A4119 over a 1.3 km section.
Scope of Survey(s)	To identify the presence/ absence and usage of the site by bats to inform the need for any further survey/ mitigation work that will be needed to allow the proposed works to progress.
Type and Dates of Surveys:	<p>Surveys were designed by NRW bat licenced ecologists Neil Price and Megan Price. The survey effort was increased towards the end of 2018 due to the discovery of lesser horseshoe bats and insufficient data collected in order to inform the likely impacts. The type and dates of surveys ranging from 2018 to 2019 are provided below:</p> <ul style="list-style-type: none"> <li>• Bat Roost Assessment Survey – Buildings: 23rd March 2018 and the 5th April 2019</li> <li>• Bat Roost Assessment Survey – Structures: 23rd March 2018 and the 5th April 2019</li> <li>• Bat Roost Assessment Survey – Trees: 23rd March 2018.</li> <li>• Emergence / return to roost surveys: Building 1 – 10th May, 2nd June and 27th June 2019, Building 2 - 14th May, 2nd June and 27th June 2019, Building 3 - 14th May, 2nd June and 27th June 2019, Building 4 - 14th May, 2nd June and 27th June 2019, Building 5 - 9th May and 28th June 2019, Building 6 - 30th May 2018, 17th July 2018 and 4th June 2019, Building 7 - 28th September 2018 and 1st June 2019, Building 8 - 10th May and 28th June 2019, Building 9 - 10th May and 28th June 2019, Building 11 – 25th April 2019 and 30th May 2019, Building 12 - 27th September 2017 and 19th May 2019, Culvert 3 – 4th June 2018, Trees 1-5 – 6th May 2018 and 8th July 2018, Bridge 5 – 18th July 2019.</li> <li>• Activity Surveys – Transect 1: 19<sup>th</sup> April, 3<sup>rd</sup> May, 22<sup>nd</sup> May, 15<sup>th</sup> June, 28<sup>th</sup> June, 29<sup>th</sup> June, 9<sup>th</sup> July, 26<sup>th</sup> July, 14<sup>th</sup> August, 30<sup>th</sup> August and 13<sup>th</sup> September 2018.</li> <li>• Activity Surveys – Transects 2 and 3: 17th September 2018, 18th October 2018, 15th May 2019 and 30th May 2019.</li> <li>• Static detector 2018 surveys: 5 static detectors deployed were from April 2018-October 2018 and 12 static detectors from October to November 2018.</li> <li>• Static 2019 Surveys: 13 static detectors deployed from April-June 2019</li> <li>• Point Count Survey 1: 25<sup>th</sup> and 26<sup>th</sup> September 2018.</li> <li>• Point Count Survey 2: 1<sup>st</sup> August 2019</li> </ul>
Overview of Results:	<p><i>Assessment Results:</i></p> <ul style="list-style-type: none"> <li>• High Bat Roost Potential Buildings / Structures / Trees: Buildings 4, 6, 7A, 7D, 8, 9, 9A, 11, 12 and Bridge 4.</li> <li>• Moderate Bat Roost Potential Buildings / Structures / Trees: Buildings 1, 1A, 2, 3, 5, 7B, 7C and Trees 2 and 5.</li> <li>• Low Bat Roost Potential Buildings / Structures / Trees: Buildings 7E, 7F, 7G, 7H, 11A, Bridges 3 and 5, brick walls associated with Culvert 3, Wall 1 and Trees 1, 3, 4, 6, 7 and 8.</li> <li>• Negligible Bat Roost Potential Buildings / Structures / Trees: Buildings 11B, 13, 14, 15, 16, Bridges 1, 2 and 6 and Culverts 1, 2, 3 and</li> </ul>

	<p><i>Survey Results:</i></p> <ul style="list-style-type: none"> <li>• Building 1 - Day roost for 2 common pipistrelle bats and 1 brown long-eared bat.</li> <li>• Building 2 – Day roost for 3 soprano pipistrelle bats.</li> <li>• Building 3 - maternity roost for c400 soprano pipistrelles and c5 whiskered/Brandt's bats.</li> <li>• Building 5 – day roost for approximately 6 soprano pipistrelle bats.</li> <li>• Building 7G - day roost for 2 common pipistrelles.</li> <li>• Building 7D - small maternity roost for c20 lesser horseshoes.</li> <li>• Building 8 - day roost for 2 whiskered/Brandt's bats.</li> <li>• Building 9A - day roost for 3 soprano pipistrelle bats</li> <li>• Building 9 - day roost for 2 whiskered/Brandt's bats.</li> <li>• Building 11 – maternity roost for 30 soprano pipistrelle bats.</li> <li>• Building 12 - small maternity roost/non-breeding day roost for c14 lesser horseshoes.</li> <li>• At least ten species of bats were identified / recorded commuting and / or foraging across the area surveyed during the bat activity, emergence, static and point count surveys. These were common pipistrelle, soprano pipistrelle, noctule, serotine, brown long-eared, lesser horseshoe, greater horseshoe, Nathuisius pipistrelle and at least two <i>Myotis</i> species (whiskered / Brandt's bats and Daubenton's). Two probable barbastelle calls were also recorded.</li> <li>• Soprano pipistrelle, common pipistrelle, brown long-eared and <i>Myotis</i> bats have been visually recorded crossing the road. Lesser horseshoe bats were recorded on both sides of the A4119 indicating that they are occasionally crossing.</li> <li>• Common and soprano pipistrelle were recorded flying and foraging under the road crossing at the northern end of the site.</li> <li>• No bats were recorded travelling through Culverts 1 and 3</li> <li>• Two main crossing points were identified. The first, near to the existing culvert 1 and within 15 m of the c. 400 soprano pipistrelle maternity roost and the second in the vicinity of the Welsh Water Compound and within 160m of the two lesser horseshoe roosts identified (where foraging/commuting regularly occurs).</li> </ul>
<p>Further Surveys / Action Required (including opportunities for enhancement)</p>	<ul style="list-style-type: none"> <li>• Improvement of two existing culverts (Culverts 1 and 3) by installing 3 m x 3m box culverts.</li> <li>• Maintain habitat connectivity.</li> <li>• Limitation of disturbance during underpass installation.</li> <li>• Planting for bats.</li> <li>• Soft fell Trees 1-8.</li> <li>• Detailed lighting design to minimise light spill and maintain dark corridors and foraging areas identified within this report as important habitat for bat usage.</li> <li>• No temporary lighting or night-time working unless agreed in advance with an experienced ecologist.</li> <li>• Production of a Detailed Mitigation Plan.</li> <li>• Monitoring of the site through and post-construction.</li> <li>• Inclusion of mitigation within the Construction Contract, EcOW and Tool-box talks.</li> <li>• Enhancement opportunities such as installation of bat boxes.</li> </ul>

# 1. Introduction

Redstart was commissioned by Rhondda Cynon Taf County Borough Council to undertake bat surveys along the route and of the surrounding land of the proposed dualling of a section of the A4119 (Ely Valley Road), between Coed Ely and Ynysmaerdy (central Ordnance Survey grid reference: ST 02116 85420 to ST 03192 84601).

The survey was undertaken to identify any constraints that bats may present to the proposed development and to identify the need for further surveys/ mitigation measures.

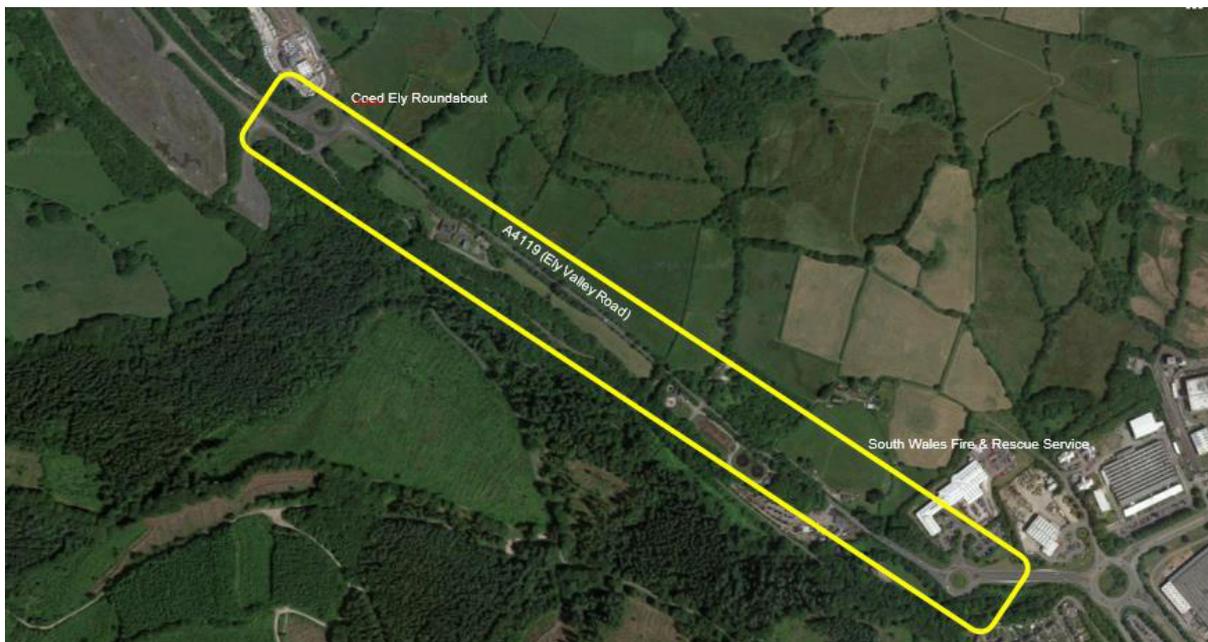
This report includes details of the survey methodologies, results and discussion and contains recommendations for further survey/ mitigation where appropriate.

## 1.1 Site Description

The proposed scheme is for road improvements to the section of the A4119 (Ely Valley Road) between Coed Ely and Ynysmaerdy. The route runs through the steep sided Ely Valley, with the River Ely running parallel to the west of the A4119 and the majority of the surrounding land consists of agricultural land, woodlands and hedgerows. The South Wales Fire and Rescue Service, industrial units and car dealerships are located to the south of the site and a caravan dealership to the north. The proposed scheme does not pass through a residential area, however the carriageway is characterised by a number of access points directly onto the road, including a scrapyard, water treatment plant and farms.

The A4119 is currently a single carriageway road in the Coed Ely area and traffic congestion is an issue on this section of road at peak travel periods, which impacts on the A4119 to the south.

**Figure 1 – Photograph of site adapted from Google Earth. The site is highlighted by a yellow boundary (Google Earth, 2018).**



## 1.2 Proposed Works

The proposed dualling will take place between the Fire Service roundabout and the Coed Ely roundabout over a 1.3 km section and will include the following works;

- Widening the existing carriageway from a single carriageway to dual carriageway. This will be achieved by both online and offline widening.
- Site Clearance – To facilitate the widening, site clearance will need to take place on both sides of the exiting road.
- Associated drainage and infrastructure works.

The proposed scheme is shown on the general arrangement Drawings GC2895-RED-61-XX-DR-C-0102, GC2895-RED-61-XX-DR-C-0103 and GC2895-RED-61-XX-DR-C-0104.

## 2. Legislation and Policy Context

All species of bats and their roosts are strictly protected by a range of legislation, including the following:

### 2.1 Conservation of Habitats and Species Regulations 2017

All bats found in the UK are European Protected Species (EPS) being protected under the Conservation of Habitats and Species Regulations 2017, known as the 'Habitats Regulations'. Under the Habitats Regulations, it is an offence to:

- Deliberately capture, injure or kill any wild animal of an EPS,
- Deliberately disturb wild animals of any such species,
- Damage or destroy a breeding site or resting place of such an animal.

Disturbance is defined as that which is likely:

1. To impair the animals' ability:

- to survive, to breed or reproduce, or to rear or nurture their young, or
  - in the case of animals of a hibernating or migratory species (e.g. bats), to hibernate or migrate;
- or

2. To affect significantly the local distribution or abundance of the species to which they belong.

Other offences also exist relating to possession, transport and sale.

### 2.2 Wildlife and Countryside Act 1981

Section 9 of the Wildlife and Countryside Act 1981 (as amended) offers varying degrees of protection to species including otter, bats, dormice, amphibians and reptiles. Animals listed on Schedule 5 of the Act are protected against one or more of the following:

- intentional killing, injuring or taking (not applicable to bats);
- intentional or reckless damage or destruction, or obstruction of access to any structure or place which any wild animal included in Schedule 5 uses for shelter or protection;
- disturbance of any such animal while it is occupying a structure or place which it uses for that purpose;
- sell, offer or exposes for sale, or has in his possession or transports for the purpose of sale, any live or dead wild animal included in schedule 5, or any part of, or anything derived from such an animal.

### 2.3 Environment Act (Wales) 2016

In addition to the above, eight species of bats in Wales are listed as Species of Principal Importance (SPI) for the conservation of biodiversity under the Environment (Wales) Act 2016. This places a duty on local authorities to take all reasonable steps to maintain and enhance the living organisms included on this list.

## 3. Methodology

### 3.1 Building Assessment

The buildings were surveyed externally on 23<sup>rd</sup> March 2018 and the 5<sup>th</sup> April 2019, with the aid of binoculars (where necessary), to identify access points and record evidence of bats such as droppings, grease marks and urine staining. Records were made of features that are favoured by bats as roosting sites, including pitched roofs with a void/loft, fascia boards and soffits, gaps around windows and hanging tiles or weatherboarding. A level of potential to support roosting bats was assigned to each building to determine the requirements for further surveys.

### 3.2 Structure Assessment

Bridges, retaining walls and culverts were surveyed on the 23<sup>rd</sup> March 2018 and the 5<sup>th</sup> April 2019. Ecologists inspected the structures for potential bat access and egress points, potential roosting sites and signs of bats themselves, using binoculars and torches where appropriate. A level of potential to support roosting bats was assigned to the structures to determine the requirements for further surveys.

### 3.3 Tree Assessment

A bat tree assessment was carried out by experienced bat surveyors on the 23<sup>rd</sup> March 2018 (when the trees were not in leaf and the potential roosts were not obstructed). Trees were assessed for suitable bat roosting features using close focusing binoculars and a high-powered torch. The surveyors looked for evidence of bats and features of interest to bats such as:

Natural holes; woodpecker holes; cracks/splits in major limbs; loose bark; dense, thick-stemmed ivy; hollows/cavities; dense epicormic growth; and/or bird and bat boxes.

A level of potential to support roosting bats was assigned to determine the requirements for further surveys.

### 3.4 Emergence/ Re-entry Surveys

Dusk emergence and dawn re-entry surveys were carried out at the following sites on the following dates:

- Building 1 – 10<sup>th</sup> May, 2<sup>nd</sup> June and 27<sup>th</sup> June 2019.
- Building 2 - 14<sup>th</sup> May, 2<sup>nd</sup> June and 27<sup>th</sup> June 2019.
- Building 3 - 14<sup>th</sup> May, 2<sup>nd</sup> June and 27<sup>th</sup> June 2019.
- Building 4 - 14<sup>th</sup> May, 2<sup>nd</sup> June and 27<sup>th</sup> June 2019.
- Building 5 - 9<sup>th</sup> May and 28<sup>th</sup> June 2019.
- Building 6 - 30<sup>th</sup> May 2018, 17<sup>th</sup> July 2018 and 4<sup>th</sup> June 2019.
- Building 7 - 28<sup>th</sup> September 2018 and 1<sup>st</sup> June 2019.
- Building 8 - 10<sup>th</sup> May and 28<sup>th</sup> June 2019.
- Building 9 - 10<sup>th</sup> May and 28<sup>th</sup> June 2019.
- Building 11 – 25<sup>th</sup> April 2019 and 30<sup>th</sup> May 2019.
- Building 12 - 27<sup>th</sup> September 2017 and 19<sup>th</sup> May 2019.
- Culvert 3 – 4<sup>th</sup> June 2018.
- Trees 1-5 – 6<sup>th</sup> May 2018 and 8<sup>th</sup> July 2018.
- Bridge 5 – 18<sup>th</sup> July 2019.

The surveys were carried out in weather conditions conducive to bat activity i.e. little or no rain and temperatures in excess of 10° C. The emergence survey began approximately 30 minutes before sunset and continued for approximately 2 hours after sunset, when it was considered that all bat species would have emerged (Mitchell-Jones and McLeish (2004)). The dawn re-entry surveys began at least an hour and a half before sunrise and continued until sunrise.

Each of the surveyors was positioned so they had a clear view of the section of building they were surveying. Each surveyor had a handheld SSF Bat2 detector and/or a Petterson d230 and an Anabat passive bat detector which records the bat activity. Where required, bat species were subsequently confirmed by computer analysis of echolocation calls using AnalookW with reference made to Russ (2012).

During the dawn re-entry surveys the surveyors followed bats returning to roost to identify the roost entrance (where possible).

Surveyors also attempted to identify roosts (other than the structure) if in the near vicinity.

### 3.5 Activity Surveys

In March 2018 a ground truthing exercise was undertaken by a bat licenced ecologist to assess the suitability of the site for bat activity and to plan the proposed transects. An activity transect route was devised to ensure coverage of the entire proposed route with particular focus on potential bat crossing points where canopy cover was dense and hedgerows or dark corridors were present. This route was extended further south to the South Wales Fire and Rescue Headquarters from the 22<sup>nd</sup> May 2018 due to amended proposals.

Due to the high suitability habitats present on the site, two activity surveys per month were undertaken across the site (except for April – see Section 3.6) in accordance with current best practice guidelines (Collins, 2016).

Dusk and/or dawn activity surveys were carried out along the existing A4119 on the 19<sup>th</sup> April, 3<sup>rd</sup> May, 22<sup>nd</sup> May, 15<sup>th</sup> June, 28<sup>th</sup> June, 9<sup>th</sup> July, 26<sup>th</sup> July, 14<sup>th</sup> August, 30<sup>th</sup> August and 13<sup>th</sup> September 2018.

The activity surveys began approximately 30 minutes before sunset and continued for approximately 2 hours after sunset. The dawn activity surveys began at least an hour and a half before sunrise and continued until sunrise. The direction the transects were walked was changed frequently to ensure listening stops were reached at different times across different dates to obtain more accurate data from the site.

Surveyors carried a handheld SSF2 bat detector and/or a Petterson D230 and an Anabat Express passive bat detector was used to record the activity. Where required, bat species were subsequently confirmed by computer analysis of echolocation calls using AnalookW with reference made to Russ (2012).

In August 2018, following analysis of echolocation calls within previous data it became apparent that the transect along the existing A4119 was not sufficient to obtain data on all the bat species that may be using the site (particularly those less light tolerant such as lesser and greater horseshoe (*Rhinolophus hipposideros* and *Rhinolophus ferrumequinum*) and brown long-eared (*Plecotus auratus*) bats. The road verge surveys ceased in September 2018 and two newly devised transect routes were instigated, one focusing on farmland to the north of the A4119 and one focusing on the woodland to the south.

The additional two transect routes were devised to try to detect the commuting routes of lesser horseshoe bats and other less light tolerant species of bat. Transect routes were chosen along dark

corridors created by woodland, hedgerows and treelines, especially those that offered a flight path from the roosts identified or close to structures that offered potential roost sites.

Dusk and/or dawn surveys were carried out along both of these transects on the following dates: 17th September 2018, 18th October 2018, 15th May 2019, 30th May 2019 and 17th June 2019.

The location, survey routes and listening stops for each transect are provided on Drawings GC2895-RED-74-XX-DR-C-0008, GC2895-RED-74-XX-DR-C-0013 and GC2895-RED-74-XX-DR-C-0014.

### 3.6 Automated / Static Survey

In April 2018 five Anabat Express passive bat detectors were deployed at different locations within the survey area to assess the level of bat activity across the site (Statics 1 – 5 on Drawing GC2895-RED-74-XX-DR-C-0031).

A total of 4 of the original 5 static detectors were deployed at locations identified as possible crossing points for bats. These were located at areas of extensive canopy cover and/or existing watercourses. The fifth was located to the north of the South Wales Fire and Rescue Headquarters as this was the darkest location at the southern end of the Scheme (as a result of high levels of street lighting around the roundabouts present).

Following the detection of lesser horseshoe bats during activity surveys on the site, it was considered that additional data was required to identify the areas where this species was active. An additional seven passive bat detectors (Anabat Expresses and Anabat Swifts) were therefore deployed at locations at a further distance from the A4119 in October 2018.

The additional static detectors were positioned to try to detect the commuting routes of lesser horseshoe bats and other less light tolerant species of bat. Locations were chosen in dark corridors created by hedgerows and treelines, especially those that offered a flight path from the roosts identified or close to structures that offered potential roost sites.

The grid reference and a description of each location are provided in Table 1.

Table 1: Grid references for locations of static bat detectors deployed in 2018

Static Location Number	Grid References	Habitat description
1	ST0220185334	Located on metal mesh covering of a culvert. A small stream flowing under a line of mature trees
2	ST0234485263	Located on a tree adjacent to the A4119, under a dark corridor formed by tree canopy across the A4119
3	ST0276784938	Located on the exterior of a disused building in the grounds of a Welsh Water Treatment Plant, slightly offset from the A4119, with woodland and scrub to the east and farmland to the north and west
4	ST0294584721	Located adjacent to the eastern carriage way of the A4119, in a partially lit area opposite a vegetated masonry retaining wall

5	ST0331984827	Located in a line of mature trees along the line of a culvert forming the margin of a field of marshy grassland. South Wales Fire and Rescue HQ was located to the south and a business estate to the east. Semi-improved grasslands and pastures were present to the west
6	ST0232785427	Located in a line of trees on the banks of a stream forming the boundary of grazed semi-improved grassland fields
7	ST0243085386	Located in a line of trees on the banks of a stream forming the boundary of grazed semi-improved grassland fields
8	ST 02740 85078	Attached to a disused, open fronted hay barn at the junction of four field boundaries (intact hedgerows)
9	ST0275384939	Located in mature trees forming a field boundary to the north end of the Welsh Water Treatment works on the western side of the A4119. The field is periodically grazed by cattle and sheep
10	ST0278885075	Located in an opening under mature trees outside a disused farm building, in the corner of a semi-improved grassland field with a stream flowing to the east
11	ST0278884927	Located in a clearing in dense scrub and woodland to the east of the disused building in the Welsh Water Treatment Plant
12	ST0251184755	Located in forestry plantation adjacent to a minor road

The locations of each static bat detector for each year are shown on Drawings GC2895-RED-74-XX-DR-C-0031 and GC2895-RED-74-XX-DR-C-0040. The dates that the static bat detectors at each location were operative in 2018 is provided in Appendix D.

All of the detectors were removed from the site for the winter months when bats would be in hibernation from November 2018.

A total of 13 static detectors (Anabat Expresses and Anabat Swifts) were again deployed on site between April and June 2019. The grid reference and a description of each location are provided in Table 3 and the dates that the detector at each location in 2019 were operative are provided in Table 4.

Table 3: Grid references and habitat description for locations of static bat detectors deployed in 2019

Static Location Number	Grid References	Habitat description
1	ST02217 85349	Located on metal mesh covering of a culvert. A small stream flowing under a line of mature trees
2	ST02298 85399	Located in a line of trees on the banks of a stream forming the boundary of grazed semi-improved grassland fields

3	ST02438 85371	Located in a line of trees on the banks of a stream forming the boundary of grazed semi-improved grassland fields
4	ST02411 85301	Located in a line of trees on the banks of a stream forming the boundary of grazed semi-improved grassland fields
5	ST02294 85217	Located in a group of coniferous trees close to the south west of Building 1, adjacent to a minor road
6	ST02411 85183	Small area of broadleaved copse with a small pond present, adjacent on the margin of a field which is periodically grazed by cattle and sheep
7	ST 02717 84970	Located adjacent to a culvert that carries a stream under the A4119, to the west of the Welsh water treatment. Immediate surrounding habitat is broadleaved woodland and a derelict shed was present across the stream.
8	ST02748 84915	Located on the gates at the entrance of the Welsh Water Treatment Plant on the eastern side of the A4119.
9	ST02789 84930	Located in a clearing in dense scrub and woodland to the east of the disused building in the Welsh Water Treatment Plant
10	ST02818 84980	Located in broadleaved woodland to the north east of the disused building in the Welsh Water Treatment Plant
11	ST03010 84942	Located outside of disused farmhouse, (Building 7D) surrounded by semi-improved grasslands and hedgerows
12	ST02999 84926	Located outside of a derelict, stone barn associated with a disused farmhouse, surrounded by semi-improved grasslands and hedgerows
13	ST02929 84803	Located in a hedgerow adjacent to a disused Exchange building

Data from the detectors was downloaded at regular intervals and the batteries were changed each time to enable them to continue recording.

The recorded data was analysed to identify the species of bats using the site using AnalookW or Analook Insight software.

Recordings were subsequently analysed using Insight® software to assist species identification, using parameters for species call identification given in Russ, 2012 as a reference.

The recordings were processed through BatClassify with a setting of 85% certainty threshold i.e. the software is 85% sure of the bat and species. Any files that Batclassify had labelled as uncommon species (i.e. anything other than a pipistrelle species) were checked and re-classified if incorrect.

A further check of 10% of the files that BatClassify had classified as common pipistrelle or soprano pipistrelle was carried out and incorrect files were re-classified if required.

A final random check of 10% of the remaining files that BatClassify didn't classify was carried out and these files were classified appropriately.

To ensure that results from each static detector location was comparable the data was transformed to the number of bat passes per hour, for use as a Bat Activity Index (BAI), using the following equation:

$$\text{Bat Activity Index} = \frac{\text{Total bat passes recorded at a location}}{\text{Total number of hours the detector was recording}}$$

This data transformation allows adjustment for the differences in the hours of recording due to detector failure/loss of detector or varying dates of deployment as well as the variations in night length throughout the year.

### 3.7 Point Count Survey 1

The presence of lesser horseshoe bats was identified from the recorded data from the bat activity surveys but there was uncertainty regarding where, or if, this species was crossing the existing road. Consequently, a decision was made to carry out a point count survey. This involved placing surveyors at 16 locations at potential crossing points along the route over two nights. The survey was carried out on the 25th and 26th September 2018.

Surveyors were positioned in pre-planned locations and had a handheld SSF Bat2 detector and/or a Petterson d230 and an Anabat passive bat detector to record the bat activity. Where required, bat species were subsequently confirmed by computer analysis of echolocation calls using Analoow with reference made to Russ (2012).

The survey was carried out in weather conditions conducive to bat activity i.e. little or no rain and temperatures in excess of 10° C. The point count surveys began between 30 and 15 minutes before sunset and continued for 2 - 2 ½ hours after sunset.

The locations of the surveyors are illustrated on Drawings GC2895-RED-74-XX-DR-C-0015-1 and GC2895-RED-74-XX-DR-C-0015-2.

### 3.8 Point Count Survey 2

The presence of lesser horseshoe bats was identified on either side of the A4119 but following the first Point Count survey it was still unclear as to where the crossing points were. Consequently, a decision was made to carry out a second point count survey. This involved placing 15 surveyors at key locations relating to known roosts, identified/likely crossing and foraging routes and the two proposed underpass mitigation locations. The survey was carried out on the 1st August 2019.

Surveyors were positioned in pre-planned locations and had a handheld Echo Meter Touch Pro 2 and I-pad or I-phone. In addition, some of the surveyors also had a Petterson D230 and BatBox Duet bat detectors to record the bat activity. Where required, bat species were subsequently confirmed by computer analysis of echolocation calls using the Echo Meter Touch app. with reference made to Russ (2012).

The survey was carried out in weather conditions conducive to bat activity i.e. little or no rain and temperatures in excess of 10° C. The point count survey began 20 minutes before sunset and continued for 2 1/2 hours after sunset.

The locations of the surveyors are illustrated on Drawings GC2895-RED-74-XX-DR-C-0036-1 and GC2895-RED-74-XX-DR-C-0036-2.

### 3.9 Monitoring of Road Crossings

#### *Road bridge at the northern end of the site*

A dusk survey was carried out under the road bridge at the north of the site to assess whether bats were flying under the road bridge and the bat activity levels on 19th September 2019.

The survey was carried out in weather conditions conducive to bat activity i.e. little or no rain and temperatures in excess of 10° C. The emergence survey began at 19:30, approximately 10 minutes after sunset and continued for approximately 2 hours,

A pair of surveyors was positioned at locations on either side of the bridge with clear views under the bridge. Each pair of surveyors had a handheld SSF Bat2 detector and an Anabat passive bat detector to record the bat activity.

Surveyor positions are shown in the Figure 2.



#### *Culverts 1 and 3*

An Anabat Swift passive bat detector was placed at the western entrance of Culvert 1 and the eastern entrance of Culvert 3 for two separate periods September and October 2019 to establish a baseline level of bat activity through these culverts.

The trigger sensitivity settings on the detectors were set to minimise the impact of noises other than bat calls as there was running water flowing through each culvert.

### 3.10 Survey Constraints

None of the domestic buildings were surveyed internally due to access not being granted.

Only one bat activity survey was carried out in the month of April 2018 and none in April 2019 due to low air temperatures. This is not expected to impact on the results due to conditions often not being suitable in the month of April, the high number of bat surveys undertaken across the site and the deployment of static detectors across the site which recorded bat activity across the survey area.

Access to suitable surveyor locations under the road crossing at the north of the site was difficult due to steep slopes and a high retaining wall along the river side. The locations to ensure an optimal sight line under the bridge could not be accessed safely and the survey commenced 10 minutes after sunset, Surveyors were located at locations that were safe to access from where the majority of the underside of the bridge could be observed. Analysis of the recorded data confirmed surveyor observations that only common and soprano pipistrelle bats were active under the bridge at the time of survey and therefore it is not considered that the constraints had a negative impact on survey results.

Any ecological survey can only identify what was present on site at the time it was conducted and habitat usage by species can change over time. The length of time that the survey data remains valid will depend on a case-by-case basis, but it is generally considered that if the development or proposed works do not commence within 2 years of the date of this report an update may be required.

Low light levels of light can restrict observations of bats meaning that flight patterns cannot be determined, or animals cannot be seen by surveyors. Surveyors therefore may record bats as 'heard but not seen' as flight pattern and direction cannot be determined.

Each bat species differs in its likelihood of detectability, repetition rate and call intensity. Additionally, there is also variation in the sensitivity of different models of bat detectors to different bat calls and this variation should ideally be taken into account when using particular bat detectors.

For example, bats with calls at a low frequency and/or high amplitude, such as noctule bats, can be detected over greater distances whereas species such as brown long-eared bat and barbastelle that use low amplitude calls, or horseshoe bats that use high frequency calls are more difficult to detect. *Myotis* species calls often overlap depending on the type of habitat they are recorded in. This makes it difficult to identify *Myotis* bats to species level, therefore often they are recorded as '*Myotis* species'. Similarly, it can be difficult to differentiate between serotine and *Nyctulus* species and calls of these species were classified as 'SNL sp.'.

Calls identified as long-eared bat (*Plecotus* sp.) were assumed to be brown long-eared bat as brown long-eared bats are much more common and grey long-eared bats (*Plecotus austriacus*) are yet to be recorded in Wales,

The automated passive detectors are powered by batteries and occasionally the battery charge depleted before a full survey period, or the equipment malfunctioned. These detectors will not provide a count of individual bats passing through the survey area as each bat pass recorded may refer either to different individuals or to one or more bats passing the bat detector repeatedly. If more than one bat is recorded simultaneously a minimum count would be applied to that sound file alone, however, passive detector data can be used to make a cautious assessment of the likely type and levels of bat activity.

The passive detector at location 5, deployed to the north of the South Wales Fire and Rescue headquarters was stolen in May 2018 and therefore data for May was not retrievable, however, a replacement detector was deployed at the same location in June and it is not considered that the loss of this data significantly affected the overall results of the survey.

Due to time limitations analysis of static detector data was completed using the Batclassify auto-identification software in Insight. With such a large dataset it is likely that the auto-identification may have failed to identify the species of some bat calls, or mis-identified calls, measures were taken to address this by checking 10% of calls, , and it is considered that the results produced are accurate and present a realistic overview of the bat species and activity levels on this site.

### 3.11 Surveyor Details

Details of the Redstart surveyors and their competencies are provided in Appendix A.

## 4. Assessment Results

### 4.1 Buildings

The location of the buildings and their corresponding potential for bat roosts are provided on Drawing GC2895-RED-74-XX-DR-C-0034.

#### *Building 1*

A residential house, Pant Glas Farm was located to the north of the Scheme on the western side of the road. The property was a two-storey building with a slate pitched roof, gable ends, skylight windows, clay ridges, chimney, stone porch, lead flashing, soffit boxes and fascia boards. The building was relatively well maintained but due to the number of potential access points was considered to have a moderate potential to support bat roosts.

#### **Photograph 1:** Building 1



#### *Building 1A*

A two-storey garage (Building 1A) was located within the grounds of the residential property Building 1. The garage had rendered, well maintained walls and well maintained UPVC windows and doors, fascias, soffits and a slate roof. Potential access points included gaps into a soffit box, wall cavity and between roof tiles and the roof and was therefore considered to have a moderate potential for roosting bats.

#### **Photograph 2:** Building 1A



### *Building 2*

A converted barn residential property (Building 2) is located to the east of Building 1. The building is a 2-storey construction with stone walls, slate roof, slit windows, Velux windows, steel-framed extension, timber soffit boxes, fascias and clay ridges. The building was relatively well maintained but due to the number of potential access points within the features listed above was considered to have a moderate potential to support bat roosts.

### **Photograph 3: Building 2**



### *Building 3 -*

Building 3 is a converted barn residential property. The property has stone walls, a pitched slate roof, clay ridges, gable ends, lead flashing and Velux windows. Potential access points into soffit boxes and between windows and stone walls were noted.

During a great crested newt survey on the 15th May 2018 surveyors incidentally recorded soprano pipistrelle maternity roost at a residential property to the south-west of the A4119. A total of 83 bats were recorded emerging from a soffit box on the south-western corner of the building and flying into woodland to the south. The building is was identified as having a high potential and a confirmed roost.

Photographs 5 and 6: Building 3 and roost location identified during great crested newt survey (circled in yellow).



### *Building 4*

Building 4 is a 2-storey detached garage. The stone building had a slate roof with Velux windows and timber fascia and soffit boards. The building was relatively well maintained but due to the number of potential access points was considered to have a moderate potential to support bat roosts.

**Photograph 4:** Building 4



### *Building 5*

Building 5 was a small L-shaped brick pump house building with a slate roof, wooden soffits, wooden doors and grilled windows. The building was assessed as being of moderate potential for roosting bats.

**Photograph 7:** Building 5



### *Building 6*

A derelict welfare building was located within the water treatment plant on the eastern side of then A4119. The disused building was a one-storey structure with a collapsed ceiling, brick walls, chimney, shuttered windows and a slate roof. The building was approximately 7 m x 6 m, was constructed in 1912. Potential bat access points included missing slates, gaps in ridge tiles, broken shutters, an open porch and holes between the soffits and the brick work. The building was assessed as having high potential for roosting bats.

**Photograph 8:** Building 6



*Building 7A*

Building 7A was a stone barn with a metal sheet roof with an extension on the southern end (Building 7B). Numerous gaps in the masonry were present with some large stones missing completely. The metal sheet roof was loosely attached to the structure with multiple gaps between the wall and roof and also along the ridge. The masonry walls were in poor condition with many areas of missing mortar. The majority of windows and doors in the building were permanently open. Exposed concrete lintels were present above all doors, with timber lintels above windows, there were numerous gaps around the lintels. The building was assessed as having high potential to support roosting bats due to the numerous gaps and openings and the presence of exposed beams.

Photograph 9: Building 7A



*Building 7B*

Building 7B was a breeze-block rendered building with a slightly pitched metal roof that was found to be in a poor-condition. An open window was located on the southern side and there were various other openings into the building from missing block work to gaps within the metal sheeted roof. A timber lintel was present above the walls on the western aspect above which were multiple openings. Internal walls were rendered, and a part of the building had a ply wood roof with large holes in it. The rear wall of the building was in a state of collapse. The building was assessed as having low-moderate roosting potential. The building was assessed as having moderate roosting potential.

**Photograph 10** – Building 7B



### *Building 7C*

Building 7C was a stone shed building with a metal roof and vegetation growing through. There was free access to the interior of the building due to the collapsed state of the building and the metal roof was attached loosely to the masonry walls with large gaps present. The building was assessed as having a moderate potential to support roosting bats.

### **Photograph 11:** Building 7C



### *Building 7D*

Building 7D was a 2-storey farmhouse with rendered walls, a slate roof, wooden soffits, lead flashing, a porch on the southern aspect and a chimney on the eastern end. The building was empty at the time of inspection, but the farmhouse side of the building was found to be in a fairly good condition, although there were some gaps within the slates and soffits and some of the windows had been left open. Attached to the western side of the farmhouse was a stone barn which was found to be in a state of disrepair. This section of the building had dense ivy growing from it, open windows and an open door on the western side and a large hole / missing tiles in the slate roof on the northern side. The building was therefore assessed as having an overall high potential for roosting bats.

### **Photograph 12:** Building 7D



*Buildings 7E, F, G, H*

Four additional, primarily metal outbuildings were identified around the farmhouse grounds. All four buildings were assessed as having a low potential to support roosting bats.

Photographs 13, 14, 15 and 16 – Buildings 7E (top left), F (top right), G (bottom left) and H (bottom right)



*Building 8*

A detached single storey outbuilding (Building 8) which was possibly a former telephone exchange but is currently being used for storage and as housing for a small number of chickens. The building was a rendered brick construction, slate roof with clay ridges and stone features on each end. Bat droppings (likely pipistrelle and a possible brown long-eared) were identified on top of debris within the building. The open door at the north-western end of the building meant that bats could be using the building as a night perch. The building was assessed as having a high potential for roosting bats.

**Photograph 17:** Building 8



*Buildings 9 (Duffryn Farm Bungalow) and 9A*

Building 9 is a likely 1970's detached single-storey occupied bungalow. The brick building had rendered walls, convex tile roof and solar panels on the western elevation. The windows and doors were PVC and the fascia's, soffits and gables were timber. A single bat dropping was identified stuck to the wall on the eastern side of the building. The building was assessed as having a high potential for roosting bats.

Photographs 18 and 19: Buildings 9 and bat dropping identified during assessment survey



*Building 9A*

Building 9A was a 2-storey stone building with a pitched, tiled roof and timber framed windows. Many suitable roosting features including gaps underneath the roof tiles and open windows providing access into the building resulted in an assessed of high potential for roosting bats.

**Photograph 20:** Building 9A



*Building 10*

Several small single-storey, pre-fabricated commercial units and garages including a café, car repair and salvage businesses offered negligible potential for roosting bats due to the lack of potential features.

**Photograph 21:** Building 10



*Building 11, 11A and 11B*

Building 11 (Signalman's Cottage) is a stone built, 2-storey residential property with a slate roof and clay ridge tiles. There were 2 chimneys present at either end of the building, lead valleys and UPVC windows, doors and fascias. A bat dropping (likely pipistrelle) was identified on a lamp below the eastern gable end of the building where a suitable roosting feature was identified. Other roosting features included gaps under the roof tiles and gaps in the fascia boards. The building was assessed as having a high potential for roosting bats.

**Photographs 22 and 23:** Building 11 and bat dropping identified during assessment (circled in yellow)



Building 11A was an outbuilding associated with Signalman’s Cottage. It was a single storey block-built building with UPVC windows and doors and slate sheet roof. The building was assessed as having a low potential for roosting bats.

**Photograph 24:** Building 11A



Building 11B was a stable building to the north the Signalman’s Cottage. It was a block-built, single skin, one-storey building with a steel-sheet roof. The building was assessed as having a negligible potential for roosting bats.

**Photograph 25:** Building 11B



### *Building 12*

A derelict outbuilding (Building 12) was located within a farmland field to the north of the A4119 carriageway. The building was comprised of two halves. The western side of the building was a disused livestock shed and the eastern side a closed off living area that was not accessible to surveyors. The

building was a single-story brick (partially rendered) structure with glass windows often covered by metal guards and a corrugated asbestos roof. The closed eastern side of the building had wooden soffits and a brick chimney. Potential access points included open wooden doors, broken windows, gaps underneath ridge tiles and behind soffit boards. The building was assessed as having high potential for roosting bats.

**Photograph 26 – Building 12**



*Building 13*

A derelict barn (Building 13) was noted behind the derelict outbuilding Building 12. The barn was a metal construction and was completely open on the southern side. The barn was assessed as having negligible roosting potential but could be used for feeding / shelter during the night. The building was not in use and was surrounded by dense scrub.

**Photograph 27 – Building 13**



A hay barn (Building 14) was noted within farmland to the north-west of Building 12. The barn was a metal construction and negligible roosting potential but could be used for feeding and/or shelter during the night.

**Photograph 28 – Building 14**



### *Building 15*

Three wooden sheds (Building 15) were noted within an agricultural field to the along the eastern side of the carriageway, above Culvert 3. The sheds were in a state of disrepair and had **negligible** potential for roosting bats.

**Photograph 29:** Wooden shed (Building 15) located over the eastern entrance of Culvert 3



### *Building 16*

A metal stable block (Building 16) was noted within a pig-grazed field adjacent to the water treatment plant and within 10 m of the A4119. The building had negligible potential to support bat roosts.

**Photograph 30:** Building 16



## 4.2 Structures

The location of the structures and their corresponding potential for bat roosts are provided on Drawing GC2895-RED-74-XX-DR-C-0029.

### **Bridges**

#### *A4119 / River Ely Bridge (Bridge 1)*

The A4119 crosses the River Ely immediately north of the Coed Ely roundabout. The bridge was a concrete slab construction with no obvious roosting features visible. The bridge was assessed as having negligible bat roosting potential but due to the presence of the surrounding high-quality habitats (e.g. woodland, River Ely) for commuting and foraging routes for bats it is likely that bats will be active in the vicinity of the bridge.

#### **Photograph 31 – Bridge 1**



#### *Un-named Road / River Ely Bridge (Bridge 2)*

An un-named road leading to a large area of colliery spoil crosses over the River Ely to the west of the Coed Ely roundabout. The bridge was a concrete slab construction with no obvious roosting features visible. The bridge was assessed as having negligible bat roosting potential but due to the presence of the surrounding high-quality habitats (e.g. woodland, river) it is likely to offer suitable commuting and foraging routes for bats it is likely that bats will be active in the vicinity of the bridge.

#### **Photograph 32: Bridge 2**



*Smilog Road Bridge (Bridge 3)*

A bridge located over Smilog Road was noted to the north-west of the Scheme. The bridge had masonry and brick walls and a steel deck. The underneath of the structure was found to be in a good condition, but the wing-walls had small, shallow gaps and crevices with some light ivy cover. The bridge was assessed as having an overall low potential for roosting bats.

**Photograph 33:** Bridge 3



*River Ely / Public Footpath Bridge (Bridge 4)*

This was a two-span masonry bridge carrying a public footpath over the River Ely. A number of gaps between the masonry block work of the abutments and supporting pillars and between the metal deck and supporting pillars / abutments were noted by surveyors, but the underneath of the structure could not be directly accessed due to the steep embankments either side.

The bridge was previously surveyed by Capita ecologists in 2011 (Capita, 2011) for the construction of the public footpath where four soprano pipistrelle bats (*Pipistrellus pygmaeus*) and one unidentified bat were recorded roosting in the structure. At that time the surveyors concluded, that restrictions to access to the location of the roosts meant that the size and extent of the roosts within the bridge could not be fully determined. The identified roost locations were retained following the construction of the footpath and an additional Schwegler 1WQ Winter Bat Roost was erected on an abutment wall. The bridge was therefore assessed as having a high roosting potential.

**Photograph 34:** Bridge 4



*Railway Bridge (Bridge 5)*

A former railway bridge crossing over a cycle path was noted to the south-west of the Fire and Rescue Headquarters roundabout. The bridge was a stone construction with a metal deck. The stonework was found to be in a good condition and the pointing was in good order, however, the associated wing-walls had some small shallow gaps and weep-holes. The backs of the bearing shelves underneath the deck could not be seen by the surveyors but could potentially offer night-feeding perches for species such as lesser horseshoe bats. The location of the bridge is likely to increase the suitability for bats due to it being a 'pinch-point' along the wooded cycle-path and within 25 m of the River Ely. The bridge was assessed as having low suitability for roosting bats.

**Photograph 35:** Bridge 5



*Footbridge (Bridge 6)*

A small metal footbridge over the River Ely to the south of the Scheme was noted. The bridge was assessed as having negligible potential for roosting bats due to the steel construction and lack of suitable features. Bats are highly likely to be foraging and commuting underneath (along the River Ely) and there was potential for roosting within the reinforced sections of the river walls.

**Photograph 35:** Bridge 6



### ***Culverts***

A total of four culverts were identified running directly underneath the A4119 within the survey area.

#### ***Culvert 1***

The most northern culvert (Culvert 1) comprised brick construction on the eastern side and concrete construction on the western side. It was approximately 1 m in diameter. The culvert had mesh fitted over the western entrance which had been put in place by the landowner to prevent their dogs escaping through it. The culvert had negligible potential for roosting bats due to the lack of suitable features and the presence of the mesh guard.

**Photograph 36:** Western entrance of Culvert 1



**Photograph 37:** Eastern entrance of Culvert 1



### *Culvert 2*

Culvert 2 was a small (approximately 600 mm) pipe running underneath the A4119. The stream bed leading to the culvert slopes from east to west and was either shallow or dry dependent on the time of year.

**Photograph 38:** Western entrance of Culvert 2 (entrance identified with yellow arrow)



### *Culvert 3*

A concrete culvert was located underneath the A4119 to the north of the Dwr Cymru Welsh Water compound. An un-named stream runs through the culvert from agricultural fields on the northern side of the carriageway to a sloped valley between a privately-owned pig grazed field and the boundary fence of the water treatment plant. The culvert was approximately 0.5 m in diameter. The eastern side of the culvert has associated brick walls along the water channel which were found to be in a state of disrepair. Old derelict 'shed' buildings and other farmland debris (see Photograph 29) were located on top of the culvert at this location. The concrete culvert running underneath the road was found to have a negligible potential for roosting bats, but the associated brick walls were assessed as low potential.

**Photograph 39:** Eastern entrance of Culvert 3



**Photograph 40:** Stone walls associated with the eastern entrance of Culvert 3 (note Building 15 located on top)



**Photograph 41:** Western entrance of Culvert 3



*Culvert 4*

A dry culvert (Culvert 4) was located to the south of the Scheme.

**Photograph 42:** Metal gate over dry culvert on eastern side of the carriageway



### ***Other Structures***

A brick retaining wall (Wall 1) was located along the eastern carriageway towards the southern end of the scheme. The retaining wall had numerous gaps (particularly at the most northern end where it was in a state of disrepair) but was situated directly adjacent to the A4119. The saplings growing in front of the structure is likely to restrict access and constant heavy traffic flow cause disturbance and present risk for emerging bats. The retaining wall was therefore assessed as having low bat roosting potential.

**Photograph 43:** Retaining wall (Wall 1)



### 4.3 Trees

The location of trees and their corresponding potential to support bat roosts are provided on Drawing GC2895-RED-74-XX-DR-C-0033. A summary of the results is provided in Table 5.

Six mature trees (Trees 1-6) were identified at the northern end of the Scheme bordering a field adjacent to the western side of the carriage way. Of these trees two mature oak's (*Quercus robur*) (Trees 2 and 5) were identified as having moderate potential to support roosting bats due to their potential roosting features such as split limbs and knot holes. The three remaining oak trees and one beech tree (*Fagus sylvatica*) were identified as having low bat roost potential (Trees 1, 3, 4 and 6).

**Photographs 44 and 45:** Oak trees (Trees 2 and 5 respectively) with moderate roosting potential



Two mature trees (Trees 7 and 8) were identified either side of the entrance to the Dwr Cymru Welsh Water owned land on the eastern side of the A4119. Both trees had ivy coverage, Tree 7 had a knot hole approximately 10m high and small splits in the bark and Tree 8 had a broken limb at approximately 15m high. Both trees were assessed as having low potential to support bat roosts.

**Photograph 46** – Scot's pine (Tree 7) with low bat roost potential



The remaining trees within the site footprint were found to be relatively immature and lacked features suitable for bat roosts.

**Table 5:** Summary of bat tree roost assessment results

Tree number	Grid Ref	Species	Age/height classification	Roosting Features	Potential	Evidence
1	ST02137 85367	P. oak	Mature 25 m	Partial ivy coverage, broken limb, small splits in bark.	Low	-
2	ST02134 85371	P. oak	Mature 20 m	Partial ivy coverage, Split limb, Possible knot hole approx. 15 m roundabout side	Moderate	-
3	ST02146 85361	P. oak	Mature 30 m	Partial ivy coverage	Low	-
4	ST02201 85345	P. oak	Mature 30 m	Split dead limb 10 m up	Low	-
5	ST02200 85338	P. oak	Mature 30 m	Split dead limb Large open knot Split bark	Moderate	-
6	ST02193 85334	Beech	Mature 30 m	Knot holes, Splits in bark, Scaring	Low	-
7	ST02766 84938	Ash	Mature 25 m	Ivy covered, Split in bark, Knot hole 10 m high	Low	-
8	ST02770 84933	Scots Pine	Mature 25-30 m	Ivy covered, Split limb 15 m high	Low	-

## 5. Emergence / Re-entry Survey Results

The locations of the roosts identified during the emergence / re-entry surveys roosts are illustrated on Drawing GC2895-RED-74-XX-DR-C-0035. Details of the survey results are included in Appendix B.

### 5.1 Buildings

#### *Building 1*

The first emergence, a dawn re-entry and second emergence survey were undertaken on 10th May, 2nd June and 27th June 2019 respectively.

During the first emergence survey, from 21:05 soprano pipistrelles began appearing as they commuted past the building. Most of these bats flew off along the valley, but some crossed the A4119 heading north-east. At 21:21 a common pipistrelle emerged from a gap above the front door, with a second from the north side at 21:25. Also noted was an overflying noctule bat, and a brown long-eared bat, the latter commuting past at 21:50.

The dawn re-entry survey revealed a common pipistrelle flying round the building at 03:27, and it was thought to have entered the roof above the front door about 03:30. Large numbers of Soprano Pipistrelles were also noted as they commuted around the buildings prior to entering the maternity roost in Building 3. Some of these flew in across the A4119.

During the second emergence survey, at 22:04, a single common pipistrelle emerged from the extended gable on the north side of the house. This flew off around the gardens. Also noted were single Brown Long-eared and Daubenton's bats, these foraging between the house and the A4119. The latter then flew round the end of the house and headed southwest into the woodland. A noctule flew over at 22:02.

The building has been confirmed as a day roost for 2 common pipistrelle bats and 1 brown long-eared bat.

#### *Building 2*

The first emergence, a dawn re-entry and second emergence survey were undertaken on 14th May, 2nd June and 27th June 2019 respectively.

During the first emergence survey no bats emerged from the building but soprano pipistrelles began appearing in the rear garden between the house and the A4119 as they emerged from the adjacent maternity roost (Building 3). A small number of these bats were thought to have crossed the A4119 road at this point.

No bats returned to the house during the dawn re-entry survey, but a commuting brown long-eared bat was noted at 03:56, with a common pipistrelle at 03:26 heading towards Building 1, and a whiskered/Brandt's bat flying past at 04:15.

During the second emergence survey three soprano pipistrelles emerged from the north side of the house; the first at 21:35, the second at 21:55 and the third at 22:03. Other soprano pipistrelles flew around the building having emerged from the adjacent maternity roost, with a *Myotis* species commuting past at 22:15. A common pipistrelle flew along the rear boundary with the A4119 at 22:20.

The building has been confirmed as a day roost for 3 soprano pipistrelles.

### *Building 3*

The first emergence, a dawn re-entry and second emergence survey were undertaken on 14th May 2nd June and 27th June 2019 respectively.

During the first emergence survey, from 20:35, soprano pipistrelles began emerging from the south-west facing gable end apexes of the house at 20:35 (sunset 20:55). At least 105 emerged from the lower roof, with three from the upper roof. Two whiskered/Brandt's bats also emerged from the lower roof gable end at 21:36, with another three over the next 5-10 minutes. The vast majority of these bats flew off south into the woodland, but a small number headed off northwest and southeast along the valley.

At least 400 Soprano Pipistrelles returned to the house during the dawn re-entry survey; 300 into the lower roof and 100 into the upper roof.

During the second emergence survey the soprano pipistrelles began emerging at 20:50, (43 minutes before sunset) and again approximately 400 bats were counted out, although the exact number could not be determined due bats returning to the roost within 30 minutes.

Building 3 has been confirmed as a maternity roost of c400 soprano pipistrelles and c5 whiskered/Brandt's bats.

### *Building 4*

The first emergence, a dawn re-entry and second emergence survey were undertaken on 14th May 2nd June and 27th June 2019 respectively.

No bats emerged from or returned to the building but small numbers of soprano pipistrelle bats from the nearby maternity roost in Building 3 were recorded commuting past during all three visits.

A commuting brown long-eared bat was also noted at 03:56 and again at 04:22 noted flying off south into the woodland. A common pipistrelle bat flew past at 03:26 heading towards Building No's. 1-2, with a whiskered/Brandt's bat flying past at 04:15.

The building has not been identified as a bat roost.

### *Building 5*

One emergence and one dawn re-entry survey were undertaken on 9th May and 28th June 2019 respectively.

During the emergence survey at least two soprano pipistrelles emerged from the roof on the south-west elevation of the pumping station building. Two other soprano pipistrelles flew north-west to south-east along the valley, along with a single brown long-eared bat commuting through.

On the dawn re-entry survey six soprano pipistrelles bats were noted entering the south-west roof of the building, with small numbers of soprano pipistrelles heading north-west up the valley across the sewage works.

The building has been confirmed as a day roost for 6 soprano pipistrelles.

### *Building 6*

Two dusk emergence surveys and one dawn re-entry survey were undertaken on Building 6.

No bats were recorded roosting in the building during any of the surveys.

Both soprano pipistrelle and common pipistrelle bats were recorded throughout the first survey visit in May 2018. Both species were observed commuting over the A4119 (in both directions) and foraging round the building. *Myotis* bats were also heard later in the survey but were not seen by the surveyors. At 23:08 a lesser horseshoe bat was recorded foraging to the north of the building.

During the second survey on the 17th July 2018 soprano pipistrelle bats were recorded foraging around the building and crossing over the A4119 (in both directions) throughout the duration of the survey. Common pipistrelle bats were also observed crossing the road and foraging around the building from 22:02. *Myotis* bats, a single noctule pass and a single brown long-eared pass were heard later in the survey but were not seen by surveyors. A lesser horseshoe bat was recorded at 21:59 which is fairly early for this species and indicates it is likely to be roosting nearby. The horseshoe bat flew over the building and continued to the west.

The dawn survey on the 5th June recorded occasional lesser horseshoe bat passes between 03:43 and 04:22. The horseshoe bats were not seen but were thought to be flying to the north of building. Common and soprano pipistrelle bats were recorded throughout the survey, foraging over surrounding vegetation and commuting across the site in all directions. The pipistrelle bats were also frequently recorded crossing the existing A4119.

### *Building 7*

Dusk emergence surveys were undertaken on the 28th September 2018 and 1st June 2019.

During the first dusk survey approximately 4 lesser horseshoe bats were recorded roosting within the western end of the old farmhouse building 7D. The bats were recorded light sampling by flying in and out of the large hole within the roof and an open door. The bats were then detected commuting down the access track to the south-west.

No other bats were recorded roosting at this location, but species recorded foraging and commuting nearby included noctule, common pipistrelle, soprano pipistrelle, *Myotis* and brown long-eared bats.

During the second dusk survey at 21:10 a common pipistrelle appeared in the barn outbuilding 7G at the north-west end of the farm complex, with a second common pipistrelle joining it at 21:20. These were both assumed to have emerged inside the building.

From 21:26 soprano pipistrelles began flying past as they commuted across the A4119 heading northeast. At least 14-15 animals were noted up to 22:37.

Other species recorded during the survey included an overflying noctule bat, a commuting Nathusius's Pipistrelle at 21:39, a whiskered/Brandt's bat at 22:04 from the direction of Building No. 9 (flying into the barns to forage) and a Natterer's Bat from 22:21 to at least 22:36. A Daubenton's bat flew south along the farm track at 22:25.

At 21:43 lesser horseshoe bats were noted light sampling at the western end of Building 7D and began emerging from 21:45. At least 8 lesser horseshoe bats emerged, most flying off west across the fields to the west, with some turning south-west down the farm track. At 22:50 one animal returned to the building, which suggests that it is a maternity roost.

A barn owl flew over at 22:10, but the roost site was unknown.

Building 7G has been confirmed as a day roost for 2 common pipistrelles and small maternity roost/non-breeding day roost for c8 lesser horseshoes in Building 7D.

A third survey was not considered necessary and was instead covered by the second, more specific point count survey on the 1st August 2019.

### *Building 8*

One emergence and one dawn re-entry survey were undertaken on 10th May and 28th June 2019 respectively.

During the emergence survey no bats emerged from the building, but small numbers of soprano pipistrelle bats commuted north-east past the building from 21:06, having crossed the A4119 close to the access drive entrance.

An overflying noctule bat was also noted and a brown long-eared bat, with the latter commuting past at 21:40.

During the dawn re-entry survey two whiskered/Brandt's bats began swarming around the roof at 04:15 and entered at 04:20 and 04:25 respectively.

A brown long-eared bat commuted past at 04:04, with small numbers of soprano pipistrelles moving through heading northwest from 03:58 to 04:26. A Daubenton's bat was noted at 04:12, with a noctule overhead at 04:17.

The building has been confirmed as a day roost for 2 whiskered/Brandt's bats.

### *Building 9*

One emergence and one dawn re-entry survey were undertaken on 10th May and 28th June 2019 respectively.

During the emergence survey, at 21:05, the first of three soprano pipistrelles emerged from the roof of the garage outbuilding (Building 9A), on the western side. The second and third emerged from the east side at 21:08 and 21:10 respectively. Small numbers of soprano pipistrelles also began commuting past and heading south-east.

At 21:30 a Daubenton's bat commuted past, heading north-west, with a brown long-eared bat heading south-east at 21:40. At the same time a lesser horseshoe flew past also heading south-east. One or two noctule Bats were also noted flying overhead from 21:45 to 21:51.

At 21:50 a whiskered/Brandt's bat appeared from the roof of the bungalow (Building 9) and flew north-west. At 21:54 a common pipistrelle commuted past. No bats flew across the A4119.

During the dawn re-entry survey two whiskered/Brandt's bats began swarming around the south-east gable end of Building 9 at 04:10 and eventually entered at 04:25.

At 04:38 a soprano pipistrelle entered the roof of the garage outbuilding (Building 9A) on the eastern side, with a second soprano pipistrelle in at the same location at 04:48.

A single Nathusius' pipistrelle flew south-east down the valley at 04:35.

Building 9A has been confirmed as a day roost for 3 soprano pipistrelle bats and Building 9 a day roost for 2 whiskered/Brandt's bats.

### *Building 11*

During the first dusk survey on the 24th April 2019 approximately 8 soprano pipistrelle bats emerged from the northern gable end of Building 11, but six of the bats soon returned to the roost (within 10-30 minutes of emerging) at the same location. In addition to this, two soprano pipistrelles emerged from behind a fascia board on the western side of the building. Other activity recorded throughout the survey included soprano pipistrelles foraging throughout the survey a single noctule and *Myotis* pass. The survey was terminated early due to heavy rainfall.

During the dawn survey on the 31st May 2019 approximately 30 soprano pipistrelle bats returned to roost in the northern gable end of Building 11. Other species recorded during the survey included a *Myotis* bats commuting over the building, foraging in the garden and along the River Ely and single lesser horseshoe and brown long-eared bats which were heard but not seen by the surveyors.

A third survey was not considered necessary as the presence of the roost had been already identified and difficulties obtaining access.

### *Building 12*

Two dusk emergence surveys and one dawn re-entry survey were undertaken on Building 12.

Approximately 10 lesser horseshoe bats were recorded roosting within the building during the first survey on the 27th September 2018. The bats were observed flying in through an open door on the southern side of the building at 19:14 (only 13 minutes after sunset) but were not seen to re-emerge. It is possible that the bats were light-sampling and either remained in the building or emerged from a point not observed by the surveyors. Small numbers of soprano pipistrelle bats were recorded foraging around the building or trees nearby and one *Myotis* pass was heard during the survey. From 19:37 no further bats were seen and a noticeable drop in temperature during the survey was noted by the surveyors.

During the second dusk survey on the 15th May 2019 approximately 14 lesser horseshoe bats were recorded light sampling. Some of the bats recorded and flew downstream (to the south), others

remained in the building and were heard inside until the end of the survey. Since the 2018 survey the previously locked door to the eastern end of the southern side of the building had been broken and left open. Bats were emerging and returning to this location and to/from the opening to the western side of the southern side of the building. Other species recorded throughout the survey (mostly to the northern side of the building) included noctule, soprano pipistrelle, *Myotis* and brown long-eared.

A third survey was not considered necessary and was instead covered by the second, more specific point count survey on the 1st August 2019.

## 5.2 Structures

### *Railway Bridge*

One emergence survey was undertaken on the railway bridge on the 18th July 2019.

No bats were recorded emerging from the bridge. Soprano pipistrelle bats were recorded throughout the survey and appeared to arrive from the southern side of the bridge. They foraged underneath the bridge from early in the survey (prior to sunset), suggesting they were roosting nearby (which correlates with the confirmation of the soprano pipistrelle roost in Building 11). Common pipistrelle bats were occasionally recorded foraging above the canopy and a small number of noctule bats were heard but not seen. At least two species of *Myotis* bats were recorded from approximately 15 minutes after sunset and calls appeared to be most characteristically like Daubenton's and Brandt's bats.

### *Culvert 3*

No bats were recorded roosting within the culvert or its associated stone wall.

Small numbers of common and soprano pipistrelle bats were recorded foraging near to the culvert during the dusk survey on the 4th June 2018.

## 5.3 Trees

### *Trees 1-6*

Trees 2 and 5 were previously assessed as having moderate roosting potential which would warrant two emergence / return-to-roost surveys in accordance with best practice guidelines (Collins, 2016). These trees are not being directly impacted by the Scheme and whilst there was no requirement for these surveys according to the guidelines, it was considered that due to the maturity of the trees and the potential to act as a flight line surveys would be beneficial. Three surveyors carried out two emergence / return to roost survey and were positioned to provide adequate coverage of Trees 1-6.

No bats were recorded roosting within the trees during the dusk surveys on the 6th May 2018. Small numbers of common and soprano pipistrelle bats were recorded foraging and commuting during the survey.

No bats were recorded roosting within the trees during the dusk surveys on the 7th July 2018. Small numbers of common and soprano pipistrelle bats were recorded foraging and commuting near to the trees / adjacent stream during the survey. An additional surveyor positioned near to the un-named road to the south-west of Trees 1-6 (to record any bats emerging from the dense canopy) recorded low

numbers of common and soprano pipistrelles and single recordings of noctule, *Myotis* and lesser horseshoe bats.

## 6. Activity Survey Results

### 6.1 April 2018

The first evening survey of Transect 1 on the 19th April 2018 recorded common and soprano pipistrelle bats foraging throughout the survey. A soprano pipistrelle bat was recorded crossing the existing A4119 between LS4 and LS5. The bat flew from the western side of the road to the east. Pipistrelle social calls were heard between LS7 and LS8.

### 6.2 May 2018

An evening Transect 1 survey was undertaken on the 3rd May 2018 and was walked in reverse. Four soprano pipistrelle bats were recorded at LS4. They were recorded foraging and crossing over the existing A4119 at this location. An additional soprano pipistrelle was also recorded crossing the road between LS4 and LS3. At 21:41 an unknown species of bat was recorded crossing the A4119 between LS11 and LS10 but was not recorded by the detectors. Small numbers of soprano and common pipistrelle were also recorded foraging and commuting along the length of the transect. A single noctule was recorded at the northern end of the transect.

An evening survey of Transect 1 on the 22nd May recorded common and soprano pipistrelles bats from LS5. Almost constant activity was heard between LS9 and LS11.

### 6.3 June 2018

A dawn road survey of Transect 1 was undertaken on the 15th June 2018. Pipistrelle bats were recorded foraging along tree lines on the eastern side of the A4119 at LS5 and LS6 but were not heard by the recorders. Small numbers of common pipistrelle and soprano pipistrelle bats were also recorded between LS2 and LS7 but were heard and not seen.

A dusk survey of Transect 1 was undertaken on the 28th June recorded moderate levels of common and soprano pipistrelle bat activity between LS4 and LS11. Two Common pipistrelle bats were recorded crossing the existing road from west to east at LS4. Two common pipistrelles, a soprano pipistrelle and a *Myotis* bat were recorded commuting across the road between LS4 and LS5 and three individual common pipistrelle bats were recorded crossing at LS5, LS6 and LS7. A brown long-eared bat was recorded 22:32 between LS7 and LS8.

A dusk Transect 1 survey was carried out between the dusk transect on the 28th and the dawn on the 29th June 2018. Common and soprano pipistrelles were heard foraging throughout the survey.

The Transect 1 dawn survey on the 29th June recorded low numbers of common and soprano pipistrelles at LS2, between LS2 and LS3, LS4, between LS6 and LS7 and between LS9 and LS10. The bats were all heard but not seen. A *Myotis* and a brown long-eared bat were heard at LS5.

### 6.4 July 2018

On the 9th July 2018 an evening activity survey of Transect 1 was walked in reverse (i.e. starting from LS11). Common and soprano pipistrelles were recorded throughout the transect. A brown long-eared bat was recorded at LS4.

A dusk survey of Transect 1 was undertaken on the 26th July recorded common and soprano pipistrelle bat activity between LS4 and LS11. Most of these recordings consisted of foraging individuals although many were heard and not seen by surveyors. A pipistrelle species was seen foraging over the road between LS10 and LS11, and an unknown species was seen foraging whilst crossing the road between LS2 and LS3. A noctule bat was seen at LS1 and heard between LS3 and LS4.

## 6.5 August 2018

A dusk survey of Transect 1 was undertaken on the 14th August and walked in reverse, solely common and soprano pipistrelle bat activity throughout the survey. Foraging was observed around streetlights along the road notably between LS5 and LS1, and individuals were observed crossing the road between LS3 and LS2; LS2 and LS1 and LS11 and LS10.

On the 30th August 2018 an evening survey of Transect 1 was undertaken. Small numbers of common pipistrelle bats were recorded at LS2, between LS2 and LS3, LS3, between LS3 and LS4, LS5 and LS10.

## 6.6 September 2018

A dusk survey of Transect 1 was undertaken on the 13th September, recorded common and soprano pipistrelle bat activity throughout the survey. Many of the recordings were heard not seen by surveyors, although it was observed that the highest levels of activity were around streetlights, particularly evident between LS11 and LS10. Foraging activity was also noted by a number of passes or constant activity around the waterworks between both LS5 – LS4 and LS11 and LS10.

A dusk survey of the woodland route (Transect 2) along the western side of the road was undertaken on the 17th September 2018. Activity comprised of moderate levels of common and soprano pipistrelle throughout the survey. One lesser horseshoe bat was seen flying along ditch under the bridge at LS11. Noctule individuals were heard but not seen by surveyors between LS6 and LS9 and a brown long eared bat was heard between LS5 and LS6 by the forestry.

A dusk survey of the hedges/fields (Transect 3) along the eastern side of the road was undertaken on the 17th September 2018. Activity comprised of a mix of species including both common and soprano pipistrelle, noctule, Daubenton's and brown long-eared. Activity was highest between LS3 and LS4; LS8 and between LS12 and LS13. One noctule was recorded close to the road between LS9 and LS10. A lesser horseshoe bat was seen flying past surveyors between LS14 and LS15, and a serotine bat heard between LS10 and LS11.

## 6.7 October 2018

A dusk survey of Transect 2 was undertaken in reverse on the 10th October 2018. Activity comprised solely of common and soprano pipistrelle bats with peak activity ranging between LS15 – LS9. Activity dropped between LS4 and LS1 with only one soprano pipistrelle recorded.

A dusk survey of Transect 3 was undertaken in reverse on the 10th October 2018. Activity comprised solely of common and soprano pipistrelle bats which were recorded throughout the survey.

## 6.8 May 2019

A dusk survey of Transect 2 was undertaken on 15th May 2019. Activity comprised moderate levels of common and soprano pipistrelle activity throughout most of the survey. Activity was highest between LS8 and LS9 and between LS11 and LS12. Activity was generally lower between LS5 and LS7 and towards the end of the transect between LS14 and return to LS1. A Daubenton's bat was detected flying over water at LS12.

A dusk survey of Transect 3 was undertaken on 15th May 2019. Common and soprano pipistrelle were the most frequently detected species during the survey, with moderate activity over the majority of the transect route. Other species recorded during the transect included *Myotis* species and noctule. *Myotis* bats were recorded at LS4 and LS5. Bat activity peaked between LS11 to LS12. There was no activity in the early stages of the survey between LS1 and LS3. The survey was terminated early just before LS14 owing to the presence of a free running aggressive dog.

A reverse dusk survey of Transect 2 was conducted on 30th May 2019. Moderate levels of common and soprano pipistrelle activity, including feeding, were recorded throughout the transect with activity generally reducing towards the latter stages of the transect. Activity was most prominent between LS13 and LS10 and greatly reduced in the south -west sector of the transect furthest from the River Ely between LS6 and LS4.

A dusk survey of Transect 3 was undertaken on the 30th May 2019. Common and soprano pipistrelle bats were the only recorded species and were heard throughout the survey.

Detailed results if the activity surveys are presented in Appendix C.

## 7. Automated / Static Survey Results

The static detectors recorded over 44,000 bat passes in 2018 (between May to November) and over 14,000 in 2019 (between May to June). Details of the surveys are provided in Appendix D.

Nine bat species or groups of species were recorded along each route. These were common pipistrelle, soprano pipistrelle), brown long-eared bat, lesser horseshoe and greater horseshoe bats, Pipistrelle species, *Myotis* species (*My sp.*) and Serotine/Noctule/Leisler's species (*SNL sp.*), where calls could not be identified to species level. Probable barbastelle (*Barbastella barbastellus*) were also recorded.

The Bat Activity Index (BAI) for each species and species group, at each location, from recordings in 2018, is provided in Table 6

The BAI for each species per location calculated from recordings in 2019 are provided in Table 7

The BAI bat activity index is based on numbers of bat passes and not numbers of bats, as the total number of bat passes recorded could be from several individual bats flying past the detector or a single bat flying repeatedly past the detector whilst foraging.

Table 6 The BAI per species per location recorded in 2018 (the highest BAI for each species is highlighted in green)

Location	SNL sp.	MySp	Paur	PipSp	Ppip	Ppyg	Prob Bbar	Rfer	Rhip
1	0.012	0.136	0.002	0.030	0.037	0.162	0.000	0.000	0.012
2	0.410	0.011	0.007	0.214	0.083	0.427	0.000	0.000	0.000
3	0.093	1.021	0.005	4.536	1.818	8.741	0.017	0.000	0.062
4	0.448	1.232	0.001	0.257	0.082	1.607	0.000	0.000	0.001
5	0.039	0.297	0.010	1.054	16.142	1.182	0.000	0.002	0.000
6	0.099	2.122	0.004	0.000	2.383	9.675	0.000	0.000	0.022
7	0.000	0.054	0.006	0.000	0.084	0.749	0.000	0.000	0.012
8	0.031	0.274	0.040	0.063	0.157	0.397	0.000	0.000	0.246
9	0.199	0.299	0.054	1.040	0.253	2.615	0.000	0.000	0.000
10	0.008	0.333	0.003	0.024	1.198	5.542	0.000	0.000	1.663
11	0.068	0.180	0.055	0.002	0.307	1.456	0.000	0.000	0.011
12	0.015	0.028	0.003	0.680	0.052	0.542	0.000	0.000	0.003

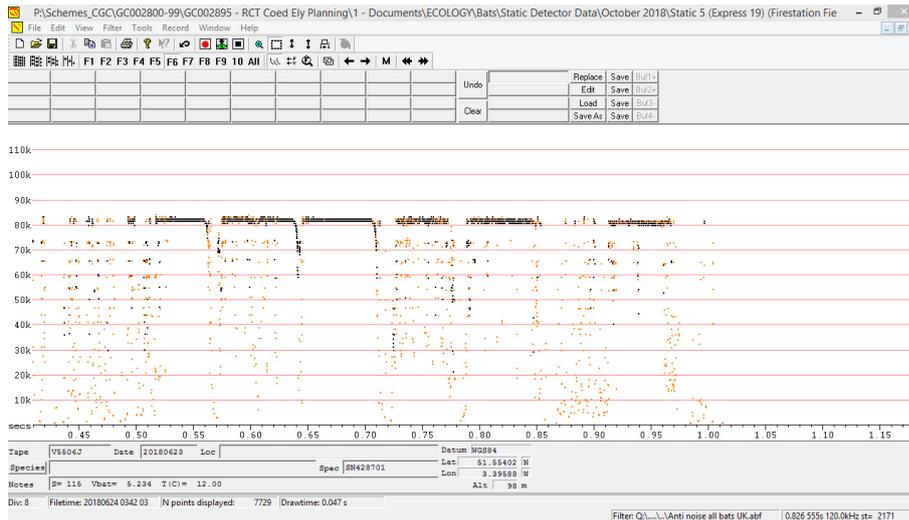
Table 7: The BAI per species per location recorded in 2019 (the highest BAI for each species is highlighted in green)

Location	SNLSp.	MySp.	Paur	PipSp.	PPip	PPyg	Rhip
1	0.018	0.036	0.000	0.303	0.231	0.303	0
2	0.097	0.277	0.145	1.170	1.135	4.023	0.132
3	0.000	0.303	0.036	0.053	0.961	1.282	0.303
4	0.018	0.594	0.000	0.146	0.238	0.942	0.119
5	0.042	0.119	0.093	0.924	1.025	1.381	0.059
6	0.000	0.016	0.016	0.694	1.179	2.455	0.000
7	0.017	0.288	0.059	0.754	0.602	2.551	0.008
8	0.064	5.328	0.000	0.128	0.462	3.578	0.277
9	0.194	4.732	0.468	3.747	12.129	17.539	1.114
10	0.105	0.009	0.000	0.237	4.659	1.459	0.000
11	0.090	3.318	0.249	0.438	4.145	8.987	0.229
12	0.064	1.440	0.064	1.734	25.236	11.017	0.138
13	0.149	11.096	0.015	1.413	2.068	12.688	0.104

## 7.1 Greater Horseshoe Bats

One greater horseshoe bat was recorded on the static bat detector 5 deployed in the tree line on the northern boundary of a parcel of semi-improved grassland to the north-west of the South Wales Fire and Rescue Headquarters on 24th June 2018 at 03:42 (see Drawing GC2895-RED-74-XX-DR-C-0032). A sonogram of the call is shown in Figure 3.

Figure 3: Sonogram of the greater horseshoe bat call on Analoow software.



No greater horseshoe calls were recorded in 2019.

## 7.2 Lesser Horseshoe Bats

In 2018, lesser horseshoe bats were recorded at nine Static detector locations, 1, 3, 6, 7, 8, 10, 11 and 12 in 2018. An example of a lesser horseshoe bat call recorded at Location 6 is shown in Figure 4.

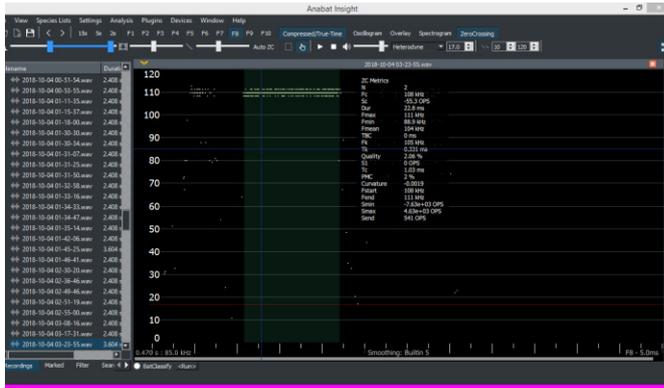
Static 1, 6 and 7 were located at the northern end of the site on both sides of the carriageway, close to the Coed Ely roundabout, Static 1 and 6 were located on opposite sides of a stream which passes under the A4119 carriageway via a culvert (Culvert 1). Static 7 was located at the northern end of the site, adjacent to a stream with a line of trees on its banks, on the northern side of the A4119.

Location 10 was in front of the derelict building within a farmland field to the north of the A4119 (Building 12), which was confirmed as a lesser horseshoe roost during the other bat activity surveys. The highest BAI for lesser horseshoe bats was recorded at this location in 2018.

Location 8 was directly west of this, the static detector was placed on a disused hay barn (Building 14), connectivity to Building 12 was provided by a hedgerow. The second highest BAI for lesser horseshoes in 2018 was recorded at this location.

The species was also recorded on the southern side of the A4119, at location 12, in woodland habitat in 2018.

Figure 4: Lesser horseshoe sonogram Static 6 using Anabat Insight software



In 2019 lesser horseshoe bats were recorded at 9 of the 13 static detector locations (2, 3, 4, 5, 7, 8, 9, 11 and 12) at the northern end of the site and around the water treatment works and farmhouse (Building 7D). The highest BAI (1.114) for this species was at location 9, the woodland clearing east of the disused welfare building in the grounds of the water treatment plant to the north of the A4119.

### 7.3 Barbastelle Bats

Two probable barbastelle calls were identified at Location 3, the detector deployed at the disused welfare building on the water treatment works site, the BAI for the species was 0.017.

No calls of possible barbastelle bats were recorded during the 2019 survey period.

### 7.4 Pipistrelle Bats

In 2018, pipistrelle bats were recorded at all static detector locations, during analysis calls were classified as common pipistrelle, soprano pipistrelle or calls that where it was not possible to distinguish down to the species level were classified as pipistrelle species. The highest BAI for soprano pipistrelles (9.675) was Location 6, adjacent to a stream and in a line of trees on the northern side of the site. Common pipistrelles had the highest BAI (16.142) at location 5, in the tree line to the north of the South Wales Fire and Rescue Headquarters and generally pipistrelles species (that were not identified to species level were most active at location 3 (BAI of 4.536), at the site of the disused welfare building at the water treatment plant.

The 2019 results confirmed that the highest levels of pipistrelle bat species in general were at the site of the disused welfare building at the water treatment plant. (Location 9) with BAIs of 3.747 and 17.539 for non-specified pipistrelle bats and soprano pipistrelle respectively.

The highest levels of activity for common pipistrelle were found to at Location 12, around the farmhouse (Building 12) and associated barns.

### 7.5 Myotis Bat Species

*Myotis* species were recorded at all the static detector locations during the 2018 survey period. The highest BAI (2.122) in this year was recorded at the northern end of the site at Location 6. In 2019 the highest levels of activity of *Myotis* bats (BAI of 11.096) was recorded at Location 13, where the detector was deployed closed to the old exchange building (Building 8).

## 7.6 Brown long-eared Bats

In 2018 brown long-eared bats were recorded at every static detector location. The highest BAI (0.055) was identified at Location 11, in the woodland and scrub habitat to the east of the water treatment plant site on the north of the A4119. A similar BAI (0.055) was recorded at Location 5, on the opposite side of the carriageway to Location 11 on a field edge adjacent to the main sewage works.

The woodland and scrub habitat to the east of the water treatment plant site on the north of the A4119 also proved to be the location with the highest BAI (0.468) for this species in 2019.

## 7.7 Noctule / Serotine species

In 2018 noctule/serotine species were recorded at every static detector location. The highest BAI (0.448) was identified at Location 4, where the detector was deployed on a lamp post alongside the A4119 towards the southern end of the site.

Location 9 in 2019 (the woodland and scrub habitat to the east of the water treatment plant site on the north of the A4119) was the site of the highest BAI for noctule/serotine species with a BAI of 0.194.

The locations for the highest Bat Activity Index per species recorded in 2018 and 2019 are shown in Drawings GC2895-RED-74-XX-DR-C-0038 and GC2895-RED-74-XX-DR-C-0039 respectively.

## 8. Point Count 1 Results

### 8.1 Survey Location 1

A brief pass of lesser horseshoe bat was recorded at 19:46 but the bat was not seen.

Other species recorded were common pipistrelle, soprano pipistrelle and *Myotis*. The earlier recordings were of bats recorded foraging along the hedgerow at this survey location, but the later recordings were not seen.

### 8.2 Survey Location 2

No lesser horseshoe bats were recorded at this survey location.

Soprano pipistrelle, common pipistrelle and *Myotis* bats were recorded throughout the survey. The earlier recordings were of bats recorded foraging along the hedgerow (to and from the existing A4119) at this survey location, but the later recordings were not seen.

### 8.3 Survey Location 3

No lesser horseshoe bats were recorded at this survey location.

Soprano pipistrelles and one *Myotis* bat were recorded at this position. One soprano pipistrelle was recorded commuting along vegetation lining the existing A4119 road.

### 8.4 Survey Location 4

A lesser horseshoe bat was recorded at 20:50 but was not seen by the surveyor.

Soprano pipistrelle and common pipistrelle bats were recorded throughout the survey and were observed foraging and heading to and from the existing A4119. Later in the survey *Myotis* species including Daubenton's bats were also recorded.

### 8.5 Survey Location 5

No lesser horseshoe bats were recorded at this survey location.

Noctule, common pipistrelle, soprano pipistrelle, *Myotis* and brown long-eared bats were recorded at this location. A soprano pipistrelle and noctule bat were noted to be crossing the existing A4119 at this location.

### 8.6 Survey Location 6

No lesser horseshoe bats were recorded at this survey location.

Noctule, common pipistrelle, soprano pipistrelle, *Myotis* and brown long-eared bats were recorded at this location. A soprano pipistrelle was recorded crossing the existing A4119 early in the survey.

## 8.7 Survey Location 7

No lesser horseshoe bats were recorded at this survey location.

During this survey >50 soprano bats were seen emerging from Building 4 over an approximate 30-minute period and heading south into woodland. One soprano pipistrelle was recorded foraging by a streetlight on the A4119 and one was noted commuting over the existing road. Soprano pipistrelle social calls were recorded throughout the survey. A single *Myotis* bat was recorded towards the end of the survey but was not seen.

## 8.8 Survey Location 8

No lesser horseshoe bats were recorded at this survey location.

Soprano pipistrelle calls were recorded throughout the survey including social calls. A single *Myotis* bat was heard at 20:31 but was not seen.

## 8.9 Survey Location 9

Lesser horseshoe bats were recorded at 19:22, 19:29, 19:32, 19:34, 19:35, 19:41 and 19:54. The earlier recordings were either not seen or recorded passing through a gap in the hedgerow towards Survey Location 10. The later recordings were of horseshoe bats commuting/foraging along the woodland edge to the south and heading towards Building 7.

Other species recorded included common pipistrelle, soprano pipistrelle, noctule and *Myotis*. The majority of the activity was foraging along the field boundaries.

## 8.10 Survey Location 10

Lesser horseshoe bats were recorded at this location at 19:50, 19:55 and 20:20. All three were heard but not seen.

Other species recorded included soprano pipistrelle, common pipistrelle, *Myotis* and noctule. A soprano pipistrelle emerged from a tree located adjacent to the surveyor, but the majority of the activity was heard but not seen.

## 8.11 Survey Location 11

A lesser horseshoe bat was recorded foraging at this position at 19:24.

Other species recorded during the survey included common pipistrelle, soprano pipistrelle and noctule bats. The majority of the activity was recorded as foraging overhead.

## 8.12 Survey Location 12

No lesser horseshoe bats were recorded at this survey location.

During the survey approximately 15 soprano pipistrelle bats emerged from Building 5 within the water works compound. The emerged bats were recorded foraging around surrounding vegetation and some crossed the existing A4119 at this location.

### 8.13 Survey Location 13

Lesser horseshoe bats were recorded at 20:05 and 20:52. Both passes were heard but not seen.

Other species recorded during the survey included common pipistrelle, soprano pipistrelle, brown long-eared, *Myotis* and noctule. High levels of activity was recorded along the access track from Building 7 (mainly pipistrelle bats) and appeared to be commuting towards the A4119.

### 8.14 Survey Location 14

A lesser horseshoe was heard at 19:51. The call was brief, and the bat was not seen.

Other species recorded during the survey included common pipistrelle, soprano pipistrelle, noctule, *Myotis* and brown long-eared. Most of the activity was foraging around the sewage works but both pipistrelle species were also recorded commuting along the tree line alongside the A4119.

### 8.15 Survey Location 15

Lesser horseshoe bats were recorded from 20:14 to 20:23 near to Building 8.

Noctule bats were recorded crossing the existing A4119 early in the survey. Other species recorded throughout the survey included common pipistrelle, soprano pipistrelle, *Myotis* and a possible serotine. Activity was concentrated along the vegetated path leading to Building 7.

### 8.16 Survey Location 16

No lesser horseshoe bats were recorded at this survey location.

At least 3 soprano pipistrelle bats were recorded crossing the existing A4119 towards the start of the survey. Other species recorded included common pipistrelle, *Myotis*, noctule and brown long-eared bats.

Full details of Point Count 1 survey are presented in Appendix E.

## 9. Point Count 2 Results

### 9.1 Survey Location 1

No lesser horseshoe bats were recorded at this location.

Species noted were common pipistrelle and soprano pipistrelle, with activity continuous from 21:55 to approximately 22:15 and from 22:25 to 22:45.

### 9.2 Survey Location 2

No lesser horseshoe bats were recorded at this location.

Species noted were common pipistrelle and soprano pipistrelle, with activity continuous from 21:55 to approximately 22:15 and from 22:25 to 22:45. Some bats noted crossing the A4119 at tree canopy height.

### 9.3 Survey Location 3

No lesser horseshoe bats recorded at this location.

Approximately 3-4 soprano pipistrelles were noted at 21:24 and one distant *Myotis* species (thought to be a Daubenton's Bat) was recorded at 22:05 and 22:07. Bat activity then dropped until 22:25 when another *Myotis* species commuted past the surveyor, and several soprano pipistrelles were foraging.

### 9.4 Survey Location 4

No lesser horseshoe bats were recorded at this location.

Approximately 2-3 soprano pipistrelles were first noted at 21:24 and were still present by 21:50. At 22:12, a common pipistrelle commuted past the surveyor, with another (or same individual) at 22:30. At 22:25, a *Myotis* species flew past, with a brown long-eared bat noted at both 22:45 and 22:50, and a soprano pipistrelle at 22:50.

### 9.5 Survey Location 5

A lesser horseshoe bat was recorded at 22:10 and assumed to have flown over the A4119 heading north.

Common pipistrelle, soprano pipistrelle, whiskered/Brandt's and a Daubenton's bat were also recorded at this location.

## 9.6 Survey Location 6

No lesser horseshoe bats were recorded at this location.

At 21:24, one common pipistrelle and one soprano pipistrelle were noted flying alongside the A4119 hedgerow, with a whiskered/Brandt's at 21:32. Pipistrelle activity was almost continuous from 21:45 to 22:12, when a Daubenton's Bat commuted past. Common and soprano pipistrelles were again present from 22:30 until 22:55 and were noted flying above the street lamps along the A4119.

## 9.7 Survey Location 7

No lesser horseshoe bats recorded at this location.

Species recorded included common pipistrelle, soprano pipistrelle and *Myotis* bats along the field boundaries. Activity levels were, however, considered to be low.

## 9.8 Survey Location 8

No lesser horseshoe bats were recorded at this location.

Species recorded included common pipistrelle, soprano pipistrelle and *Myotis* bats along the field boundaries. Activity levels were, however, considered to be low.

## 9.9 Survey Location 9

No lesser horseshoe bats were recorded at this location and none emerged from the previously identified roost in Building 12.

Species recorded included common pipistrelle, soprano pipistrelle and *Myotis* bats along the field boundaries. Activity levels were, however, considered to be low.

## 9.10 Survey Location 10

No lesser horseshoe bats were recorded at this location.

Species recorded included common pipistrelle, soprano pipistrelle and *Myotis* bats along the field boundaries. Activity levels were, however, considered to be low.

## 9.11 Survey Location 11

No lesser horseshoe bats were recorded at this location.

Species recorded included common pipistrelle and soprano pipistrelles, with individuals crossing over the A4119 above tree canopy height.

## 9.12 Survey Location 12

No lesser horseshoe bats were recorded at this location.

Species recorded included common pipistrelle and soprano pipistrelles, with individuals crossing over the A4119 above tree canopy height.

### 9.13 Survey Location 13

No lesser horseshoe bats recorded at this location.

Species recorded included common pipistrelle and soprano pipistrelles, with individuals crossing over the A4119 above tree canopy height.

### 9.14 Survey Location 14

The lesser horseshoe bats from the roost identified in Building 7D were noted flying up and down the farm access track but not crossing over the A4119. The levels of lesser horseshoe activity were intense from 21:25 until 21:52, after which bat passes became intermittent.

Other species recorded during the survey included common pipistrelle, soprano pipistrelle and brown long-eared bats. These species were also noted flying up and down the access track, with some pipistrelles crossing over the A4119 above the tree canopy.

### 9.15 Survey Location 15

Lesser horseshoe bats began emerging from Building 7D at 21:24, with at least 20 individuals counted up until 21:49. These were thought to include several juveniles based on the echolocations being slightly different to the adults and the behaviour of flying up and down the access track to and from the roost. At 21:54 a small number of lesser horseshoe bats started returning to the roost. Activity then became intermittent from 22:58, with just a small number of animals still foraging locally at 23:30.

Other species recorded during the survey included common pipistrelle, soprano pipistrelle and brown long-eared.

## 10. Monitoring of Road Crossings Results

### *Under the road crossing at the northern end of the site*

Soprano pipistrelles and common pipistrelles were active throughout the survey in small numbers, foraging along the river corridor and flying under the road crossing. No further species were recorded.

### *Culverts 1 and 3*

No bat calls were recorded in September or October, all files recorded were noise,

Full details are provided in Appendix F.

# 11. Discussion and Conclusions

## 11.1 Greater Horseshoe Bats

One greater horseshoe bat call was recorded to the north of the Fire and Rescue Headquarters at the southern end of the site.

Greater horseshoe bats generally fly 2-10m away from a linear commuting route, preferably under overhanging vegetation, and up to 2m above ground. Habitats associated with broadleaved woodland and pasture are important for this species.

As only one greater horseshoe call was recorded for the duration of the survey and at only one location it is considered that there is not a significant population of this species using the site. There are high levels of artificial lighting on the road and roundabouts at this end of the site and it is not likely that this light-sensitive species is crossing the A4119.

## 11.2 Lesser Horseshoe Bats

In 2018, lesser horseshoe bats were found to be present during the bat surveys at Coed Ely. They were heard during emergence surveys near to both Building 6 and Trees 1-5 and were initially recorded on static detectors 1 and 3.

As a result of the initial findings the emergence surveys were increased in 2018 to include further suitable buildings situated along the existing road, the activity surveys were extended into May and June 2019 and 'point-count surveys' were implemented.

Two farmland buildings (Buildings 7D and 12) within 160 m of the eastern side of the road were quickly confirmed as lesser horseshoe roosts (totalling approximately 15 bats in 2018 and approximately 20 in 2019). It is possible that the bats are switching between the two roosts as during the second Point Count survey both buildings were surveyed on the same night and only Building 7D was found to support roosting bats.

Lesser horseshoe bats were recorded at LS11 during Transect 2 (western side of the A4119) and between LS14 and LS15 during Transect 3 (eastern side of the A4119) on the 17th September 2019 within 32 minutes of each other.

The first likely lesser horseshoe crossing point was identified when this species was recorded on static detectors 1 and 6, located on opposite sides of a stream which passes under the A4119 carriageway via a culvert (Culvert 1). The culvert entrance, however, on the west of the carriageway was covered by dense vegetation and the eastern entrance is obstructed by wire mesh. This suggested that the bats may be flying over the road around this location, possibly using a dark corridor created by the dense canopy present across the road close by.

The second likely crossing point was identified during the first point count survey, located near to where the majority of lesser horseshoe bat activity has been recorded (on static detectors and during activity surveys) when surveyors on either side of the road recorded the species within 4 minutes of each other. This crossing point was thought to most likely be located over the vegetation surrounding the Welsh Water Compound (on both the eastern and western sides of the road). During the second point count

survey lesser horseshoe bats were regularly recorded commuting and foraging up and down the access track leading from Building 7D to the A4119 but none were recorded crossing the road.

Due to the presence of the large known lesser horseshoe maternity roost at Llanharan House (c. 400 bats) (ST00808364) located approximately 2.7 km to the south-west of the Scheme, various other known satellite roosts in the area (data provided from the Planning Portal and RCT County Ecologist) and a suspected (and since proven) hibernation site in Llanharry it was be concluded that crossing points would potentially be highly significant for the local population.

The static bat detector surveys confirmed the presence of the species on both sides of the A4119 and that levels of activity were highest at the northern end of the site (where the first potential crossing point was identified in 2018) and around the two farmland buildings (Buildings 7D and 12) on the eastern side of the road and the Welsh Water Compound (both sides of the A4119). This supports the original findings of a likely crossing point where culvert 1 is located.

Lesser horseshoe bats are particularly vulnerable to road schemes as they rarely fly more than five meters high. If they cannot fly underneath a road they will rely on vegetation overhead to provide a continuous flight-light which allows them to 'hop-over' the carriageway. Providing a vegetative bridge with an appropriate level of canopy cover as a way of mitigation is difficult when the proposed scheme is wider than a single-carriageway. Lesser horseshoe bats are also a particularly light-sensitive species and will avoid well-lit areas such as those affected by street lighting.

Based on the 2018 and 2019 survey data and the known behaviour of lesser horseshoe bats two potential crossing points were identified.

### 11.3 Pipistrelle Bats

Pipistrelle bats were recorded roosting within Buildings 1 (2 x common), 2 (3 x soprano), 3 (c400 soprano), 5 (c6 soprano), 7G (2 x common), 9A (3 x soprano) and 11 (c30 soprano) all located within 160 m of the existing road (the largest roost c. 400 bats, within 15 m).

Pipistrelle bats were the only species frequently recorded crossing the existing A4119 during the road transect activity surveys (April-September 2018). They were recorded crossing at numerous points along the existing A4119 LS1, between LS2-LS3, LS4 (majority of crossings), between LS4-5, LS5, LS6, LS7 and between LS10-11. Pipistrelle bats were also recorded at all Point Count locations and heard during all of the emergence / return to roost surveys.

Pipistrelle bats were recorded crossing the A4119 at Locations 2, 3, 4, 5, 6, 7, 12, 13, 14 and 16 during the first point count survey and Locations 2, 6, 11, 12, 13 and 14 during the second point count survey.

Pipistrelle bat species were recorded across the site, at all locations where static bat detectors were deployed in both 2018 and 2019. Levels of pipistrelle activity (based on BAI values) were high around the Welsh Water Plant in both years of survey. The highest BAI for pipistrelle species was recorded in 2019 around the farm and barns (Buildings 7D) on the eastern side of the A4119.

Pipistrelle bats exploit the high number of insects attracted to road lighting for foraging purposes, any increases in lighting levels may attract pipistrelle bats closer to the road and increase the risk of collisions with road traffic.

## 11.4 *Myotis* Bats

Small numbers of *Myotis* bats were recorded roosting within Buildings 3 (c5 whiskered/Brandt's), Building 8 (2 x whiskered/Brandt's) and Building 9 (2 x whiskered/Brandt's) all located within 25 m of the existing road.

A *Myotis* bat was recorded during the road activity survey crossing the existing A4119 between LS4 and LS5.

*Myotis* bats were also recorded at 14 of the 16 locations during the first point count survey (with one individual likely to be crossing the existing A4119 at Location 13), at LS5 during the road transect, between LS4 and LS5 during the hedge/field transect and at LS12 during the woodland transect. *Myotis* bats were also recorded near to Buildings 1, 2, 4, 6, 7, 8, 9, 11 and 12, Trees 1-5 and the Railway Bridge during emergence surveys. They were also recorded at Locations 3, 4, 5, 6, 7, 8, 9 and 10 during the second point count survey.

*Myotis* species were recorded at all the static detector locations during both the 2018 and 2019 survey period. In 2019 the highest overall levels of activity of *Myotis* bats (BAI of 11.096) were at the old exchange building (Building 8).

*Myotis* species, prefer to fly in or along cover and dark corridors or fly low over open habitats or roads, and therefore are species that are at increased risk from flight lines being severed and mortality by road traffic.

## 11.5 Brown Long-Eared Bats

One brown long-eared bat was recorded roosting in Building 1 located within 20 m of the existing road.

A brown-long-eared bat was recorded during an activity survey crossing the existing A4119 between LS7 and LS8 and were heard near to LS4 and LS5.

Brown long-eared bats were also recorded during the first point count survey at Locations 5, 6, 13, 14 and 16 (with one individual likely to be crossing the existing A4119 at Location 13) and near to Buildings 2, 4, 5, 6, 7, 8, 9, 11 and 12 during the emergence surveys. A small number of likely brown long-eared droppings were found in Building 8. They were also recorded at Locations 4, 14 and 15 during the second point count survey.

The static detector survey results showed this species to be widely spread across the site, brown long-eared bats were recorded at all static detector locations in 2018 and all bar three in 2019. The highest levels of activity were detected in the grounds of the Welsh Water Plant during both survey seasons. They are likely to exploit dark corridors and hedgerows to commute and forage across the site and wider landscape.

Brown long-eared bats are another species that prefer to fly in or along vegetative cover and dark corridors or will fly low over open habitats or roads, and so are at increased risk from flight lines being severed and mortality by road traffic. Increased levels along the road may also draw insects away from adjacent, darker habitats where this light sensitive species would normally forage.

## 11.6 Serotine / Noctule Bats

No noctule or serotine bats were recorded roosting within any of the buildings, trees or structures surveyed.

Noctule bats were recorded near to Buildings 1,6, 7, 8, 9, 11 and 12, Trees 1-5 and the Railway Bridge during emergence surveys. They were also heard during the majority of the activity surveys across the site and at 9 of the 16 first point count locations. Noctule bats were observed crossing the existing road at Locations 5 and 15 during the first point count survey.

A serotine bat was recorded between LS 10 and 11 of the hedges/field activity transect and a possible recording was heard at Location 15 during the first point count survey.

Serotine and noctule species were also recorded widely across the site during both 2018 and 2019 static detector surveys. These are higher flying species, noctule fly in the open, generally above tree-top level, and serotine bats tend to fly at tree-top height following lines of vegetation such as hedges.

Both species feed on insects attracted to the ultraviolet emissions from street lighting. Increased lighting levels from the proposed development may attract these bat species closer to the road and increase the risk of collision with vehicles. The removal of hedges and trees associated with the proposed development will also negatively impact flight lines and foraging opportunities for these species.

The highest levels of activity were detected around the old exchange building and the Welsh Water Plant.

## 11.7 Overall Value of the Site for Bats

The importance of the survey area for commuting and foraging has been assessed using the approach described by Wray et al. 2010.

The results show that the rarest bats crossing the A4119 were lesser horseshoe and brown long-eared and therefore a score of 5 is applied.

From the results, it is considered that a small number of bats are crossing the road along the sections identified and a score of 10 applies.

Ten roosts of varying size and species composition have been identified within the survey area. This is considered a large number of roosts within the context of the scheme, with 7 occurring within 30m of the road and a small lesser horseshoe maternity roost identified for Building 12/7e. Buildings 12 and 7e lie approximately 300m north of the existing carriageway. In addition, a large known maternity roost for lesser horseshoe bat exists some 2.7km south of the proposed scheme at Llanharan.

Consequently a score of 5 is applied. The landscape in the vicinity of the proposed road widening comprises mature woodland, an established, well-connected hedgerow network, the River Ely and connecting tributaries/ditches as well as areas of canopy closure above the existing road. In this instance therefore a score of 4 applies.

The overall score for the survey area is  $5+10+5+4 = 24$

The site is therefore considered as of County Value for commuting bats.

This value is taken into account in assessing impacts in Section 10.8 below.

Using DMRB methodology for environmental sensitivity, the environmental value of for the bat population in this instance is considered as of medium – low.

**Table 8: Environmental Value or Sensitivity**

Sensitivity (Value)	Typical Descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

The following magnitude of impacts is used in 10.8 below:

**Table 9: Magnitude of Impact**

Magnitude of Impact	Typical Criteria Description
Major	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

The significance of the impacts is then determined as a product of the sensitivity of the receptor and the magnitude of the impact as show in Tables 10 and 11:

**Table 10: Significance of Effects Categories**

Significance Category	Typical Descriptors of Effect
Very Large	Only adverse effects are assigned this level of importance as they represent key factors in the decision-making process. These effects are generally, but not exclusively associated with sites and features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. A major change at a regional or district scale site or feature may also enter this category.
Large	These beneficial or adverse effects are likely to be very important considerations at a local or district scale and, if adverse, are potential concerns to the Scheme and may become material in the decision-making process.
Moderate	These beneficial or adverse effects while important at a local scale are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may influence decision making if they lead to an increase in the overall adverse effects on a particular area or on a particular resource.
Slight	These beneficial or adverse effects may be raised as local factors but are unlikely to be critical in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the Scheme and consideration of mitigation or compensation measures.
Neutral or Insignificant	No effect or an effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects should not be considered by the decision maker.

**Table 11: Significance Matrix**

	Magnitude of Impact					
		No Change	Negligible	Minor	Moderate	Major
Value	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large

	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

## 11.8 Predicted Impacts

Surveys have identified 11 bat roosts of varying size and species composition within the vicinity of the scheme, with roosts being present on both sides of the road.

Buildings 8 and 9 are less than 20m from the existing road, but no direct increase in disturbance is anticipated as the widening will take place on the opposite (southern) side of the carriageway along this section.

Similarly, Buildings 1, 2 and 3 are located between 20m and 8m from the existing carriageway, but again no direct increase in disturbance is anticipated due to the road being widened on the opposite (north) side, although there will be some loss of scrub/woodland along the verge opposite Buildings 1 – 4. A 2 – 3m buffer of vegetation screen will remain. The majority of bats seen emerging from roosts in Buildings 1,2 and 3 were observed to head to the woodland south of the roosts (i.e. away from the carriageway).

There are no direct impacts on the identified roosts, with no demolition of roost sites.

Despite the identified bat roosts not being directly affected by the proposed dualling of the A4119, habitats such as tree lines, hedgerows, woodland removed to accommodate the works, together with the wider footprint of carriageway have a potential adverse impact on bat commuting and foraging routes. This is especially true in relation to low flying bat species such as lesser horseshoe bats and brown long-eared bats, who are currently thought to be crossing above the canopy closed sections of the road.

Small numbers of bats are identified as crossing the road, including rarer species such as lesser horseshoe and brown long-eared bat. The loss of closed canopy and the wider footprint of the road is considered to provide an impact of moderate adverse magnitude and therefore of moderate adverse significance in the unmitigated scenario.

The removal of tree lines, hedgerows, woodland, scrub and grassland will result in a loss and/or fragmentation of foraging habitat.

Due to the extensive areas of foraging habitat available in the wider landscape it is considered that the loss of foraging habitat along the A4119 in this section is of negligible adverse magnitude and consequently of neutral-slight adverse significance.

The existing carriageway is currently lit, however, street lighting for the proposed widening is only proposed at the terminal roundabouts and will extend 111m back from each roundabout along the newly widened carriageway. Whilst the opening up the canopy will increase light levels in certain sections, it is considered that this additional impact will be of neutral - slight adverse significance.

Given the number of identified roosts in the survey area (including maternity roosts) and the proximity of a number of these roosts close to the road, it is considered that there will be cumulative increased disturbance to the local bat population.

Bats are likely to be affected by both the construction phase and operational phase of the improvement scheme.

Loss or fragmentation between maternity and hibernation roosts. This is considered a Major adverse impact but may be reduced to Minor adverse if alternative crossing points / underpasses allow bats to continue to commute across the road.

Mitigation will concentrate on providing safe passage for bats (and other faunal species) across the newly widened carriageway. The reconnection of tree lines, hedgerows and other linear features will be necessary as part of this safe passage.

Wildlife crossing mitigation involves the construction of two underpasses, one at either end of the proposed carriageway widening (see section 10.9 below).

Re-planting of native species, woodland and hedgerows with similar native tree and shrub species will reduce this impact further and is required in any case as mitigation for other faunal species.

## 11.9 Proposed Underpass Locations

Based on the high number of bats roosts identified within 160 m of the existing road and the species recorded during the surveys, safe crossing-points are required to allow bats to cross the proposed widened road. This is required in order to avoid road traffic mortality and to allow bats to continue to use their traditional commuting / foraging flight lines.

Volume 10 of the DMRB states that bats will use existing crossing-points (such as culverts, side road and cattle underpasses, access tracks and pedestrian crossings) to crossroads. Where no suitable structures exist, however, new crossing-points may need to be provided or existing structures adapted.

For this scheme it was concluded that the proposed mitigation would be replacement of existing culverts where or near to where the bat activity (in particular lesser horseshoe bats) was concentrated. These improvements were considered to likely be the most effective based on the findings within the WC1060 research project which found that underpasses were more likely to be used successfully by commuting bats compared to overpasses and bat gantries/wire bridges, both of which were found to be ineffective (Berthinussen and Altringham, 2015).

The proposed locations of the underpasses are detailed below:

### *Location 1*

The proposed development will result in the loss of the extensive existing canopy cover towards the northern end of the Scheme, but the improvement of an existing culvert at the existing pipistrelle crossing point identified during the first- and second-point count surveys will help to mitigate this loss.

The existing culvert will need to be opened (currently covered with a wire mesh to prevent dogs accessing it) and widened to at least 3 x 3 m. This will provide a dark corridor for lesser horseshoe bats and other bats known to be roosting in buildings nearby (pipistrelles, brown long-eared) due to the existing tree line / connecting woodland and hedgerows. A 4.5 x 4.5 m would be more likely to be used by pipistrelle bats, but as this species is more likely to cross the road at height it is considered less vulnerable than other species. Bats (including lesser horseshoes) will need to be channelled to this location through vegetation and/or fencing.

Photograph 2: Existing culvert towards the north of the scheme (photograph taken from the western side of the A4119)



### *Location 2*

There is an existing culvert on the same vegetation lines as the identified lesser horseshoe roost in Building 12. Two emergence surveys were carried out by Capita ecologists in 2018 on Culvert 3 and the associated stone wall but only a limited amount of bat activity was recorded (common and soprano pipistrelles only) (it is likely surveyors did not identify lesser horseshoes due their directional calls as they have otherwise been recorded regularly in this area).

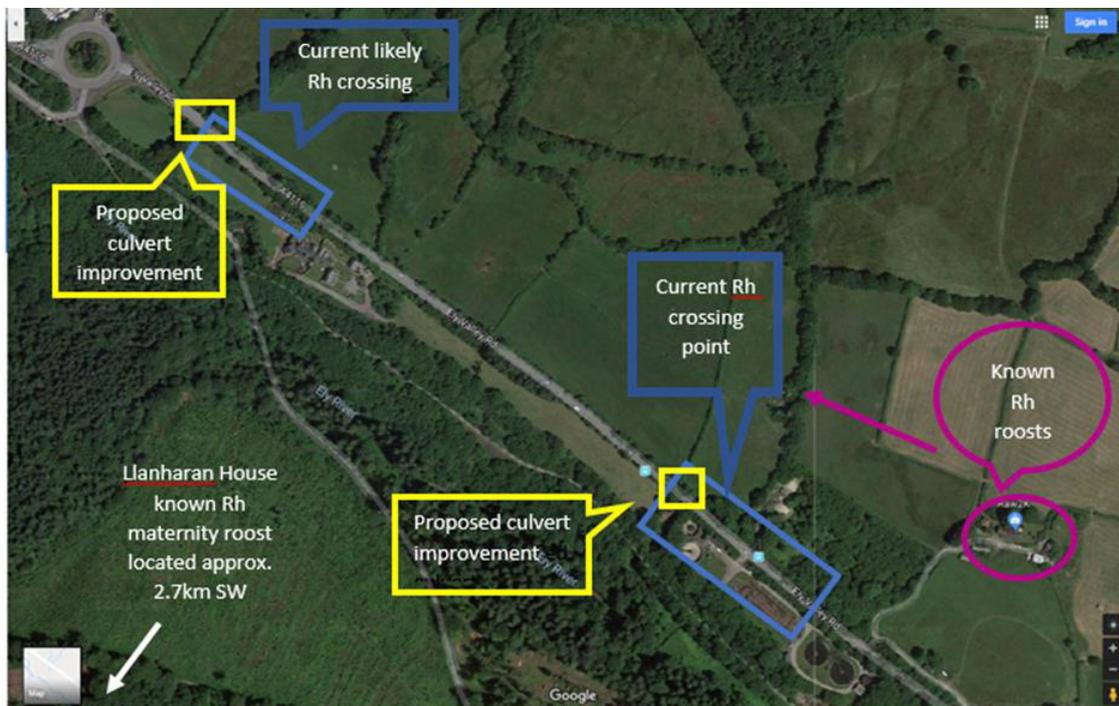
Due to the close location of the lesser horseshoe recordings including the two known roosts (Buildings 7D and 12) it is considered, that this is the optimum location for the underpass / crossing point for this species. The culvert would need to be cleared as it is partially covered by farmland debris including an old shed building and a 3 x 3 m box culvert installed. The bats will need to be channelled to this location through earthworks, vegetation and/or fencing.

Photograph 2: Existing culvert to the north of the Welsh Water Compound (taken from the eastern side of the A4119)



The locations of the proposed culvert improvements in relation to the Scheme and the existing lesser horseshoe bat crossing points are illustrated in Figure 5.

Figure 5: Aerial map illustrating the locations of existing and proposed crossing points (and known lesser horseshoe (Rh) roost locations).



Key; Rh = lesser horseshoe bat

# 12. Recommendations

## 12.1 Bat Underpasses

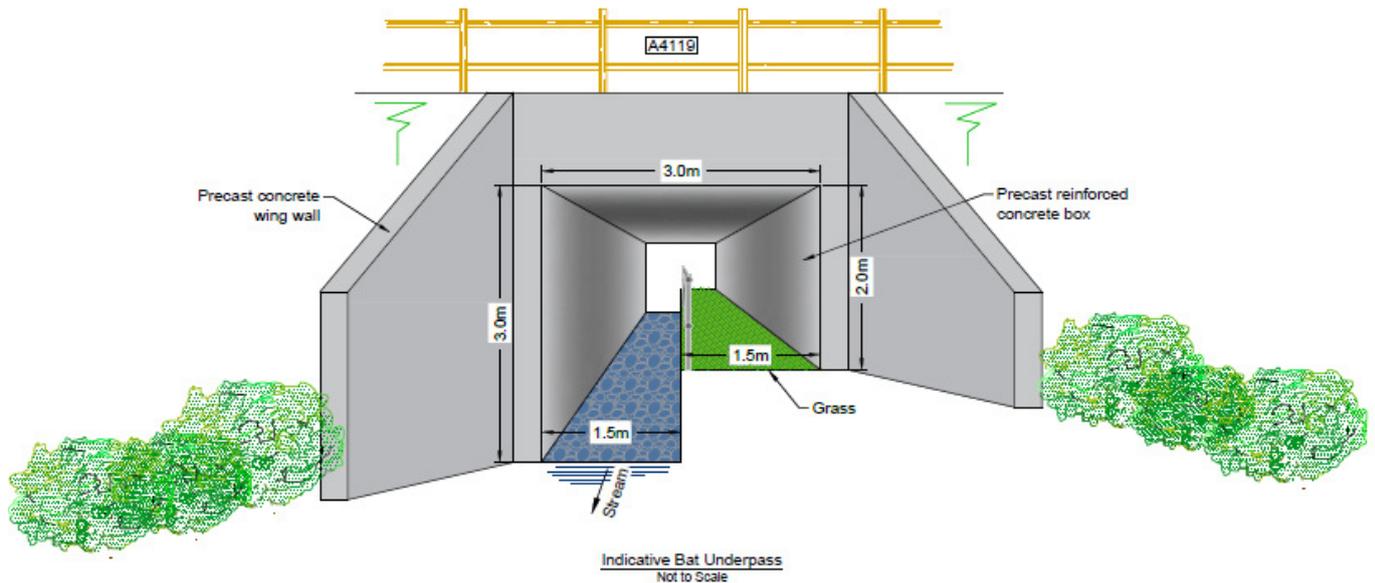
Advice provided in the Natural Resources Wales 2017 ‘Bats and Linear Infrastructure Guidelines’ states that underpasses should be of sufficient height and should be as spacious as possible with height being the critical factor. The minimum requirements for underpass height will be species-specific but for lesser horseshoe bats (which this mitigation is primarily focused on) is 3 m x 3 m.

It should be noted that crossings are also required for other faunal species (such as badgers and otters) and the 3 x 3 m underpasses also provide for these species.

Two 3 x 3 m box culverts are therefore required for this Scheme (indicative design illustrated in Figure 6).

The specifications of the proposed underpasses will be included in the Detailed Mitigation Plan (see Section 11.9).

Figure 6: Indicative design for bat underpasses running underneath the A4119.



## 12.2 Maintain Habitat Connectivity

Existing woodlands, hedgerows and tree lines that are not being directly impacted should be protected throughout the works.

It is important that access to the proposed crossing structures is maintained (e.g. grilles should not be installed on underpasses) and that connecting vegetation is retained indefinitely or for as long as the mitigation structure is required.

The DMRB states that if possible, water be allowed to flow through the underpass which will increase its value for bats (which correlates with the two chosen locations) and that it is advantageous to use linear landscape planting elements to lead bats to the crossing.

Bats should be diverted to safe crossing points with unlit plantings and/or fencing. It will take time, however, for hedgerows or trees to become established and sufficiently mature. Existing commuting routes should be retained where possible and translocation of existing hedgerows considered.

The vegetation planted directly adjacent to either side of the proposed culverts would need to be lower growing, robust and low maintenance species such as goat willow and hazel to help guide the bats species down to the culverts rather than encouraging them to cross over the road at these locations.

Details of the planting proposals will be provided in the Detailed Mitigation Plan.

### 12.3 Limit Disturbance during Underpass Installation

Disturbance should be minimised during installation of mitigation structures. For example, by limiting noise and light pollution along the bat flight path, minimising vegetation clearance, installing suitable temporary crossing structures. These temporary crossing points should be as close to the proposed bat underpasses as possible to allow bats to habituate to the crossing locations. Temporary lighting should be used to deter bats from crossing at other locations and funnel bats to the temporary crossing points.

Ideally the installation of these temporary structure should be completed at a time outside of the summer months when bats are most active.

### 12.4 Planting for Bats

Newly planted hedgerows should include a mix of trees and shrubs and include a diverse range of native insect-attracting species such as hawthorn, blackthorn, hazel, field maple, holly, wild privet and dog rose.

### 12.5 Soft Felling Trees

No further surveys are required for the trees identified as having bat roost potential, however, should any of these trees be removed a precautionary approach will be required, which will include section (soft) felling of the trees under supervision of a suitably experienced ecologist.

The felled trees should be left on site at least 24 hours to allow any bats present to move away from the site.

## 12.6 Permanent Lighting

A detailed lighting plan and design will be agreed to minimise light spill and ensure that the dark corridors identified are maintained.

## 12.7 Temporary Lighting

Where possible, night work should be kept to a minimum. If this is not possible, lighting must be directional, at low level avoiding any light spill into the surrounding habitats such as woodland, hedgerows and watercourses. The lighting set up during any night shift must be agreed with a supervising ecologist. Any day shifts that run into the hours of darkness will require the presence/agreement of an ecologist to ensure lighting is set up in a way that will not affect bat foraging and commuting routes (except where considered desirable).

## 12.8 Monitoring

Landscape scale post-construction monitoring will be required to assess the effects of the scheme and the effectiveness of the mitigation implemented. The monitoring should be carried out for a minimum of three years post-construction. The monitoring will need to be based around increasing the existing knowledge of bat crossing points along the scheme as well as assessing the effectiveness of the culvert mitigation.

### *Temporary Crossing Points*

Monitoring of temporary crossing points will be required to assess the effectiveness of the measures and determine whether bats are using the structures or continuing to use previously established routes close to, or below, the temporary structures.

Monitoring of temporary structures should be carried out using automated and observational methods.

### **Automated monitoring**

One static detector should be placed at each side of each temporary crossing point. Directional microphones should be used to target and record bats crossing the structure rather than those flying nearby. The detectors should be deployed for 25-day sessions per month (mid-March to mid-October) during the construction period, with at least seven clear days between each deployment. This will allow coverage of the early and late season movement of bats moving to/from summer roost locations from/to winter hibernation sites as well as the main bat activity season.

### **Observational monitoring**

Temporary crossing points should also be monitored by ecologists twice a month, during the periods that the static detectors are deployed (mid-March to mid-October). One dusk and one dawn visit each month should be carried out each month. Dusk monitoring should commence 15 minutes before sunset for a duration of up to 3 hours after sunset to ensure that later emerging species are included in the monitoring.

Dawn surveys should commence 2.5 hours before sunrise and finish 15 minutes after sunrise. Recordings and observations noted during the activity surveys should be compared with the data recorded by the static detectors to confirm the validity of the static detector data.

Use of thermal imaging cameras would greatly enhance the likelihood of recording bats accurately during the activity surveys as bats are extremely difficult to see at night. One camera with an appropriate level of sensitivity is recommended per crossing point per monitoring survey.

### *Bat Underpasses*

A combination of automated and observational surveys should also be used to monitor and assess the efficacy of the bat underpasses.

#### **Automated monitoring**

During the construction of the road it is recommended that a static detector is deployed in each of the underpasses as soon as they are completed, for two periods of five days per month with at least seven clear days between each deployment.

Following the completion of the dualling scheme the bat underpasses should be monitored for three years post construction. Static bat detectors should be deployed for 10 days each month from Mid-April to Mid-October following completion of the highway each monitoring year.

A suitable fixing point for a static bat detector security box should be incorporated at the mid-point of one wall of each underpass during their construction.

For each monitoring period one static bat detector should be placed at a central point within the culvert and fitted with an omni-directional microphone. The detector should be located on one wall of the culvert with the microphone facing the opposite wall to capture calls from bats moving in either direction.

#### **Observational monitoring**

Each bat underpass should be monitored for activity one night per month during May to September for each of the three years following completion of the highway construction. The observational monitoring surveys should be timed to coincide with one of the nights that statics are deployed to allow comparison of observational data with data recorded by statics over the same time period.

During highway construction, the bat underpasses should be monitored for bat activity as soon as they are completed. Observational bat activity surveys at the underpasses should be carried out twice each month with one survey at dusk and one at dawn using the same methodology detailed for the temporary crossing site observational monitoring.

In addition to observing bat activity through the underpasses, use by bats of trees, shrubs and fencing installed to guide bats towards culverts should be assessed by the surveyors. Evidence of bats observed avoiding the underpasses and crossing the highway should be used to inform whether further mitigation measures are required to minimise the risk of bats colliding with vehicles. (e.g. installation of screening above the underpasses to either push bats to fly higher across the highway, or lower to towards the underpasses).

## 12.9 Detailed Mitigation Plan

A detailed mitigation plan, including measures during and post-construction, will need to be produced as part of the detailed design process (currently ongoing). This would include early planting of connecting vegetation, temporary guidance measures, timing of vegetation clearance, temporary

lighting during construction, (to potentially dissuade bats crossing at existing crossing locations), the timings/phasing of the culvert construction, planting specification and details of the proposed monitoring plan.

The watercourse at the southern (eastern) end is to be diverted and the culvert installed as a 3 x 3 m box culvert. This will require some moderate earthworks, creating a valley feature for bats to follow. This will be augmented with landscape planting. The culvert will link to the attenuation pond basin on the southern side of the carriageway, potentially enhancing foraging opportunity in this location.

At the northern (western) end of the Scheme, landscape planting will be used to guide bats to the culvert associated with the diverted watercourse.

Drawing GC2895-RED-74-XX-DR-C-0028 shows a schematic mitigation design. This will need to be developed as part of the detailed design process.

It is considered that following successful implementation and maturation of the proposed mitigating underpasses, earthworks and planting that the impact upon severance of flight lines, foraging areas and cumulative disturbance will range from minor adverse significance to neutral.

## 12.10 Enhancement Opportunities

Bat boxes could be installed as part of the development thereby providing additional roost sites for bats in the area.

A selection of bat boxes could be installed on mature trees outside of the site boundary (subject to landowner agreement) which don't currently offer any other features suitable for roosting bats thereby provide additional roost sites for these species in the area.

Schwegler boxes are recommended for durability but are not always available so advice should be sought from an ecologist at the time of purchase for suitable alternatives (if required). Consideration should be given to the inclusion of one or more winter bat boxes as well as summer bat boxes. Boxes should be installed under the guidance of an ecologist, as high as possible (no lower than soffit level to avoid vandalism) with clear flight access. Bat boxes should be sited in a sunny yet sheltered position, close to foraging/commuting habitat such as hedgerows/woodland.

Guidance should be sought from an ecologist with regards to the most suitable box types.

Monitoring and maintenance of the bat boxes will need to be considered within the Detailed Mitigation Plan (see Section 11.9).

## 12.11 Construction Contract, ECoW and Tool-box talk

The contractors will need to be made aware of the important bat habitats within/surrounding the site including commuting routes and foraging areas from the offset. The construction contract will need to include all mitigation requirements in relation to bats (e.g. the underpasses and lighting) and working methods required.

An Ecological Clerk of Works (ECoW) will need to be employed for the duration of the works to ensure that the mitigation and working measures are adhered to.

All site operatives (including sub-contractors) should receive a toolbox talk given by the project ecologist/ECOW prior to commencing work on site. The toolbox talk should cover the actions to be taken in the event of discovering this species unexpectedly and a contact number provided.

## 13. References

Bat Conservation Trust (2009). Gardening for bats.

Berthinussen A. & Altringham J. (2015) WC1060: Development of a cost-effective method for monitoring the effectiveness of mitigation for bats crossing linear transport infrastructure. Department for Environment, Food and Rural Affairs (Defra), UK report.

Capita (2011). Llantrisant Community Route (Sections 8-10). Ecological Survey Report.

Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3<sup>rd</sup> edn). The Bat Conservation Trust, London. ISBN – 13 978-1-872745-96-1.

DMRB Volume 10 Section 4 Part 3 (HA 80/99) Environmental design and management. Nature conservation. Nature conservation advice in relation to bats.

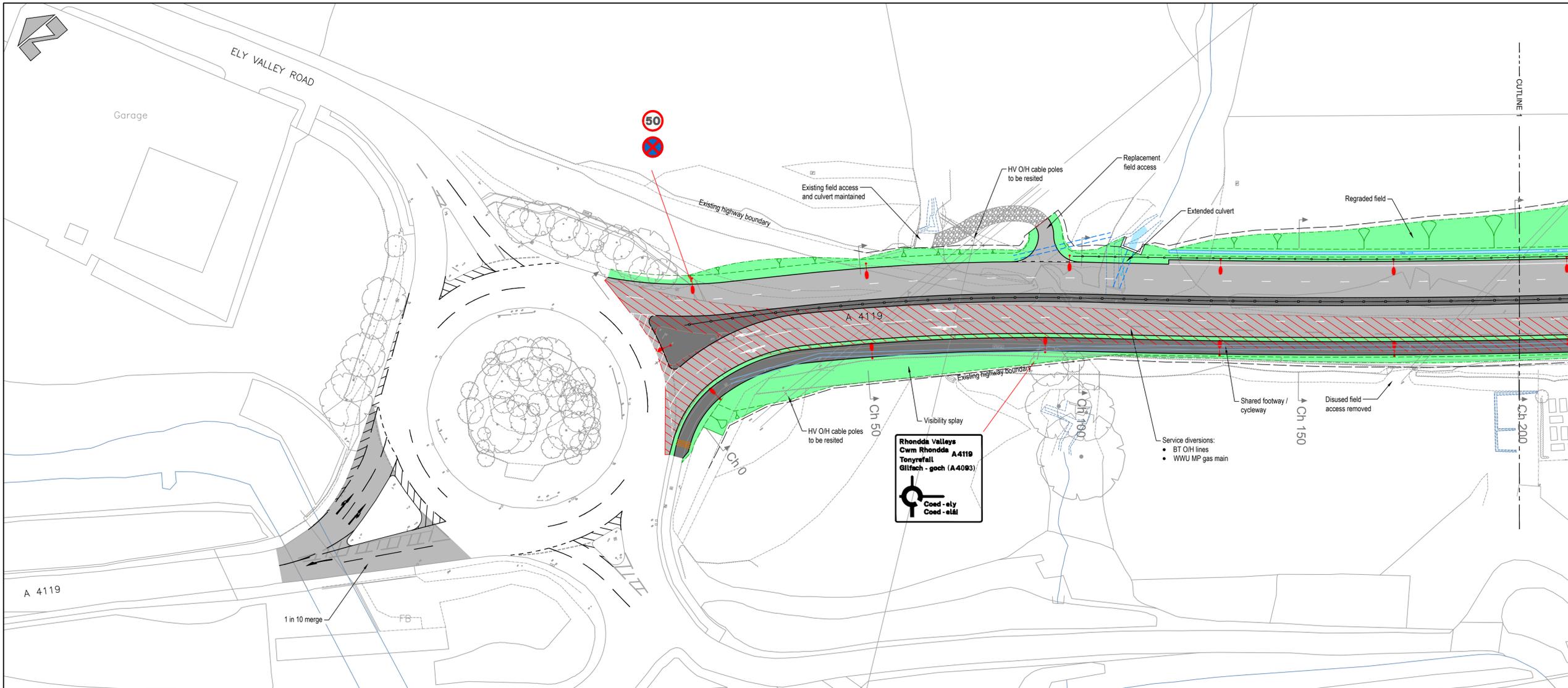
Hundt, L (2012) *Bat Surveys - Good Practice Guidelines* 2nd Edition. Bat Conservation Trust, London.

Mitchell-Jones, A.J. and McLeish, A.P., (2004). *The Bat Worker's Manual*, 3<sup>rd</sup> Edition, Joint Nature Conservation Committee.

Wray *et al* (2010): Valuing Bats in Ecological Impact Assessment

# Drawings

GC2895-RED-61-XX-DR-C-0102 – General Arrangement Drawings  
GC2895-RED-61-XX-DR-C-0103 – General Arrangement Drawings  
GC2895-RED-61-XX-DR-C-0104 – General Arrangement Drawings  
GC2895-RED-74-XX-DR-C-0008 – Bat Activity Survey – Transect 1  
GC2895-RED-74-XX-DR-C-0013 – Bat Activity Survey – Transect 2  
GC2895-RED-74-XX-DR-C-0014 – Bat Activity Survey – Transect 3  
GC2895-RED-74-XX-DR-C-0031 – Static Bat Detector Locations 2018  
GC2895-RED-74-XX-DR-C-0040 – Static Bat Detector Locations 2019  
GC2895-RED-74-XX-DR-C-0015 – 1 Bat Point Count 1 - Survey 1 - 25.09.2018  
GC2895-RED-74-XX-DR-C-0015 – 2 Bat Point Count 1 - Survey 1 - 25.09.2018  
GC2895-RED-74-XX-DR-C-0036 – 1 Bat Point Count Survey 2 – 01.08.19  
GC2895-RED-74-XX-DR-C-0036 – 2 Bat Point Count Survey 2 – 01.08.19  
GC2895-RED-74-XX-DR-C-0034 – Bat Roost Assessment – Buildings  
GC2895-RED-74-XX-DR-C-0029 – Bat Roost Assessment – Structures  
GC2895-RED-74-XX-DR-C-0033 – Bat Roost Assessment - Trees  
GC2895-RED-74-XX-DR-C-0035 – Bat Roost Locations  
GC2895-RED-74-XX-DR-C-0032 – Locations of Horseshoe Bat Species -Recorded During  
2018 Static Surveys  
GC2895-RED-74-XX-DR-C-0038 – Highest Bat Activity Index Per Species 2018  
GC2895-RED-74-XX-DR-C-0039 – Highest Bat Activity Index Per Species 2019  
GC2895-RED-74-XX-DR-C-0028 – Bat Crossing Points



**Key**

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- Existing Road
- New Footway / Traffic Islands
- New verge and re-graded embankment
- New / altered unbound field access
- Area of Accommodation Works

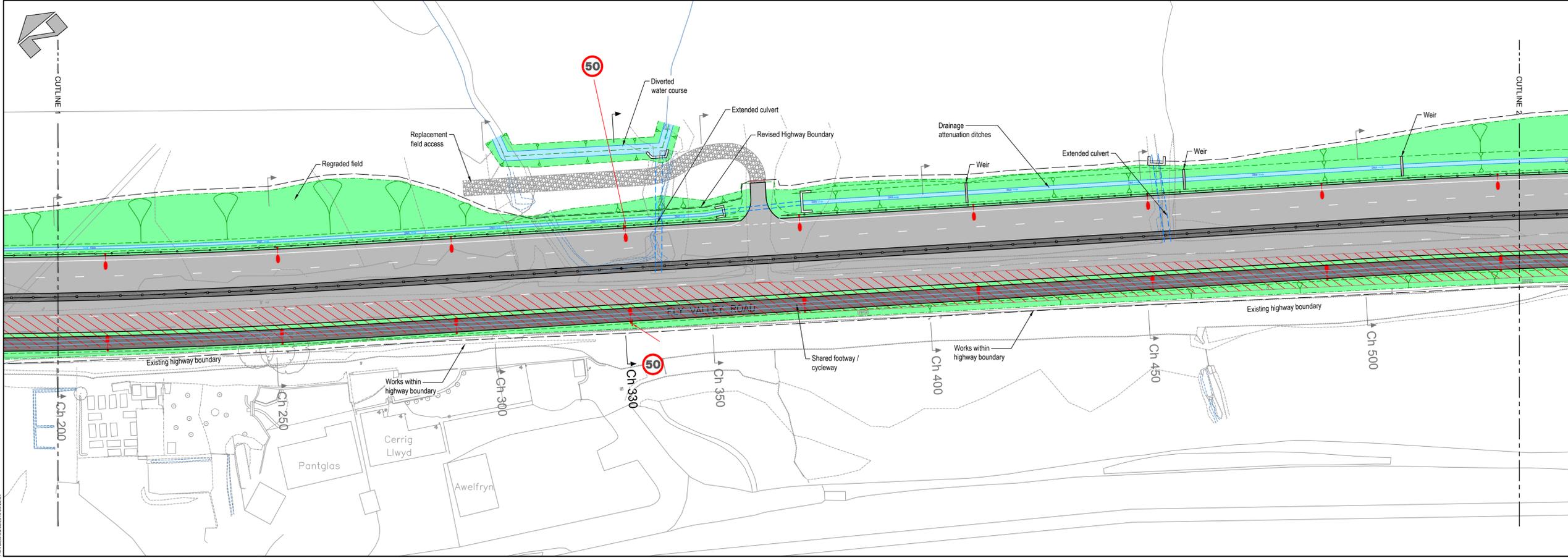
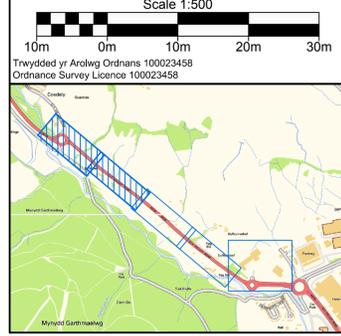
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- New structures - retaining walls/bridge and approx height
- New drainage attenuation ditch
- New culvert headwall
- New traffic sign
- New lamp column (indicative location)
- New vehicle restraint system
- New highway boundary fence
- New gate

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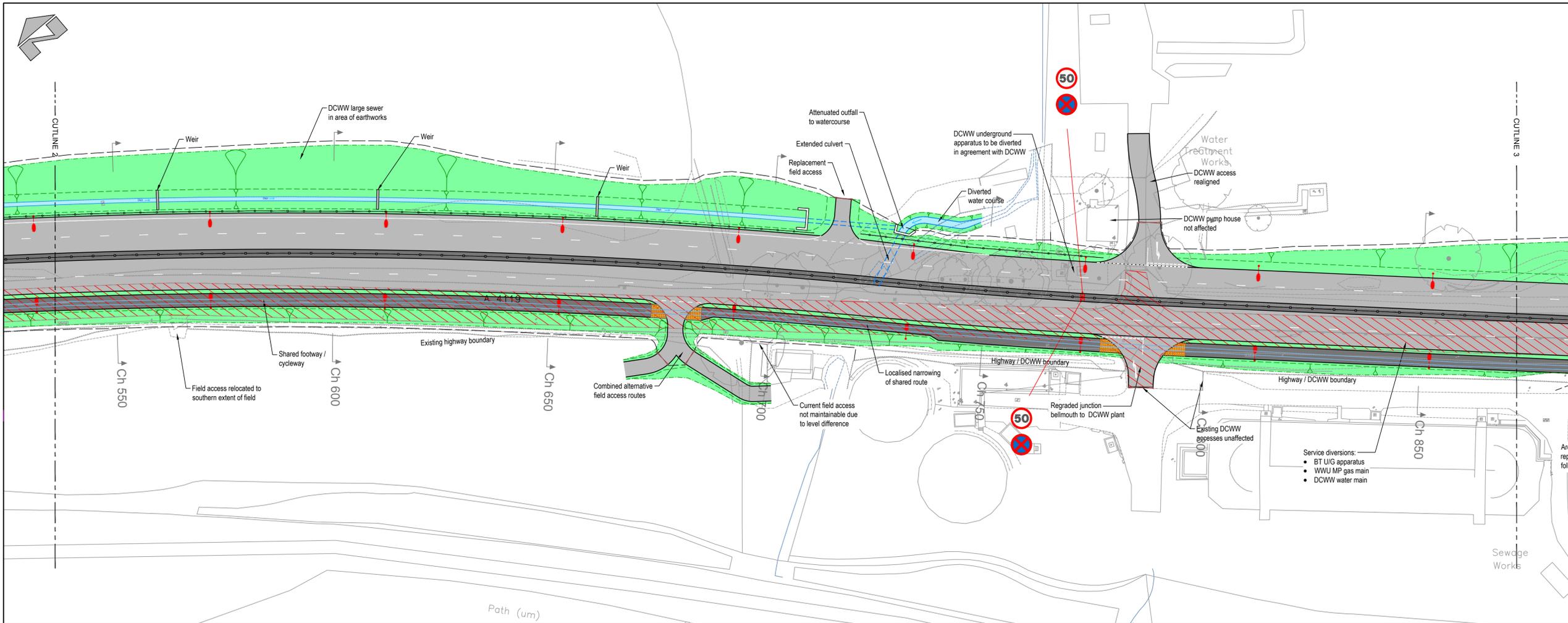
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Client					
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Project					
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Drawing					
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Project - Originator - Zone - Level - File Type - Role - Number				revision	
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- New Footway / Traffic Islands
- New verge and re-graded embankment
- New / altered unbound field access
- Area of Accommodation Works

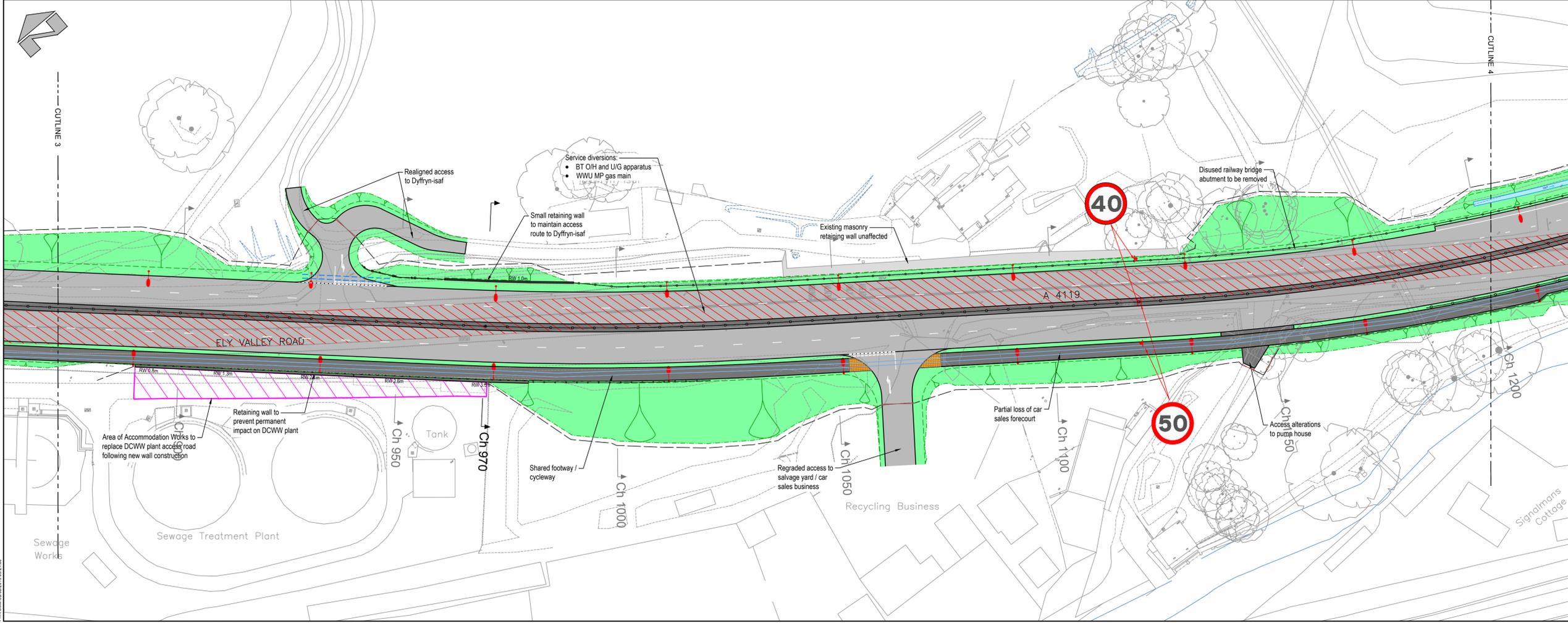
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- New structures - retaining walls/bridge and approx height
- New drainage attenuation ditch
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- New traffic sign
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- New highway boundary fence
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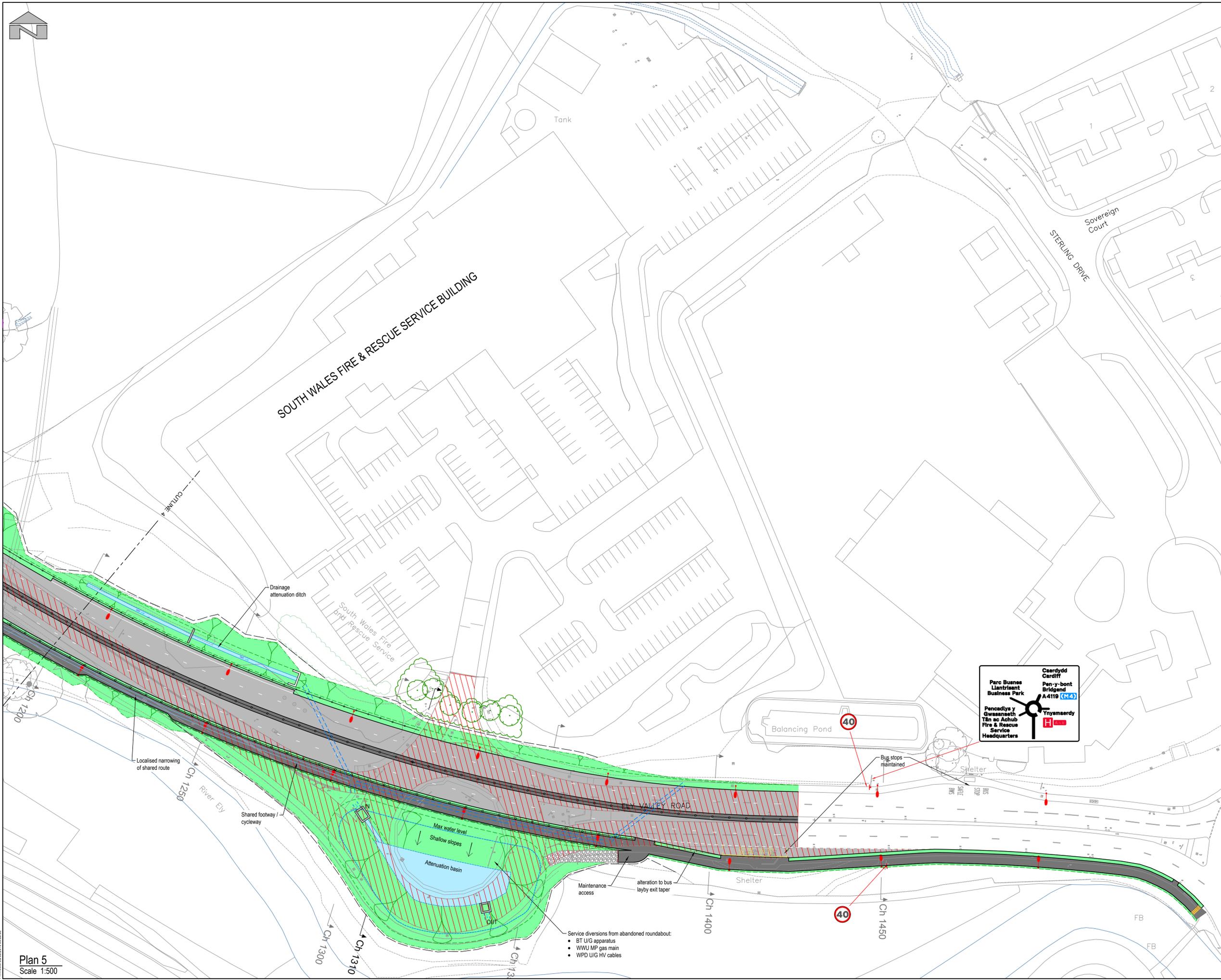


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Project					
A4119 Coed Ely Dualling					
Drawing					
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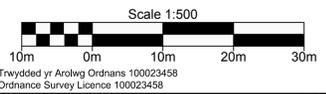
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**Key**

	New Road
	Existing Road
	New Footway / Traffic Islands
	New verge and re-graded embankment
	New / altered unbound field access
	Area of Accommodation Works

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	New tactile paving at uncontrolled pedestrian crossings and entries to shared cycle routes
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Classification  
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Client  
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Drawing  
**Planning Application  
General Arrangement  
(Sheet 3 of 3)**

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Project No. **GC/002895** Date **November 2018**

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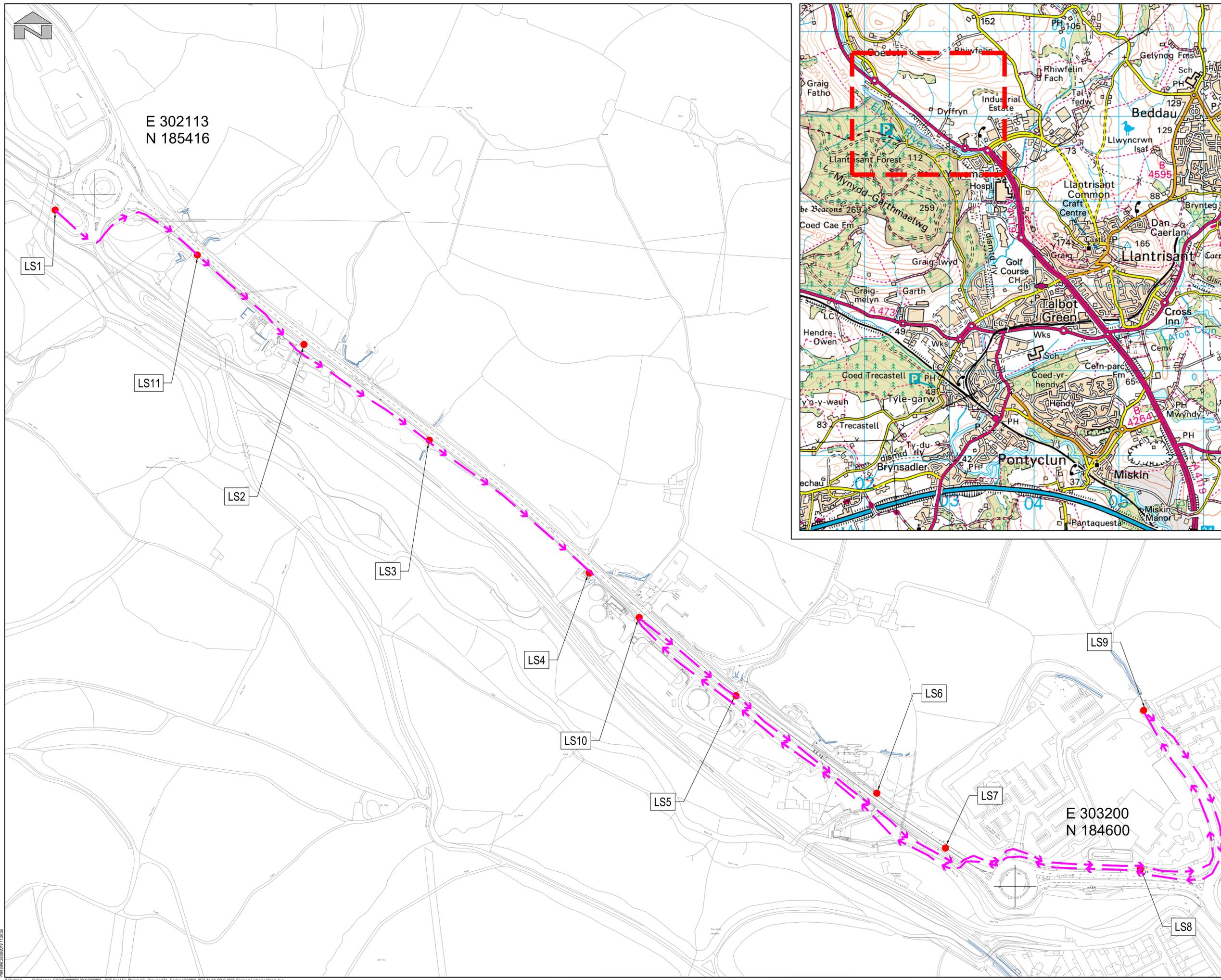
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**Caerdydd  
Cardiff**  
Pen-y-bont  
Bridgend  
A4119 (v4)

**Pencadlys y  
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Fire & Rescue  
Service  
Headquarters**

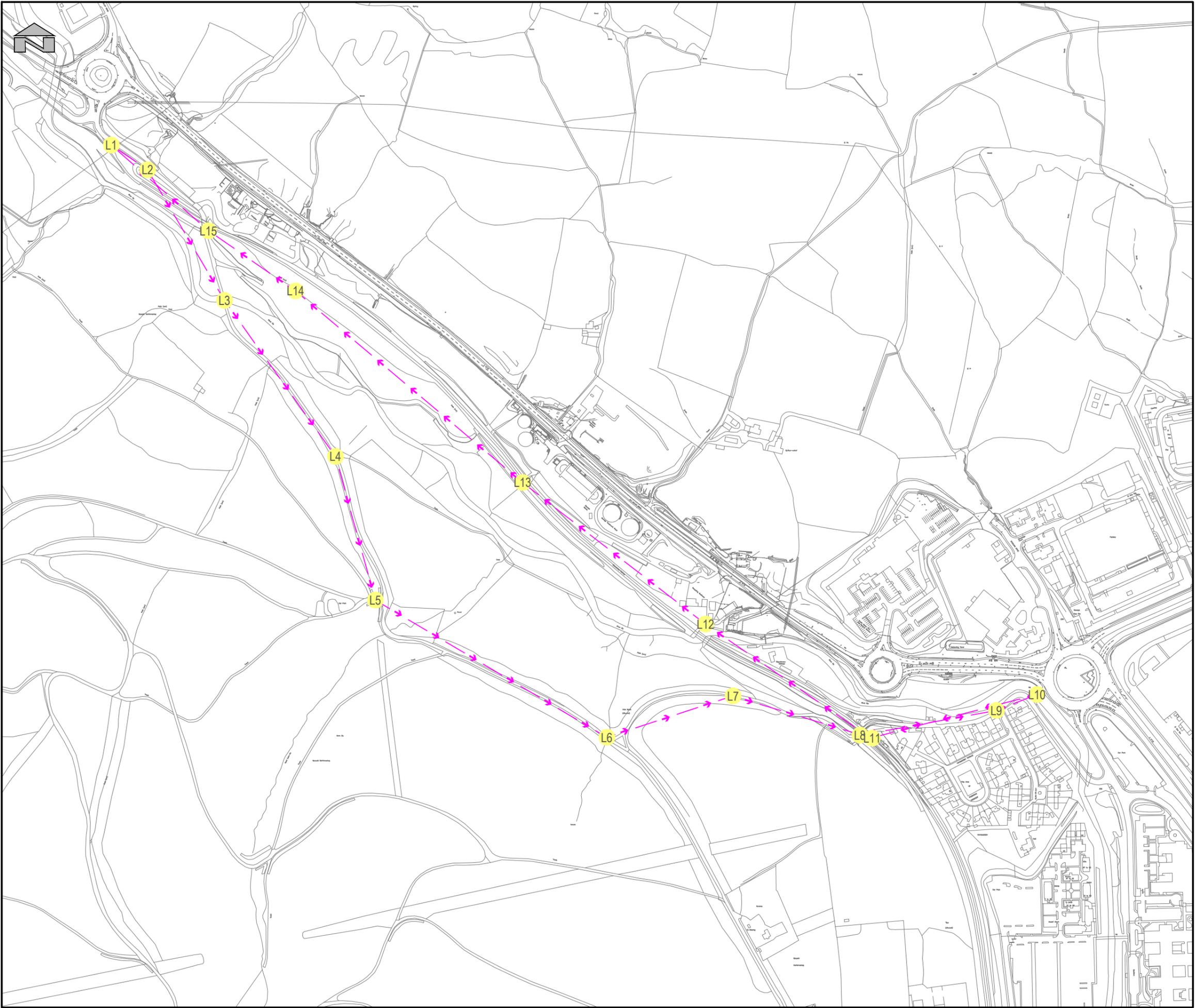
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- BT U/G apparatus
  - WWU MP gas main
  - WPD U/G HV cables



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→ Survey Route

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Purpose of Issue					
S2 - Suitable for Information					
Classification					
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Client					
Rhondda Cynon Taf County Borough Council					
Project					
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Purpose of Issue  
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Client  
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Project  
**A4119 Coed Ely Dualling**

Drawing  
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GC/002895	May 2018

Drawing Identifier	BS1192 Compliant
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Client  
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 County Borough Council**

Project  
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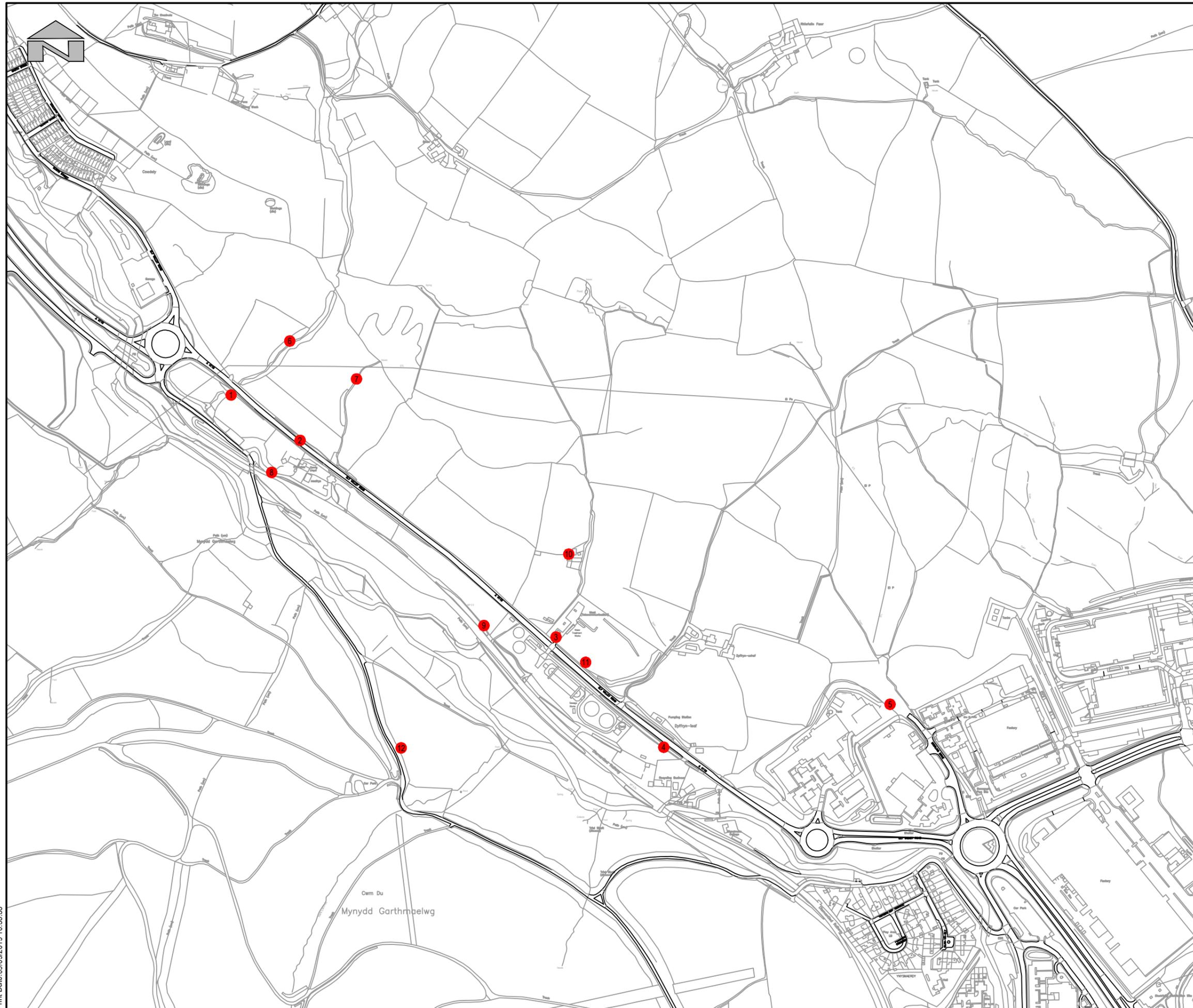
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**Key**

 Static Bat Detectors

Rev	Dwn	CHK'd	App'd	Description	Date
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Purpose of Issue  
**S2 - Suitable for Information**

Classification  
**Commercial in Confidence**

Client  
**Rhondda Cynon Taf  
 County Borough Council**

Project  
**Coed Ely Planning**

Drawing  
**Location of Static Bat Detectors -  
 2018**

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Project No.	Date
GC/002895	August 2019

Drawing Identifier	BS1192 Compliant
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**Key**

 Static Bat Detector Locations

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Purpose of Issue  
**S2 - Suitable for Information**

Classification  
**Commercial in Confidence**

Client  
**Rhondda Cynon Taf  
 County Borough Council**

Project  
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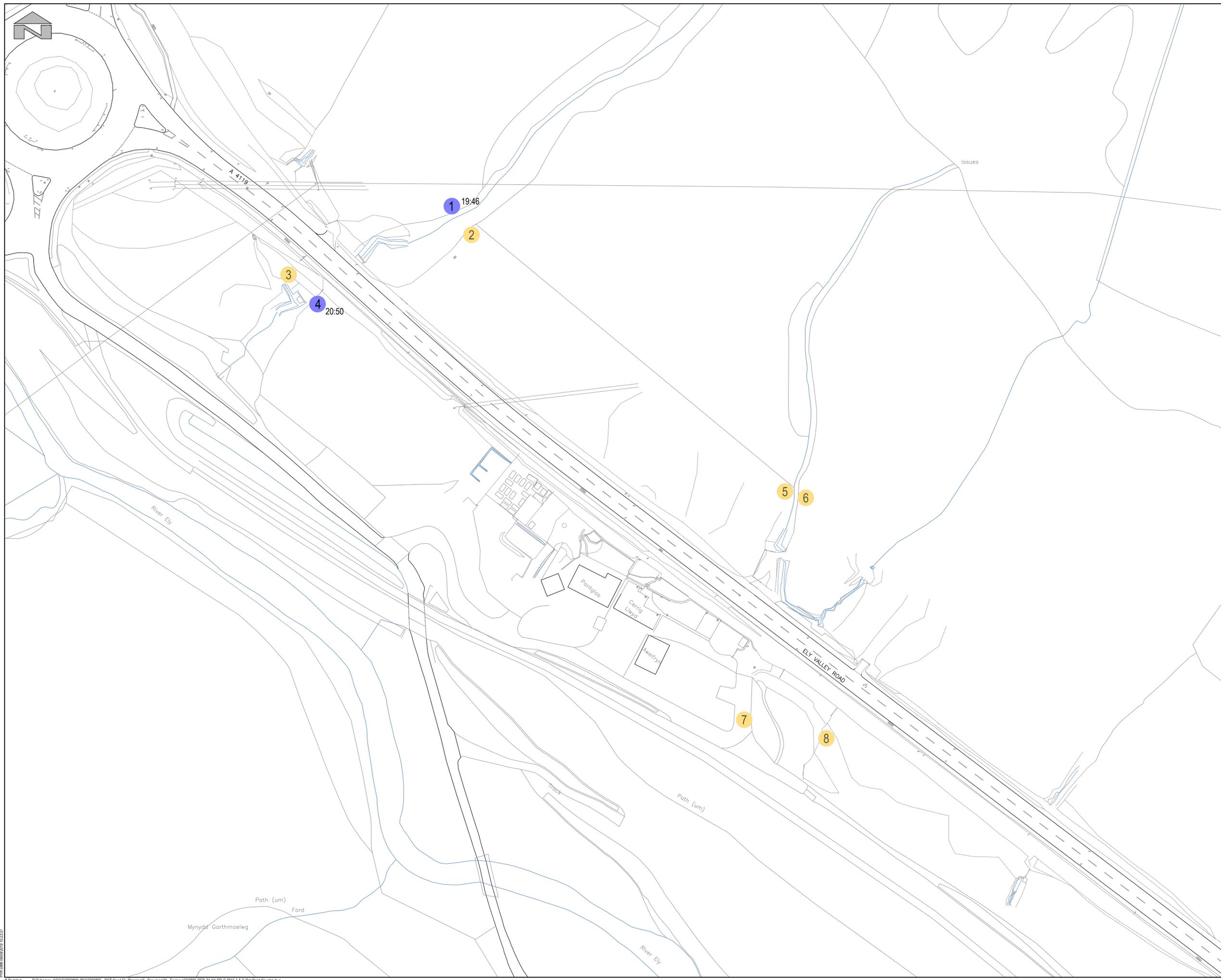
Project No. **GC/002895** Date **May 2020**

Drawing Identifier **GC2895-RED-74-XX-DR-C-0040** BS1192 Compliant rev **P01**



St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW  
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Print Date: 07/05/2020 11:04:28



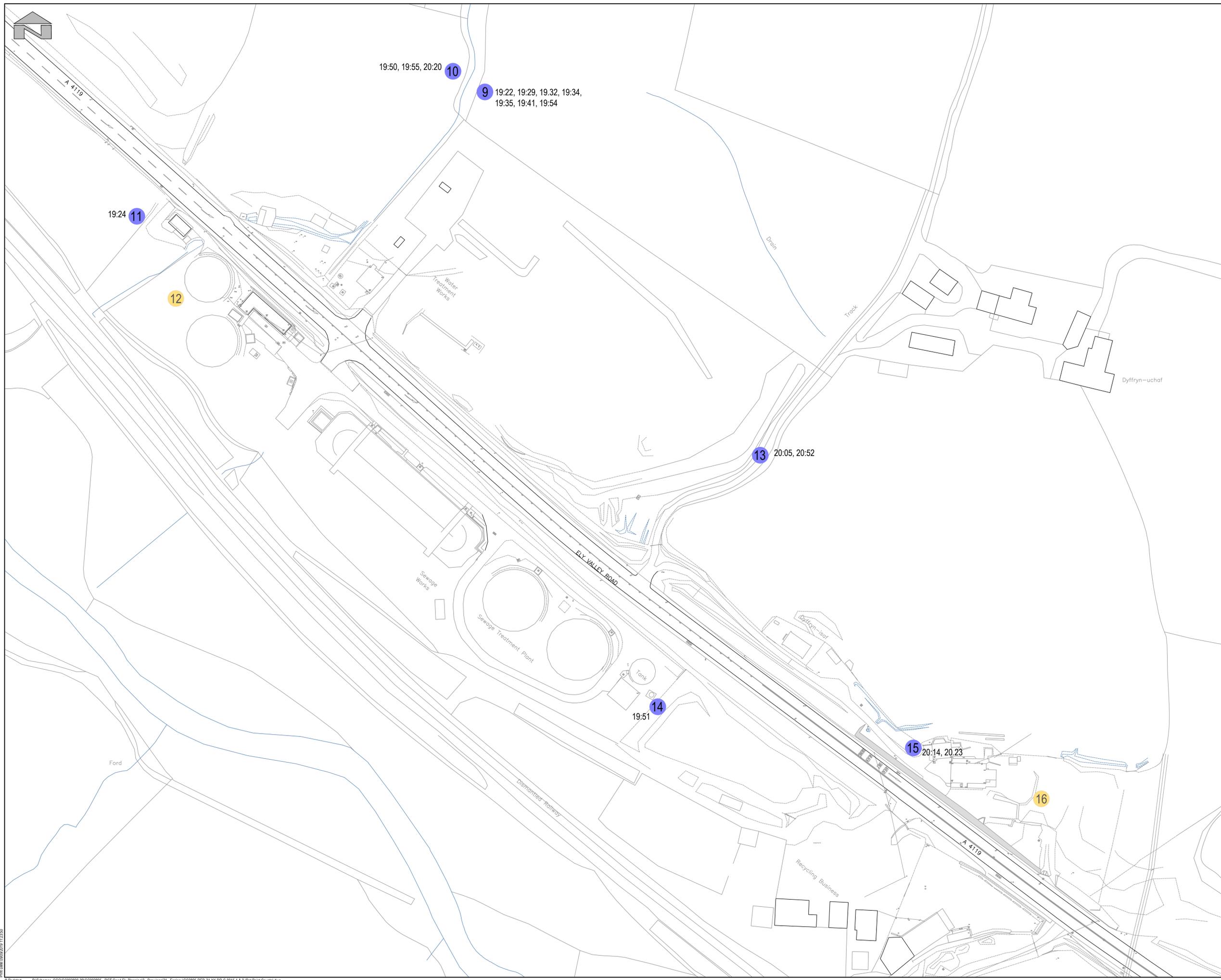
**Key**

- 1 Surveyor Number
- Lesser Horseshoe Bats (LHS) Recorded
- 00:00 Time LHS Recorded

Rev	Drawn	Checked	Approved	Description	Date
Purpose of Issue					
S2 - Suitable for Information					
Classification					
Commercial in Confidence					
Client					
Rhondda Cynon Taf County Borough Council					
Project					
A4119 Coed Ely Dualling					
Drawing					
Bat Point Count 1 - Survey 1 25.09.2018					
Scale @ A1					
NTS	Drawn	Checked	Approved		
	JF	HL			
Project No.					
GC/002895				Date	
				July 2019	
Drawing Identifier					
Project - Originator - Zone - Level - File Type - Role - Number					revision
GC2895-RED-74-XX-DR-C-0015-1					P01



P01 Date: 25/09/2019 15:23:37

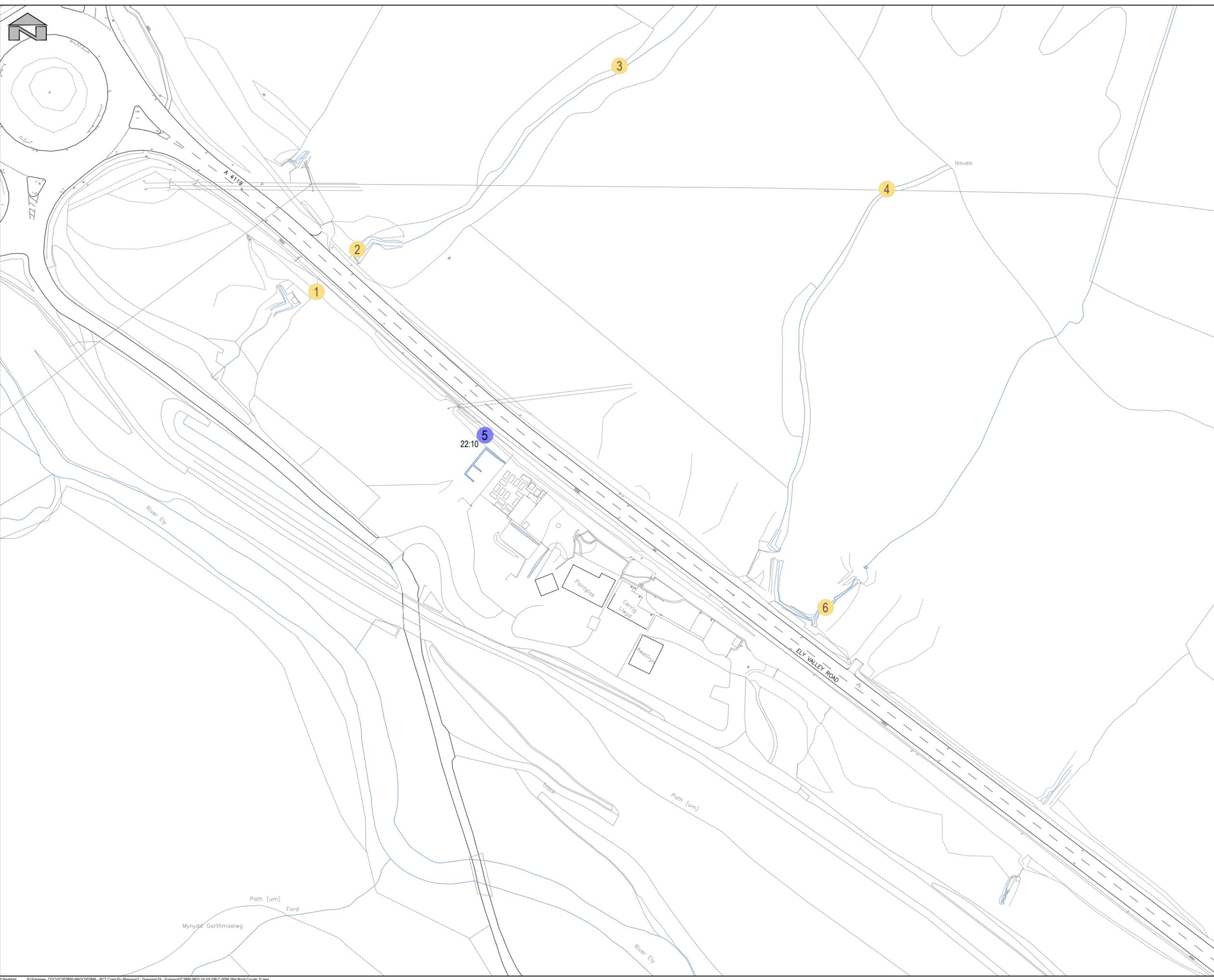


**Key**

- 1 Surveyor Number
- Lesser Horseshoe Bats (LHS) Recorded
- 00:00 Time LHS Recorded

Rev	Drawn	Checked	Approved	Description	Date
Purpose of Issue					
S2 - Suitable for Information					
Classification					
Commercial in Confidence					
Client					
Rhondda Cynon Taf County Borough Council					
Project					
A4119 Coed Ely Dualling					
Drawing					
Bat Point Count 1 - Survey 2 26.09.2018					
Scale @ A1	Drawn	Checked	Approved		
NTS	JF	HL			
Project No.				Date	
GC/002895				July 2019	
Drawing Identifier					BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number					revision
GC2895-RED-74-XX-DR-C-0015-2					P01





- Key**
- 1 Surveyor Number
  - Lesser Horseshoe Bats (LHS) Recorded
  - 00:00 Time LHS Recorded

Rev	Drawn	Checked	Approved	Description	Date
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Purpose of Issue  
**S2 - Suitable for Information**

Classification  
**Commercial in Confidence**

Client  
**Rhondda Cynon Taf  
 County Borough Council**

Project  
**A4119 Coed Ely Dualling**

Drawing  
**Bat Point Count 2  
 01.08.2019**

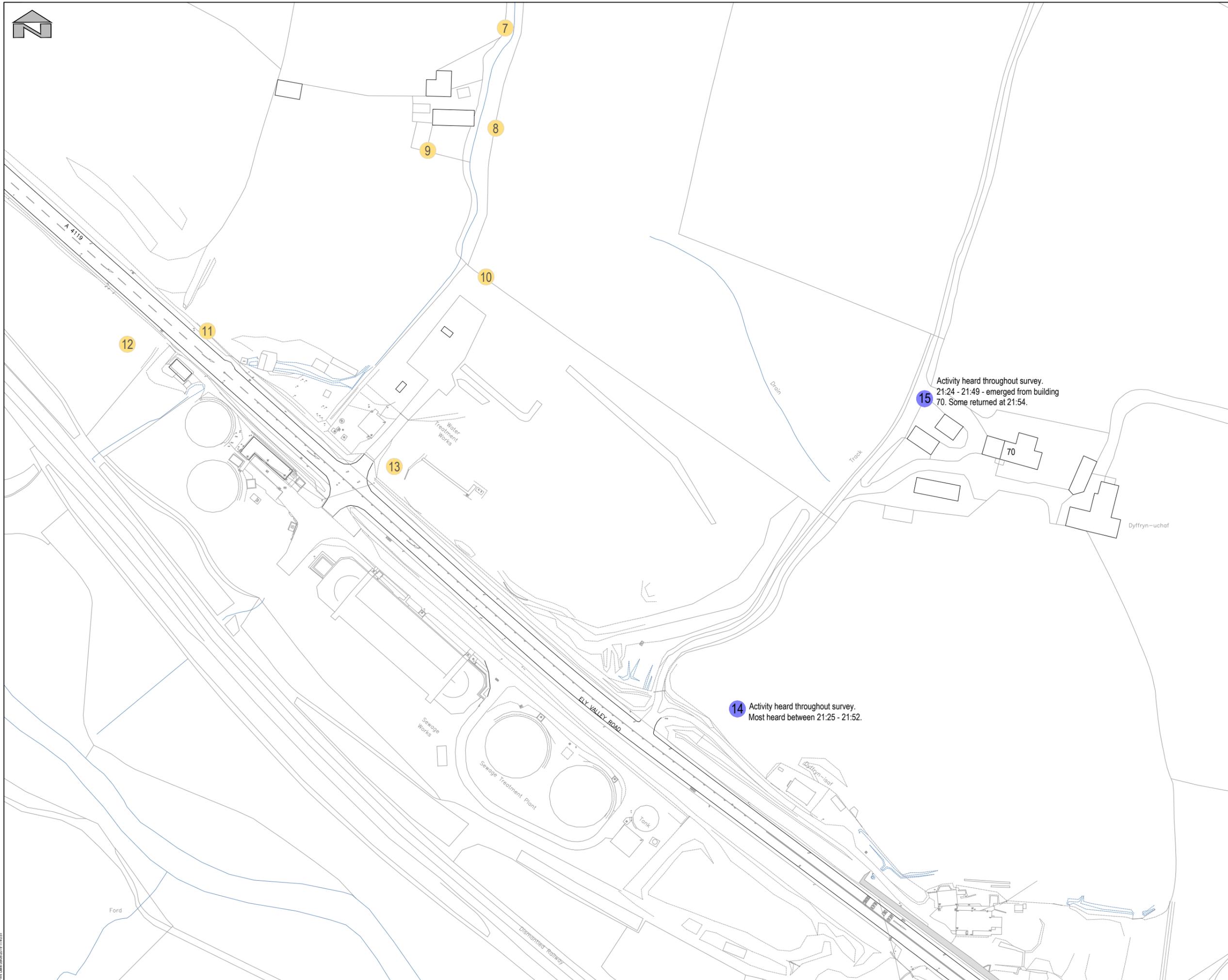
Scale @ A1	Drawn	Checked	Approved
NTS	JF	HL	

Project No.	Date
GC/002895	August 2019

Drawing Identifier	BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number GC2895-RED-74-XX-DR-C-0036-1	revision P01



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**Key**

- 1 Surveyor Number
- Lesser Horseshoe Bats (LHS) Recorded
- 00:00 Time LHS Recorded

**15** Activity heard throughout survey.  
21:24 - 21:49 - emerged from building  
70. Some returned at 21:54.

**14** Activity heard throughout survey.  
Most heard between 21:25 - 21:52.

Rev	Drawn	Checked	Approved	Description	Date
Purpose of Issue					
S2 - Suitable for Information					
Classification					
Commercial in Confidence					
Client					
Rhondda Cynon Taf County Borough Council					
Project					
A4119 Coed Ely Dualling					
Drawing					
Bat Point Count 2 01.08.2019					
Scale @ A1	Drawn	Checked	Approved		
NTS	JF	HL			
Project No.	Date				
GC/002895	August 2019				
Drawing Identifier					BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number					revision
GC2895-RED-74-XX-DR-C-0036-2					P01



Plot Date: 09/08/2019 11:42:51



**Bat Roost Potential:**

- High Potential
- ⊗ Moderate Potential
- Low Potential
- ⊗ Negligible

Rev	Drawn	Checked	Appr	Description	Date
Purpose of Issue					
S2 - Suitable for Information					
Classification					
Commercial in Confidence					
Client					
Rhondda Cynon Taf County Borough Council					
Project					
A4119 Coed Ely Dualling					
Drawing					
Bat Roost Potential Assessment - Buildings					
Scale @ A1					
1:2,000	Drawn	Checked	Approved		
	KW	HL			
Project No.					
GC/002895				Date	
			August 2019		
Drawing Identifier					
Project - Originator - Zone - Level - File Type - Role - Number					BS1192 Compliant
GC2895-RED-74-XX-DR-C-0034					revision
					P01



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P:\Schemes\_GC\GC002895-99\GC002895 - RCT Coed Ely Planning2 - Drawings\14 - Ecology\GC2895-RED-74-XX-DR-C-0034 (Bat Roost Buildings).dwg



Bat Roost Potential:

- X High Potential
- X Moderate Potential
- X Low Potential
- X Negligible

Rev	Dwn	CHK'd	App'd	Description	Date
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Purpose of Issue  
S2 - Suitable for Information

Classification  
Commercial in Confidence

Client  
Rhondda Cynon Taf  
County Borough Council

Project  
A4119 Coed Ely Dualling

Drawing  
Bat Roost Potential Assessment -  
Structures

Scale @ A3	Drawn	Checked	Approved
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1:5,000

JF

Project No. Date  
GC/002895 July 2019

Drawing Identifier	BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number	rev
GC2895-RED-74-XX-DR-C-0029	P01



St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW  
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Print Date: 28/08/2019 13:16:18



**Bat Roost Potential:**

- X Moderate Potential
- Low Potential

Rev	Drawn	Checked	App'd	Description	Date
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Purpose of Issue

**S2 - Suitable for Information**

Classification

**Commercial in Confidence**

Client

**Rhondda Cynon Taf  
County Borough Council**

Project

**A4119 Coed Ely Dualling**

Drawing

**Bat Roost Potential Assessment -  
Trees**

Scale @ A1	Drawn	Checked	Approved
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1:2,000      KW      HL

Project No.      Date

GC/002895      August 2019

Drawing Identifier      BS1192 Compliant

Project - Originator - Zone - Level - File Type - Role - Number      revision

GC2895-RED-74-XX-DR-C-0033      P01



**REDSTART.**

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Bat Roost Potential:

- High Potential
- ⊗ Moderate Potential
- Low Potential
- ⊗ Negligible

Rev	Drawn	Checked	App'd	Description	Date
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Purpose of Issue  
S2 - Suitable for Information

Classification  
Commercial in Confidence

Client  
Rhondda Cynon Taf  
County Borough Council

Project  
A4119 Coed Ely Dualling

Drawing  
Bat Roost Potential Assessment -  
Buildings

Scale @ A1	Drawn	Checked	Approved
1:2,000	KW	HL	

Project No.	Date
GC/002895	August 2019

Drawing Identifier	BS1192 Compliant
GC2895-RED-74-XX-DR-C-0034	revision: P01



REDSTART.

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**Bat Roost Potential:**

- High Potential
- Moderate Potential
- Low Potential
- Negligible

Rev	Drawn	Checked	Appr	Description	Date
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Purpose of Issue  
S2 - Suitable for Information

Classification  
Commercial in Confidence

Client  
Rhondda Cynon Taf  
County Borough Council

Project  
A4119 Coed Ely Dualling

Drawing  
Bat Roost Locations

Scale @ A1	Drawn	Checked	Approved
1:2,000	KW	HL	

Project No.  
GC/002895

Date  
August 2019

Drawing Identifier	BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number GC2895-RED-74-XX-DR-C-0035	revision P01

**REDSTART.**

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P:\Schemes\_C\GC\002895-99\GC002895 - RCT Coed Ely Dualling\2 - Drawings\14 - Ecology\GC2895-RED-74-XX-DR-C-0035 (Bat Roost Locations).dwg



**Key**

- 1 Lesser Horseshoe Bats
- 1 Greater Horseshoe Bats

Rev	Dwn	Chk'd	App'd	Description	Date
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Purpose of Issue  
**S2 - Suitable for Information**

Classification  
**Commercial in Confidence**

Client  
**Rhondda Cynon Taf  
 County Borough Council**

Project  
**Coed Ely Planning**

Drawing  
**Locations of Horseshoe Bat Species -  
 Recorded During 2018 Static Surveys**

Scale @ A3	Drawn	Checked	Approved
1:4,000	JF	JB	JB

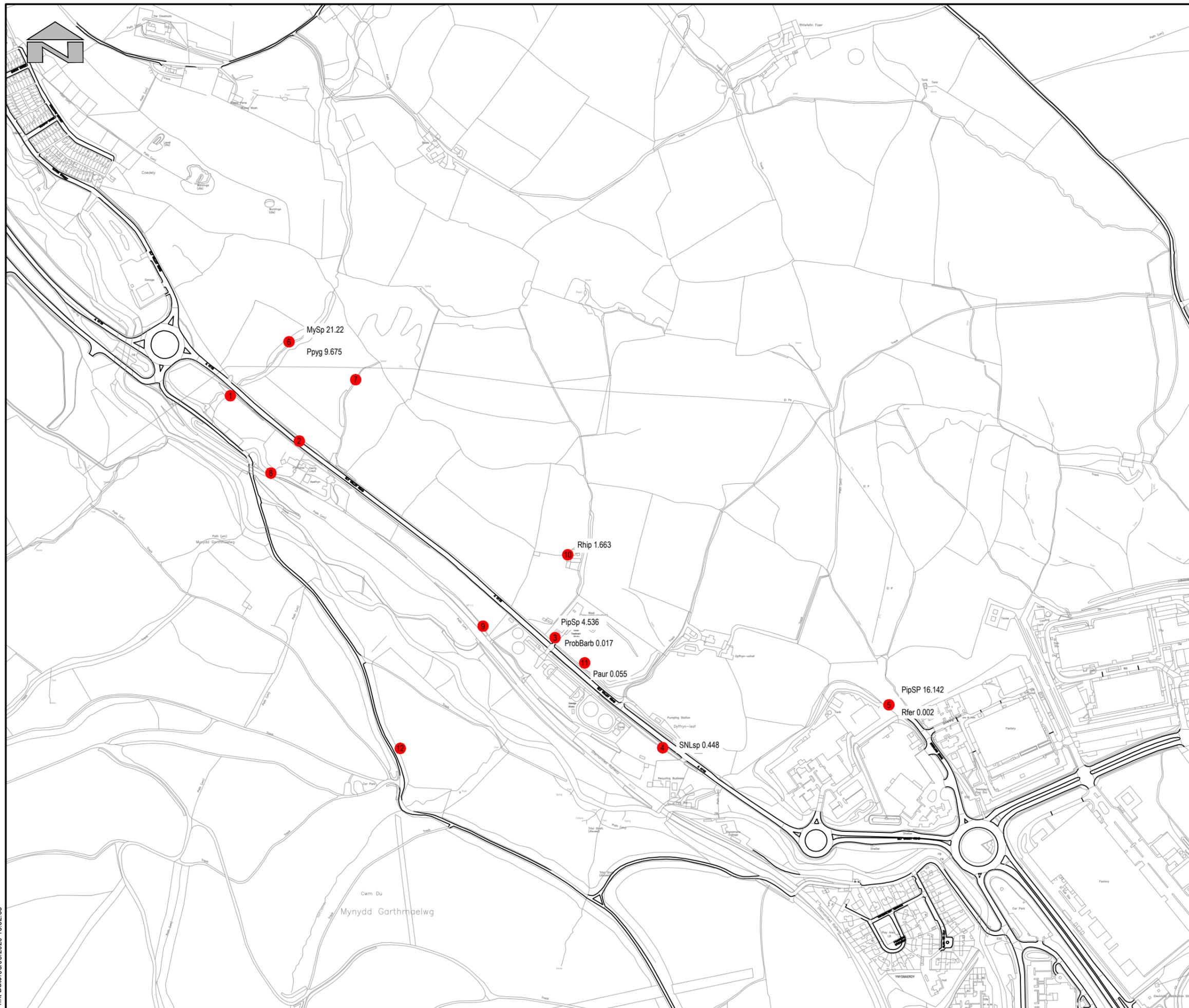
Project No.	Date
GC/002895	August 2019

Drawing Identifier	BS1192 Compliant
Project - Originator - Zone - Level - File Type - Role - Number	rev
GC2895-RED-74-XX-DR-C-0032	P01



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Print Date: 28/08/2019 15:25:50



### Key

- Static Bat Detectors
- 00.00 Highest Bat Activity per Species

Bat symbol	Species
MySp	Myotis Species
Ppyg	Soprano Pipistrelle
Rhip	Lesser Horseshoe Bat
PipSp	Pipistrelle Species
ProbBarb	Probable Barbastelle
Paur	Brown Long-eared Bat
Rfer	Greater Horseshoe Bat
SNLsp	Noctule / Serotine Species

Rev	Dwn	Chk'd	App'd	Description	Date
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Purpose of Issue  
**S2 - Suitable for Information**

Classification  
**Commercial in Confidence**

Client  
**Rhondda Cynon Taf  
 County Borough Council**

Project  
**Coed Ely Planning**

Drawing  
**Static Bat Detectors 2018**

**Highest Bat Activity Index Per Species**

Scale @ A3	Drawn	Checked	Approved
1:6,000	JF	JB	JB

Project No. **GC/002895** Date **May 2020**

Drawing Identifier **GC2895-RED-74-XX-DR-C-0038** BS1192 Compliant rev **P01**



St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW  
[www.redstartwales.com](http://www.redstartwales.com)

Print Date: 06/05/2020 15:52:38



### Key

- Static Bat Detectors
- 00.00 Highest Bat Activity per Species

Bat symbol	Species
MySp	Myotis Species
Ppyg	Soprano Pipistrelle
Rhip	Lesser Horseshoe Bat
PipSp	Pipistrelle Species
ProbBarb	Probable Barbastelle
Paur	Brown Long-eared Bat
Rfer	Greater Horseshoe Bat
SNLsp	Noctule / Serotine Species

Rev	Dwn	Chk'd	App'd	Description	Date
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Purpose of Issue  
**S2 - Suitable for Information**

Classification  
**Commercial in Confidence**

Client  
**Rhondda Cynon Taf  
 County Borough Council**

Project  
**Coed Ely Planning**

Drawing  
**Static Bat Detectors 2019**

**Highest Bat Activity Index Per Species**

Scale @ A3	Drawn	Checked	Approved
NTS	JF	JB	JB

Project No. **GC/002895** Date **May 2020**

Drawing Identifier **GC2895-RED-74-XX-DR-C-0039** BS1192 Compliant rev **P01**



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Print Date: 07/05/2020 00:38:55

## Appendix A - Surveyor Details

Surveyor Name	Level of Experience
Neil Price (Redstart)	NRW Bat Licenced. Over 20 years bat survey experience.
Megan Price (Redstart)	NRW Bat Licenced.
Richard Poole (Redstart)	NRW Bat Licenced. Approximately 18 years bat experience (12 of those licenced) and 3 years as a BCT registered bat carer.
Holly Lewis (Redstart)	NRW Bat Licence in application (successfully passed Bat Licence Training Course in 2018). 9 years bat survey experience.
Janine Burnham (Redstart)	6 years bat survey experience
Trevor Fletcher (Redstart)	4 years bat survey experience
Rebecca Howells (Redstart)	5 years bat survey experience
Olga Krylova (Redstart)	4 years bat survey experience
Emma Carney (Redstart)	2 years bat survey experience
Natalie Pyatt (Capita)	2 years bat survey experience
Suzannah Spencer (Capita)	NE Bat Licenced. NRW Bat Licenced. 7 years' experience.
Paul James (Capita)	16 years occasional bat survey experience
Andrea Sarkissian (Capita)	6 years bat survey experience

# Appendix B - Emergence/Re-entry Survey Results

Key

Common name	Scientific name	Code
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	Pp
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	Ppy
Noctule	<i>Nyctalus noctula</i>	Nn
Serotine	<i>Eptesicus serotinus</i>	Es
Daubenton's bat	<i>Myotis daubentonii</i>	Md
Lesser horseshoe	<i>Rhinolophus hipposiderous</i>	Rh
Brown long-eared	<i>Plecotus auritus</i>	Pa

HNS Bat heard on bat detector but not seen  
SNH Bat seen but not heard on bat detector

## Building 1

Raw survey unavailable from Cotswold Ecology, but details supplied in an e-mail providing a summary of results.

## Building 2

Raw survey data unavailable from Cotswold Ecology, but details supplied in an e-mail providing a summary of results.

## Building 3

Raw survey data unavailable from Cotswold Ecology, but details supplied in an e-mail providing a summary of results.

## Building 4

Raw survey data unavailable from Cotswold Ecology, but details supplied in an e-mail providing a summary of results.

## Building 5

Raw survey data unavailable from Cotswold Ecology, but details supplied in an e-mail providing a summary of results.

## Building 6

Surveyor 1:	Megan Price (A)		
Surveyor 2:	Holly Lewis & Emma Carney (B)		
Date:	30 <sup>th</sup> May 2018		
Feature/s being surveyed:	Building 6		
Time Start:	20:57	Time Finish:	23:24

Sunrise/sunset time:		21:19	Detectors used:	Anabat Walkabout, Echo Meter Touch and SSF Bat 2 (A) Anabat Express and SSF Bat 2 (B)
Temperature Start (°C):		15	Temperature Finish (°C):	17
Cloud Cover Start (%):		50	Cloud Cover Finish (%):	75
Humidity Start (%)		79	Humidity Finish (%)	87
Wind Start (Beaufort):		1	Wind Finish:	2
Precipitation:		Wet - Drizzle prior to survey starting		
Surveyor Location	Time	Species	Activity and Direction	
A	21:32	Ppy	Flew from road, up drive and over behind surveyor	
A	21:34	Pp	HNS – brief burst of strong activity	
B	21:34	Ppy/Pp	Flew along tree line west to east	
A	21:36	Pp	HNS	
B	21:37	Ppy	Flew from west and foraged over building	
A	21:38	Ppy	HNS - brief	
B	21:40	Ppy	Foraging over building, flew south over tree line	
A	21:40	Ppy	Flew from road heading northerly over to behind surveyor above the tree level	
B	21:41	Ppy	Foraging	
A	21:42	My sp.	HNS	
A	21:43	Ppy	Brief	
A	21:44	Light spots of rain		
A	21:46	Pp		
B	21:46	Pp	Flew from west – foraged over building	

B	21:48	Pp	Flew east to west along tree line
A	21:49	Rh	HNS
A	21:55	Ppy	HNS - faint
B	22:00	Ppy	HNS
B	22:05	Ppy	HNS
B	22:10	Unknown (likely pipistrelle sp.)	Commuting west to east over building
A	22:11	Ppy	HNS - brief
B	22:12	Ppy	HNS
A	22:14	Ppy	HNS - brief
B	22:15	Ppy	HNS
B	22:18	Ppy	HNS
A	22:21	Ppy	HNS - brief
B	22:22 – 22:23	Ppy + Pp	HNS
B	22:27	Pp	HNS
A	22:27	Ppy	HNS
B	22:31	Pp	HNS
B	22:34	Ppy	HNS
A	22:36	Ppy	HNS (distant)
B	22:36	Pp + Ppy	HNS
A	22:38	My sp.	Very loud pass
A	22:40 – 22:41	Ppy + Pp	HNS – foraging for about 1 min
B	22:40	Ppy	HNS - loud
B	22:43	Ppy	HNS

A	22:43	Pp	Faint
B	22:45	Ppy	HNS
A	22:46	My sp.	
A	22:48	Pp	Brief
A	22:51	My sp.	Brief
A	22:54	Ppy	Brief
B	23:06	Ppy	HNS - foraging
A	23:08	Rh	Foraging around surveyor
A	23:09	Pp	HNS
A	23:13	Pp	HNS
B	23:14	Ppy	HNS - foraging
A	23:16	Ppy	HNS - foraging

Surveyor 1:	Janine Burnham (A)		
Surveyor 2:	Emma Carney (B)		
Date:	4 <sup>th</sup> June 2019		
Feature/s being surveyed:	Building 6		
Time Start:	03:00	Time Finish:	05:00
Sunrise/sunset time:	04:59	Detectors used:	Anabat Express and and SSF Bat 2 (A)  Anabat Express and SSF Bat 2 (B)
Temperature Start (°C):	11	Temperature Finish (°C):	10
Cloud Cover Start (%):	n/a	Cloud Cover Finish (%):	100
Humidity Start (%)	83	Humidity Finish (%)	84

Wind Start (Beaufort):		4	Wind Finish:	4
Precipitation:		Light rain briefly for 15 mins then dry.		
Surveyor	Location	Time	Species	Activity and Direction
A		03:31	Pp	HNS – two passes
B		03:31	Pp	HNS – brief pass
A		03:33	Unknown	HNS – very faint pass
B		03:33	Pp	HNS – brief faint pass
A		03:35	Unknown	HNS – very faint, one pass
A		03:41	Pp	HNS – one pass, feeding buzz
B		03:41	Pp	HNS
A		03:43	Rh	HNS – one pass
A		03:46	Pp	HNS – one pass
B		03:46	Pp	HNS – brief pass
A		03:58	Rh	HNS – one pass
A		04:10	Rh	HNS – one pass
B		04:10	Pp	HNS – very brief and faint
A		04:11	Pp	HNS - commuting
B		04:11	Pp	Commuting overhead from east to west over tree canopy
A		04:13	Pp Rh	Pp - foraging overhead Rh - HNS – one pass
B		04:13	Pp	Foraged over building and headed north-east towards surveyor A
A		04:14	Pp	SNH – foraging over trees above building
B		04:14	Pp	Foraged overhead then commuted into tree line to east
A		04:15	Pp	Foraging above trees

B	04:15	Pp	Commuted west to east
A	04:16	Ppy	Commuting to south-western side of A4119
B	04:16	Ppy	Commuted north to south-east over A4119 road
B	04:18	Ppy x 2	Foraging by gate. One commuted east along tree line and the other commuted south over A4119 road
A	04:19	Ppy	HNS - commuting
B	04:20	Ppy	Foraged over building then headed west along road tree line and possibly over A4119 road
A	04:21	Ppy	Commuting to north-east
A	04:22	Ppy Rh	Ppy - commuting to north-east Rh - HNS
B	04:22	Ppy x 2	One commuted west to east along A4119 road tree line, the other foraged overhead then commuted north-east
B	04:23	Ppy	Commuted west to east
B	04:24	Pp x 2	Both foraged adjacent to gate then headed south-east over A4119 road
A	04:25	Ppy	HNS – numerous passes
B	04:25	Ppy x 2	One commuted north-east to south-west, other commuted south-east to north-west
A	04:27	Ppy	Foraging then flew north-east
B	04:27	Ppy	Commuted south-west to north-east
A	04:31	Pp	HNS - commuting
B	04:32	Pp Ppy	Pp headed north-east to south-west Ppy - HNS
B	04:33	Ppy	HNS
B	04:34	Ppy	HNS
A	04:35	Ppy	HNS
B	04:35	Ppy	HNS
B	04:37	Ppy	HNS

A	04:38	Pp	HNS - commuting
A	04:40	Ppy	Foraging then commuted across A4119 road
B	04:40	Ppy	Commuted overhead west to east along tree line
B	04:41	Pp/Ppy x 4	One foraging over building several passes before heading north up tree line nearest gate Remaining three commuted from north-east to south-west over A4119
A	04:42	Pp	HNS
B	04:42	Pp/Ppy x 2	Commuting south behind surveying position over A4119 road
B	04:44	Pp	Commuting south directly behind surveying position over A4119 road
A	04:46	Pp	Brief forage over trees
B	04:46	Pp	Commuted from east, brief foraging over building and commuted west
B	04:47	Pp x 3	One commuting south-east to north-west Remaining two foraging over building before one commuting back west and the other commuted north up tree line nearest gate
B	04:49	Pp x 4	Foraged then headed west to east along A4119 road tree line.
A	04:52	Pp/Ppy x 2	SNH at gate foraging then commuted across A4119 road
A	04:53	Ppy	HNS - commuting
B	04:53	Ppy x 3	Commuting north to south-west over building

Surveyor 1:	Megan Price (A)		
Surveyor 2:	Janine Burnham (B)		
Date:	17 <sup>th</sup> July 2018		
Feature/s being surveyed:	Building 6		
Time Start:	21:00	Time Finish:	23:00
Sunrise/sunset time:	21:24	Detectors used:	Anabat Walkabout and Echo Meter Touch (A)

			Anabat Walkabout and Batscanner Stereo (B)
Temperature Start (°C):	18	Temperature Finish (°C):	15
Cloud Cover Start (%):	50	Cloud Cover Finish (%):	50
Humidity Start (%)	61	Humidity Finish (%)	85
Wind Start (Beaufort):	1/2	Wind Finish:	1
Precipitation:	0		
Surveyor	Time	Species	Activity and Direction
A	21:31	Ppy	HNS
A	21:36	Ppy	Commuting from Surveyor A in the south-west flying over the building and headed north-east.
B	21:36	Ppy	Flying toward farm house (Building 7)
A	21:39	Ppy	HNS - very faintly
A	21:41	Ppy	Flew northerly into treatment plant behind surveyor.
A	21:41	Ppy	Foraging then flew northerly into treatment plant behind surveyor
B	21:41	Ppy	Foraging over building
A	21:43	Ppy	Foraging around oak tree then crossed the road
B	21:44	Ppy	Foraging
A	21:44	Ppy	Foraging over building, came from the north and flew back
A	21:46	Ppy	HNS – brief pass
A	21:47	Ppy	Commuting across site following fence
B	21:48	Ppy	Flew north-east over southern corner of building
A	20:50	Ppy	HNS
A	20:50	Ppy	HNS - foraging

A	21:51	Ppy (multiple)	Foraging over water treatment plant to north
A	21:56	Ppy	1 crossed road, multiple still foraging behind
B	21:57	Unknown	Flew north-east over southern corner of building
A	21:59	Rh	Came from path located to the east and flew across top of building and left westerly.
B	21:59	Ppy	Foraging
A	22:02	Pp	Joined Ppy foraging over building
A	22:04	Pp + Ppy	Foraging, but activity drop
B	22:08	Ppy	Foraging - flew from Surveyor A in the north-east and headed across A4119 road.
A	22:09	Pa	HNS
A	22:10	Pp + Ppy	Activity increased, social calls heard
B	22:10- 22:17	Ppy	HNS
A	22:20	Nn	HNS - very brief
B	22:22	Ppy	HNS
B	22:27	Ppy	HNS - Foraging
B	22:29	Ppy	Foraging
B	22:30	Pp	Foraging
A	22:31	Pp + Ppy	Occasional
A	22:32	My sp.	HNS
B	22:36	Nn	HNS
B	22:37	Pp	HNS
B	22:40	Ppy	Foraging
B	22:42	Pp	HNS
B	22:44	Ppy	HNS

A	22:46	My sp.	HNS
B	22:50- 22:53	Ppy	Foraging, HNS
A	22:53	My sp. + occasional Pp + Ppy	HNS - too dark to see, reduced activity
B	22:55	Ppy	HNS

## Building 7

Raw survey data unavailable from Cotswold Ecology, but details supplied in an e-mail providing a summary of results.

## Building 8

Raw survey data unavailable from Cotswold Ecology, but details supplied in an e-mail providing a summary of results.

## Building 9

Raw survey data unavailable from Cotswold Ecology, but details supplied in an e-mail providing a summary of results.

## Building 11

Project:	Coed Ely		
Surveyor A:	Richard Poole (east)		
Surveyor B:	Neil Price (north)		
Surveyor C:	Megan Price (west)		
Surveyor D:	Olga Krylova (south)		
Date:	25 <sup>th</sup> April 2019		
Feature/s being surveyed:	Building 11		
Time Start:	20:20	Time Finish:	21:10
Sunrise/sunset time:	20:25	Detectors used:	Surveyor A: Anabat Express, SSF Bat2 Surveyor B: Petterson M500-384 Petterson D240X Surveyor C: Petterson D240X, Echo Meter Touch Surveyor D: Anabat Express, SSF Bat2

Temperature Start (°C):		12	Temperature Finish (°C):	12
Cloud Cover Start (%):		50	Cloud Cover Finish (%):	n/a
Humidity Start (%)		78	Humidity Finish (%)	80
Wind Start (Beaufort):		1	Wind Finish:	1
Precipitation:		Light showers until heavy rain at 20:50		
Surveyor Location	Time	Species	Activity and Direction	
B	20:23-20:37	PPY/PP x 8	Approximately 8 pipistrelles emerged from the northern apex of the building	
C / D	20:25	Ppy	Flew from the direction of surveyor D to the woodland to the west (behind Surveyor C)	
C	20:27	Ppy x 2	Emerged from behind 2 <sup>nd</sup> storey fascia on the western side of the building	
C	20:30	Ppy	Flew from woodland to the west and foraged	
B / C / D	20:36	Ppy	Flew from Surveyor B across length of building towards Surveyor D	
B / C / D	20:36-20:30	Ppy	Constant foraging	
C	20:40	My	HNS	
C/D	20:40	Ppy	Ppy activity to and from woodland	
B	20:40-20:54	Ppy x 6	Approximately 6 bats returned to roost (prior to and during rain fall)	
C/D	20:43	Ppy	Ppy activity to and from woodland	
A	20:45	Ppy	Foraging over building – left towards woodland	
A	20:45-20:49	Ppy	Constant activity in tree canopy over River Ely	
C	20:46	Ppy	Returned to roost behind fascia on western side of building	
C / D	20:58	Nn	Commuting high above building	
A	20:59	Ppy	HNS	
D	21:03	Ppy	Foraging around chimney	
-	21:10	Survey terminated due to rain		

Project:		Coed Ely	
Surveyor A:		Richard Poole (east)	
Surveyor B:		Neil Price (north)	
Surveyor C:		Natalie Pyatt (west)	
Surveyor D:		Rebecca Howells (south)	
Date:		31 <sup>st</sup> May 2019	
Feature/s being surveyed:		Building 11	
Time Start:		2:30	Time Finish: 5:00
Sunrise/sunset time:		5:01	Detectors used: Surveyor A: SD2/SSF Bat2 Surveyor B: Petterson M500-384 Petterson D240X Surveyor C: SSF Bat2, Echo Meter Touch Surveyor D: Anabat Express, SSF Bat2
Temperature Start (°C):		16	Temperature Finish (°C): 14
Cloud Cover Start (%):		100	Cloud Cover Finish (%): 100
Humidity Start (%)		76	Humidity Finish (%) 80
Wind Start:		10mph	Wind Finish: 8mph
Precipitation:		Light drizzle/spotting	
Surveyor Location	Time	Species	Activity and Direction
A	2:30	Pp	HNS
A	2:32	Ppy	HNS
A	2:37	Pp	HNS
A	2:37	My	HNS- Faint call
D	2:40	Pp	Foraging – intermittent passes

A	02:39	Pp	HNS
A	02:40	Pp	Foraging along front of house
A	02:42	Pp	2/3 Bats foraging above house
A	02:43	Pp	Feeding through garden and along trees
D	02:43	Ppy	Brief and intermittent passes
A	02:45	Pp	Passed over house
A	02:46	Pp	Feeding above and in front of house – Regular and continuous passes
D	02:47	My sp.	HNS
A	02:49	Ppy	HNS
A	2:52	Pp	Flew across front of house
A	02:53	Pp	Front of house – circling and foraging for approximately 1 minute
A A/B/C/D	02:55	My sp. + Pp	My - HNS PP+ Ppy constant foraging over house
A	02:57	My sp. + Pp	HNS
C	02:58	My sp.	Flew over house (west to east)
C	03:00	Rh	HNS
A	03:02	Pp	HNS – Distant
A	03:03	Pp	Foraging over river – two passes
C	03:04	BLE	HNS
A	03:05	My sp. + Pp	HNS
A	03:06	Pp	HNS
A	03:08	Pp	Above house – Circled + departed west
A	03:10	My sp.	HNS
A	03:11	2 x My sp.	Along trees/river Not seen – several passes

A	03:12	Ppy	Joined <i>Myotis</i> bat foraging above river
D	03:20	My sp.	HNS
A	03:35	Pp	HNS
A	03:37	Pp	Feeding around fence and house
A	03:38	My sp.	Passing through front garden area – social call
D	03:40	Pp + Ppy	Still foraging as before
A	03:42	My sp. + Pp	Social call heard
B	4:10- 4:45	Pp/Ppy	Returned to roost - approximately 30 bats entered at northern apex

## Building 12

Surveyor 1:	Neil Price (A)		
Surveyor 2:	Holly Lewis (B)		
Date:	15 <sup>th</sup> May 2019		
Feature/s being surveyed:	Building 12		
Time Start:	20:43	Time Finish:	22:32
Sunrise/sunset time:	20:59	Detectors used:	Echo Meter Touch and Petterson D230 (A) Anabat Express and SSF Bat2 (B)
Temperature Start (°C):	15	Temperature Finish (°C):	11
Cloud Cover Start (%):	10	Cloud Cover Finish (%):	n/a
Humidity Start (%)	80	Humidity Finish (%)	78
Wind Start (Beaufort):	0	Wind Finish:	0
Precipitation:	0		

Surveyor Location	Time	Species	Activity and Direction
A	21:10	Rh	Flying inside building
B	21:11	Nn	Flew across field north to south
B	21:13	Nn	
B	21:14	Nn	Continued foraging and feeding over field
B	21:15	Pp/Ppy	Flew over Building 12 and towards A4119
A	21:16	Rh	Flew out of open door on the eastern side of the building and into the adjoining barn (western section)
A	21:17	Rh	Flying in building
A	21:19	Rh	Flying in building before emerging from western barn side of building
A	21:20	Rh	Light sampling
A	21:24	Rh	Left eastern side of building and re-entered western side (as above) / light sampling
B	21:24	Ppy	Foraging by metal shed (Building 14) / over scrub
A	21:25	Rh	Left eastern side of building and re-entered western side (as above)
A	21:28	Rh	Left western side of building and flew downstream adjacent (towards A4119)
B	21:28- 21:33	Ppy	Constant foraging around scrub to the north of Building 12. Feeding heard.
B	21:33	Ppy x 2	Continued foraging around Building 12 / scrub
A	21:35	Rh	Returned from stream and re-entered eastern side of building
A	21:36	Rh	Left eastern side of building and re-entered western side
B	21:40	Ppy x 2-3	Continued foraging around Building 12 / scrub
A	21:41	Rh	Emerged
B	21:47	PP + Ppy	PP commuted across field south to north Ppy constant foraging continued.
A	21:47	Ppy	HNS

B	21:53	Pp + Ppy	PP occasional passed Ppy continued foraging
A	21:56	Rh x 2	Left eastern side of building and flew downstream
B	22:02- 22:12	Ppy	Continued foraging
A	22:09	BLE	HNS
B	22:13	Pp	Heard briefly
A	22:13	Rh	HNS
A	22:16	Rh	HNS
B	22:21	BLE	HNS
B	22:22	Nn + Ppy	HNS
A	22:25	Rh	HNS
B	22:28	My	HNS
B	22:31	Pp	HNS
A	22:32	Rh	Rh still flying inside building at end of survey

Surveyor 1:	Megan Price (A)		
Surveyor 2:	Rebecca Howells (B)		
Date:	27 <sup>th</sup> September 2018		
Feature/s being surveyed:	Building 12		
Time Start:	18:45	Time Finish:	21:00
Sunrise/sunset time:	19:01	Detectors used:	Anabat Walkabout and Petterson D230 (A) Anabat Express and SSF Bat2 (B)
Temperature Start (°C):	16	Temperature Finish (°C):	12
Cloud Cover Start (%):	0	Cloud Cover Finish (%):	0

Humidity Start (%)		73	Humidity Finish (%)		78
Wind Start (Beaufort):		3	Wind Finish:		3
Precipitation:		0			
Surveyor Location	Time	Species	Activity and Direction		
B	19:05	Unknown x 3	Seen flying north along stream tree line – too far away to be picked up by detector		
A	19:14	Rh	At least 10 individuals light sampling. Entering the building from the door but unclear as to where they were emerging from. Did not appear to leave the roost.		
B	19:20	Ppy x 2	Flying north along tree line		
B	19:30	Ppy	Foraging above outbuilding		
A	19:36	My sp.	HNS – brief pass		
A	19:37	Completely quiet –temperature drop and wind chill noted			

### Culvert 3

Surveyor 1:	Megan Price		
Surveyor 2:	Janine Burnham		
Date:	4 <sup>th</sup> June 2018		
Feature/s being surveyed:	Culvert 3		
Time Start:	21:10	Time Finish:	23:10
Sunrise/sunset time:	21:25	Detectors used:	Pettersen D230 Anabat Express
Temperature Start (°C):	20	Temperature Finish (°C):	17
Cloud Cover Start (%):	100	Cloud Cover Finish (%):	75
Humidity Start (%)	80	Humidity Finish (%)	85
Wind Start (Beaufort):	1	Wind Finish:	1

Precipitation:		0
Time	Species	Activity and Direction
21:53	Pp	HNS
21:55	Pp	HNS
22:00	Pp	HNS - foraging
22:39	Ppy	HNS – foraging, distant

## Bridge 5

Project:		Coed Ely	
Surveyor A:		Rebecca Howells	
Surveyor B:		Holly Lewis	
Date:		18 <sup>th</sup> July 2019	
Feature/s being surveyed:		Bridge 5	
Time Start:		21:05	Time Finish: 23:00
Sunrise/sunset time:		21:21	Detectors used: Anabat Express, SSF2 + Bat scanner
Temperature Start (°C):		16	Temperature Finish (°C): 15
Cloud Cover Start (%):		50	Cloud Cover Finish (%): n/a
Humidity Start (%)		80	Humidity Finish (%) 84
Wind Start (Beaufort):		0	Wind Finish: 0
Precipitation:		None	
Surveyor Location	Time	Species	Activity and Direction
A / B	21:16	Ppy	Foraging above and beneath bridge – feeding buzzes heard
A / B	21:24	Ppy x 2	Joined by a second Ppy foraging under bridge

A / B	21:36	Ppy	One Ppy remained
A / B	21:39	Bats left - quiet	
A / B	21:44	Pp	1 x Pp foraging
B	21:45	Md	Commuted N to S
B	21:46	Pp	Foraging above trees overhead
A / B	21:48	Nn	Brief - overhead
B	21:52	Md	Commuted S to N
B	21:56	Md	Foraged under bridge briefly
B	21:59	Ppy	HNS
A / B	22:00	Ppy	Foraging under bridge
B	22:01	Md	HNS
B	22:03	My	Foraging above in canopy
B	22:12	Pp	Faint- HNS
A / B	22:31	Ppy	Foraging brief

## Trees 1 - 6

### Trees 1- 3 -Survey 1 – 5<sup>th</sup> June 2018

<b>Surveyor 1:</b>	<b>Neil Price</b>		
<b>Date:</b>	05/06/2018		
<b>Feature/s being surveyed:</b>	Trees 1 -3		
<b>Time Start:</b>	21:00	<b>Time Finish:</b>	
<b>Sunrise/sunset time:</b>	21:25	<b>Detectors used:</b>	Pettersson M500-384 Pettersson D240X
<b>Temperature Start (°C):</b>	15	<b>Temperature Finish (°C):</b>	14
<b>Cloud Cover Start (%):</b>	10	<b>Cloud Cover Finish (%):</b>	n/a

<b>Humidity Start (%)</b>	77	<b>Humidity Finish (%)</b>	72
<b>Wind Start:</b>	0	<b>Wind Finish:</b>	0
<b>Precipitation:</b>	0		
<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>	
21:43	Pp	Foraging along tree line	
21:53		Quiet	
22:03	Pp	Foraging	
22:28	Pp	Faint	

### Trees 4- 6 -Survey 1 – 5<sup>th</sup> June 2018

<b>Surveyor 1:</b>	Janine Burnham		
<b>Date:</b>	05/06/2018		
<b>Feature/s being surveyed:</b>	Trees 4 - 6		
<b>Time Start:</b>	21:10	<b>Time Finish:</b>	23:10
<b>Sunrise/sunset time:</b>	21:25	<b>Detectors used:</b>	Batscanner stereo Anabat Express
<b>Temperature Start (°C):</b>	15	<b>Temperature Finish (°C):</b>	14
<b>Cloud Cover Start (%):</b>	50	<b>Cloud Cover Finish (%):</b>	n/a
<b>Humidity Start (%)</b>	77	<b>Humidity Finish (%)</b>	72
<b>Wind Start (Beaufort):</b>	0	<b>Wind Finish:</b>	0
<b>Precipitation:</b>	0		
<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>	
22:08	Pp	Faint, foraging from towards road	
22:21	Pp	HNS	
22:25	Pp	HNS – very faint, 1 pass from road side to wood	

22:35	PPy	HNS – very faint, 1 pass	
22:51	PPy	HNS – very faint	
Surveyor 1:		Megan Price	
Date:		05/06/2018	
Feature/s being surveyed:		Trees 4 - 6	
Time Start:		21:10	Time Finish: 23:10
Sunrise/sunset time:		21:26	Detectors used: EMT Petterson D230
Temperature Start (°C):		15	Temperature Finish (°C): 14
Cloud Cover Start (%):		25	Cloud Cover Finish (%): n/a
Humidity Start (%)		77	Humidity Finish (%) 72
Wind Start:		0	Wind Finish: 0
Precipitation:		0	
Time	Species	Activity and Direction	
21:37	PPy	HNS - briefly	
21:52	Pp	HNS – very brief	
21:56	Pp	HNS - foraging	
22:02	Pp	HNS	
22:15	PPy	HNS	
22:21	Pp	HNS – foraging	
22:25	Pp	HNS – foraging	
22:58	Pp	HNS – foraging	

Trees 1- 3 -Survey 2 – 17<sup>th</sup> July 2018

<b>Surveyor 1:</b>		<b>Neil Price</b>	
<b>Date:</b>		17/07/2018	
<b>Feature/s being surveyed:</b>		Trees 1 - 3	
<b>Time Start:</b>		21:00	<b>Time Finish:</b> 23:00
<b>Sunrise/sunset time:</b>		21:24	<b>Detectors used:</b> Anabat Walkabout, Peterson D300 384 D240X
<b>Temperature Start (°C):</b>		20	<b>Temperature Finish (°C):</b> 16
<b>Cloud Cover Start (%):</b>		80	<b>Cloud Cover Finish (%):</b> 50
<b>Humidity Start (%):</b>		64	<b>Humidity Finish (%):</b> 80
<b>Wind Start:</b>		0	<b>Wind Finish:</b> 2
<b>Precipitation:</b>		0	
<b>Listening Station Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
	21:34	PPy	HNS - Faint possible commuting along road
	21:37	PPy++	HNS - Faint possible commuting along road
	21:38	PPy++	
	21:39	PPy + Pp	Foraging around the canopy
	21:44	Pp	Foraging over trees
	21:58	Rh	HNS
	22:00	Rh	HNS
	22:08	Pp	Foraging
	22:28	Nn	Commuting
	22:32	Pp	Foraging
	22:34	PPy	Foraging

	22:50	PPy	
	22:55	Pp	
	22:57	My sp.	

### Trees 1 - 6 -Survey 2 – 17<sup>th</sup> July 2018

<b>Surveyor 1:</b>	<b>Rebecca Howells</b>		
<b>Date:</b>	17/07/2018		
<b>Feature/s being surveyed:</b>	Trees 4-6		
<b>Time Start:</b>	21:00	<b>Time Finish:</b>	23:00
<b>Sunrise/sunset time:</b>	21:24	<b>Detectors used:</b>	Express 21 Batbox Duet
<b>Temperature Start (°C):</b>	20	<b>Temperature Finish (°C):</b>	15/16
<b>Cloud Cover Start (%):</b>	80	<b>Cloud Cover Finish (%):</b>	50
<b>Humidity Start (%)</b>	64	<b>Humidity Finish (%)</b>	80
<b>Wind Start (Beaufort):</b>	0	<b>Wind Finish:</b>	2
<b>Precipitation:</b>	0		
<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>	
21:36	PPy	Foraging in tree canopy	
21:38	PPy	Flew along trees towards road (may be the same bat as above)	
21:44	PPy	Potentially same bat foraging as above	
21:55	Pp	HNS - brief pass	
22:00-23:00	PPy	Foraging in canopy for the last hour	

<b>Surveyor 1:</b>	Trevor Fletcher
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<b>Date:</b>	17/07/2018		
<b>Feature/s being surveyed:</b>	Trees 4-6		
<b>Time Start:</b>	21:00	<b>Time Finish:</b>	23:00
<b>Sunrise/sunset time:</b>	21:24	<b>Detectors used:</b>	Express 7 SSF Bat 2 (SSF 4)
<b>Temperature Start (°C):</b>	20	<b>Temperature Finish (°C):</b>	16
<b>Cloud Cover Start (%):</b>	80	<b>Cloud Cover Finish (%):</b>	50
<b>Humidity Start (%)</b>	64	<b>Humidity Finish (%)</b>	80
<b>Wind Start (Beaufort):</b>	0	<b>Wind Finish:</b>	2
<b>Precipitation:</b>	0		
<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>	
No bats			

## Appendix C - Activity Survey Tables

### Transect 1 – Survey 1 – 19<sup>th</sup> April 2018

<b>Surveyor 1:</b>		Holly Lewis	
<b>Surveyor 2:</b>		Megan Price	
<b>Date:</b>		19/04//2018	
<b>Feature/s being surveyed:</b>		Transect 1 – A4119	
<b>Time Start:</b>		20:15	<b>Time Finish:</b>
<b>Sunrise/sunset time:</b>		20:16	<b>Detectors used:</b> Anabat Express Echometer Touch
<b>Temperature Start (°C):</b>		14	<b>Temperature Finish (°C):</b> 13
<b>Cloud Cover Start (%):</b>		0	<b>Cloud Cover Finish (%):</b> n/a
<b>Humidity Start (%)</b>		-	<b>Humidity Finish (%)</b> -
<b>Wind Start (Beaufort):</b>		1	<b>Wind Finish:</b> 1
<b>Precipitation:</b>		0	
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS1	20:15		-
Walk	20:23	Pp	HNS - commuting
LS2	20:26	PPy	Foraging over bridge – constant at listening point
LS3	20:36		-
LS4	20:45		-
Walk	20:50	PPy	Commuting west to east
	20:51	PPy	HNS - foraging
LS5	20:55		-

LS6	21:02		-
Walk	21:04	PPy	HNS – very faint
LS7	21:10		-
Walk	21:19	PPy	HNS - foraging
	21:22	Bat	HNS
LS8	21:23	Pp	HNS
Walk	21:24	Bat	HNS
	21:27	PPy	-
	21:29	PPy	HNS - foraging
	21:31	PPy	HNS - foraging
	21:35	PPy	Foraging around street light
	21:37	PPy	Foraging
	21:39	Pp	Foraging
LS9	21:43	PPy	HNS - foraging
Walk	21:52	PPy	Foraging near roundabout
LS10	21:53		-
Walk	21:57	Pp	HNS

### Transect 1 – Survey 2 – 3<sup>rd</sup> May 2018

<b>Surveyor 1:</b>	<b>Holly Lewis</b>		
<b>Surveyor 2:</b>	Megan Price		
<b>Date:</b>	03/05/2018		
<b>Feature/s being surveyed:</b>	Transect 1 – A4119		
<b>Time Start:</b>	20:40	<b>Time Finish:</b>	22:10

<b>Sunrise/sunset time:</b>	20:40	<b>Detectors used:</b>	Anabat Express SSF Bat2
<b>Temperature Start (°C):</b>	10	<b>Temperature Finish (°C):</b>	10
<b>Cloud Cover Start (%):</b>	95	<b>Cloud Cover Finish (%):</b>	n/a
<b>Humidity Start (%)</b>	82	<b>Humidity Finish (%)</b>	86
<b>Wind Start (Beaufort):</b>	3	<b>Wind Finish:</b>	7
<b>Precipitation:</b>	0		
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS7	20:42		
LS6	20:50		
LS4	21:02	PPy x 3	Foraging over field – constant at listening point
	21:03	Unknown	Foraging over field, commuted over road
	21:06	PPy	Foraging over field, commuted over road
Walk	21:08	Pp	
	21:10	PPy	Flew low over road
LS3	21:12		
LS2	21:19		
	21:20	PPy	Commuting
	21:23	PPy	Commuting
Walk	21:25	Pp	HNS
LS1	21:30		
Walk	21:34	Nn	HNS
LS11	21:37	Pp	HNS

Walk	21:41	Unknown	Seen not heard crossing the road
	21:45	PPy	Foraging – before conifers
LS10	21:53		
LS5	22:01	Pp	Foraging around lamp post

### Transect 1 – Survey 3 – 22<sup>nd</sup> May 2018

<b>Surveyor 1:</b>		<b>Megan Price</b>	
<b>Surveyor 2:</b>		Janine Burnham	
<b>Date:</b>		22/05/2018	
<b>Feature/s being surveyed:</b>		Transect 1– A4119	
<b>Time Start:</b>	21:11	<b>Time Finish:</b>	23:12
<b>Sunrise/sunset time:</b>	21:09	<b>Detectors used:</b>	Echo Meter Touch SSF Bat2
<b>Temperature Start (°C):</b>	17	<b>Temperature Finish (°C):</b>	16
<b>Cloud Cover Start (%):</b>	0	<b>Cloud Cover Finish (%):</b>	n/a
<b>Humidity Start (%)</b>	-	<b>Humidity Finish (%)</b>	-
<b>Wind Start (Beaufort):</b>	0	<b>Wind Finish:</b>	0
<b>Precipitation:</b>		0	
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS1	21:11		
Walk	21:17		
LS2	21:24		
Walk	21:29		
LS3	21:38		

Walk	21:43		
LS4	21:45		
Walk	21:50		
LS5	21:54		
	21:57	Pp	HNS
Walk	21:59		
LS6	22:00		
Walk	22:05	Pp	HNS
LS7	22:08		
	22:09	Pp	HNS
Walk	22:15		
LS8	22:18		
	22:20	Pp	HNS
Walk	22:23		
	22:27	Pp + Ppy	HNS – commuting, brief pass
LS9	22:28		
	22:30	Pp	HNS
	22:32	Ppy	HNS
Walk	22:33		
	22:35	Pp	HNS
	22:44	Ppy	HNS
	22:47	Pp + Ppy	Foraging
LS10	22:51		

	22:55	Ppy	HNS
	22:57	Pp + Ppy	Foraging, constant Pp and Ppy foraging
	23:05	Es	HNS
LS11	23:07	Pp + Ppy	Constant foraging throughout listening stop

### Transect 1 – Survey 4 – 15th June 2018

<b>Surveyor 1:</b>	Holly Lewis		
<b>Surveyor 2:</b>	Janine Burnham		
<b>Date:</b>	15/06/2018		
<b>Feature/s being surveyed:</b>	Activity Transect 4 – A4119		
<b>Time Start:</b>	03:24	<b>Time Finish:</b>	05:16
<b>Sunrise/sunset time:</b>	04:55	<b>Detectors used:</b>	Anabat Express SSF Bat2
<b>Temperature Start (°C):</b>	11	<b>Temperature Finish (°C):</b>	10
<b>Cloud Cover Start (%):</b>	0	<b>Cloud Cover Finish (%):</b>	n/a
<b>Humidity Start (%)</b>	53	<b>Humidity Finish (%)</b>	-
<b>Wind Start (Beaufort):</b>	3	<b>Wind Finish:</b>	2
<b>Precipitation:</b>	0		

	Time	Species	Activity and Direction
LS1	03:24		-
Walk	03:29		-
LS2	03:38		-
	03:39	PPy	HNS - faint
Walk	03:43		-
	03:45	PPy	HNS

LS3	03:49		-
Walk	03:54		-
LS4	03:56		-
	04:00	Pp	HNS
Walk	04:00		-
LS5	04:04	Pp/PPy	Seen foraging on opposite road (over woodland) – not picked up by detector
Walk	04:09		-
LS6	04:11		-
	04:15	Pp/PPy	Foraging along woodland
Walk	04:16	Pp	HNS
LS7	04:19		-
	04:24	PPy	HNS
Walk	04:25		-
LS8	04:29		-
Walk	04:34		-
LS9	04:38		-
Walk	04:43		-
LS10	04:56		-
Walk	05:01		-
LS11	05:09		-

**Transect 1 – Survey 5 – 28th June 2018**

<b>Surveyor 1:</b>	<b>Holly Lewis</b>
<b>Surveyor 2:</b>	Megan Price

<b>Date:</b>	28/06/2018		
<b>Feature/s being surveyed:</b>	Activity Transect 5 Dusk – A4119		
<b>Time Start:</b>	21:34	<b>Time Finish:</b>	23:29
<b>Sunrise/sunset time:</b>	21:34	<b>Detectors used:</b>	Anabat Walkabout Petterson
<b>Temperature Start (°C):</b>	21	<b>Temperature Finish (°C):</b>	20
<b>Cloud Cover Start (%):</b>	30	<b>Cloud Cover Finish (%):</b>	n/a
<b>Humidity Start (%)</b>	50	<b>Humidity Finish (%)</b>	49
<b>Wind Start (Beaufort):</b>	3	<b>Wind Finish:</b>	3
<b>Precipitation:</b>	0		
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS1	21:35		-
Walk	21:40		-
LS2	21:46		-
Walk	21:50		-
LS3	21:54		-
Walk	21:59		-
LS4	22:02		-
	22:03	Pp	Flew over road from west to east
	22:05	Pp	Flew over road west to east then seen foraging (0.97 lux)
Walk	22:06	Pp x 2	Commutated across
	22:08	PPy + My sp.	Commutated across
	22:10	Pp	HNS

LS5	22:13		-
	22:14	Pp	HNS
	22:15	Pp	Commuting west to east
	22:16	PPy	HNS
Walk	22:17	Pp	-
LS6	22:20	Pp	<b>Crossed road south to north (0.114 lux)</b>
Walk	22:25		-
LS7	22:27		8.57 lux
	22:32	Pp	<b>Commuting across road</b>
Walk	22:32	Pa	HNS
	22:33	PPy	HNS – on roundabout
	22:35	PPy	HNS – on roundabout
LS8	22:38		-
	22:42	Pp	HNS
Walk	22:43		-
LS9	22:47		-
	23:00	Pp	HNS
Walk	23:02	PPy	HNS
	23:06	Pp	HNS – foraging opposite farm
	23:07	Pp	HNS – foraging opposite farm
LS10	23:09		-
	23:10	PPy	HNS - foraging
Walk	23:13	Pp	HNS - foraging

	23:17	Pp	HNS - foraging
LS11	23:24	Pp + PPy	HNS – several counted foraging

### Transect 1 – Survey 6 – 29<sup>th</sup> June 2018

<b>Surveyor 1:</b>		<b>Holly Lewis</b>	
<b>Surveyor 2:</b>		Megan Price	
<b>Date:</b>		29/06/2018	
<b>Feature/s being surveyed:</b>		Transect 1 – A4119	
<b>Time Start:</b>		03:13	<b>Time Finish:</b> 05:02
<b>Sunrise/sunset time:</b>		04:59	<b>Detectors used:</b> Walkabout Petterson
<b>Temperature Start (°C):</b>		17	<b>Temperature Finish (°C):</b> 18
<b>Cloud Cover Start (%):</b>		N/A	<b>Cloud Cover Finish (%):</b> N/A
<b>Humidity Start (%)</b>		59	<b>Humidity Finish (%)</b> 68
<b>Wind Start (Beaufort):</b>		3	<b>Wind Finish:</b> 3
<b>Precipitation:</b>		0	
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS1	03:13		-
Walk	03:18		-
LS2	03:22		-
	03:23	PPy	HNS
	03:24	Pp	HNS
Walk	03:27		-
	03:28	Pp	HNS - Foraging

LS3	03:30		-
Walk	03:35		-
LS4	03:37		-
	03:40	Pp	HNS
Walk	03:42		-
LS5	03:45	My sp. + Pa	HNS - faint
Walk	03:50		-
LS6	03:51		-
Walk	03:56		-
	03:58	Pp	HNS
LS7	03:59		-
Walk	04:04		-
LS8	04:09		-
Walk	04:09		-
LS9	04:18		-
Walk	04:23		-
	04:24	Pp	HNS - commuting
LS10	04:39		-
Walk	04:44		-
LS11	04:53		-

### Transect 1 – Survey 7 –9th July 2018

<b>Surveyor 1:</b>	<b>Janine Burnham</b>
<b>Surveyor 2:</b>	Rebecca Howells

<b>Date:</b>		09/07/2018	
<b>Feature/s being surveyed:</b>		Transect 1 – A4119	
<b>Time Start:</b>	23:04	<b>Time Finish:</b>	01:00
<b>Sunrise/sunset time:</b>	21:29	<b>Detectors used:</b>	Anabat Express SSF Bat2
<b>Temperature Start (°C):</b>	25	<b>Temperature Finish (°C):</b>	23
<b>Cloud Cover Start (%):</b>	0	<b>Cloud Cover Finish (%):</b>	0
<b>Humidity Start (%)</b>	91	<b>Humidity Finish (%)</b>	89
<b>Wind Start:</b>	0	<b>Wind Finish:</b>	0
<b>Precipitation:</b>	0		
<b>Listening Station Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS9	11:04	Pp	HNS - Foraging
Walk	11:10	Pp	
LS8	11:14	Pp	
	11:17	Pp	1 Pass
	11:19	Pp	
Walk	11:20	Pp	Foraging
	11:21	Pp	Foraging
LS7	11:25	Pp	Constant Foraging
Walk	11:31	Pp	
LS5	11:31	Pp	
	11:35	Pp	1 Pass
	11:40	PPy	Foraging constantly around trees at Farm Lane entrance

Walk	11:41		
LS4	11:45	Pp Pa	Constant foraging (sometimes very faint). HNS
Walk	11:51		
LS3	11:55	Pp & PPy	Foraging
Walk	00:01		
LS2	00:05	Pp	Foraging
Walk	00:11	Tawny Owl	
LS1	00:16		
	00:19	Pp	Foraging
Walk	00:21		
LS11	00:25	Pp	Constant foraging
Walk	00:30	Tawny Owl	
	00:33	Pp	Foraging
LS10	00:41	Pp	Foraging briefly
Walk	00:47		
LS6	00:55	Pp	Constant foraging

### Transect 1 – Survey 8 – 26th July 2018

<b>Surveyor 1:</b>	Janine Burnham		
<b>Surveyor 2:</b>	Trevor Fletcher		
<b>Date:</b>	26/07/2018		
<b>Feature/s being surveyed:</b>	Transect 1 – A4119		
<b>Time Start:</b>	21:23	<b>Time Finish:</b>	23:23
<b>Sunrise/sunset time:</b>	21:18	<b>Detectors used:</b>	Batscanner Stereo Anabat Express

<b>Temperature Start (°C):</b>		21.5	<b>Temperature Finish (°C):</b>	20
<b>Cloud Cover Start (%):</b>		0	<b>Cloud Cover Finish (%):</b>	n/a
<b>Humidity Start (%)</b>		49	<b>Humidity Finish (%)</b>	51
<b>Wind Start (Beaufort):</b>		0	<b>Wind Finish:</b>	0
<b>Precipitation:</b>		0		
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>	
LS1	21:23	Nn	<b>Seen commuting north-west</b>	
Walk	21:26		-	
LS2	21:33		-	
Walk	21:36		-	
	21:41	Unknown Sp.	Bat foraging as crossing road from east to west	
	21:42		Tawny Owl and buzzard heard	
LS3	21:43		-	
Walk	21:47			
	21:48	Nn	<b>Foraging over field north of road</b>	
	21:49		-	
	21:50	PPy	HNS – quick pass	
LS4	21:53	PPy	HNS - pass	
	21:56	PPy	HNS - pass	
Walk	21:57		-	
	21:58	Pp	HNS - pass	
LS5 (Farm Track)	22:00		-	

	22:03	PPy	HNS - foraging
Walk	22:04		-
LS6	22:07		-
Walk	22:10		-
	22:12	PPy	HNS - foraging
	22:13	Pp + PPy	HNS – constant foraging by trees
LS7	22:15	Pp	HNS
	22:17	PPy	HNS
Walk	22:18		-
	22:19	PPy	HNS
	22:22	Pp	HNS
LS8	22:24		-
	22:25	PPy	HNS – faint, foraging
	22:26 – 22:27	PPy	HNS
Walk	22:28		-
	22:29	PPy	HNS – faint pass
	22:33	Pp	
LS9	22:34		-
	22:34- 22:35	Pp	HNS - foraging
	22:36	Pp	HNS - foraging
Walk	22:37	Pp	<b>Foraging</b>
	22:39	Pp	HNS - foraging
	22:41	Pp	HNS - faint

	22:43	PPy	HNS – foraging over river by bridge
	22:46 – 22:47	PPy	HNS – foraging over river
	22:48	PPy	HNS – foraging over river
	22:50	PPy + Pp	
	22:51	Pp	
	22:52 - 22:53	PPy	HNS – foraging by scrap yard
	22:55	PPy	HNS – foraging by scrap yard
	22:55	PPy	HNS - foraging
	22:57	PPy	HNS - foraging
	22:59	Pp + PPy	HNS - foraging
LS10	23:00	PPy	HNS - foraging
	23:02	Pp	HNS
	23:03	PPy	HNS
Walk	23:04	PPy	HNS
	23:05	PPy	HNS - foraging
	23:06- 23:08	Pp/ PPy	<b>Foraging over road/ lights</b>
	23:10	PPy	HNS - foraging
	23:12	PPy + Pp	HNS - foraging
	23:15	PPy	HNS - foraging
LS11	23:17	PPy	HNS –foraging
	23:18	PPy	HNS - foraging
	23:19	PPy	

## Transect 1 – Survey 9 – 14th August 2018

<b>Surveyor 1:</b>		<b>Janine Burnham</b>	
<b>Surveyor 2:</b>		Trevor Fletcher	
<b>Date:</b>		14/08/2018	
<b>Feature/s being surveyed:</b>		Transect 1 – A4119 (in reverse)	
<b>Time Start:</b>		21:09	<b>Time Finish:</b> 23:09
<b>Sunrise/sunset time:</b>		21:39	<b>Detectors used:</b> Anabat Express SSF Bat2
<b>Temperature Start (°C):</b>		16.5	<b>Temperature Finish (°C):</b> 16.5
<b>Cloud Cover Start (%):</b>		100	<b>Cloud Cover Finish (%):</b> n/a
<b>Humidity Start (%):</b>		69	<b>Humidity Finish (%):</b> 69
<b>Wind Start (Beaufort):</b>		1	<b>Wind Finish:</b> 1
<b>Precipitation:</b>		0 – light rain from 22:40	
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS9	21:09	PPy	Flew past in an easterly direction
Walk	21:12		-
LS8	21:17		-
Walk	21:20		-
LS7	21:25		-
	21:27	PPy	Five passes - foraging
	21:28	PPy	Foraging over field east of road
Walk	21:28	PPy	Just past LS7
	21:30	Pp	Two passes around lamppost by the car yard

LS6	21:33		-
	21:34	PPy	HNS
	21:36	PPy	HNS – one commuting
Walk	21:36		-
	21:37	PPy	HNS – constant foraging until LS5
LS5	21:39	PPy	Constant foraging around street light
Walk	21:42		-
	21:44	PPy	Foraging near street light
	21:46	PPy	Foraging around water plant
	21:47	Pp/PPy	HNS - foraging
LS4	21:48		-
Walk	21:51	Pp	HNS - foraging
	21:52	Pp	HNS – foraging
	21:53	PPy	Foraging around street light
	21:54	PPy	Foraging around street light
	21:55	PPy	HNS - foraging
LS3	21:59	Pp	HNS - foraging
	22:00	Pp	HNS – foraging
	22:01	Pp	HNS - foraging
	22:02	Pp	HNS – foraging continuous
Walk	22:03	PPy	Foraging around street light
	22:05	PPy	Constant foraging
	22:06	Pp x 2 + PPy	Foraging around street light, crossing back and forth across road by farm gate

LS2	22:10	Pp	HNS - foraging
Walk	22:13	Pp	Looping and crossing road to forage by street light
	22:16 – 22:18	PPy + Pp	HNS – foraging around street light, constant
LS1	22:21		-
	22:23	PPy	HNS
Walk	22:24		-
	22:25	Pp	HNS – by roundabout
	22:25 – 22:30	PPy + Pp	HNS - constant foraging
LS11	22:30	PPy + Pp	HNS –constant foraging
Walk	22:33		-
	22:37	PPy + Pp	Foraging around street lights and crossing back and forth over road by farm gate
	22:38 – 22:45	PPy + Pp	Constant foraging until LS10
	22:40		<i>Light rain started</i>
LS10	22:45	Pp + PPy	HNS – constant foraging throughout listening stop
Walk	22:48		-
	22:56	Pp	Foraging
	22:59	Pp	Foraging around light by fire station roundabout

### Transect 1 – Survey 10 – 30th August 2018

<b>Surveyor 1:</b>	<b>Janine Burnham</b>		
<b>Surveyor 2:</b>	Rebecca Howells		
<b>Date:</b>	30/08/2018		
<b>Feature/s being surveyed:</b>	Transect 1 – A4119		
<b>Time Start:</b>	20:45	<b>Time Finish:</b>	22:52

<b>Sunrise/sunset time:</b>	20:05	<b>Detectors used:</b>	Anabat Express SSF Bat2
<b>Temperature Start (°C):</b>	11	<b>Temperature Finish (°C):</b>	10
<b>Cloud Cover Start (%):</b>	10	<b>Cloud Cover Finish (%):</b>	0
<b>Humidity Start (%)</b>	68	<b>Humidity Finish (%)</b>	80
<b>Wind Start (Beaufort):</b>	1	<b>Wind Finish:</b>	1
<b>Precipitation:</b>	0		
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS1	20:45		-
Walk	20:51		-
	20:53	Pp	HNS
LS2	20:55	PPy	HNS
Walk	21:01	Pp	Brief pass
LS3	21:05		-
Walk	21:11	Unknown sp.	Seen not heard
	21:12	PPy	HNS
LS4	21:17		-
Walk	21:23		-
	21:26	PPy	HNS
LS5	21:30	PPy + Pp	HNS – constant foraging
Walk	21:36		-
LS6	21:37		-
Walk	21:43		-

LS7	21:46		-
Walk	21:52		-
LS8	21:57		-
Walk	22:03		-
LS9	22:07		-
Walk	22:13		-
LS10	22:29	PPy + Pp	HNS –constant foraging above road – tree canopy level
Walk	22:35		-
LS11	22:45		-
Walk	22:51		-

### Transect 1 – Survey 11 – 13<sup>th</sup> September 2018

<b>Surveyor 1:</b>	Janine Burnham		
<b>Surveyor 2:</b>	Trevor Fletcher		
<b>Date:</b>	13/09/2018		
<b>Feature/s being surveyed:</b>	Transect 1 – A4119 (from fire station end)		
<b>Time Start:</b>	19:43	<b>Time Finish:</b>	21:16
<b>Sunrise/sunset time:</b>	19:33	<b>Detectors used:</b>	Anabat Express SSF Bat2
<b>Temperature Start (°C):</b>	13	<b>Temperature Finish (°C):</b>	11
<b>Cloud Cover Start (%):</b>	10	<b>Cloud Cover Finish (%):</b>	n/a
<b>Humidity Start (%)</b>	79	<b>Humidity Finish (%)</b>	88
<b>Wind Start (Beaufort):</b>	3	<b>Wind Finish:</b>	2
<b>Precipitation:</b>	0		
<b>Listening Station</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>

(LS) Number			
LS9	19:44	Pp	HNS – brief pass
Walk	19:48	Pp	HNS (by industrial park)
	19:50	Pp	Foraging in trees along tree line opposite CAT plant
LS8	19:53		-
Walk	19:59	Pp	Brief pass – feeding buzz
LS7	20:01		-
	20:02	Pp	HNS – brief pass
Walk	20:05		-
	20:06	Pp	Foraging over trees opposite the car yard and around the street light
LS6	20:08		-
	20:09	Pp	HNS – feeding buzz
	20:11	Pp	Feeding buzz
Walk	20:11	PPy	HNS
LS5	20:13		-
	20:14	Pp	HNS
	20:15	Pp	Seen not heard – foraging in trees and around the street light
Walk	21:16		-
	20:17 – 20:19	Pp	HNS – foraging around street light and trees
	20:20	Pp	Number of passes by water works - foraging
LS4	20:21	Pp	HNS – feeding buzzes
	20:23	Pp	Foraging
	20:24	Pp	HNS - foraging

Walk	20:24		-
	20:25	Pp	HNS
	20:28	Pp	HNS
LS3	20:31		-
	20:33	Pp	HNS
Walk	20:34		-
LS2	20:36		-
Walk	20:39		-
	20:41 – 20:43	Pp x 3	HNS by culvert along field margin
LS1	20:46		-
	20:49	PPy	HNS – brief pass
Walk	20:50		-
	20:51	Pp	HNS
	20:52	Pp	HNS – brief pass
LS11	20:53		-
	20:54	Pp	HNS – feeding buzzes, constant foraging Tawny Owl also heard
Walk	20:56		-
	20:57 – 20:58	Pp	HNS – foraging opposite farm gate
	21:01	Pp	HNS
	21:02	Pp	HNS – foraging under street light
	21:03	Pp	HNS – foraging under street light
	21:05	Pp	HNS – foraging in field
	21:08	PPy + Pp	HNS

	21:09	Pp >1	HNS – foraging under street light
LS10	21:11	Pp >1	Foraging around water works, constant activity
	21:15	PPy	HNS

### Transect 2 – Survey 1 – 17<sup>th</sup> September 2018

Surveyor 1:	Janine Burnham		
Surveyor 2:	Trevor Fletcher		
Date:	17 <sup>th</sup> September 2018		
Feature/s being surveyed:	Woodland Transect		
Time Start:	19:48	Time Finish:	21:58
Sunrise/sunset time:	19:23	Detectors used:	Anabat Express SSF Bat2
Temperature Start (°C):	18	Temperature Finish (°C):	16
Cloud Cover Start (%):	-	Cloud Cover Finish (%):	n/a
Humidity Start (%)	82	Humidity Finish (%)	82
Wind Start (Beaufort):	3	Wind Finish:	3
Precipitation:	0		
Listening Station (LS) Number / Target Note (A-N)	Time	Species	Activity and Direction
LS1	19:50	Ppy	HNS
Walk	19:53		-
	19:54	Pp	Foraging
LS2	19:56	Ppy	Foraging over bridge – constant at listening point
Walk	19:59		-

LS3	20:01		-
	20:04	Ppy	Foraging above river and then crossed to south of road
Walk	20:05		-
	20:07	Ppy	HNS
	20:10	Ppy	HNS – brief pass
LS4	20:11		-
Walk	20:15		-
LS5	20:17		-
Walk	20:20		-
	20:24	Pa + brief Ppy	HNS – by forestry
LS6	20:29		-
Walk	20:32		-
	20:33	Ppy	HNS
	20:37- 20:39	Nn	HNS
LS7	20:42	Nn + Ppy	HNS
	20:43	Ppy + Nn	HNS
Walk	20:45		-
LS8	20:50		-
	20:51	Ppy	HNS – over east side of bridge
Walk	20:53		-
	20:54	Nn	HNS
	20:55	Ppy	-
	20:56	Pp	HNS

LS9	20:58		-
	20:59	Pp	
Walk	21:01		
LS10	21:02	-	
Walk	21:06	Pp	HNS
	21:07	Pp	HNS
	21:08	Pp	HNS – foraging over trees
	21:10	Pp	HNS -brief pass
LS11	21:12	Rh	Seen flying to east along ditch at side of the path under the bridge
Walk	21:16	Pp	HNS – 1 pass
	21:18	Es?	HNS
	21:22	Ppy	HNS – 1 pass
LS12	21:23	Ppy	HNS
	21:24 – 21:25	Pa + Ppy + Pp	HNS
Walk	21:26		
	21:25	My sp	HNS
	21:27	Pp/Ppy	HNS
	21:32	Nn	HNS – 1 pass
LS13	21:33	Ppy	HNS – 1 pass
Walk	21:36		
LS14	21:40		
	21:41	Nn	Short call
Walk	21:43		

LS15	21:47	Nn	HNS – very brief
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### Transect 2 – Survey 2 – 10<sup>th</sup> October 2019

<b>Surveyor 1:</b>	<b>Trevor Fletcher</b>		
<b>Surveyor 2:</b>	Rebecca Howells		
<b>Date:</b>	10 <sup>th</sup> October 2018		
<b>Feature/s being surveyed:</b>	Transect 2 - Woodland Transect – walked in reverse		
<b>Time Start:</b>	18:40	<b>Time Finish:</b>	21:05
<b>Sunrise/sunset time:</b>	18:31	<b>Detectors used:</b>	Anabat Express SSF Bat2
<b>Temperature Start (°C):</b>	19	<b>Temperature Finish (°C):</b>	16
<b>Cloud Cover Start (%):</b>	-	<b>Cloud Cover Finish (%):</b>	n/a
<b>Humidity Start (%)</b>	80	<b>Humidity Finish (%)</b>	80
<b>Wind Start (Beaufort):</b>	3	<b>Wind Finish:</b>	3
<b>Precipitation:</b>	0		
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS15	18:40	Pp + Ppy x 3	Foraging above tree canopy
Walk	18:45	Pp	Foraging
LS14	18:48		
Walk	18:53	Pp x 2	Foraging
LS13	19:00	Ppy >5	Foraging above tree canopy
Walk	19:05	Ppy	HNS – brief pass, commuting
LS12	19:11	Ppy >3	HNS - foraging
Walk	19:16	Ppy	HNS – constant foraging between stops

LS11	19:22	Ppy	HNS - foraging
Walk	19:27	Ppy	HNS – foraging and commuting
LS10	19:32	Ppy	HNS – commuting + constant foraging
Walk	19:37	Ppy	<b>Foraging</b>
LS9	19:39		
Walk	19:44		
LS8	19:49 – 19:54	Ppy	HNS - foraging
Walk		Ppy	HNS - foraging
LS7	19:57 – 20:02	Ppy	Social calls also heard
Walk	20:02		
LS6	20:09	Ppy > 2	Foraging
Walk	20:14		
LS5	20:21	Pp + Ppy	Foraging
Walk	20:26	Ppy	Social calls
LS4	20:31		
Walk	20:36		
LS3	20:43	Ppy	Foraging/Commuting
Walk	20:48		
LS2	20:51		
Walk	20:56		
LS1	21:00		

### Transect 2 – Survey 3 – 15<sup>th</sup> May 2019

<b>Surveyor 1:</b>	Trevor Fletcher
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<b>Surveyor 2:</b>		Emma Carney	
<b>Date:</b>		15/05/2019	
<b>Feature/s being surveyed:</b>		Transect 2 - Woodland Transect	
<b>Time Start:</b>		21:00	<b>Time Finish:</b> 23:34
<b>Sunrise/sunset time:</b>		20:59	<b>Detectors used:</b> Anabat Express SSF Bat2
<b>Temperature Start (°C):</b>		17	<b>Temperature Finish (°C):</b> 11
<b>Cloud Cover Start (%):</b>		10	<b>Cloud Cover Finish (%):</b> 10
<b>Humidity Start (%)</b>		54	<b>Humidity Finish (%)</b> 63
<b>Wind Start (Beaufort):</b>		3	<b>Wind Finish:</b> 3
<b>Precipitation:</b>		0	
<b>Listening Station (LS) Number / Target Note (A-N)</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS1	21:00		
Walk	21:05	Pp	Commuting-HNS
LS2	21:06		
	21:11	Ppy	2x passes
Walk	21:11		
	21:14	Ppy	Constant foraging overhead
	21:17	Ppy	Foraging-HNS
LS3	21:19	Ppy	Foraging-HNS
	21:20	Ppy	Foraging -HNS
	21:22	Ppy	Brief pass (quiet) HNS

	21:24	Ppy	Flew under bridge, upstream
Walk	21:26	Pp	Brief pass -HNS
	21:28	Pp	Feeding-HNS
	21:29	Pp	HNS
LS4	21:30	Pp	HNS
	21:31	Ppy	Flew from plantation, across road and back to plantation
	21:32	Ppy	Flew from plantation, across road and back to plantation
	21:34	Pp	Feeding in plantation 3x passes.
	21:35	Pp	Feeding in plantation
Walk	21:36	Pp	Feeding along plantation edge
	21:38		Feeding along plantation edge
LS5	21:38- 21:44		No activity
Walk	21:46	Pp	HNS
	21:49	? Pp	HNS
LS6	21:51- 21:56		No activity
Walk	21:58	Pp	HNS
LS7	21:59- 22:04		No activity
Walk	22:08	Pp	Faint call- 1 x pass
	22:10	Pp	Faint call
LS8	22:11		
	22:12	Pp	HNS-Multiple passes (faint)
	22:12- 22:16	Pp	Numerous passes HNS
Walk	22:18	Pp	Feeding

	22:19	Pp and Ppy	Feeding
	22:20	Pp/Ppy	Feeding
LS9	22:21- 22:26	Pp	Occasional passes HNS. Feeding near street light
Walk	22:28	Pp	HNS
LS10	22:28	Pp	HNS
	22:29	Pp	HNS
	22:30	Pp	Feeding over river/riparian vegetation
	22:32- 22:33	Pp/Ppy	Feeding over river/riparian vegetation
Walk	22:33- 22:39	Pp	Occasional passes and feeding
LS11	22:39	Pp/Ppy	HNS
	22:41- 22:44	Pp/Ppy	Feeding. One bat seen flying under bridge, otherwise HNS
	22:44	Pp/Ppy	Regular passes and feeding
Walk	22:44- 22:47	Pp/Ppy	Occasional calls. HNS
LS12	22:48- 22:53	Pp/Ppy	Constant feeding and passes throughout LS12 station stop
	22:53	Pp+ Daubenton's	
	22:54	Pp	Feeding. HNS
Walk	22:57	Pp	Faint call (passes)
	22:58	pp	HNS
	23:01	Ppy	2x passes. HNS
LS13	23:01- 23:05	Pp/Ppy	Constant passes and some feeding
	23:06	Pp/Ppy	Seen over path, circling around trees
Walk			No activity
LS14	23:11- 23:16		No activity

Walk	23:19	Pp	HNS
LS15	23:21		
	23:23	Pp	HNS
Walk	23:24	Pp	HNS
LS1	23:29- 23:34		No activity
Survey end 23:34			

### Transect 2 – Survey 4 –30<sup>th</sup> May 2019

<b>Surveyor 1:</b>	Trevor Fletcher		
<b>Surveyor 2:</b>	Emma Carney		
<b>Date:</b>	30/05/2019		
<b>Feature/s being surveyed:</b>	Transect 2 - Woodland Transect		
<b>Time Start:</b>	21:38	<b>Time Finish:</b>	23:34
<b>Sunrise/sunset time:</b>	21:17	<b>Detectors used:</b>	Anabat Express SSF Bat 2
<b>Temperature Start (°C):</b>	14	<b>Temperature Finish (°C):</b>	11
<b>Cloud Cover Start (%):</b>	100	<b>Cloud Cover Finish (%):</b>	10
<b>Humidity Start (%)</b>	95	<b>Humidity Finish (%)</b>	95
<b>Wind Start (Beaufort):</b>	3	<b>Wind Finish:</b>	3
<b>Precipitation:</b>	0		
<b>Listening Station (LS) Number / Target Note (A-N)</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS1	21:38	Pp	Flying around street lighting on roundabout
Walk	21:43- 21:47		No activity

LS15	21:47	Ppy	3 x bats flying around open areas and trees
	21:51	Ppy	Feeding. HNS.
	21:52	Ppy	3 or 4 bats seen.
Walk	21:58	Ppy	Feeding along path edge.
LS14	21:59		
	22:02	Ppy	HNS. 1x pass.
	22:04	Pp/PPy	2 feeding along path and over from main road
Walk	22:06	Ppy	Over path feeding, then into woodland
	22:09	Pp	HNS
LS13	22:10- 22:15	Pp/PPy	HNS. Constant feeding.
Walk	22:17	Pp	Faint call
	22:20	Pp	HNS
LS12	22:22	Pp+ <i>Myotis</i> sp.	Feeding over water near bridge
	22:27	Pp	Constant feeding
Walk	22:27- 22:31		No activity
LS11	22:31		
	22:34- 22:37	Pp	Faint calls from above bridge
Walk	22:41	Pp	Faint call
	22:42	Pp	Faint call
LS10	22:44- 22:49	Pp+Ppy	Moving up and down stream below bridge. Feeding
Walk	22:49		No activity
LS9	22:52	Pp	HNS
	22:54	Pp	HNS

Walk	22:58	Pp	HNS
	23:00	Ppy	HNS
LS8	23:01	Pp	HNS
	23:03	Pp	HNS
	23:06	Pp	HNS
Walk			No activity
LS7	23:09		
	23:10	Ppy	HNS
Walk	23:19	Ppy	HNS
LS6	23:21- 23:26		No activity
Walk	23:30		
	23:31- 23:33	Pp	HNS. feeding
LS5	23:35- 23:40		No activity
Walk	23:40- 23:43		No activity
LS4	23:43- 23:48		No activity
Walk	23:48- 23:53		No activity
LS3	23:53	Pp	HNS
	23:54	Pp	HNS
	23:56	Pp	HNS
	23:57	Pp	HNS
Walk	23:57- 00:00		No activity
LS2	00:00	Pp	HNS
	00:02	Pp	HNS

	00:04	Pp	HNS
Walk	00:05-00:07		No activity
LS1	00:07		
	00:08	Pp	HNS
	00:12	Pp	HNS
	00:12	Survey end	

### Transect 3 – Survey – 17<sup>th</sup> September 2018

<b>Surveyor 1:</b>	Megan Price		
<b>Surveyor 2:</b>	Natalie Pyatt		
<b>Date:</b>	17 <sup>th</sup> September 2018		
<b>Feature/s being surveyed:</b>	Hedge Transect		
<b>Time Start:</b>	19:23	<b>Time Finish:</b>	22:02
<b>Sunrise/sunset time:</b>	19:23	<b>Detectors used:</b>	Walkabout Echo Meter Touch
<b>Temperature Start (°C):</b>	15	<b>Temperature Finish (°C):</b>	13
<b>Cloud Cover Start (%):</b>	20	<b>Cloud Cover Finish (%):</b>	n/a
<b>Humidity Start (%)</b>	80	<b>Humidity Finish (%)</b>	80
<b>Wind Start:</b>	2	<b>Wind Finish:</b>	2
<b>Precipitation:</b>	0		
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>
LS1	19:36		
Walk	19:41		
LS2	19:42		

Walk	19:47		
LS3	19:50		
Walk	19:55		
	19:54	Pp	HNS
	19:59	Ppy	Foraging along field boundary
	20:00	Nn	Foraging along field boundary
	20:02	<i>Myotis</i> sp.	HNS (Pp dominating)
LS4	20:02	Ppy + Pp	Foraging throughout listening stop
Walk	20:07	<i>Myotis</i> sp.	<i>Myotis</i> sp. & social calling
LS5	20:09	Pp/Ppy	Occasional Pp/Ppy through wood
Walk	20:14		
	20:11	My	HNS
LS6	20:18		
Walk	20:23		-
	20:19	Md	Flew past -east
LS7	20:24		
Walk	20:29		
	20:27	Nn	HNS - faintly
	20:29	My sp.	HNS - faintly
LS8	20:34	Pp + Nn	Constant foraging
Walk	20:39		
	20:35	Ppy	-
LS9	20:44	Ppy	Occasional pass

Walk	20:49		
	20:48	Md	<b>Brief pass</b>
	20:52	Ppy	HNS - brief
	20:55	Nn	Bottom corner of field (close to road)
LS10	21:01	Md + Ppy	Foraging over stream
Walk	21:06		
	21:03	Es + Ppy + Md	Ppy and Md still foraging
	21:04	Pa	-
	21:09	Md	Foraging
LS11	21:12		
Walk	21:17		
	21:16	Pp	Foraging in field
	21:17	Ppy	HNS - briefly
LS12	21:25		
Walk	21:30		
	21:28	Pp + Nn	HNS - brief
	21:29	Nn	HNS - brief
	21:30	Pa	Brief
	21:30	Ppy + Pp	Foraging
	21:31	Md	Foraging in field
	21:34	Pa	Brief
LS13	21:34		
Walk	21:39		

	21:36	Nn	HNS
	21:38	Ppy	HNS - foraging
	21:41	Ppy	Foraging
LS14	21:43		
Walk	21:48		
	21:44	Rh	Flew along hedge – not heard
	21:49	Pa	-
LS15	21:50		
Walk	21:55		
	21:54	Ppy + Pa	-
	21:55	Pp	Foraging
LS16	21:54		
Walk	22:04		
	22:01	Ppy	

### Transect 3 – Survey 3 – 15<sup>th</sup> May 2019

<b>Surveyor 1:</b>	<b>Rebecca Howells</b>		
<b>Surveyor 2:</b>	Natalie Pyatt		
<b>Date:</b>	15 <sup>th</sup> May 2019		
<b>Feature/s being surveyed:</b>	Transect 3 - Field/Hedge Transect		
<b>Time Start:</b>	21:00	<b>Time Finish:</b>	00:16
<b>Sunrise/sunset time:</b>	20:59	<b>Detectors used:</b>	Anabat Express SSF Bat2
<b>Temperature Start (°C):</b>	15	<b>Temperature Finish (°C):</b>	11

<b>Cloud Cover Start (%):</b>		10	<b>Cloud Cover Finish (%):</b>	-
<b>Humidity Start (%):</b>		61	<b>Humidity Finish (%):</b>	55
<b>Wind Start (Beaufort):</b>		2	<b>Wind Finish:</b>	2
<b>Precipitation:</b>		0		
<b>Listening Station (LS) Number</b>	<b>Time</b>	<b>Species</b>	<b>Activity and Direction</b>	
LS1	21:00		-	
Walk	21:05		-	
LS2	21:08		-	
Walk	21:13		-	
LS3	21:19		-	
	21:20	Pp	Commuting along hedge	
Walk	21:24			
	21:25	Unknown	HNS – brief call	
	21:28	Pp	HNS	
	21:29	Ppy	Foraging along stone wall	
LS4	21:35	Pp		
	21:38	My sp.		
Walk	21:40			
LS5	21:42	Ppy + My + Pp	Above tree line	
Walk	21:47		-	
	21:51	Pp	HNS	
LS6	21:55	Ppy		
Walk	22:00		-	

LS7	22:04		-
Walk	22:09		-
	22:10	Nn	
LS8	22:17	Pp + Ppy	Pp foraging Ppy HNS brief pass
Walk	22:22		-
LS9	22:27		-
	22:28	Nn	
Walk	22:32		-
	22:33	Ppy	
	22:37	Nn	HNS
	22:39	Ppy	HNS
LS10	22:46	My sp. + Ppy	Constant foraging
Walk	22:51		-
LS11	22:58	Nn + Pp + My sp.	
Walk	23:03		-
	23:14	Pp/Ppy	HNS
	23:17	Pp	HNS
	23:21	Pp	HNS
	23:32	Pp	HNS
LS12	23:37		-
Walk	23:42		-[[[[[[[[
	23:44	Pp	HNS – brief pass
	23:45	Ppy + My sp.	HNS – brief pass

LS13	23:52	Ppy	HNS – brief pass
Walk	23:57		-
	00:02	Ppy	HNS
	00:03	Pp/Ppy	HNS - foraging
LS14	00:16		-
			Survey ended due to aggressive dog present LS 14, 15 + 16 not complete

## Appendix D – Automated / Static Survey

### Dates the static detector at each location was operative in 2018

Location	Dates static detector operative (2018)	Total hours in operation
1	22 <sup>nd</sup> May – 10 <sup>th</sup> June 14 <sup>th</sup> June – 6 <sup>th</sup> July 9 <sup>th</sup> – 19 <sup>th</sup> July 20 <sup>th</sup> July – 7 <sup>th</sup> August 14 <sup>th</sup> August – 4 <sup>th</sup> September 2 <sup>nd</sup> – 6 <sup>th</sup> October 29 <sup>th</sup> October to 8 <sup>th</sup> November	1286.05
2	2 <sup>nd</sup> – 11 <sup>th</sup> June 14 <sup>th</sup> June – 5 <sup>th</sup> July 9 <sup>th</sup> July – 12 <sup>th</sup> August 14 <sup>th</sup> August – 4 <sup>th</sup> September 13 <sup>th</sup> – 17 <sup>th</sup> September 3 <sup>rd</sup> – 7 <sup>th</sup> October 29 <sup>th</sup> October – 7 <sup>th</sup> November	1348.25
3	22 <sup>nd</sup> May – 12 <sup>th</sup> June 9 <sup>th</sup> – 26 <sup>th</sup> July 13 <sup>th</sup> – 18 <sup>th</sup> September 3 <sup>rd</sup> – 7 <sup>th</sup> October 10 <sup>th</sup> October – 9 <sup>th</sup> November	1101.97
4	3 <sup>rd</sup> May – 12 <sup>th</sup> June 14 <sup>th</sup> June – 4 <sup>th</sup> July 9 <sup>th</sup> July – 4 <sup>th</sup> September 13 <sup>th</sup> – 18 <sup>th</sup> September 3 <sup>rd</sup> – 7 <sup>th</sup> October 28 <sup>th</sup> October – 9 <sup>th</sup> November	1442.6
5	24 <sup>th</sup> May – 12 <sup>th</sup> June 14 <sup>th</sup> June – 5 <sup>th</sup> July 9 <sup>th</sup> July – 12 <sup>th</sup> August	515.25
6	2 <sup>nd</sup> – 10 <sup>th</sup> October 29 <sup>th</sup> October – 8 <sup>th</sup> November	271.93
7	28 <sup>th</sup> October – 7 <sup>th</sup> November	166.78
8	13 <sup>th</sup> September – 16 <sup>th</sup> October 29 <sup>th</sup> October – 9 <sup>th</sup> November	350.07
9	3 <sup>rd</sup> – 10 <sup>th</sup> October	110.53
10	2 <sup>nd</sup> – 12 <sup>th</sup> October	369.75
11	10 <sup>th</sup> – 28 <sup>th</sup> October 29 <sup>th</sup> October – 7 <sup>th</sup> November	526.87
12	13 <sup>th</sup> September – 10 <sup>th</sup> October 28 <sup>th</sup> October – 10 <sup>th</sup> November	326.38

**Numbers of bat calls per species for each static detector location in 2018**

Static Location Number	Number of bat calls per species recorded in 2018									
	Unidentified bat species	Serotine/noctule species	Myotis species	Brown long-eared bat	Pipistrelle species	Common pipistrelle	Soprano pipistrelle	Probable Barbastelle bat	Greater horseshoe bat	Lesser horseshoe bat
1	0	15	175	2	38	48	208	0	0	15
2	57	553	15	10	289	112	576	0	0	0
3	52	102	1125	6	4998	2003	9632	19	0	68
4	126	646	1777	1	371	119	2318	0	0	1
5	91	20	153	5	543	8317	609	0	1	0
6	0	27	577	1	0	648	2631	0	0	6
7	0	0	9	1	0	14	125	0	0	2
8	5	11	96	14	22	55	139	0	0	86
9	3	22	33	6	115	28	289	0	0	0
10	0	3	123	1	9	443	2049	0	0	615
11	5	36	95	29	1	162	767	0	0	6
12	2	5	9	1	222	17	177	0	0	1

**Dates the static detector at each location was operative in 2019**

<b>Location</b>	<b>Dates static detector operative (2019)</b>	<b>Total hours in operation</b>
1	10 - 14th April	56.18
2	10 - 18th April 23rd - 27th May	144.43
3	10 - 14th April	56.18
4	10 - 14th April 23rd - 28th May	109.37
5	10 - 14th April 23rd - 29th May	118.01
6	23rd - 29th May	61.92
7	10 - 14th April 23rd - 29th May	118.01
8	9th - 15th April 23rd - 29th May	140.58
9	23rd - 29th May	61.92
10	23rd May - 4th June	113.75
11	10 - 14th April 24th - 28th May	100.37
12	10 - 14th April 24th - 28th May	109.01
13	10th - 15th April	67.23

### Numbers of bat calls per species for each static detector location in 2019

Static Location Number	Number of bat calls per species recorded in 2019									
	Unidentified bat species	Serotine/noctule species	Myotis species	Brown long-eared bat	Pipistrelle species	Common pipistrelle	Soprano pipistrelle	Probable Barbastelle bat	Greater horseshoe bat	Lesser horseshoe bat
1	1	1	2	0	17	13	17	0	0	0
2	3	14	40	21	169	164	581	0	0	19
3	0	0	17	2	3	54	72	0	0	17
4	1	2	65	0	16	26	103	0	0	13
5	13	5	14	11	109	121	163	0	0	7
6	0	0	1	1	43	73	152	0	0	0
7	1	2	34	7	89	71	301	0	0	1
8	4	9	749	0	18	65	503	0	0	39
9	0	12	293	29	232	751	1086	0	0	69
10	0	12	1	0	27	530	166	0	0	0
11	0	9	333	25	44	416	902	0	0	23
12	1	7	157	7	189	2751	1201	0	0	15
13	2	10	746	1	95	139	853	0	0	7

# Appendix E – Point Count 1 Survey Tables

## Location 1

Surveyor 1:	Megan Price		
Date:	25 <sup>th</sup> September 2018		
Feature/s being surveyed:	Point Count 1 – Location 1		
Time Start:	18:38	Time Finish:	21:04
Sunrise/sunset time:	19:05	Detectors used:	Petterson D230 Anabat Express
Temperature Start (°C):	14	Temperature Finish (°C):	12
Cloud Cover Start (%):	0	Cloud Cover Finish (%):	n/a
Humidity Start (%)	66	Humidity Finish (%)	76
Wind Start (Beaufort):	0	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
19:21	Ppy	Movement north-west from Surveyor 2 over hedge, foraging in field before returning south-east towards Surveyor 2.	
19:33	Pp	HNS (Heard first on Surveyor 2's bat detector before on own detector, call detected intermittently – mainly on Surveyor 2's side)	
19:39	Pp	HNS - foraging	
19:40	Pp	Movement north-east from A4119 road, commuting up hedge line.	
19:43	My sp.	HNS - brief	
19:45	My sp.	Brief pass	
19:46	Rh	HNS – Brief pass	
19:57	My sp.	HNS	
20:10	My sp.	HNS - foraging	

20:47	My sp.	HNS
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## Location 2

Surveyor 2:	Janine Burnham		
Date:	25th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 2		
Time Start:	18:38	Time Finish:	21:04
Sunrise/sunset time:	19:05	Detectors used:	Anabat Express SSF Bat2
Temperature Start (°C):	14	Temperature Finish (°C):	12
Cloud Cover Start (%):	0	Cloud Cover Finish (%):	n/a
Humidity Start (%)	66	Humidity Finish (%)	76
Wind Start (Beaufort):	0	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
19:19	Ppy	HNS	
19:21	Pp	SNH – Flying south towards A4119 road	
19:26	Pp	HNS – Faint ,1 pass.	
19:28	Ppy	HNS – 1 pass	
19:30	Ppy	HNS – 1 pass	
19:33	Ppy	HNS – 1 pass	
19:38	Ppy	Foraging over tree by stream (stream located adjacent to the west of survey position), flew off to the east.	
19:40	Ppy	HNS – foraging (feeding buzzes)	
19:43	Ppy.	HNS – couple of passes	

19:43	My Sp.	1 pass
19:44	My Sp.	Flying north up hedge line
19:46	Ppy	Foraging up and down hedge line – 2 x passes
19:49	Ppy	HNS – 1 pass
19:51	My Sp.	HNS – very faint, brief pass
19:52	My Sp.	HNS – very faint, brief pass
19:55	My Sp.	HNS – very faint, brief pass
19:56	Ppy	HNS
20:03	Pp	HNS – brief pass
20:05	Ppy	HNS
20:14	Pp	HNS
20:29	Ppy	HNS – 1 pass
20:36	Ppy	Brief pass
20:37	My Sp.	Pass
20:51	My Sp.	1 pass

### Location 3

Surveyor 3:	Paul James		
Date:	25th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 3		
Time Start:	18:51	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Anabat Express Petterson D230
Temperature Start (°C):	14	Temperature Finish (°C):	12
Cloud Cover Start (%):	0	Cloud Cover Finish (%):	n/a

Humidity Start (%)	66	Humidity Finish (%)	76
Wind Start (Beaufort):	0	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
19:05-19:06	Ppy	Commuting, flying north along A4119 road	
19:14	Ppy		
19:24	Ppy	Foraging	
19:43	Ppy		
19:44	Ppy		
19:49	Ppy		
19:51	Ppy		
20:16	My Sp.		
20:28	Ppy.		

## Location 4

Surveyor 4:	Natalie Pyatt		
Date:	25th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 4		
Time Start:	18:30	Time Finish:	21:04
Sunrise/sunset time:	19:05	Detectors used:	Echometer Touch Anabat Express
Temperature Start (°C):	14	Temperature Finish (°C):	12
Cloud Cover Start (%):	0	Cloud Cover Finish (%):	n/a
Humidity Start (%)	66	Humidity Finish (%)	76

Wind Start (Beaufort):	0	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
18:45	Ppy	HNS - foraging	
19:02	Pp	Movement across the tree line from the south before foraging east	
19:05	Pp + Ppy	Foarging over trees	
19:17	Ppy	Flew south from A4119 road	
19:22	Ppy	Flew from tree located to the west of survey position	
19:24	Nn	Commuted across top of trees from east to west	
19:26	Pp	Commuted from top of trees to the west of survey position	
19:28	Unknown sp.	Foraging above tree on north-eastern corner of field.	
19:30	Ppy	Foraged from west to east and back	
19:37	Ppy	Foraged from west to east and back	
19:39	Pp	Foraging from the west across the top of the trees, circling and returning west	
19:43	Ppy	HNS	
19:45	My sp.	HNS	
19:46	Pp	HNS	
19:53	Ppy/My sp.	HNS	
19:58	Ppy/My sp.	HNS	
20:08	Ppy	HNS	
20:11	My sp.	HNS	
20:12	Md	HNS	
20:17	Pp	HNS	

20:33	Ppy	HNS
20:34	Md	HNS
20:37	Md	HNS
20:42	Pp	HNS
20:44	Md	HNS
20:50	Rh	HNS

## Location 5

Surveyor 5:	Holly Lewis		
Date:	25th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 5		
Time Start:	18:30	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Anabat Express Echo Meter Touch
Temperature Start (°C):	14	Temperature Finish (°C):	12
Cloud Cover Start (%):	5	Cloud Cover Finish (%):	-
Humidity Start (%)	66	Humidity Finish (%)	76
Wind Start (Beaufort):	0	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
19:18	Nn?	Bat high over hedgerow and across road to the south (not picked up by detector, likely to be Noctule)	
19:20-19:28	Ppy	Flew over hedge from the east, foraging in field (feeding buzzes)	
19:31	Pp	Flew across into field from the south, foraged briefly	
19:37	Ppy	Committed down the field from the north and across the A4119 road	

19:46	Ppy	Commuted up the field from the south – brief foraging
19:51	Nn	HNS
20:04	Pa	HNS
20:04	Pp	HNS – commuting, loud
20:06	Pa	HNS
20:10	Pp	HNS - brief
20:13	Pp	HNS - brief
20:27	Ppy	HNS - faint
20:28	Pp	HNS - faint
21:01	Pa	HNS
21:05	My sp.	HNS - brief

## Location 6

Surveyor 6:	Trevor Fletcher		
Date:	25th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 6		
Time Start:	18:10	Time Finish:	21:21
Sunrise/sunset time:	19:05	Detectors used:	Anabat Walkabout SSF Bat 2
Temperature Start (°C):	14	Temperature Finish (°C):	12
Cloud Cover Start (%):	80	Cloud Cover Finish (%):	-
Humidity Start (%)	66	Humidity Finish (%)	76
Wind Start (Beaufort):	0	Wind Finish:	0
Precipitation:	0		

Time	Species	Activity and Direction
19:19	Ppy	Movement across A4119 road from the south, foraging over hedgerow
19:34	Ppy	Seen around street light on A4119
19:38	Ppy	HNS
19:41	Pp	Movement north along hedge line
19:44	Pp	HNS
19:47	Pp	HNS
19:53	My sp	HNS
19:57	Ppy	HNS
20:03	Pp	HNS
20:11	Pp	HNS – brief
20:12	Pp	HNS - brief
20:18	Nn	HNS - brief
20:28	Pp	HNS
20:31	My sp.	HNS – very brief
20:38	Nn	HNS
20:50	My sp.	HNS – very brief
20:51	Pa	HNS
21:03	My sp.	HNS

## Location 7

Surveyor 7:	Rebecca Howells
Date:	25th September 2018

Feature/s being surveyed:	Point Count 1 – Location 7		
Time Start:	18:40	Time Finish:	21:04
Sunrise/sunset time:	19:05	Detectors used:	Anabat Express SSF Bat2
Temperature Start (°C):	14	Temperature Finish (°C):	12
Cloud Cover Start (%):	5	Cloud Cover Finish (%):	-
Humidity Start (%)	66	Humidity Finish (%)	76
Wind Start (Beaufort):	0	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
18:42	Ppy	Leaving roost (>50) located on the south-west corner of Building 3, heading south over a 30 min period	
18:50	Unknown	SNH - flying over house south-wards towards woodland from the direction of the A4119	
19:09-19:42	Ppy	Commuting/foraging from roost along edge of wood. Social calls heard.	
19:45	Ppy	Foraging under street light by A4119 road.	
19:49	BLE	Flying low from a south-east to north-west direction	
20:04	Ppy	HNS - Few passes, foraging in woods	
20:11	PP	Faint	
20:14	Pa	-	
20:18	Ppy	Faint	
20:21	Pp	Faint	
20:23	My sp.	HNS – very faint	
20:24-20:37	Ppy	Foraging in woods	
20:41-20:44	BLE + Ppy	Foraging	

## Location 8

Surveyor 8:	Suzannah Forshaw		
Date:	26th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 8		
Time Start:	18:30	Time Finish:	21:04
Sunrise/sunset time:	19:05	Detectors used:	Anabat Walkabout Echo Meter Touch 2 Pro
Temperature Start (°C):	15	Temperature Finish (°C):	12
Cloud Cover Start (%):	30	Cloud Cover Finish (%):	n/a
Humidity Start (%)	64	Humidity Finish (%)	76
Wind Start (Beaufort):	0/1	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
19:09	Ppy	HNS	
19:34	Ppy	HNS	
19:38	Ppy	Commuting from west to east along hedgerow	
19:40	Ppy	Commuting - heading south-west (did not come from across road)	
19:42	Ppy	HNS	
Bright street light – marked on map			
19:43	Ppy	Foraging in field, many passes	
20:02	Ppy	Flying around field, social calling	
20:08	Ppy	HNS – brief pass	
20:18	Ppy	HNS – brief pass	

20:20 - 20:27	Ppy	Few very faint passes possibly in woodland area south of the field (Not heard on detectors)
20:31	My sp.	HNS
20:38	Pp	HNS
20:41	Ppy	Social calling
20:48	Ppy	HNS - commuting
21:01	Ppy	Faint pass, brief

## Location 9

Surveyor 1:	Megan Price		
Date:	26th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 9		
Time Start:	18:33	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Walkabout Petterson D230
Temperature Start (°C):	15	Temperature Finish (°C):	12
Cloud Cover Start (%):	30	Cloud Cover Finish (%):	n/a
Humidity Start (%)	64	Humidity Finish (%)	76
Wind Start (Beaufort):	0/1	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
19:15	Ppy	HNS - brief	
19:19	Ppy	HNS – brief pass	
19:22	Rh	HNS – on Petterson	
19:26	Ppy	Commuting over field heading west	

19:28	Ppy	Foraging in south-western corner of field, leaving to the west
19:29	Rh	
19:29	Pp	Foraging from north
19:31	Pp	Commuting east up hedge
19:32	Rh	Movement up hedge line through gate to Surveyor 2
19:34	Rh	HNS
19:34	My sp.	Heading north along hedge
19:34	Rh	HNS – foraging from north
19:35	Ppy	Foraging over south-western corner of field
19:35	Rh	Movement along southern hedge boundary from the east – foraged overhead before following hedge northwards
19:39	Ppy	Following southern hedge boundary from east heading north (as above)
19:41	Rh	HNS
19:43	Ppy	Commuting east to west through gate
19:53	Nn	Down farm
19:54	Rh	Commuting down southern hedge boundary back to farm
20:05	Nn	HNS
20:39	Nn	Constant foraging over field
20:39	Ppy	Occasional
20:39	My sp.	High level of foraging in corner of field
20:39	Pp	Occasional
21:00	Pp	Quiet – low activity, just intermittent Pp

Location 10

Surveyor 2:	Natalie Pyatt		
Date:	26th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 10		
Time Start:	18:30	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Walkabout SSF Bat2 EMT 2 and iPhone
Temperature Start (°C):	15	Temperature Finish (°C):	12
Cloud Cover Start (%):	30	Cloud Cover Finish (%):	n/a
Humidity Start (%)	64	Humidity Finish (%)	76
Wind Start (Beaufort):	0/1	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
19:17	Ppy	Emerged from tree in hedgerow located to the north-east and flew back in before emerging again	
19:21	Ppy	HNS	
19:29	Pp	HNS	
19:31	Pp	Foraging along trees/hedgerow and back again	
19:34	Ppy	As above but did not return	
19:40	Pp		
19:41	My sp.	HNS	
19:43	Ppy	HNS	
19:45	Ppy	HNS	
19:50	Rh	HNS	
19:55	Rh	HNS	

19:57	Ppy	HNS
20:08	Ppy	HNS
20:16	My sp.	HNS
20:20	Rh	HNS
20:23	Ppy	HNS
20:36	Ppy	HNS
20:40	Nn	HNS
21:02	Ppy	HNS

## Location 11

Surveyor 3:	Paul James		
Date:	26th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 11		
Time Start:	18:48	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Anabat Express Petterson
Temperature Start (°C):	15	Temperature Finish (°C):	12
Cloud Cover Start (%):	30	Cloud Cover Finish (%):	n/a
Humidity Start (%)	64	Humidity Finish (%)	76
Wind Start (Beaufort):	0/1	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
19:03	Ppy		
19:11 – 19:12	Ppy	Foraging overhead	

19:15	Ppy	Foraging overhead
19:17	Ppy	Foraging overhead
19:19 – 19:23	Ppy x 3	Foraging overhead
19:24	Ppy	Foraging overhead
19:24- 19:36	Ppy	Foraging overhead
19:24	Rh	Foraging overhead
19:28	Pp	Foraging overhead
19:39 – 19:40	Ppy	Foraging overhead
19:48	Ppy	Foraging overhead
19:48	Nn	-
19:57	Nn	-
19:58	Ppy	-
20:00 – 20:01	Nn	-
20:02	Nn	-
20:04 – 20:05	Nn	-
20:10	Nn	-
20:11 – 20:12	Pp	-
20:14	Pp	-
20:16	Ppy	-
20:32	Ppy	-
20:49	Ppy	-
20:52	Nn	-

## Location 12

Surveyor 4:	Rebecca Howells		
Date:	26th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 12		
Time Start:	18:40	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Anabat Express SSF Bat2
Temperature Start (°C):	15	Temperature Finish (°C):	12
Cloud Cover Start (%):	30	Cloud Cover Finish (%):	n/a
Humidity Start (%)	64	Humidity Finish (%)	76
Wind Start (Beaufort):	0/1	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
18:45	Ppy	First bat emerges from Building 5, ~15 emerge	
19:00	Ppy	Foraging overhead	
19:16	Ppy x 2	Flew north along hedge from wood	
19:55	Ppy	Continued foraging from Ppy	
20:23	Ppy	Foraging overhead, >2	
20:25	Ppy x3+	Foraging overhead, sounded like more than 3 individuals	

## Location 13

Surveyor 5:	Suzannah Forshaw		
Date:	26th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 13		

Time Start:	18:30	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Anabat Walkabout Echo Meter Touch Pro 2
Temperature Start (°C):	15	Temperature Finish (°C):	12
Cloud Cover Start (%):	30	Cloud Cover Finish (%):	n/a
Humidity Start (%)	64	Humidity Finish (%)	76
Wind Start (Beaufort):	0/1	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
18:00	Ppy	Commuting southwards along hedgerow, appeared to cross over the A4119 road	
18:51	Ppy	HNS - commuting	
19:00	Pp	Commuting southwards along hedgerow and over A4119 road	
19:10	Ppy	Commuting northwards along hedgerow	
19:15	Ppy	Commuting southwards along hedgerow, appeared to cross over A4119 road	
19:18	Pp	HNS	
19:20	Ppy	HNS	
19:20	Ppy	Commuting northwards along hedgerow	
19:21	Ppy	Heading southwards along hedgerow towards the A4119, foraging	
19:21	Pp	Commuting towards house	
19:22	Ppy x 4	Foraging along hedgerow towards A4119 road	
19:23	Ppy x 3	Foraging up and down hedgerow, moving in and out of the tree canopy just north of position	
19:23	Ppy x 2	Chasing in and out of tree canopy heading northwards towards the house	
19:27	Ppy	Foraging in and out of tree canopy, flying low along track, many passes	

19:27	Pp	Commuting towards A4119 road
19:29	Ppy	Foraging down towards A4119 road
19:29	Ppy x 2	Foraging in and out of woodland, many passes
19:34	My sp.	HNS – brief pass
19:36 – 19:40	Ppy	Still foraging up and down, many passes
19:37	Ppy x 2	Foraging
19:39	Ppy	Social calling, flying up and down hedge
19:40 – 19:52	Ppy x 2	Chasing and social calling, many passes
19:55	My sp.	HNS
19:56	My sp.	Commuting southwards towards A4119 road
19:57	My sp.	Commuting southwards towards A4119 road
20:01	Pa	Commuting towards A4119 road (did not record on detector)
20:01	My sp.	Commuting towards A4119 road (did not record on detector)
20:02	My sp.	Flying up and down hedgerow
20:05	Rh	HNS
20:05	My sp.	Commuting towards A4119 road
20:05	Nn	HNS
20:06	My sp.	Flying up and down hedge
20:07	Ppy	HNS – social calling
20:08	Nn	HNS
20:09	My sp.	HNS
20:10	My sp.	HNS
20:12	My sp.	HNS - foraging

20:12	Ppy	HNS
20:14	My sp.	Continuous foraging along hedgerow, many passes
20:14	Nn	HNS - Continuous noctule passes
20:20	Ppy	Social calling up and down hedge
20:21	Pa	HNS
20:27	My sp.	
20:29	My sp.	Continuous foraging, many passes
20:38	My sp.	Constant foraging, many passes
20:38	Ppy	HNS – social calling
20:42	My sp.	Still continuous My foraging, many passes
20:50	My sp.	Still continuous My foraging, many passes
20:50	Ppy	HNS - foraging
20:51	Nn	HNS
20:52	Rh	HNS – brief pass (not picked up on detector)
20:52	My sp. + Ppy	Continuous <i>Myotis</i> and Ppy foraging and social calls until end of the survey

## Location 14

Surveyor 6:	Trevor Fletcher		
Date:	26th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 14		
Time Start:	18:50	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Anabat Express SSF Bat2
Temperature Start (°C):	15	Temperature Finish (°C):	12

Cloud Cover Start (%):	30	Cloud Cover Finish (%):	n/a
Humidity Start (%)	64	Humidity Finish (%)	76
Wind Start:	0/1	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
19:12	Pp	Flying overhead northwards to the tree line along the A4119 road, then heading north-west up tree line	
19:12	Ppy	Flying overhead northwards to the tree line along the A4119 road, then heading north-west up tree line	
19:17	Pp/Ppy X 3	Foraging over trees	
19:19	Ppy + Pp + My sp.	Four individuals foraging around the corner of the sewage works, constant	
19:29	Ppy/Pp	>6 foraging around corner of sewage works	
19:33	Ppy/Pp	>8 foraging around corner of sewage works	
19:44 – 19:48	Ppy/Pp + My sp.	Foraging around corner of sewage works	
19:51	Rh	HNS – brief call	
19:53	Pa	HNS	
19:56	Pa		
19:56	Ppy/Pp	Continued foraging	
20:01	Ppy + Pa	Foraging	
20:07	Pa + Nn	Foraging	
20:07 – 21:20 (End)	Ppy/Pp	Continuous foraging	
20:08	Nn		
20:11	Pa + Ppy	Foraging - occasional Pa, constant Ppy	
20:15	Nn + Ppy/Pp	HNS	

20:17	Nn + Ppy/Pp	HNS
20:21	My sp. + Nn + Ppy	HNS plus occasional Nn and constant Ppy
20:23 – 20:39	Ppy	HNS - constant calling and foraging
20:28	Pa	Foraging
20:30	My sp.	
20:34	Nn + Ppy	HNS - occasional call
20:35	My sp.	HNS – occasional call
20:39	My sp.	HNS
20:40	Ppy + Pp	HNS - foraging
20:42	Nn	Foraging
20:42 – 20:53	Ppy/Pp	Constant foraging
20:48	Rh	
20:49	Nn	
20:51	Rh	HNS – brief call
20:53	Rh	HNS – brief call
20:58	Ppy	HNS
21:00	Ppy	HNS
21:04	Pa	HNS
21:06 – 21:08	Ppy	HNS - foraging
21:09	My sp.	HNS
21:10	Ppy + My sp.	HNS
21:11	Pa	HNS
21:14	Ppy	HNS – foraging

21:16	Pp	HNS - foraging
21:17	Pp	HNS - foraging
21:18	Ppy	HNS
21:20	Ppy	HNS - foraging

## Location 15

Surveyor 7:	Janine Burnham		
Date:	26th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 15		
Time Start:	18:45	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Anabat Walkabout Batscanner Stereo
Temperature Start (°C):	15	Temperature Finish (°C):	12
Cloud Cover Start (%):	30	Cloud Cover Finish (%):	n/a
Humidity Start (%)	64	Humidity Finish (%)	76
Wind Start (Beaufort):	0/1	Wind Finish:	0
Precipitation:	0		
Time	Species	Activity and Direction	
18:57	Nn	SNH – flying over field south towards the A4119 road (high flying)	
18:58	Nn X 2	SNH – flying over field south towards the A4119 road (high flying)	
19:14	Ppy	Foraging along tree line, 1 pass	
19:17	Ppy	1 faint pass	
19:18	Ppy	Foraging over building, flew to north	
19:22	Ppy	HNS	

19:23 – 19:24	Nn + Ppy	Nn flew west of building, foraging over field; Ppy foraging up and down lane
19:25	Pp	SNH - Flying north across field
19:26	Ppy	Still foraging up and down lane and over field to the west of the building
19:30	Pp x 3	Foraging above trees along the lane to the farmhouse
19:34	Ppy	Foraging in trees around northern boundary of building
19:35	Pp	Foraging around building
19:36	My sp.	HNS
19:36	Ppy	Foraging up and down lane
19:37	Pp	Foraging
19:38	Pp	Flew south towards A4119 road
19:39	My sp.	HNS – 1 pass
19:41	My sp. + Ppy	HNS
19:42	Ppy	Foraging along hedge line
19:45	Ppy + Nn	Ppy flying east down lane towards farmhouse; Nn - HNS
19:49	Pp	HNS – 1 pass
19:55 – 19:57	Rh	HNS - occasional
20:00	Ppy	
20:03	Ppy	HNS
20:08	Ppy	HNS
20:09	Nn + Ppy	
20:11	My sp.	HNS
20:13	Nn + Ppy	HNS
20:14 – 20:23	Rh	HNS

20:23 – 20:32	Ppy	
20:41 – 20:42	Nn + Ppy	HNS
20:44	My sp.	HNS
20:53	Pp	HNS – 1 brief pass
21:03	My sp.	3 x passes
21:05	My sp.	1 x pass
21:05	My sp.	1 x pass
21:07	My sp.	2 x passes
21:09	Nn + Ppy	
21:12	My sp.	1 x pass
21:12	My sp.	Seen flying east down path
21:15	Nn	

## Location 16

Surveyor 8:	Holly Lewis		
Date:	26th September 2018		
Feature/s being surveyed:	Point Count 1 – Location 16		
Time Start:	18:30	Time Finish:	21:20
Sunrise/sunset time:	19:05	Detectors used:	Echo Meter Touch Anabat Express
Temperature Start (°C):	15	Temperature Finish (°C):	12
Cloud Cover Start (%):	30	Cloud Cover Finish (%):	n/a
Humidity Start (%)	64	Humidity Finish (%)	76
Wind Start (Beaufort):	0/1	Wind Finish:	0

Precipitation:		0
Time	Species	Activity and Direction
19:11 – 19:17	Ppy x 3	Flew across field – foraging in field by vegetative opening to road where pylon is located, then headed southwards across A4119 road
19:16	Pp	HNS - foraging
19:17	Pp	Foraging by pylon
19:19	Ppy	Foraging by pylon
19:21	Pp + Ppy	Foraging around tree/field/pylon and garden
19:24 – 19:42	Pp + Ppy	Foraging around field/pylon and garden - constant
19:35	My sp.	In amongst pipistrelles
19:41	Nn	HNS
19:43	Nn	HNS
Very dark – hard to see after 19:45		
19:45	Pa	HNS on Echo Meter Touch, amongst ongoing pipistrelle bats foraging
19:48	Pa	HNS
19:49	Ppy	HNS - foraging
19:51	Pa	HNS plus occasional Pp
19:54	My sp.	HNS
19:55	Nn	HNS
19:56	Ppy	HNS – occasional foraging
20:04	Pa + Nn	HNS– occasional
20:06 – 20:17	Ppy + Pp + Pa	HNS – occasional foraging
20:17	Pp	Seen foraging in field
20:18	Pp, + Ppy + Pa	HNS – foraging

20:26	Md	HNS
20:26	Pp + Ppy	HNS
20:31	Pp	Foraging in field
20:40	My sp.	
20:40	Pp + Ppy	HNS - occasional
<b>20:40 – 21:20 (End)</b>	Pp + Ppy + Pa	HNS – occasional passes

Point Count 2 Raw survey data unavailable from Cotswold Ecology, but details supplied in an e-mail providing a summary of results.

# Appendix F - Road Crossing Monitoring of Road Crossings

Under the road bridge at north of site

Surveyor 1:	Richard Poole/Trevor Fletcher (north side of the bridge)		
Surveyor 2:	Janine Burnham/Olga Krylova (south side of the bridge)		
Date:	19 <sup>th</sup> September 2019		
Feature/s being surveyed:	Under road crossing at north of site		
Time Start:	19:30	Time Finish:	21:32
Sunrise/sunset time:	19:22	Detectors used:	SSF Bat 2 Anabat Express and
Temperature Start (°C):	16	Temperature Finish (°C):	14
Cloud Cover Start (%):	30	Cloud Cover Finish (%):	-
Humidity Start (%)	67	Humidity Finish (%)	72
Wind Start (Beaufort):	2	Wind Finish:	2
Precipitation:	None		
Surveyor Location	Time	Species	Activity and Direction
1	19:37 to end of survey	Ppip and Ppyg	Flying up and down river corridor, foraging, low numbers
2	19:39 to end of survey	Ppip and Ppyg	Foraging and flying up and down river, Low numbers of bats (c7 observed)

## Culverts 1 and 3

Culvert 1			
SEPTEMBER 2019			
19th - 27th October SWIFT Sensitivity setting 15	19th/20th	19th/21st	SD CARDS FULL
	2587 files	258 files	
	All noise	All noise	

OCTOBER 2019				SD CARDS FULL
29th - 11th October SWIFT Sensitivity setting 16	3rd/4th	4th/5th	5th/6th	
	4584 files	1552 files	102 files	
	All noise	All noise	All noise	

Culvert 3					
SEPTEMBER 2019					
19th - 27th October SWIFT Sensitivity setting 16	19th/20th	24th/25th	25th/26th	27th/28th	SD CARDS FULL
	324 files	1040 files	12 files	39 files	
	All noise	All noise	All noise	All noise	

OCTOBER 2019						SD CARDS FULL
29th - 11th October SWIFT Sensitivity setting 16	29th/30th	3rd/4th	4th/5th	10th/11th	11th/12th	
	35 files	1098 files	3 files	587 files	1403 files	
	All noise	All noise	All noise	All noise	All noise	

REDSTART

St David's House  
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St Mellons  
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