Welsh Government

M4 Corridor around Newport

Environmental Statement Volume 3: Appendix 10.23

Bat Activity Surveys 2015

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CVJV/AAR
3rd Floor
Longross Court,
47 Newport Road,
Cardiff
CF24 0AD

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S.1 RPS (together with Thomson Ecology) has undertaken a bat activity survey of land along the route of the proposed M4 Corridor around Newport (M4CaN) between Castleton and Magor to inform the ecological baseline for the Environmental Impact Assessment (EIA) of the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the chapter on Ecology and Nature Conservation.

S.2 A suite of bat surveys previously undertaken by Arup on behalf of Welsh Government in 2014 is reported separately in Appendix 10.7 of the M4CaN Environmental Statement.

S.3 This report sets out the findings of the bat activity survey, which was undertaken from June to September 2015, inclusive, using standard methods as described in Bat Surveys Good Practice Guidelines (Hundt, 2012). Two types of surveys were undertaken; a survey of bat activity at linear features that would be crossed by the new motorway (primarily hedgerows and tree belts along reens and ditches) using static detectors; and manned dusk and dawn surveys at a number of underpasses and bridges crossing the existing M4 motorway.

S.4 A total of 104,575 bat passes was recorded during the course of the static detector surveys. The maximum level of bat activity was recorded during the first survey visit (carried out between 04 June and 22 July 2015).

S.5 The highest levels of bat activity recorded during each survey visit were from Locations 43, 13 and 27. Locations 43 and 27 are both situated near the western end of the proposed new section of motorway, both to the south of Duffryn. Location 13 was near Tatton Farm, to the east of Pye Corner. The majority of bat passes recorded in these areas were made by pipistrelles and other relatively common species.

S.6 Two detectors located in the central area of the proposed new section of motorway and at the western end did not record any bats during one or more of the survey visits.

S.7 The diversity of bat species recorded was consistently higher at the eastern end of the proposed new section of motorway around Llandevenny and Magor than the western end.

S.8 Lesser horseshoe bats were only recorded in the areas around Magor and Llandevenny in 2015. Activity levels for this species were highest during survey visit 1, with the levels observed in visits 2 and 3 being broadly similar (22 and 38 passes, respectively). The levels of lesser horseshoe bat activity in this area are generally comparable with those observed in 2014.

S.9 The underpass and bridge surveys undertaken demonstrate that the St Bride's Brook/public footpath underpass and the road underpasses at St Brides Road, The Elms and Bencroft Lane were regularly used by commuting bats. Species recorded were common and soprano pipistrelles and *Myotis* species commuting both north and south through the underpasses throughout the dusk and dawn surveys.

S.10 Only a small number of common pipistrelles were recorded commuting through the B4245 underpass during the dusk survey. No bats were recorded commuting

over the M4 motorway bridges at Pound Hill at Castleton and or Grange Road at Magor.

1 Introduction

1.1.1 RPS (together with Thomson Ecology) has undertaken a bat activity survey of land within the corridor of the new section of proposed M4 Corridor around Newport (M4CaN) between Castleton and Magor to inform the ecological baseline for the Environmental Impact Assessment (EIA) of the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the chapter on Ecology and Nature Conservation.

1.1.2 A suite of bat surveys previously undertaken by Arup on behalf of Welsh Government in 2014 is reported separately in Appendix 10.7 of the M4CaN ES. A review of that work was undertaken independently by Hyder (see Appendix 9.1 in the ES Scoping Report (ES Appendix 5.1)) and RPS (see ES Chapter 10). The conclusions of that review and the requirements for additional surveys in 2015 were set out in the Scope of Ecology Surveys Report (see Appendix 9.1 of the ES Scoping Report). This was discussed with Natural Resources Wales (NRW) and they were further consulted on the scope of the proposed surveys through consultation on the ES Scoping Report.

1.1.3 This document reports the findings of the bat activity survey which was undertaken from June to September 2015 inclusive, using standard methods as described in Bat Surveys Good Practice Guidelines (Hundt, 2012).

1.1.4 This report outlines the previous survey carried out and the reasons for this additional survey (Section 2), describes the methods used in the survey (Section 3) and the findings of the survey (Section 4). A discussion of the survey findings is provided in Section 5.

2 Previous Surveys

2.1 Introduction

2.1.1 The bat surveys undertaken by Arup in 2014 are reported in Appendix 10.7 of the M4CaN ES.

2.1.2 The key objectives of the bat surveys undertaken by Arup were as follows.

- To assess the potential of trees and buildings within the study area to support roosting bats.
- To record bat activity levels and make observations on bat behaviour on ten walked transects, sampling the habitats present within the study area.
- To record and identify the levels of bat activity at twenty locations spaced along the proposed route of the new section of motorway.
- To identify the range of species present and their relative abundance in terms of activity levels at these locations.

2.1.3 The study area for the purpose of the Arup surveys was based on a 500 m buffer around the physical extents of the scheme alignment studied in 2007/08, including the route alignment proposed at that time, potential junctions and water treatment areas. The preferred route announced by Welsh Government in July 2014 is located within the centre of this corridor.

2.1.4 This report only considers the results of the bat activity surveys undertaken by Arup in 2014. Appendix 10.7 of the ES considers the results of the assessments of buildings and trees carried out by Arup in 2014.

2.2 2014 Survey Method and Results

Walked Transect Surveys

2.2.1 Ten transects were walked during the 2014 bat surveys to sample habitats throughout the study area. Where possible, transects concentrated on the central part of the study area as this represents the area most likely to be affected by the new section of motorway.

2.2.2 The transects were walked from approximately the time of sunset (or shortly prior to sunset) for approximately one and a half to two hours. The transects were repeated once per month between April and October 2014, inclusive, in accordance with Table 7.2 of Hundt (2012). This corresponds to the requirements for a major infrastructure project in an area of medium quality habitat for bat species. Although it was acknowledged at the time of the 2014 surveys that some parts of the new section of motorway are likely to cross areas of high quality habitat for bats, such as the woodlands near Castleton, other areas, such as the more open areas of the Gwent Levels, are likely to be of lower quality. The medium level was therefore used to reflect the average quality of habitats across the new section of motorway as a whole. This approach to survey effort and the indicative transect routes were agreed with NRW prior to the commencement of the surveys.

2.2.3 The transects were carried out using Anabat SD1 or SD2 detectors connected to GPS receivers. All bats encountered were recorded and their locations noted using the GPS modules. Species identification was undertaken following completion of the transects using a combination of different software packages designed for analysing and identifying bat calls. The primary software used was Analook.

2.2.4 The walked activity transects recorded bats in all of the areas covered by the surveys. This included less optimal habitats, such as along the A48 corridor and the open fields to the west of the River Ebbw. The species encountered were generally common, with common pipistrelle (*Pipistrellus pipistrellus*) being the most frequently recorded. Less common species recorded include Leisler's bat (*Nyctalus leisleri*), serotine (*Eptesicus serotinus*) and Nathusius' pipistrelle (*Pipistrellus nathusii*). No horseshoe bats were recorded during the walked transect surveys.

2.2.5 Full details of the walked transect surveys completed in 2014 are provided in Appendix 10.7.

Static Detector Surveys

2.2.6 Static detectors were used in 2014 by Arup to assess bat activity. Two locations were selected at points on or near the route of each of the ten walked transects, giving a total of twenty locations within their study area. Wildlife Acoustic Song Meter 2 Ultrasonic Bat Detectors (SM2+BAT) were used to record bat activity for five consecutive nights in each month between April and October, inclusive. A total of ten detectors were used to cover the twenty locations with between four and ten detectors being used simultaneously. This level of survey effort was determined in accordance with Table 7.2 of Hundt (2012), as described in paragraph 2.2.2, above. This approach and the locations of the static detectors were agreed with NRW in April 2014.

2.2.7 The locations of the static detectors were selected using professional judgement to provide a representative sample of the different habitats present and to provide information on areas of known bat activity recorded during previous surveys undertaken in 2008.

2.2.8 More than 85,000 bat passes were recorded by the static detectors during the course of the survey. The level of bat activity encountered was variable across the study area, with the highest levels recorded at Location 6, which was sited in fields to the west of Lighthouse Road and Fair Orchard Farm. With an average number of 554.4 bat passes per night, activity levels at this monitoring location were approximately twice that of the sites with the next highest levels of activity.

2.2.9 The most commonly recorded species during the 2014 static detector surveys was common pipistrelle, with soprano pipistrelles (*Pipistrellus pygmaeus*) and *Myotis* species also frequently detected. Other notable species recorded include single passes of a barbastelle bat (*Barbastella barbastellus*) at Locations 13 and 14 (near Tatton Farm), small numbers of Nathusius' pipistrelle at Locations 13, 14 and 15 (near Tatton Farm) and lesser horseshoe bats (*Rhinolophus hipposideros*) at Locations 11 (near Pye Corner Laboratories), 15 (North Row), 16 (Bareland Street) and 19 (St Bride's Reen Culvert). A single greater horseshoe bat (*Rhinolophus ferrumequinum*) was recorded at Location 7 (Llandevenny) in October 2014.

2.2.10 Full details of the results of the static detector surveys carried out in 2014 are provided in Appendix 10.7

2.3 Desk Study

2.3.1 Arup undertook a desk study in relation to bats (and other species) as part of an extended Phase 1 habitat survey in 2014. The full report can be found in Appendix 10.2.

2.3.2 An updated desk study was undertaken by RPS in 2015. The search area used during this study in relation to bat species was based on a 5 km buffer around the existing M4 between Junctions 23 and 29 and the route of the proposed new section of motorway between the same junctions.

2.3.3 Requests for records of bat species from the last ten years within the study area were sent to South East Wales Biological Records Centre (SEWBReC).

2.3.4 The Joint Nature Conservation Committee (JNCC) website was consulted for details of any Special Areas of Conservation (SACs) within the study area for which bats are a qualifying feature. In addition, a request was made to NRW for the citation documents associated with all Sites of Special Scientific Interest (SSSIs) located within the study area. These were examined and those for which bats are a notified feature were identified. The Gwent Wildlife Trust website was consulted for details of their reserves.

2.3.5 Records of a total of thirteen bat species were returned from the data request to SEWBReC as occurring within 5 km of the new section of motorway. Bat species recorded include Daubenton's bat *Myotis daubentonii,* Whiskered bat *Myotis mystacinus*, Brandt's bat *Myotis brandtii ,* Natterer's bat *Myotis nattereri,* serotine *Eptesicus serotinus,* Lesser noctule *Nyctalus leisleri,* Noctule bat, *Nyctalus noctula*, Nathusius's pipistrelle *Pipistrellus nathusii,* Common Pipistrelle, *Pipistrellus pipistrellus,* Soprano Pipistrelle *Pipistrellus pygmaeus,* Brown long-eared bat *Plecotus auritus,* Greater horseshoe bat *Rhinolophus ferrumequinum* and Lesser horseshoe bat *Rhinolophus hipposideros.* A number of records were provided for bats not identified to species level, therefore these could have been other additional species.

2.3.6 Bats were recorded widely across the search area but the greatest concentrations of records were in the western half of the route. Many records were in clusters at locations around Cardiff, Rogerstone, Cwmbran, Newport, Llanber, Wentwood Reservoir and Magor Marsh.

2.3.7 Two SSSIs were identified within the study area for which bats are a notified feature. These are the River Usk (Lower Usk) SSSI, and the Ruperra Castle and Woodlands SSSI, which hosts breeding and hibernating colonies of greater horseshoe and lesser horseshoe bats.

2.3.8 Full details of the results of the desk study, including figures, are provided in Appendix 10.17.

2.4 Requirements for Further Survey

2.4.1 The 2014 bat surveys carried out by Arup recorded a range of bat species utilising the habitats within the study area.

2.4.2 In relation to bat activity, it was recommended that further survey work be undertaken to establish the main foraging areas and flight paths used by lesser horseshoe bats that may be roosting in the vicinity of the Scheme. Although it was suggested by Arup that this would likely require radio-tracking work to be carried out, it was subsequently agreed with NRW that there would be little merit in such an exercise.

2.4.3 Instead, it was agreed with NRW that additional surveys should focus on identifying key locations where bats may follow linear features for commuting and foraging and which may be intersected by the new section of motorway. These locations could then be surveyed using static detectors to determine the species of bats present and their relative levels of activity.

2.4.4 The results of these surveys would provide the information needed to identify the locations where safe crossing points would need to be provided across the new motorway. The results would not only inform the assessment of impacts on commuting and foraging bats but would also represent the baseline for future monitoring of the effectiveness of such mitigation (e.g. underpasses, over-sized culverts etc.).

3 2015 Survey Methods

3.1 Introduction

3.1.1 The bat activity survey was carried out over the period June to September 2015 inclusive, which falls within the optimum period for this type of survey.

3.1.2 The survey area was based upon the proposed alignment of the new section of motorway.

3.2 Methodology

Static Bat Detector Survey

Field Survey

3.2.1 The survey method was based on that described in the BCTs Bat Surveys Good Practice Guidelines (Hundt, 2012).

3.2.2 Based on the results of the 2014 surveys and on subsequent consultation with NRW, the focus of the bat activity monitoring in 2015 was to survey linear features, located in suitable habitat, which could be used for commuting and foraging by bat species (and in particular lesser horseshoe bats) and which could be severed by the new section of motorway.

3.2.3 A total of 50 such locations were selected along the proposed route of the new section of motorway. These were identified based on the results of the 2014 field surveys, the desk studies completed in 2014 and 2015 and using professional judgement. The locations selected included hedgerows, woodland edges and alongside reens.

3.2.4 Static detectors were used to record bat activity at the 50 selected locations. It was agreed with NRW that three 'survey visits' at these locations, each involving the static detectors being used for a period of five consecutive nights, would provide an adequate level of survey effort to monitor bat activity levels. The start and end dates for each of the three survey visits are provided in Table 3.1, below. With 50 monitoring locations, there was a degree of overlap between the Survey Visits, with some locations recording for the second survey visit, while others were recording for the third survey visit. However, the three visits were generally distinct enough to allow comparisons in activity levels to be made. The primary bat activity season was also fully covered by the three survey visits. A full record of the dates of monitoring at each of the 50 static detector locations is provided in Annex A.

Table 3.1: Survey Visit Monitoring Dates

Survey Visit	Start Date for Monitoring	End Date for Monitoring
1	04 June 2015	22 July 2015
2	02 July 2015	01 September 2015
3	30 July 2015	22 September 2015

3.2.5 Wildlife Acoustics SM2BAT+ detectors were used, with the devices programmed to begin recording bat activity one hour before sunset and to switch off one hour after sunrise.

3.2.6 The locations of the static detectors are shown on Figure 1. A full description of each location is provided in Annex B.

Data Analysis

3.2.7 The data analysis was undertaken by Sarah Hawes (Thomson Ecology), who has extensive experience in bat activity survey and call analysis. Any ambiguous calls were checked with a more experienced ecologist with over five years' experience in bat activity survey and call analysis.

3.2.8 The recorded bat activity data were downloaded from the detectors and processed using Kaleidoscope Pro Software (Version 3.1.4B). This software produced audio files (.wav) and zero crossing files. Using the accompanying classifier developed by Wildlife Acoustics, the processing included the automatic identification of species.

3.2.9 In order to ensure that the calls were correctly identified by the software and to identify any bat calls not recognised by the software, the files were also manually reviewed.

3.2.10 Kaleidoscope was used to automatically identify (auto ID) calls as an initial stage to assigning calls to bat species. It is known that the Kaleidoscope auto ID function cannot be relied upon, particularly for species other than pipistrelles. For this reason, during call analysis of the first 10 sm2 locations, all calls were manually verified, including pipistrelles, to check confidence in the Kaleidoscope auto ID.

3.2.11 Following this confidence test, for all other locations, 5% of all auto-identified common and soprano pipistrelle calls (those scored with the least confidence of being correct species match) were manually checked. If a high proportion of these were found to be incorrectly auto-labelled, then all the pipistrelle calls at that location would be manually checked.

3.2.12 All other species and noise files were manually verified with any ambiguous calls checked by a more senior Thomson Ecology ecologist, Rob Corcoran, who has over five years' experience of conducting and managing bat activity surveys. If identification of any ambiguous calls were still uncertain, these were labelled as unidentified (un-ID).

3.2.13 Because of the difficulty of identifying *Myotis* bat species, bat calls from the *Myotis* genus were grouped together and manually labelled as *Myotis* species.

3.2.14 Kaleidoscope was found to overcompensate for rare species and so as these and all noise files were all manually identified it is unlikely that rare species were missed or mis-identified.

3.2.15 Calls were manually checked using Kaleidoscope and Analook. Calls were compared to the five call features as described in British Bat Calls (Russ 2012) to verify that a species ID was correct. Websites and other books were also reviewed if required. A second opinion by the more senior ecologist above was

provided for ambiguous calls and rare species such as barbastelles in order to manually label with reasonable certainty.

3.2.16 Bat passes were counted and used to quantify activity. A bat pass was defined as an unbroken stream of echolocation calls on a recorded file. Within each file the species of bat present was identified (at times this was more than one) and labelled appropriately. This means that within the output table those files where more than one species is present would count for more than one pass, i.e. one pass for each species present.

Underpass/Bridge Surveys

3.2.17 In addition to the static bat detector surveys, bat activity surveys were undertaken on several underpasses and road bridges that cross the existing M4 to determine whether these are used as commuting routes by bats (in particular, lesser horseshoe bats).

3.2.18 A number of locations were surveyed. A description of the locations and dates of the surveys are provided in Table 3.2 below. The survey locations are shown on Figure 1.

Table 3.2: Underpass/Bridge Survey Details

Location	Description	Visit 1	Visit 2	Visit 3
St Bride's Road	Single lane concrete underpass under M4. Hedgerows at both entrances, 2 m eastern road edge, 8 m western road edge, running parallel with both entrance roads.	24 Aug 2015	9 Sept 2015	21 Sept 2015
St Bride's Brook/Public Footpath Underpass	Footpath and St Bride's Brook underpass under M4. Tall dense hedgerows and plantation woodland present at both entrances.	9 Sept 2015	21 Sept 2015	22 Sept 2015
The Elms	Single lane concrete underpass under M4. Two metre managed hedgerows at both entrances, running parallel with both entrance roads.	20 Aug 2015	2 Sept 2015	7 Sept 2015
Bencroft Lane	Single road, passing through two separate road bridges, crossing M48 slip roads onto M4. Plantation woodland in central reservation, approximately 60	18 Aug 2015	4 Sept 2015	8 Sept 2015

Location	Description	Visit 1	Visit 2	Visit 3
	years old			
Pound Hill	Two lane road bridge over M4. Plantation woodland approximately 60 years old on M4 road verges.	3 Sept 2015	10 Sept 2015	23 Sept 2015
B4245	Two lane road underpass under M4. Plantation woodland, approximately 60 years old along M4 road verges.	20 Aug 2015	3 Sept 2015	9 Sept 2015
Grange Road	Two lane road bridge over M4. Plantation woodland, approximately 60 years old on M4 road verges.	25 Aug 2015	1 Sept 2015	8 Sept 2015

3.2.19 Bat surveys were undertaken in accordance with the best practice guidelines and recommendations as discussed below (Hundt, 2012). Surveys were undertaken during the optimum period, however a little late to pick up peak commuting from maternity roosts (May – August).

3.2.20 Three dusk or dawn surveys were undertaken at each of the underpass/bridge locations to determine whether the structures are being used as commuting routes across the existing M4.

3.2.21 Only bats crossing the road safely from one side to the other were considered. Those crossing the motorway at other locations, such as over the road rather than through an underpass or over a bridge, were not monitored as it was considered that these were not using the bridge as a commuting route.

3.2.22 The use of a bridge was defined as bats flying over it within two metres or just above to cross the motorway. The use of the underpass was defined as bats commuting through the underpass to the other side of the motorway.

3.2.23 Dusk surveys commenced half an hour before sunset and continued until approximately two hours after sunset.

3.2.24 Dawn surveys commenced one and a half hours before sunrise and ended at sunrise (or fifteen minutes after the last bat was recorded if bats were present at sunrise).

3.2.25 All surveys were carried out during suitable weather conditions for undertaking bat surveys.

3.2.26 During each survey visit, the underpass/bridge was surveyed continuously by suitably experienced ecologists stationed at either end within the underpass or on the bridge. The number of bats entering and passing through the underpass or across the bridge was noted in addition to the direction from which they had appeared.

3.2.27 Bat detectors Bat Box Duets were used to record echolocation calls from any bats using the underpasses/bridges to assist with species identification. The data recorded were subsequently analysed on computer using BatScan v.9, Analook and Adobe Audition software.

3.3 Limitations

3.3.1 There were five occasions when static detectors malfunctioned, meaning that the devices did not record for the full five nights required. Details of these occasions are provided in Table 3.3, below.

Table 3.3: Static Detector Operational Errors

Detector Location	Visit Number	Start Date and Time	End Date and Time	Approximate Recording Deficiency
3	2	23/07/2015 20:30	28/07/2015 02:59	3 hours
38	2	16/07/2015 20:30	20/07/2015 00:28	1.5 nights
5	3	20/08/2015 20:00	23/08/2015 05:59	2 nights
10	3	03/09/2015 19:30	08/09/2015 00:58	5 hours
21	3	27/08/2015 19:30	29/08/2015 03:13	3.25 nights
31	3	17/09/2015 19:00	21/09/2015 02:59	1.25 nights
44	3	09/09/2015 19:30	13/09/2015 23:59	7.5 hours

3.3.2 In response to the loss of recording time as a result of these errors, a fourth survey visit was undertaken at Locations 5, 10, 21 and 38, to make up for the deficiency in the data recorded. With a maximum of only three hours of missing data from detector Location 3, it was not considered necessary to undertake further monitoring at this point. Similarly, with only around 7.5 hours of missed recording at Location 44, and with several other detectors in operation around Location 31, it was not considered necessary to undertake further monitoring at these points.

3.3.3 Therefore, following the completion of the additional survey visit carried out to compensate for the lost time resulting from the detector malfunctions described in Table 3.3, it is not considered that these occurrences led to any limitations to the reliability of the results of the bat activity survey.

3.3.4 No monitoring was undertaken at Location 40 during survey visit 3. Furthermore, no monitoring was undertaken at Locations 11, 12, 13, 14, 15 or 16 during survey visit 3. These surveys were not carried out after a series of unsavoury incidents led to health and safety concerns in the area around Pye Corner, where these detectors were sited. Although this means that the amount of data collected at these locations in 2015 was somewhat reduced, at least two survey visits were completed for Locations 11, 12, 13, 14 and 15. Moreover, a number of other detectors were also used near to Location 40, thus providing some information of the likely levels of bat activity in this area. In addition, several static detectors

were used in this area during the 2014 surveys, meaning that further relevant data regarding bat activity are also available. It is not considered, therefore, that the lack of monitoring at these locations will have had a significant effect on the reliability of the results of the bat activity surveys.

3.3.5 During the analysis of the static detector data it was noticed that there was a lack of bat calls at some locations during some visits. It was found that the microphone within one of the detectors used had detached internally after the first survey. Since this was only discovered outside the survey season after the surveys had been completed, the surveys could not be repeated.

3.3.6 A list of the surveys affected by this is provided in the table below. Further discussion and tables within this report have been marked as 'No detector (N/D)' where this applies and averages for each locations have been calculated using the 1 or 2 survey visits for which data are available. The result of these errors is that some locations will only have five or ten night's worth of data rather than the recommended 15 nights.

Table 3.4: Static Detector Errors

Detector Location	Visit Number
4	2 & 3
7	3
17	1
22	2 & 3
23	1
25	3
26	3
31	1
32	3
42	2
43	3
47	1
48	2
49	3

3.3.7 There are many limitations to bat call recording and analysis. The identification of bat calls can differentiate based on the decisions made by the analyst on the shape and characteristics of the calls.

3.3.8 It is not always possible to differentiate between the *Myotis* species due specific call variation and intra specific overlap in call structure. Therefore *Myotis* species have been grouped together as they have very similar echolocation calls and identification from their calls alone is often not possible.

3.3.9 Also, in some cases noctule, serotine and Leislers bat species have been grouped together as again the overlap in call parameters makes it very difficult to distinguish between the species during data analysis. Therefore if the call is definitely not one of these species, then it in placed in this group.

3.3.10 There are differences in the likelihood of the detection of bat species which must be taken into account in the interpretation.

3.3.11 Some bats are quieter and more directional than others, such as horseshoe bats and brown long eared and less likely to be recorded during stationary detector surveys.

3.3.12 It must be considered that there is a possibility of under recording or mis-identification of bat calls.

4 Results

4.1 Introduction

4.1.1 The results of the static detector bat activity surveys are described below in terms of the species present and the number of bat passes recorded during each of the three survey visits.

4.1.2 A summary of the overall levels of bat activity recorded during the survey is provided, highlighting any notable species encountered as well as those areas of the new section of motorway most frequently used by bats.

4.1.3 The full results of the static detector surveys in terms of the numbers of bat passes recorded at each location during each survey visit are presented in Tables C1 –C4 in Annex C. Graphs illustrating the results are provided in Annex D.

4.1.4 The results of the bat activity surveys at each underpass/bridge location are discussed below. Full results are provided in Annex E.

4.2 Results

Static Bat Detector Survey

Survey Visit 1

4.2.1 A total of 38,915 bat passes was recorded from the 50 static detector locations, with bats present along the length of the proposed new section of motorway. Including the groupings of pipistrelle and *Myotis* species, ten species of bats were recorded during survey visit 1.

4.2.2 The most commonly recorded species were pipistrelles, accounting for 35,851 bat passes (approximately 92% of the total bat activity). *Myotis* species were also frequently encountered (1,875 passes), with records from almost all of the detector locations. Noctules (*Nyctalus noctula*) were commonly recorded (871 passes) and were present at the majority of the detector locations, with a peak activity level of 94 passes at Location 34. Brown-long eared (*Plecotus auritus*) and Leisler's bats (*Nyctalus leisleri*) were recorded in relatively low levels at 21 and 19 detector locations, respectively. The majority of recordings for these two species were made in the area near the eastern end of the new section of motorway around Magor and Llandevenny.

4.2.3 The highest levels of bat activity were recorded at Location 43, situated beside Old Dairy Reen between Old Dairy Farm and Whitecross Farm to the south of Duffryn. A total of 4,288 bat passes were recorded at this location. 4,241 of these were made by pipistrelles, with only small numbers of *Myotis* species and noctules also being recorded. Therefore, despite the high levels of activity at this location, species diversity was relatively low.

4.2.4 The highest level of species diversity was recorded by the detector at Location 2, near Llandevenny near the eastern end of the new section of motorway, which recorded a total of eight different species, including barbastelle, serotine, *Myotis*

sp., Leisler's bat, noctule, pipistrelle species, brown long eared bat and lesser horseshoe bat.

4.2.5 No recordings of bats were made by the detectors at Locations 45, 49 and 50. All of these locations were situated in the centre of the new section of motorway.

4.2.6 Barbastelle bats (*Barbastella barbastellus*) were identified at Location 2, to the west of Magor, with a total of four passes recorded, and at Location 38, to the south of the Solutia Chemical Works, with a single pass recorded.

4.2.7 Serotines (*Eptesicus serotinus*) were recorded by a total of eight of the static detectors. Recordings were made at Locations 2, 6, 9, 25, 26, 29, 36 and 41. The levels of activity ranged from single passes to a maximum of three passes at Location 26, near the western end of the new section of motorway at Coedkernew. Low levels of serotine activity were therefore recorded along the length of the route.

4.2.8 Several *Myotis* species were recorded during Visit 1, in most locations (1-16, 18-22, 24-30, 32-44 and 46-48) but none could be accurately identified to species level as their calls are very similar in structure and the variation observed between species may be due to the habitat in which the species occurs. Therefore the confidence in correct species identification is low (Russ, 2012).

4.2.9 Nathusius' pipistrelles (*Pipistrellus nathusii*) were recorded at Location 26 (two passes) and Location 41 (one pass). Both of these locations are situated towards the western end of the new section of motorway, with Location 41 sited just to the west of the River Ebbw.

4.2.10 A total of 68 lesser horseshoe bat passes were recorded during Visit 1. Recordings were made by the static detectors at Locations 1, 2, 3, 4, 6, 9, 10, 32, 35, 36 and 37. All of these are located at the eastern end of the new section of motorway in an area which follows the existing A4810 road, extending from just south of Gwent Europark to the west of Magor (see Figure 1). The level of lesser horseshoe bat activity recorded at each location ranged from single passes at Locations 9 and 10 to sixteen passes at Location 1. From the data analysis it is assumed that these passes were a series of bats commuting along the hedgerow.

Survey Visit 2

4.2.11 A total of 35,185 bat passes was recorded from the 50 static detector locations, with bats present along the length of the proposed new section of motorway. Including the groupings of pipistrelle and *Myotis* species, nine species of bats were recorded during survey visit 2.

4.2.12 The most commonly recorded species were pipistrelles, accounting for 31,851 bat passes (approximately 91% of the total bat activity). *Myotis* species were also frequently encountered (1,903 passes), with records from almost all of the detector locations. Noctules were commonly recorded (1,127 passes) and were present at the majority of the detector locations, with a peak activity level of 331 passes at Location 33. Brown-long eared and Leisler's bats were recorded in relatively low levels at fifteen and twenty detector locations, respectively. Unlike survey visit 1, the records of these two species were more widely distributed along the length of the proposed new section of motorway.

4.2.13 The highest levels of bat activity were recorded at Location 13, near Tatton Farm, just to the east of Pye Corner. A total of 3,682 bat passes were recorded at this location. As in Visit 1, however, these were made by only three species, with pipistrelles accounting for 3,666 of the passes, *Myotis* species accounting for four passes and noctules accounting for twelve passes.

4.2.14 The highest level of species diversity was recorded at Location 33, again situated near the eastern end of the proposed new section of motorway, which recorded a total of at least seven species, including serotine, *Myotis sp*., Leisler's bat, noctule, Nathusius pipistelle, pipistrelle species and brown long eared bat. High levels of diversity were also recorded at Locations 3, 7, 8, 10, 33 and 34.

4.2.15 No recordings of bats were made by the detectors at Locations 22, 28 and 47.

4.2.16 Barbastelle bat activity was slightly lower during Visit 2 than Visit 1, with only two passes being recorded (compared to five during the previous survey visit). Barbastelles were only recorded at Location 3, which was situated beside the A4810 to the east of Llandevenny.

4.2.17 The levels of serotine activity during Visit 2 increased in comparison to Visit 1. For this species, a total of 28 passes were recorded during Visit 2, compared to thirteen passes in Visit 1. As in Visit 1, serotine activity was recorded by static detectors along the full length of the proposed new section of motorway, with a maximum of nine passes recorded at Location 43, adjacent to Old Dairy Reen. However, despite the apparently wide distribution of this species, serotines were recorded on more static detectors near the eastern end of the new section of motorway, than the western end of the new section of motorway.

4.2.18 Several *Myotis* species were recorded during Visit 2, but none could be accurately identified to species level as their calls are very similar and confidence in correct identification is low.

4.2.19 Only three passes by Nathusius' pipistrelles were recorded during Visit 2. Single passes of Nathusius' pipistrelles were recorded at Locations 15 and 30. This is fairly consistent with the recordings made of this species in Visit 1, which were located in the central and western parts of the proposed section of new motorway. However, unlike in Visit 1, a single pass of Nathusius' pipistrelle was also recorded around the eastern end of the new section of motorway, at Location 10.

4.2.20 In contrast to the majority of other species, the level of activity of lesser horseshoe bats was reduced in Survey Visit 2 compared to Survey Visit 1. In total, 22 passes were identified, with all recordings made by detectors situated near the eastern end of the Scheme. The maximum number of passes recorded was fourteen at Location 33, adjacent to the A4810 to the west of Magor.

Survey Visit 3

4.2.21 A total of 29,757 bat passes was recorded from the 50 static detector locations, with bats present along the length of the proposed new motorway. Including the groupings of pipistrelle and *Myotis* species, nine species of bats were recorded during Survey Visit 3.

4.2.22 The most commonly recorded species were pipistrelles, accounting for 25,310 bat passes (approximately 85% of the total bat activity). *Myotis* species were

also frequently encountered, with the highest number of passes of all three survey visits being recorded (3,237). Noctules were commonly recorded (840 passes) and were present at the majority of the detector locations, with a peak activity level of 196 passes at Location 18. Brown-long eared and Leisler's bats were recorded in relatively low levels at eighteen and seventeen detector locations, respectively. Records of both species were made along the length of the proposed section of new motorway.

4.2.23 The highest levels of bat activity were recorded at Location 27, near The Stud Farm, south of Coedkernew, towards the western end of the new section of motorway. A total of 6,613 bat passes were recorded at this location. As in Visits 1 and 2, the majority of these (6,179 passes) were pipistrelles. However, serotines, *Myotis* species, noctules and brown long-eared bats were also recorded by this detector.

4.2.24 The highest levels of species diversity were recorded again by the detectors located near the eastern end of the proposed new section of motorway. The greatest number of species recorded by a single detector was eight, at Location 33, including serotine, *Myotis* sp., Leislers bat, noctule, Nathusius pipistelle, pipistrelle species, brown long eared bat and lesser horseshoe bat. Relatively high levels of species diversity were encountered at Locations 3, 5, 8, 9, 10 and 37.

4.2.25 A total of twelve serotine passes were recorded during Visit 3. All of these records were made at the eastern end of the new section of motorway, around Magor, and at the very western end of the route, around Duffryn. There were no recordings of this species from locations in the central parts of the proposed new section of motorway.

4.2.26 Several *Myotis* species were recorded during Visit 3, but none could be accurately identified to species level as their calls are very similar and confidence in correct identification is low.

4.2.27 Six passes by Nathusius' pipistrelles were recorded during Survey Visit 3. Single passes were recorded at Locations 1 and 33, near the eastern end of the new section of motorway, while three passes were recorded at Location 42, to the south west of Duffryn. A single pass was also recorded at Location 45, just south of the railway line, near Duffryn.

4.2.28 A total of 38 passes of lesser horseshoe bats were recorded. As in Visits 1 and 2, these were all made at the eastern end of the new section of motorway in the areas around Llandvenny and Magor. The maximum number of passes recorded at single detectors was fourteen, at Locations 9 and 33.

Survey Visit 4

4.2.29 As discussed in Section 3, a fourth survey visit was carried out at static detector Locations 5, 10, 21 and 38 to make up for lost survey time resulting from device malfunctions.

4.2.30 Including the groupings of pipistrelle and *Myotis* species, seven species of bats were recorded during Visit 4. A total of 718 bat passes were recorded from the four static detector locations.

4.2.31 The most commonly recorded species were pipistrelles, accounting for 526 bat passes (approximately 73% of the total bat activity). *Myotis* species were present at Locations 5 and 21, with a total of 175 passes recorded. Five passes by noctules were recorded at Location 5, with a single pass also recorded at Location 21. Two passes of brown long-eared bats were recorded at both Location 5 and Location 21.

4.2.32 The highest levels of bat activity were recorded at Location 5, to the east of Llandevenny, near the eastern end of the new section of motorway. A total of 457 bat passes were recorded at this location, although this was predominantly comprised of pipistrelles.

4.2.33 The highest levels of species diversity were also recorded Location 5.

4.2.34 It was not possible to distinguish to species level from the calls recorded, but two passes by either Leisler's bats and/or serotines were made at Location 5.

4.2.35 Two Nathusius' pipistrelle passes were also recorded at Location 5.

4.2.36 A single lesser horseshoe bat pass was recorded at Location 5.

Underpass/Bridge Surveys

St Bride's Road

4.2.37 Activity surveys were undertaken at dusk on each of the evenings of 24 August, 09 and 21 September 2015.

4.2.38 On 24 August, one common pipistrelle was observed commuting through the underpass from south to north. Several other common and soprano pipistrelles and *Myotis* bats were observed entering the underpass at both the southern and northern ends to forage but left at the same end as the point of entry and were not believed to have used it for commuting purposes.

4.2.39 On 09 September 2015, three common pipistrelles passed through the underpass in a north to south direction. Throughout the survey several common and soprano pipistrelles were observed foraging around the entrances at both the northern and southern ends of the underpass and it is considered likely that some of these bats passed through, but were not seen.

4.2.40 In addition to further common and soprano pipistrelles, *Myotis* bats were recorded later on during the survey, but it is not known whether any of these bats passed through as it was too dark to accurately observe their movement.

4.2.41 On 21 September 2015, common and soprano pipistrelles were observed foraging within the underpass and commuting through the underpass from both the north and south.

4.2.42 At least six common pipistrelles, three soprano pipistrelles and one *Myotis* bat were recorded commuting from north to south through the underpass. One common pipistrelle was seen commuting in a south to north direction through the underpass.

4.2.43 A number of bats including common and soprano pipstrelles and *Myotis* bats were recorded at the northern end of the underpass later in the evening, but were not seen so it is not known whether they passed through the underpass.

St Bride's Brook/Public Footpath Underpass

4.2.44 Activity surveys were undertaken at dusk on each of the evenings of 09, 21 and 22 September 2015.

4.2.45 Common and soprano pipistrelles and *Myotis* species were recorded commuting and foraging through the underpass from both the north and south during all three surveys.

4.2.46 On 09 September 2015, at least nine common pipistrelles were observed commuting through the underpass from south to north. Later on during the survey, two *Myotis* bats passed through heading northwards. A number of further *Myotis* bats were recorded in the underpass but the direction of flight was not known due to it being too dark. One common pipistrelle and one *Myotis* bat were observed commuting southwards through the underpass.

4.2.47 On 21 September 2015, ten common pipistrelles, seven soprano pipistrelles and three *Myotis* bats commuted from south to north through the underpass and six common pipistrelles, four soprano pipistrelles and four *Myotis* bats commuted from north to south through the underpass. A number of *Myotis* bats were also recorded near the end of the survey but their direction of flight was unknown.

4.2.48 On 22 September 2015, one common pipistrelle, one soprano pipistrelle and four *Myotis* bats were recorded commuting from south to north through the underpass, while two soprano pipistrelles and two *Myotis* bats were recorded commuting from north to south through the underpass. Although only a small number of individuals was observed commuting through the underpass, several bats were recorded foraging within the tunnel. However, it was not possible to observe their direction of flight.

The Elms

4.2.49 Activity surveys were undertaken on 20 August (at dusk), 02 September (at dawn) and 07 September 2015 (at dusk).

4.2.50 Common and soprano pipistrelles and *Myotis* species were recorded during the dusk survey on 20 August 2015. Five common pipistrelles, one soprano pipistrelle and one *Myotis* bat were observed commuting south to north through the underpass. Eleven common pipistrelles, two soprano pipistrelles and two *Myotis* bats were observed commuting north to south through the underpass.

4.2.51 Several other common and soprano pipistrelle and *Myotis* bat passes were recorded during the survey but were either made by foraging individuals at the entrances of the underpass or were made by bats that were unseen and their direction of flight is unknown.

4.2.52 No bats were recorded using the underpass during the dawn survey on 02 September 2015. Only one common pipistrelle was recorded during the survey, at the southern end of the underpass.

4.2.53 During the dusk survey on 07 September 2015, ten common pipistrelles, two soprano pipistrelles and two *Myotis* bat passes were recorded within the underpass at the southern entrance. Most were heard but not seen, however a small number of the pipistrelles were observed foraging at the southern entrance.

Bencroft Lane

4.2.54 Activity surveys were undertaken on 18 August (at dusk), 04 September (at dawn) and 08 September 2015 (at dusk).

4.2.55 During the dusk survey on 18 August 2015, six common pipistrelles and one *Myotis* bat commuted north to south through the underpasses and one common pipistrelle commuted south to north.

4.2.56 Several other common pipistrelle and *Myotis* bats were recorded but not seen during the survey and a brief soprano pipistrelle pass was recorded during the survey but not observed.

4.2.57 No bats were recorded during the dawn survey on 04 September 2015.

4.2.58 Four bats were recorded on the dusk survey undertaken on 08 September 2015. Two common pipistrelles and one unknown bat passed northwards through the underpass and two common pipistrelles passed southwards.

Pound Hill

4.2.59 Activity surveys were undertaken on 03 September (at dusk), 10 September (at dawn) and 23 September 2015 (at dawn). No bats were recorded commuting over the bridge during any of the surveys.

4.2.60 Common pipistrelles were observed foraging within the trees along the road verges on the 03 and 10 September 2015 surveys. A couple of soprano pipistrelles were also recorded but not observed within the trees during the survey on 03 September 2015.

4.2.61 No bats were recorded either using the bridge or in the nearby area during the survey on 23 September 2015.

B4245

4.2.62 Activity surveys were undertaken on 20 August (at dusk), 03 September (at dawn) and 09 September 2015 (at dawn).

4.2.63 On 20 August, single common pipistrelles were observed commuting under the bridge from east to west and from west to east. No other bats were observed commuting under the bridge, although *Myotis* and noctule bats were recorded foraging at the entrance to the bridge or within surrounding scrub habitat.

4.2.64 No bats were recorded during the dawn surveys on 03 or 09 September 2015.

Grange Road

4.2.65 Activity surveys were undertaken on 25 August (at dusk), 01 September (at dusk) and 08 September 2015 (at dawn).

4.2.66 Common pipistrelles were the only species recorded during the dusk surveys on 28 August and 01 September 2015. All were recorded within the trees surrounding the bridge and none were recorded flying over the structure.

4.2.67 Noctules were the only species recorded during the dawn survey on 08 September 2015. They were also all recorded within the trees surrounding the bridge and none were recorded flying over the bridge.

5 Discussion

5.1 Introduction

5.1.1 This section discusses the main findings of the static detector and bridge/underpass bat activity surveys, making reference to the results of the 2014 surveys carried out by Arup. It sets out the key considerations for the Scheme.

5.2 Survey Findings

Static Bat Detector Survey

5.2.1 A total of 104,575 bat passes was recorded during the course of the static detector surveys. The maximum level of bat activity was recorded during the first survey visit (carried out between 04 June and 22 July 2015).

5.2.2 Table 5.2 summarises the count data and ranks the average counts at each location, based on the methodology adopted in 2014 bat activity survey (Appendix 10.7). The relative level of bat activity (number of passes per visit) is illustrated using the colour codes below and the locations shown on Figure 2.

Table 5.1: Relative Level of Bat Activity (per survey visit)

0-25
25-50
50-100
100-250
250-500
500-1500
>1500

Table 5.2: Level of bat activity at stationary detector location

Detector Location	Average	Relative level of bat activity (per survey visit)
1	608	500-1500
2	76	50-100
3	140	100-250
4	1174	500-1500
5	2644	>1500
6	344	250-500
7	397	250-500
8	1246	500-1500
9	416	250-500
10	597	500-1500
11	180	100-250
12	657	500-1500

Detector Location	Average	Relative level of bat activity (per survey visit)
13	469	250-500
14	800	500-1500
15	709	500-1500
16	576	500-1500
17	485	250-500
18	743	500-1500
19	440	250-500
20	265	250-500
21	308	250-500
22	1053	500-1500
23	1899	>1500
24	104	100-250
25	2290	>1500
26	317	250-500
27	2698	>1500
28	371	250-500
29	1517	>1500
30	168	100-250
31	158	100-250
32	716	500-1500
33	575	500-1500
34	1334	500-1500
35	204	100-250
36	756	500-1500
37	890	500-1500
38	1663	>1500
39	1096	500-1500
40	2294	>1500
41	112	100-250
42	2603	>1500
43	2655	>1500
44	663	500-1500
45	137	100-250
46	1082	500-1500
47	45	25-50
48	22	0-25
49	207	100-250
50	43	25-50

5.2.3 The highest levels of bat activity recorded during each survey visit were from Locations 43, 13 and 27, respectively. Locations 43 and 27 are both situated near the western end of the new section of motorway, both to the south of Duffryn. Location 13 was sited near Tatton Farm, to the east of Pye Corner. These results are broadly consistent with those of the 2014 survey when three of the four detector locations that recorded the highest levels of activity were located in areas to the south of Duffryn. However, as in the current study, the majority of bat passes recorded in these areas were made by pipistrelles and other relatively common species.

5.2.4 Nine locations had an average number of bat passes per survey visit greater than 1500. These spread across the entire length scheme and located at 5 (Llandevenny), 23, 25 (near Berryhill farm), 27, 29 (Coedkernew) 38, 40 (south of Solutia), 42 and 43 (Whitecross Farm).

5.2.5 Eighteen locations had between 500-1500 average numbers of bat passes per visit. Four of these are located west of the River Usk, five around the Pye Corner area and the remaining nine locations at the eastern end of the new section of motorway around Llandevenny and Magor.

5.2.6 Ten locations had between 250-500 average numbers of bat passes per visit, nine had between 100-250, one 50-100, two 25-50 and one 0-25. These locations are spread along the route of the new section of motorway.

5.2.7 Although the peak numbers of bat passes recorded by the detectors towards the eastern end of the new section of motorway were lower than those from the western end, it should be noted that consistently high levels of activity were recorded in this area. In contrast, two detectors located in the central area of the proposed new section of motorway did not record any bats at all during one or more of the survey visits (Locations 28 and 50).

5.2.8 The diversity of bat species recorded was consistently highest at the eastern end of the new section of motorway around Llandevenny and Magor. Although serotines were recorded along the length of the route, the levels of activity of this species were relatively low away from the eastern end. Similarly, Nathusius pipistrelles were recorded in very low levels in the central and western parts of the new section of motorway. By comparison, relatively high levels of activity of all of these species together with others including barbastelles and lesser horseshoes were recorded consistently in the areas around Magor at the eastern end of the new section of motorway.

5.2.9 These results are somewhat different to those of the 2014 surveys. For example, in 2014, low numbers of barbastelles and Nathusius' pipistrelles were recorded along the entire length of the proposed new section of motorway, including in the central and western areas. In contrast, serotines, which were recorded fairly consistently along the length of the route in 2015, were only recorded at three detector locations in three of the seven survey visits carried out in 2014. Two of these were situated to the south east of Duffryn while the other was located to the south west of Magor.

5.2.10 Lesser horseshoe bats were only recorded in the areas around Magor and Llandevenny in 2015. Activity levels for this species were highest during Visit 1, with the levels observed in Visits 2 and 3 being broadly similar (22 and 38 passes, respectively). The levels of lesser horseshoe bat activity in this area of

the new section of motorway were generally comparable with those observed in 2014.

5.2.11 In 2014, lesser horseshoe bats were also recorded in the area around Pye Corner, which is more centrally located in relation to the proposed new section of motorway. No lesser horseshoe bats were recorded in this area in 2015. The 2014 surveys also recorded lesser horseshoe bats at locations to the south of the Tata Steelworks which was not included in the 2015 surveys. No lesser horseshoe bats were recorded in the western half of the new section of motorway in either 2014 or 2015.

5.2.12 A single greater horseshoe bat was near Whitecross Farm recorded in 2014. This species was not recorded during the 2015 static detector surveys.

Underpass/Bridge Survey

5.2.13 The surveys undertaken demonstrate that the St Bride's Brook/Public Footpath underpass and the underpasses at St Bride's Road, The Elms and Bencroft Lane were regularly used by commuting bats. Common and soprano pipistrelles and *Myotis* sp. were recorded commuting through the underpass both north and south throughout the dusk and dawn surveys. Across all surveys, the numbers of bats commuting southwards through the M4 underpasses was slightly greater than bats traveling northwards.

5.2.14 Only a small number of common pipistrelles were recorded commuting through the B4245 underpass during the dusk survey. No bats were recorded during either of the dawn surveys.

5.2.15 No bats were seen commuting over the M4 motorway bridges located at Pound Hill and Grange Road.

5.2.16 Generally bat activity during the dawn surveys at the M4 crossing survey locations was significantly lower than during the dusk surveys.

5.3 Key Considerations

5.3.1 Survey locations with a large number of average bat passes (>1500) and those areas that have more than 2500 bats passes in any one visit are considered to be the most important commuting and foraging routes. These areas would be dissected by the new section of motorway and therefore mitigation measures should be considered to retain the connectivity.

5.3.2 The locations with an average number of bat passes per survey visit (consisting of 5 nights) greater than 1,500 include 5 (Llandevenny), 23, 25 (near Berryhill farm), 27, 29 (Coedkernew) 38, 40 (south of Solutia) and 42, 43 (Whitecross Farm).

5.3.3 The locations that have more than 2,500 bat passes in any one visit (consisting of 5 nights) are 5, 8 (near Llandevenny), 13 (near Tatton farm) 23, 25, 27 (near Berryhill farm), 29 (Coedkernew), 42 and 43 (near Whitecross farm).

5.3.4 The area from Pye Corner eastwards to Magor is considered to be the most important for Lesser Horseshoe bats. The information from both the static detectors and underpass surveys should be used to determine mitigation

measures and the locations of the proposed mammal passes along the new section of motorway.

References

Hundt (2012) Bat Surveys Good Practice Guidelines. Bat Conservation Trust. London.
Russ (2012) British Bat Calls A Guide to Species Identification. Pelagic Publishing, Exeter

Figures

Legend

- 2014 static bat detector locations
- 2015 static bat detector locations
- Underpass / bridge locations
- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

6 - Static bat detector reference number

The scheme shown reflects the design at time of survey

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Welsh Government

Appendix 10.23: Bat Activity Survey

Bat Activity Survey 2015

Figure: 1a	Revision: -
Date: March 2016	Status: AT ISSUE
Drawn: AVG	Checked: AR

Scale: A3 @ 1:15,000
0 250 500 m

N

dwg ref: 8235-0226-09

dwg ref: 8235-0226-09 Contains Ordnance Survey data © Crown copyright and database right 2015

Legend

- 2014 static bat detector locations
- 2015 static bat detector locations
- Underpass / bridge locations
- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

6 - Static bat detector reference number

The scheme shown reflects the design at time of survey

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Appendix 10.23: Bat Activity Survey

Bat Activity Survey 2015

Figure: 1b	Revision: -
Date: March 2016	Status: AT ISSUE
Drawn: AVG	Checked: AR

Scale: A3 @ 1:15,000
0 250 500 m

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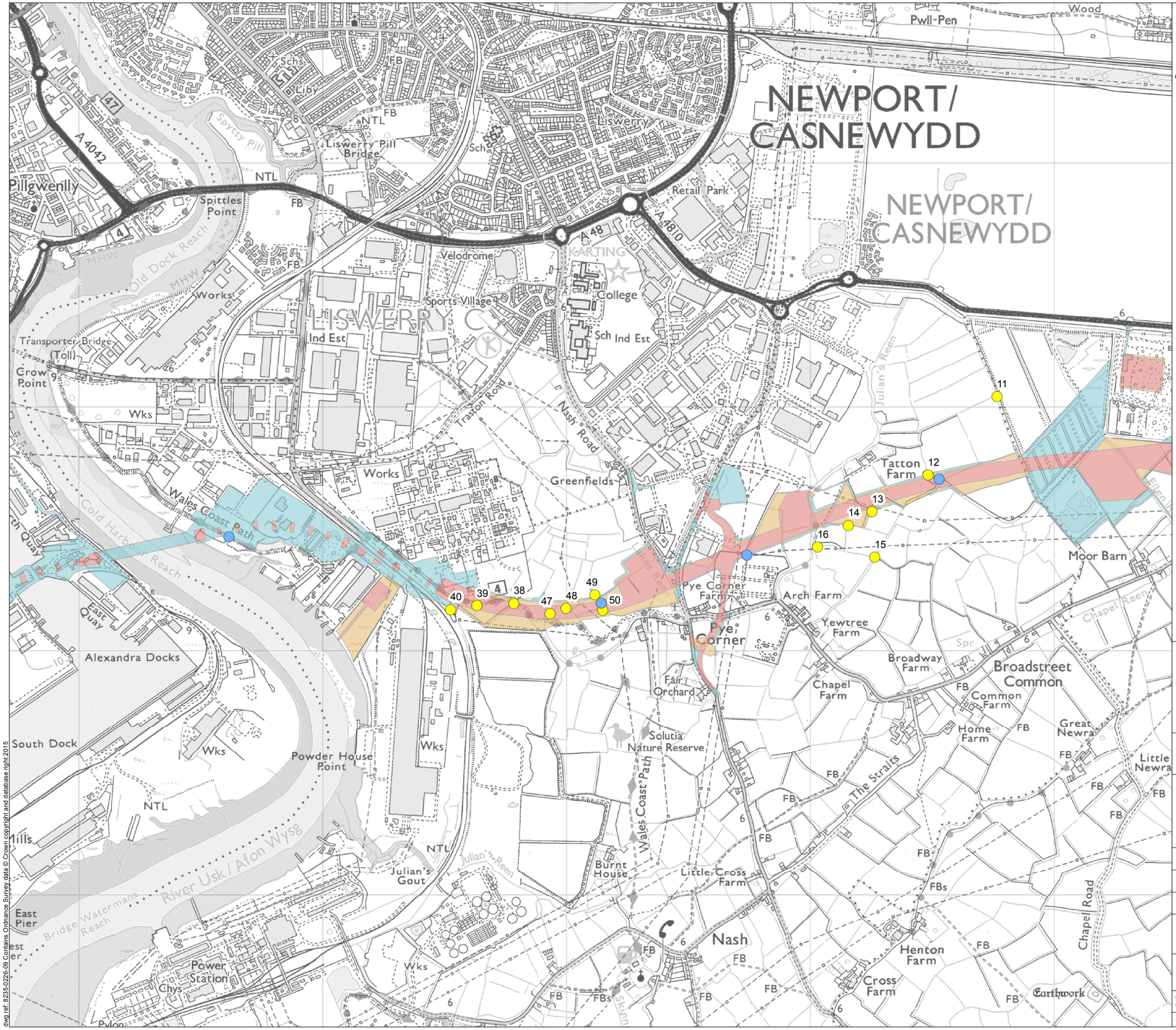
dwg ref: 8235-0226-09



Legend

- 2014 static bat detector locations
- 2015 static bat detector locations
- Underpass / bridge locations
- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

6 - Static bat detector reference number

The scheme shown reflects the design at time of survey

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Appendix 10.23: Bat Activity Survey

Bat Activity Survey 2015

Figure: 1c	Revision: -
Date: March 2016	Status: AT ISSUE
Drawn: AVG	Checked: AR

Scale: A3 @ 1:15,000
0 250 500 m

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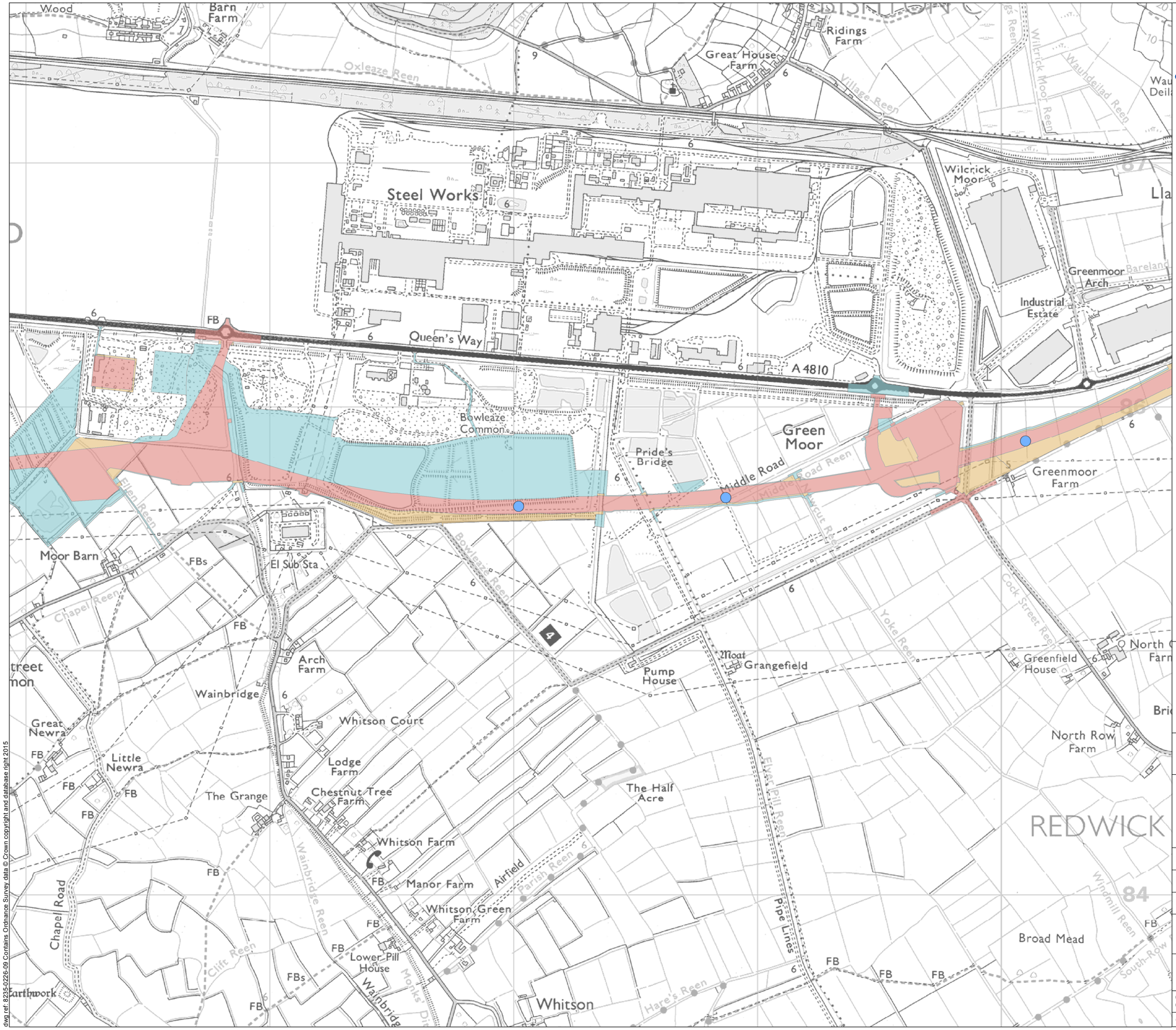
dwg ref: 8235-0226-09



Legend

- 2014 static bat detector locations
- 2015 static bat detector locations
- Underpass / bridge locations
- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

6 - Static bat detector reference number

The scheme shown reflects the design at time of survey

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Appendix 10.23: Bat Activity Survey

Bat Activity Survey 2015

Figure: 1d	Revision: -
Date: March 2016	Status: AT ISSUE
Drawn: AVG	Checked: AR

Scale: A3 @ 1:15,000
0 250 500 m

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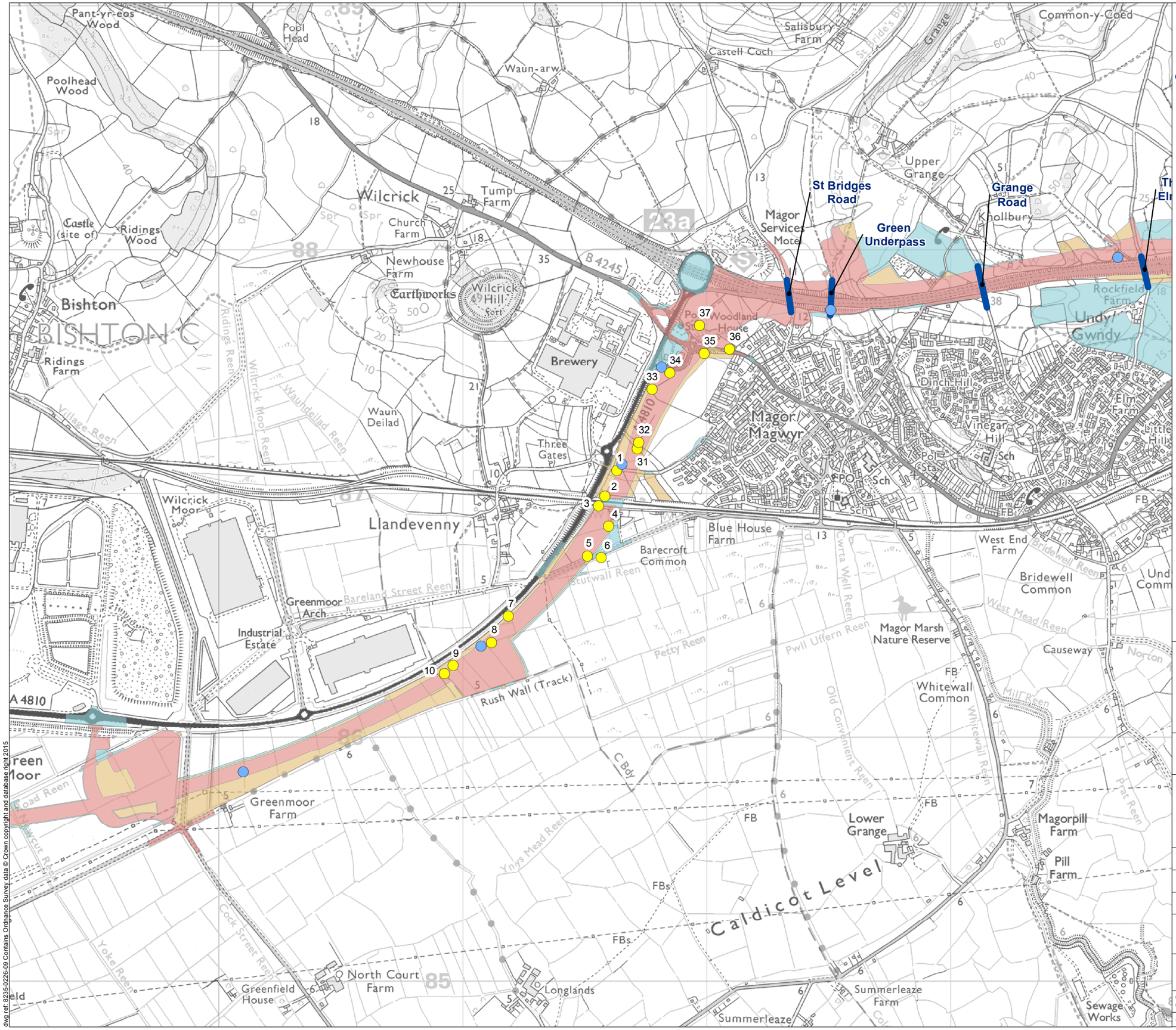
dwg ref: 8235-0226-09



Legend

- 2014 static bat detector locations
- 2015 static bat detector locations
- Underpass / bridge locations
- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

6 - Static bat detector reference number

The scheme shown reflects the design at time of survey

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Appendix 10.23: Bat Activity Survey

Bat Activity Survey 2015

Figure: 1e	Revision: -
Date: March 2016	Status: AT ISSUE
Drawn: AVG	Checked: AR

Scale: A3 @ 1:15,000

0 250 500 m

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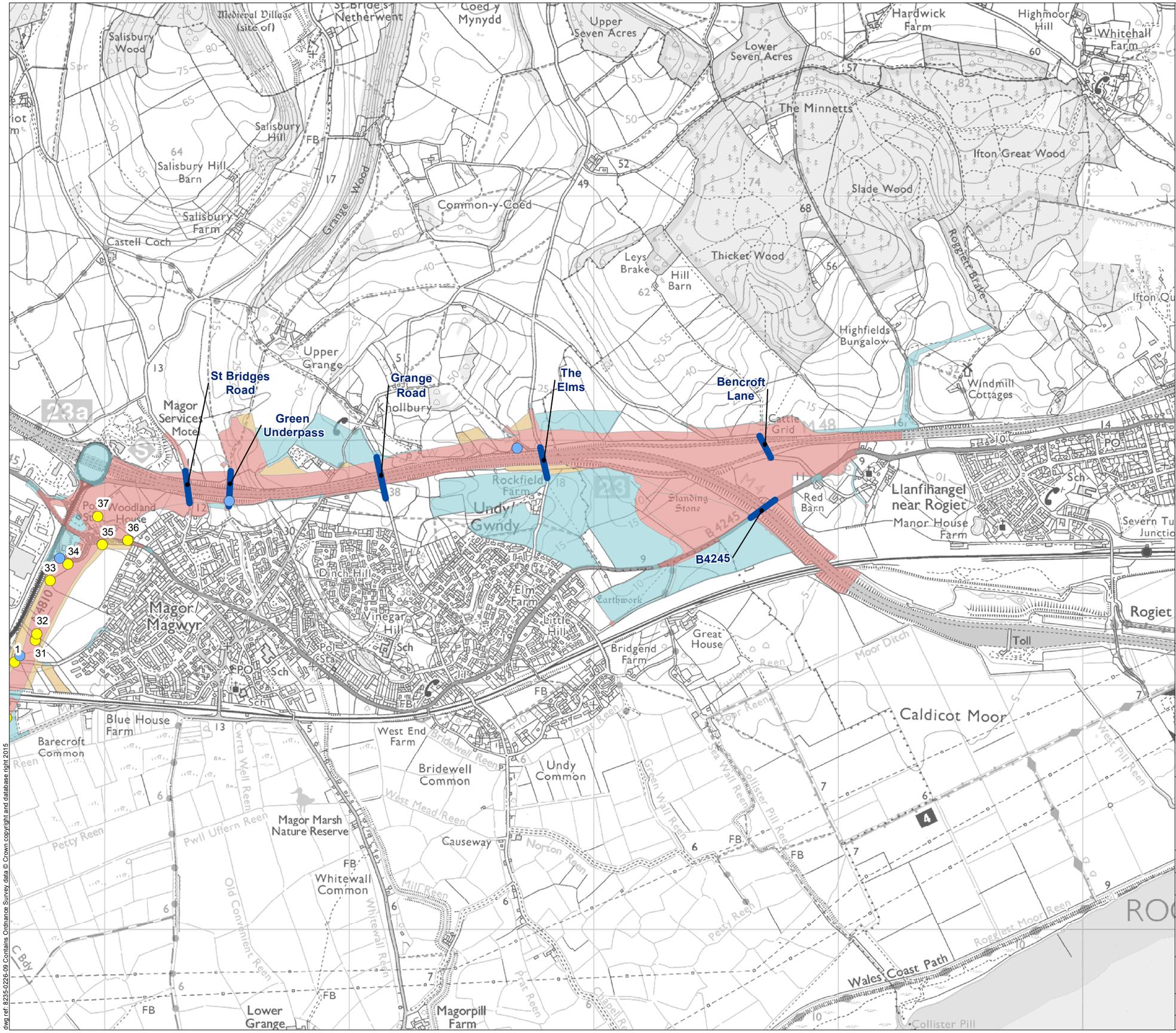
dwg ref: 8235-0226-09



Legend

- 2014 static bat detector locations
- 2015 static bat detector locations
- Underpass / bridge locations
- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

6 - Static bat detector reference number

The scheme shown reflects the design at time of survey

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Appendix 10.23: Bat Activity Survey

Bat Activity Survey 2015

Figure: 1f	Revision: -
Date: March 2016	Status: AT ISSUE
Drawn: AVG	Checked: AR

Scale: A3 @ 1:15,000
0 250 500 m

N

dwg ref: 8235-0226-09

Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

Average number of bat passes for survey visit

- 0-25
- 25-50
- 50-100
- 100-250
- 250-500
- 500-1500
- >1500
- >2500 bat passes recorded during one survey visit

The scheme shown reflects the design at time of survey

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Appendix 10.23: Bat Activity Survey

Relative level of bat activity

Figure: 2a	Revision:
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: LW

Scale: A3 @ 1:15,000

0 250 500 m

N

dwg ref: 8235-0293-12

Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

Average number of bat passes for survey visit

- 0-25
- 25-50
- 50-100
- 100-250
- 250-500
- 500-1500
- >1500
- >2500 bat passes recorded during one survey visit

The scheme shown reflects the design at time of survey

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Welsh Government

Appendix 10.23: Bat Activity Survey

Relative level of bat activity

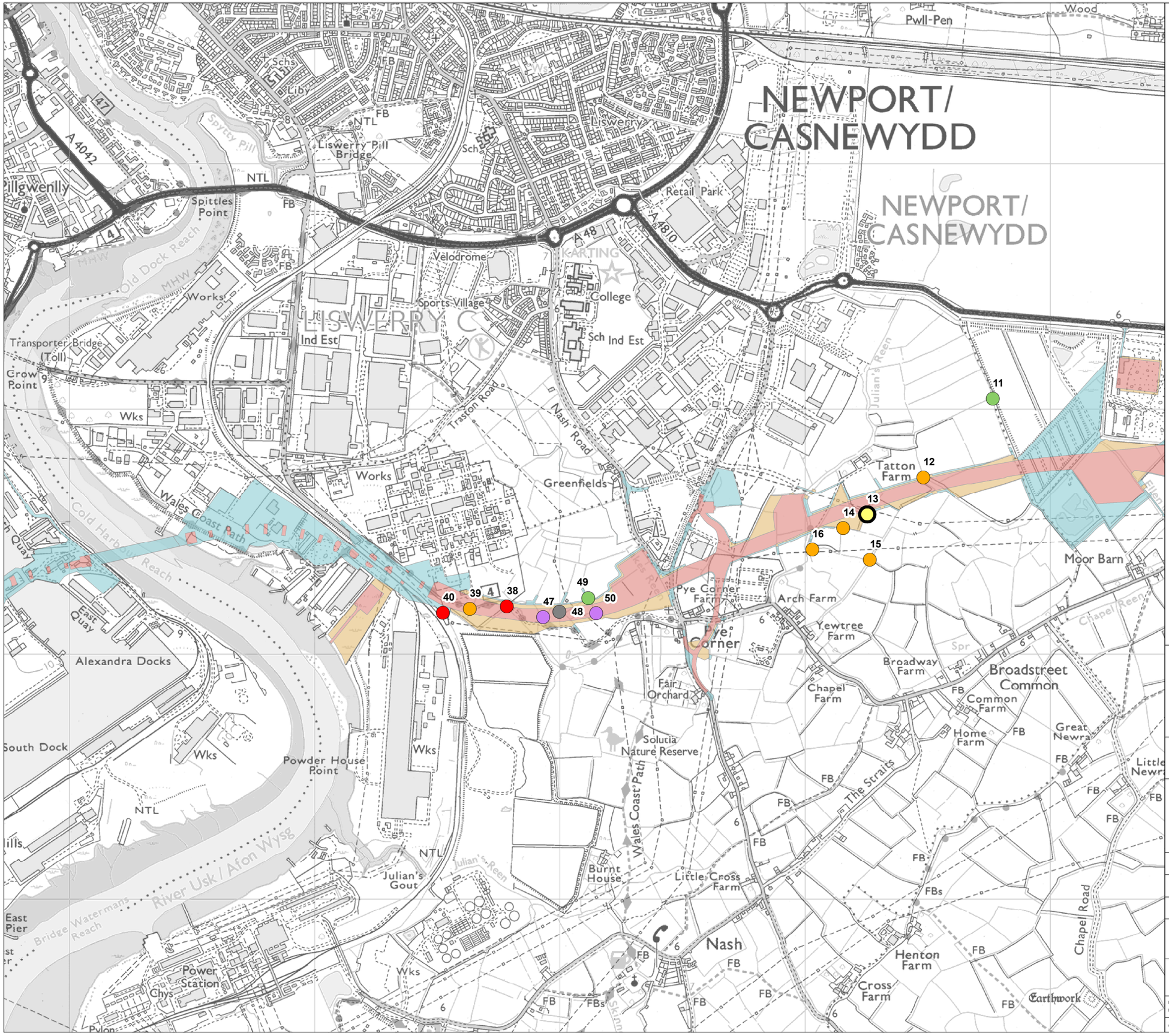
Figure: 2b	Revision:
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: LW

Scale: A3 @ 1:15,000

0 250 500 m

N

dwg ref: 8235-0293-12



Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

Average number of bat passes for survey visit

- 0-25
- 25-50
- 50-100
- 100-250
- 250-500
- 500-1500
- >1500
- >2500 bat passes recorded during one survey visit

The scheme shown reflects the design at time of survey

Llywodraeth Cymru
Welsh Government

Appendix 10.23: Bat Activity Survey

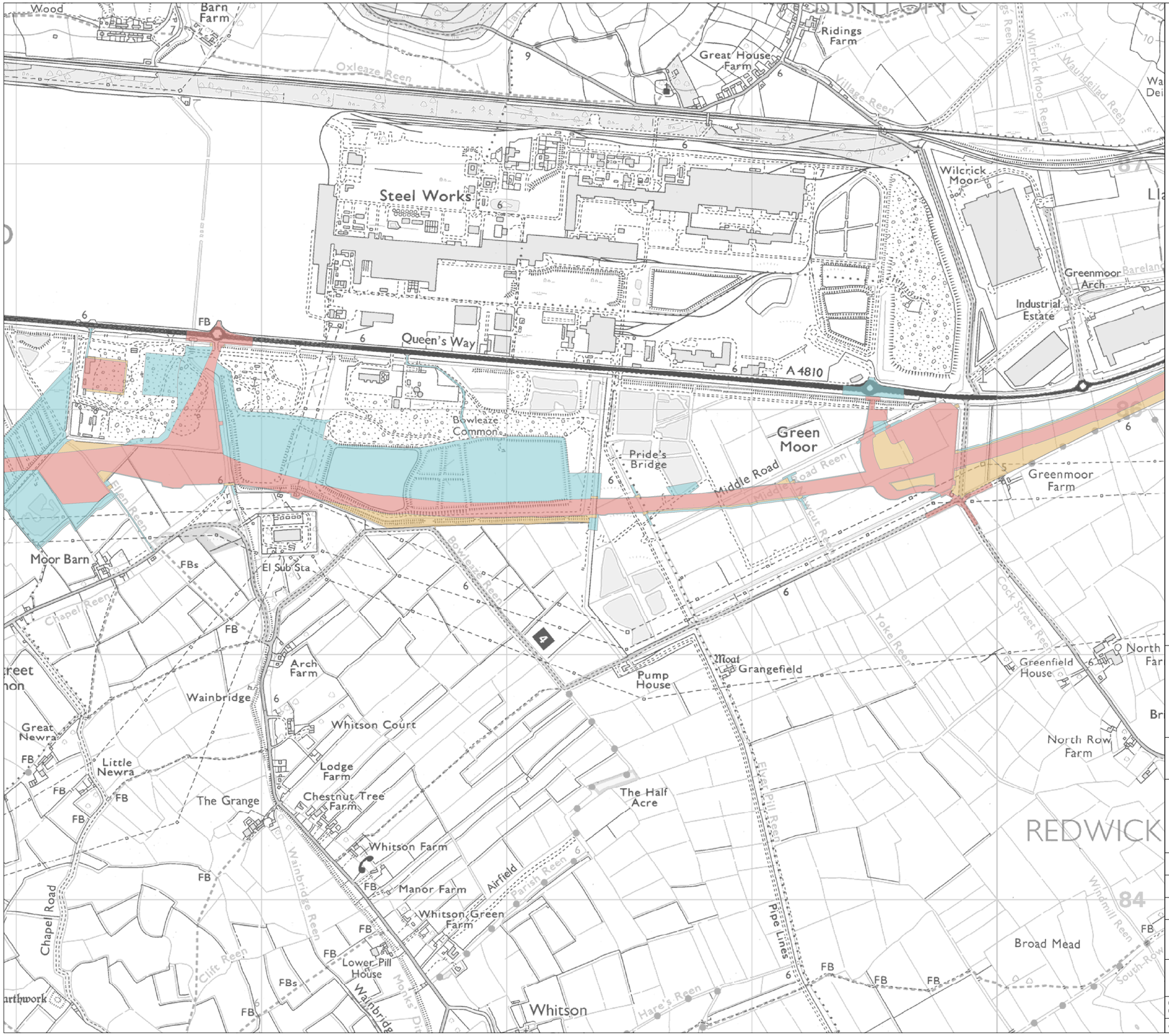
Relative level of bat activity

Figure: 2c	Revision:
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: LW

Scale: A3 @ 1:15,000
0 250 500 m

N

dwg ref: 8235-0293-12



Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

Average number of bat passes for survey visit

- 0-25
- 25-50
- 50-100
- 100-250
- 250-500
- 500-1500
- >1500
- >2500 bat passes recorded during one survey visit

The scheme shown reflects the design at time of survey

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Appendix 10.23: Bat Activity Survey

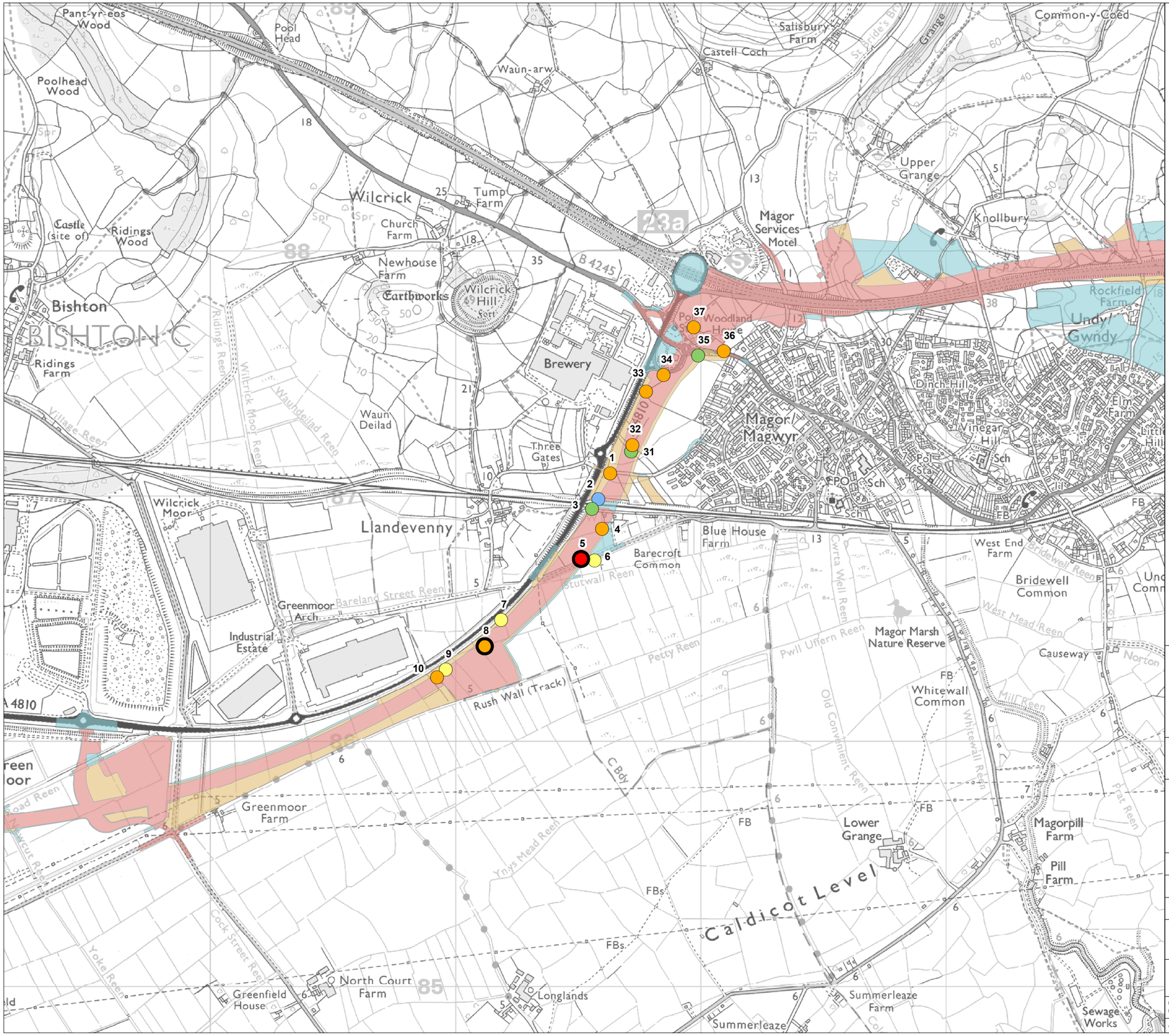
Relative level of bat activity

Figure: 2d	Revision:
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: LW

Scale: A3 @ 1:15,000
0 250 500 m

N

dwg ref: 8235-0293-12



Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

Average number of bat passes for survey visit

- 0-25
- 25-50
- 50-100
- 100-250
- 250-500
- 500-1500
- >1500
- >2500 bat passes recorded during one survey visit

The scheme shown reflects the design at time of survey

Llywodraeth Cymru
Welsh Government

Appendix 10.23: Bat Activity Survey

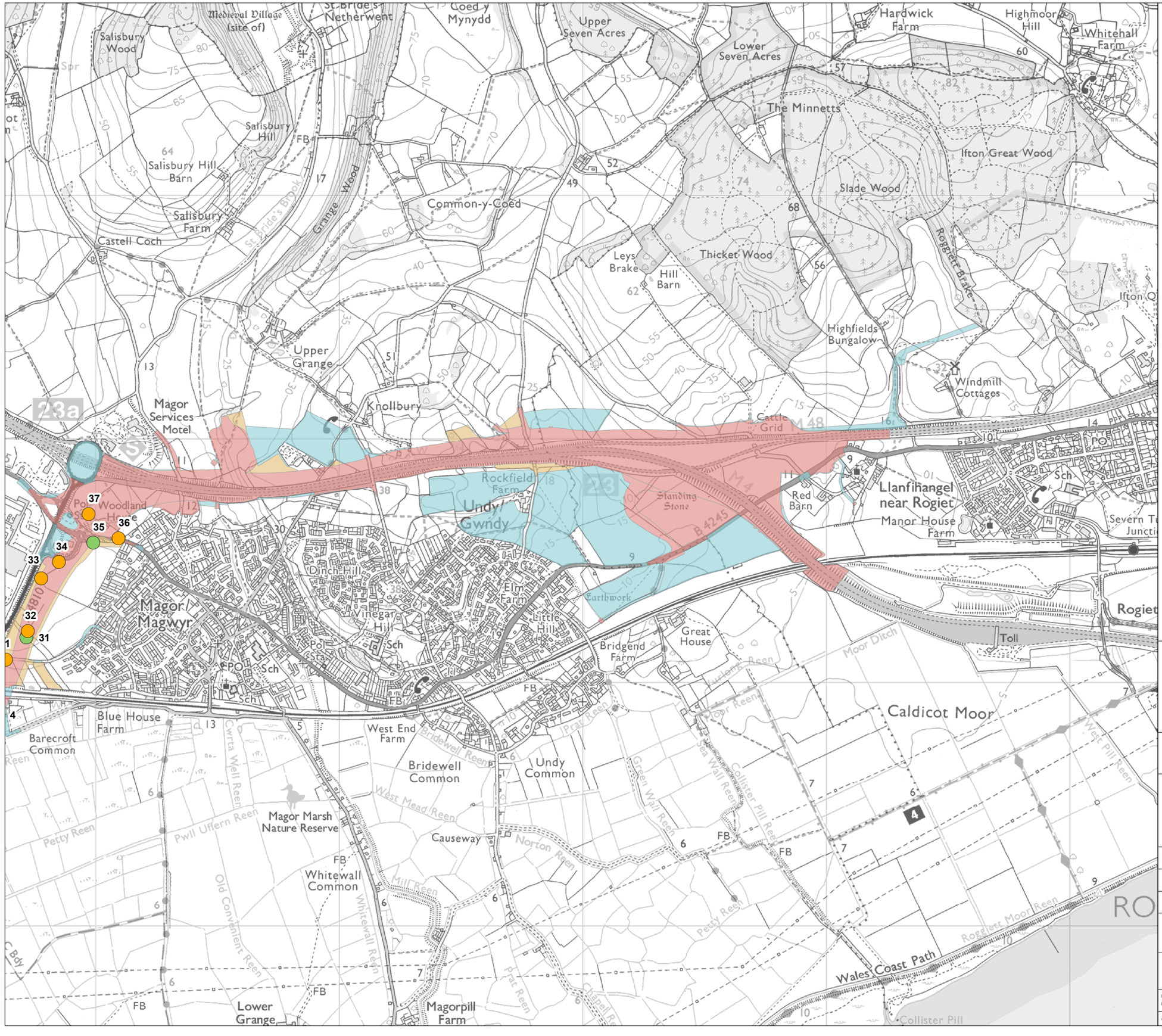
Relative level of bat activity

Figure: 2e	Revision:
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: LW

Scale: A3 @ 1:15,000
0 250 500 m

N

dwg ref: 8235-0293-12



Legend

- Permanent highway land within fenceline, including water treatment areas
- Other permanent land take e.g. mitigation planting.
- Temporary construction land

Average number of bat passes for survey visit

- 0-25
- 25-50
- 50-100
- 100-250
- 250-500
- 500-1500
- >1500
- >2500 bat passes recorded during one survey visit

The scheme shown reflects the design at time of survey

Llywodraeth Cymru
Welsh Government

Appendix 10.23: Bat Activity Survey

Relative level of bat activity

Figure: 2f	Revision:
Date: March 2016	Status: AT ISSUE
Drawn: CR	Checked: LW

Scale: A3 @ 1:15,000

0 250 500 m

N

dwg ref: 8235-0293-12

Annexes

Annex A – Dates for Static Bat Detector Surveys

Table A1: Survey Visit Dates at Each Static Bat Detector

Static Detector Location Number	Start Date for Monitoring	End Date for Monitoring
Survey Visit 1		
1	04/06/2015	08/06/2015
2	04/06/2015	08/06/2015
3	04/06/2015	08/06/2015
4	04/06/2015	08/06/2015
5	04/06/2015	08/06/2015
6	04/06/2015	08/06/2015
7	04/06/2015	08/06/2015
8	04/06/2015	08/06/2015
9	04/06/2015	08/06/2015
10	04/06/2015	08/06/2015
11	11/06/2015	16/06/2015
12	11/06/2015	16/06/2015
13	11/06/2015	16/06/2015
14	11/06/2015	16/06/2015
15	11/06/2015	16/06/2015
16	11/06/2015	16/06/2015
17	11/06/2015	16/06/2015
18	11/06/2015	16/06/2015
19	11/06/2015	16/06/2015
20	11/06/2015	16/06/2015
21	18/06/2015	23/06/2015
22	18/06/2015	23/06/2015
23	18/06/2015	23/06/2015
24	18/06/2015	23/06/2015
25	18/06/2015	23/06/2015
26	18/06/2015	23/06/2015
27	18/06/2015	23/06/2015
28	18/06/2015	23/06/2015
29	18/06/2015	23/06/2015
30	18/06/2015	23/06/2015
31	25/06/2015	30/06/2015
32	25/06/2015	30/06/2015
33	25/06/2015	30/06/2015
34	25/06/2015	30/06/2015
35	25/06/2015	30/06/2015
36	25/06/2015	30/06/2015
37	25/06/2015	30/06/2015
38	25/06/2015	30/06/2015
39	25/06/2015	30/06/2015
40	16/07/2015	21/07/2015
41	02/07/2015	07/07/2015
42	02/07/2015	07/07/2015
43	02/07/2015	07/07/2015
44	02/07/2015	07/07/2015
45	30/07/2015	04/08/2015
46	02/07/2015	07/07/2015
47	09/07/2015	14/07/2015
48	09/07/2015	14/07/2015
49	16/07/2015	22/07/2015
50	09/07/2015	14/07/2015
Survey Visit 2		
1	23/07/2015	28/07/2015
2	23/07/2015	28/07/2015
3	23/07/2015	28/07/2015
4	23/07/2015	28/07/2015

Static Detector Location Number	Start Date for Monitoring	End Date for Monitoring
5	23/07/2015	28/07/2015
6	16/07/2015	21/07/2015
7	16/07/2015	21/07/2015
8	16/07/2015	21/07/2015
9	16/07/2015	21/07/2015
10	16/07/2015	21/07/2015
11	09/07/2015	14/07/2015
12	09/07/2015	14/07/2015
13	09/07/2015	14/07/2015
14	09/07/2015	14/07/2015
15	09/07/2015	14/07/2015
16	09/07/2015	14/07/2015
17	02/07/2015	07/07/2015
18	02/07/2015	07/07/2015
19	02/07/2015	07/07/2015
20	02/07/2015	07/07/2015
21	16/07/2015	21/07/2015
22	16/07/2015	21/07/2015
23	23/07/2015	28/07/2015
24	23/07/2015	28/07/2015
25	23/07/2015	28/07/2015
26	27/08/2015	01/09/2015
27	30/07/2015	04/08/2015
28	30/07/2015	04/08/2015
29	23/07/2015	28/07/2015
30	23/07/2015	28/07/2015
31	30/07/2015	04/08/2015
32	30/07/2015	04/08/2015
33	06/08/2015	11/08/2015
34	06/08/2015	11/08/2015
35	06/08/2015	11/08/2015
36	06/08/2015	11/08/2015
37	06/08/2015	11/08/2015
38	16/07/2015	20/07/2015
39	16/07/2015	21/07/2015
40	06/08/2015	11/08/2015
41	20/08/2015	25/08/2015
42	20/08/2015	25/08/2015
43	20/08/2015	25/08/2015
44	20/08/2015	25/08/2015
45	20/08/2015	25/08/2015
46	30/07/2015	04/08/2015
47	06/08/2015	11/08/2015
48	06/08/2015	11/08/2015
49	06/08/2015	11/08/2015
50	06/08/2015	11/08/2015
Survey Visit 3		
1	20/08/2015	25/08/2015
2	20/08/2015	25/08/2015
3	20/08/2015	25/08/2015
4	20/08/2015	25/08/2015
5	20/08/2015	23/08/2015
6	03/09/2015	08/09/2015
7	13/08/2015	18/08/2015
8	13/08/2015	18/08/2015
9	03/09/2015	09/09/2015
10	03/09/2015	08/09/2015
11	N/D	N/D
12	N/D	N/D
13	N/D	N/D
14	N/D	N/D

Static Detector Location Number	Start Date for Monitoring	End Date for Monitoring
15	N/D	N/D
16	N/D	N/D
17	30/07/2015	04/08/2015
18	30/07/2015	04/08/2015
19	30/07/2015	04/08/2015
20	30/07/2015	04/08/2015
21	27/08/2015	29/08/2015
22	27/08/2015	01/09/2015
23	27/08/2015	01/09/2015
24	27/08/2015	01/09/2015
25	27/08/2015	01/09/2015
26	17/09/2015	22/09/2015
27	27/08/2015	01/09/2015
28	27/08/2015	01/09/2015
29	27/08/2015	01/09/2015
30	27/08/2015	01/09/2015
31	17/09/2015	21/09/2015
32	17/09/2015	22/09/2015
33	03/09/2015	08/09/2015
34	03/09/2015	08/09/2015
35	03/09/2015	08/09/2015
36	17/09/2015	22/09/2015
37	17/09/2015	22/09/2015
38	13/08/2015	18/08/2015
39	13/08/2015	18/08/2015
40	N/D	N/D
41	09/09/2015	14/09/2015
42	09/09/2015	14/09/2015
43	09/09/2015	14/09/2015
44	09/09/2015	13/09/2015
45	09/09/2015	14/09/2015
46	09/09/2015	14/09/2015
47	09/09/2015	14/09/2015
48	03/09/2015	08/09/2015
49	03/09/2015	08/09/2015
50	09/09/2015	14/09/2015
Survey Visit 4		
5	25/09/2015	30/09/2015
10	25/09/2015	27/09/2015
21	25/09/2015	27/09/2015
38	25/09/2015	30/09/2015

Note: N/D means no data was collected. Detectors were not used at these locations due to health and safety concerns.

Annex B – Locations of Static Bat Detectors

Table B1: Static Bat Detector Locations

Static Detector Location Number	Grid Reference	Description
1	341607, 187098	Located on fenceline under oak (*Quercus* sp.) canopy with hawthorn (*Crataegus monogyna*) and bramble (*Rubus fruticosus*) nearby. Height: 3.5 m. Direction: south.
2	341610, 186995	Located on fenceline under oak canopy with nettles (*Urtica dioica*) in the area. Height: 3.5 m. Direction: north.
3	341538, 186951	Located on roadside fenceline with bramble and nettles. Height: 4.5 m. Direction: south.
4	341591, 186858	Located beside hedgerow with willows (*Salix* spp.). Height: 4.5 m. Direction: west.
5	341512, 186743	Located on fenceline along roadside hedge with willows. Height: 4.5 m. Direction: north.
6	341547, 186738	Located on fenceline along roadside hedge with willows. Height: 4.5 m. Direction: south.
7	341199, 186514	Located on fenceline and behind a log. Height: 4.5 m. Direction: east.
8	341179, 186399	Located on fencepost at the corner of two ditches. Height: 3 m. Direction: west.
9	340994, 186263	Located on fencepost beside ditch with hawthorn in the vicinity. Height: 4.5 m. Direction: north-east.
10	340936, 186254	Located on hawthorn tree. Height: 4.5 m. Direction: north-east.
11	335760, 186047	Located beside hedgerow at the corner of a field where two ditches meet. Height: 4.5 m. Direction: north-west.
12	335474, 185730	Located at the junction of hedgerows with a surrounding habitat of grazing pasture. Height: 4.5 m. Direction: north-west.
13	335248, 185575	Located in the corner of a field where two ditches meet. Surrounding habitat predominantly grazing pasture. Height: 4.5 m. Direction: north-west.
14	335158, 185513	Located in the corner of a field, beside a gate, with the surrounding habitat predominantly composed of grazing pasture. Height: 4.5 m. Direction: south-east.
15	335262, 185388	Located in the corner of a field, with the surrounding habitat predominantly composed of grazing pasture. Height: 4.5 m. Direction: north-west.
16	335053, 185430	Located beside hedge with surrounding habitat of grazing pasture. Height: 4.5 m. Direction: north.
17	328847, 183697	Located along hedgerow with surrounding habitat of grazing pasture. Height: 4.5 m. Direction: south-west.
18	329003, 183642	Located along hedgerow with surrounding habitat of grazing pasture. Height: 4.5 m. Direction: south-west.
19	329151, 183563	Located at the corner of a field, beside railway line, with surrounding habitat composed of grazing pasture. Height: 4.5 m. Direction: west.
20	328989, 183439	Located at the corner of a field, beside railway line, with surrounding habitat composed of grazing pasture. Height: 4.5 m. Direction: east.
21	326705, 184146	Located along hedgerow with surrounding habitat predominantly composed of grassland. Height: 3 m. Direction: west.
22	327013, 184183	Located in habitat comprising grassland, orchard and woodland. Height: 3 m. Direction: south-west.
23	327148, 183963	Located in habitat comprising grassland, orchard and woodland. Height: 3 m. Direction: south-west.
24	327141, 184171	Located along hedgerow with orchard and grassland in surrounding area. Height: 3 m. Direction: west.
25	327236,	Located on tree line with surrounding habitat of amenity

Static Detector Location Number	Grid Reference	Description
	183907	grassland. Height: 4.5 m. Direction: east.
26	327336, 183998	Located along hedgerow with surrounding habitat predominantly composed of amenity grassland. Height: 3 m. Direction: south-east.
27	327566, 183779	Located along hedgerow with surrounding habitat comprised of woodland and arable fields. Height: 4.5 m. Direction: south.
28	327813, 183615	Located along hedgerow with surrounding habitat comprised of woodland and grazing pasture. Height: 3 m. Direction: south.
29	328149, 183364	Located along hedgerow with ditch beside it. Surrounding habitat comprised of woodland and grazing pasture. Height: 3 m. Direction: north-east.
30	328281, 183468	Located along hedgerow with surrounding habitat comprising woodland and grassland. Height: 4.5 m. Direction: north-east.
31	341733, 187172	Located beside hedgerow with surrounding habitat of allotments and grassland. Height: 4 m. Direction: north-east.
32	341710, 187213	Location at junction of hedgerows with surrounding habitat of allotments and grassland. Height: 3 m. Direction: south-west.
33	341777, 187430	Located at junction of hedgerows. Surrounding habitat predominantly arable fields. Height: 3 m. Direction: east.
34	341847, 187506	Located at junction of hedgerows. Surrounding habitat of arable fields and roads. Height: 4 m. Direction: south-east.
35	341993, 187580	Located beside hedgerow with surrounding habitat of arable fields and roads. Height: 4.5 m. Direction: south.
36	342085, 187598	Located in the corner of a garden with surrounding habitat of amenity grassland and woodland. Height: 4.5 m. Direction: north-west.
37	341979, 187689	Located beside woodland with surrounding habitat of amenity grassland and grazing pasture. Height 4.5 m. Direction: north.
38	333782, 185214	Located on the edge of woodland with surrounding habitat of amenity grassland and further woodland. Height: 4.5 m. Direction: south.
39	333627, 185185	Located on the edge of woodland with surrounding habitat of amenity grassland and further woodland. Height: 4 m. Direction: north.
40	333524, 185224	Located on the edge of woodland with surrounding habitat of amenity grassland and further woodland. Height: 4 m. Direction: north.
41	330752, 184403	Located beside a ditch with surrounding habitat composed of grazing pasture. Height: 3 m. Direction: north-east.
42	330598, 184239	Located beside hedgerow with surrounding habitat of grazing pasture. Height: 3 m. Direction: north-east.
43	330311, 184189	Located beside ditch with surrounding habitat composed of grazing pasture. Height: 3 m. Direction: north-east.
44	329848, 183836	Located in grassland habitat. Height: 3 m. Direction: east.
45	329104, 183397	Located in grassland habitat. Height: 3 m. Direction: south-east.
46	329283, 183491	Located in grassland habitat. Height: 3 m. Direction: south-west.
47	333962, 185179	Located in grassland habitat. Height: 3 m. Direction: south-east.
48	334018, 185182	Located in grassland habitat. Height: 3 m. Direction: north-west.
49	334102, 185231	Located in grassland habitat. Height: 3 m. Direction: west.
50	334133, 185164	Located in grassland habitat. Height: 3 m. Direction: south-east.

Note: Height refers to the height at which the static detector was located while direction indicates the approximate direction in which the microphone of the detector was pointed.

Annex C – Full Results of Static Bat Detector Surveys

The tables in this Annex provide the full results of the static detector surveys. The following abbreviations are used:

B. ba – Barbastelle bat
E. se – Serotine
M. be – Bechstein's bat
M. br – Brandt's bat
Myo spp. – *Myotis* species of bats, including Daubenton's and Natterer's bats
N. le – Leisler's bat
N. no – Noctule
P. na – Nathusius' pipistrelle
Pip spp. – Pipistrelle bats, including common and soprano pipistrelles
P. au – Brown long-eared bat
R. hi – Lesser horseshoe bat
E. se / *N. le* – Serotine or Leisler's bat, not possible to distinguish from recording
E. se / *P. au* – Serotine or brown-long eared bat, not possible to distinguish from recording
N. le / *N.no* – Leisler's bat or noctule, not possible to distinguish from recording
SLN – Serotine or Leisler's bat or noctule, not possible to distinguish from recording
UnID – Unidentified bat
N/D – No data collected

An * is used to highlight the static detector location which recorded the highest levels of bat activity during each Survey Visit.

Table C1: Results of Survey Visit 1

Detector Location	Number of Passes per Species at Each Detector Location														Total
	B. ba	*E. se*	*Myo.* spp.	*N. le*	*N. no*	*P. na*	*Pip.* spp.	*P. au*	*R. hi*	*E. se / N. le*	*E. se / P. au*	*N. le / N. no*	SLN	UnID	
1	-	-	13	40	91	-	1,015	5	16	4	-	1	6	7	1,198
2	4	1	3	7	28	-	58	6	7	3	-	-	-	1	118
3	-	-	13	10	1	-	105	1	3	-	-	-	-	-	133
4	-	-	50	1	73	-	1,042	-	7	-	-	-	1	-	1,174
5	-	-	10	1	4	-	1,790	3	-	-	-	-	-	-	1,808
6	-	2	66	4	43	-	858	20	2	2	-	-	-	2	999
7	-	-	52	3	29	-	474	2	5	-	-	-	-	-	565
8	-	-	349	1	7	-	1,891	2	-	3	-	-	-	2	2,255
9	-	2	65	2	21	-	632	9	1	-	1	-	-	1	734
10	-	-	9	2	12	-	121	3	1	1	-	-	-	-	149
11	-	-	6	-	10	-	238	-	-	-	-	-	-	-	254
12	-	-	13	-	48	-	998	2	-	-	-	-	-	-	1,061
13	-	-	4	-	4	-	927	1	-	-	-	-	1	-	937
14	-	-	5	2	3	-	1,297	-	-	-	-	-	-	-	1,307
15	-	-	5	-	18	-	398	-	-	-	-	-	-	-	421
16	-	-	16	-	29	-	895	1	-	-	-	1	-	-	942
17	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
18	-	-	113	1	13	-	873	9	-	1	-	-	1	-	1,011
19	-	-	117	1	23	-	330	1	-	-	-	-	-	-	472
20	-	-	1	-		-	2	-	-	-	-	-	-	-	3
21	-	-	52	-	5	-	246	1	-	-	-	-	-	-	304
22	-	-	102	-	-	-	951	-	-	-	-	-	-	-	1,053
23	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
24	-	-	1	-	-	-	11	-	-	-	-	-	-	-	12
25	-	1	6	1	20	-	1,700	13	-	-	-	-	-	-	1,741
26	-	3	14	3	9	2	419	9	-	-	-	1	-	-	460
27	-	-	7	2	2	-	274	-	-	-	-	-	-	-	285
28	-	-	48	-	-	-	42	-	-	-	-	-	-	-	90
29	-	1	74	-	49	-	211	2	-	1	-	2	2	-	342
30	-	-	2	-	14	-	216	1	-	-	-	-	-	-	233
31	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
32	-	-	19	-	1	-	263	2	15	-	-	-	-	-	300
33	-	-	1	-		-	89	-	-	-	-	-	-	-	90
34	-	-	13	-	94	-	1,866	-	-	-	-	-	-	-	1,973
35	-	-	15	-	4	-	321	-	5	-	-	-	-	-	345
36	-	2	11	2	61	-	970	-	1	1	-	2	-	-	1,050
37	-	-	15	-	4	-	321	-	5	-	-	-	-	-	345
38	1	-	103	-	-	-	1,847	-	-	-	-	-	-	-	1,952
39	-	-	256	-	-	-	944	-	-	-	-	-	-	-	1,200
40	-	-	171	-	6	-	2,001	-	-	-	-	-	-	-	2,178
41	-	1	1	1	7	1	121	-	-	-	-	-	-	-	132
42	-	-	24	-	26	-	3,431	-	-	-	-	1	-	-	3,482
43	-	-	5	-	42	-	4,241	-	-	-	-	-	-	-	4,288*
44	-	-	2	-	46	-	477	-	-	-	-	-	-	-	525
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
46	-	-	19	1	23	-	918	1	-	-	-	-	-	-	962
47	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
48	-	-	4	-	1	-	27	-	-	-	-	-	-	-	32
49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total Number of Passes	5	13	1,876	85	871	3	35,851	94	68	16	1	8	11	13	**38,915**

Table C2: Results of Survey Visit 2

Detector Location	Number of Passes per Species at Each Detector Location														Total
	B. ba	*E. se*	*Myo.* spp.	*N. le*	*N. no*	*P. na*	*Pip.* spp.	*P. au*	*R. hi*	*E. se / N. le*	*E. se / P. au*	*N. le / N. no*	SLN	UnID	
1	-	1	24	-	-	-	467	3	-	2	-	-	-	-	497
2	-	1	1	-	-	-	23	-	-	-	-	-	-	-	25
3	2	-	33	1	30	-	194	-	-	1	-	17	-	-	278
4	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
5	-	1	57	3	14	-	3,406	-	-	-	-	5	-	1	3,487
6	-	-	-	-	-	-	13	-	5	-	-	-	-	-	18
7	-	1	30	-	46	-	148	2	-	-	-	2	-	-	229
8	-	2	43	-	7	-	1,126	5	-	-	-	2	-	-	1,185
9	-	1	27	-	30	-	331	-	-	5	-	16	-	-	410
10	-	1	27	2	183	1	1,161	-	-	2	-	4	1	-	1,382
11	-	-	-	-	1	-	105	-	-	-	-	-	-	-	106
12	-	-	2	1	-	-	249	-	-	-	-	-	-	-	252
13	-	-	4	-	12	-	3,666	-	-	-	-	-	-	-	3,682*
14	-	-	3	-	7	-	281	1	-	-	-	1	-	-	293
15	-	-	5	1	5	1	982	-	-	-	-	2	-	-	996
16	-	1	1	-	4	-	201	-	-	-	-	3	-	-	210
17	-	-	30	-	-	-	457	2	-	-	-	-	-	-	489
18	-	-	21	1	4	-	286	-	-	-	-	-	-	-	312
19	-	-	18	3	6	-	416	-	-	1	-	2	-	-	446
20	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
21	-	-	107	-	-	-	128	-	-	-	-	-	-	-	235
22	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
23	-	-	31	-	-	-	102	-	-	-	-	-	-	-	133
24	-	-	6	-	2	-	69	1	-	-	-	-	-	-	78
25	-	-	30	-	24	-	2,775	9	-	-	-	-	-	-	2,838
26	-	-	41	-	2	-	129	-	-	-	-	1	-	-	173
27	-	-	40	1	1	-	1,152	-	-	-	-	1	-	-	1,195
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
29	-	-	60	1	7	-	122	-	-	-	-	2	-	-	192
30	-	-	11	1	46	1	170	2	-	-	-	-	-	-	231
31	-	-	4	1	17	-	195	1	-	1	-	2	-	-	221
32	-	-	10	-	-	-	1,121	-	1	-	-	-	-	-	1,132
33	-	3	124	4	331	-	597	1	14	-	-	5	-	-	1,079
34	-	1	17	20	178	-	1,427	1	-	-	-	28	-	-	1,672
35	-	-	47	3	4	-	210	-	-	-	-	1	-	-	265
36	-	-	30	-	2	-	940	1	2	1	-	2	-	-	978
37	-	-	23	-	1	-	863	1	-	-	-	-	-	-	888
38	-	-	64	-	1	-	2,019	-	-	-	-	-	-	-	2,084
39	-	-	137	1	3	-	1,622	-				-	-	-	1,763
40	-	-	740	-	12	-	1,658	-				-	-	-	2,410
41	-	5	13	1	5	-	177	-	-	1	-	2	-	-	204
42	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
43	-	9	3	6	6	-	980	-	-	13	-	2	3	-	1,022
44	-	1	9	3	73	-	1,242	1	-	1	-	4	3	-	1,337
45	-	-	17	-	41	-	71	8	-	1	-	3	2	1	144
46	-	-	9	1	16	-	95	-	-	-	-	1	-	-	122
47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
48	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
49	-	-	2	3	5	-	399	-	-	-	-	2	-	2	413
50	-	-	1	-	1	-	76	-	-	-	-	-	-	-	78
Total Number of Passes	2	28	1,903	58	1,127	3	31,851	39	22	29	0	110	9	4	**35,185**

Table C3: Results of Survey Visit 3

Detector Location	Number of Passes per Species at Each Detector Location														Total
	B. ba	*E. se*	*Myo.* spp.	*N. le*	*N. no*	*P. na*	*Pip.* spp.	*P. au*	*R. hi*	*E. se / N. le*	*E. se / P. au*	*N. le / N. no*	SLN	UnID	
1	-	-	8	-	-	1	119	-	1	-	-	-	-	-	129
2	-	-	5	-	4	-	73	-	-	2	-	-	-	-	84
3	-	-	4	-	1	-	3	-	1	-	-	1	-	-	10
4	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
5	1	-	15	1	1	-	2,163	-	-	-	-	-	-	-	2,181
6	-	-	4	-	-	-	9	-	2	-	-	-	-	-	15
7	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
8	-	-	12	4	3	-	274	2	-	-	-	2	-	-	297
9	-	-	44	1	-	-	42	-	14	-	-	2	-	-	103
10	2	-	72	3	18	-	150	1	3	-	-	9	-	1	259
11	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
12	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
13	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
14	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
15	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
16	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
17	-	-	26	3	104	-	336	8	-	-	-	2	1	1	481
18	-	-	7	1	199	-	672	9	-	1	-	14	1	1	905
19	-	-	18	-	165	-	203	7	-	-	-	9	-	1	403
20	-	-	82	1	138	-	545	9	-	1	-	8	1	6	791
21	-	-	5	-	-	-	117	-	-	-	-	-	-	1	123
22	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
23	-	-	57	-	13	-	3,584	2	-	1	-	2	-	5	3,664
24	-	-	119	-	1	-	97	3	-	-	-	-	-	1	221
25	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
26	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
27	-	1	411	-	16	-	6,179	4	-	-	-	2	-	-	6,613*
28	-	1	89	-	8	-	916	6	-	-	-	1	-	1	1,022
29	-	-	414	4	30	-	3,560	5	-	1	-	4	-	-	4,018
30	-	-	12	-	-	-	28	-	-	-	-	-	-	-	40
31	-	-	40	-	1	-	52	-	-	-	-	-	-	2	95
32	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
33	-	1	178	2	14	1	339	2	14	1	-	4	-	-	556
34	-	-	93	1	28	-	231	-	-	-	-	3	-	2	358
35	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2
36	-	-	42	1	-	-	194	-	2	-	-	1	-	-	240
37	-	1	1,290	-	4	-	138	-	1	-	-	4	-	-	1,438
38	-	1	50	-	33	-	860	3	-	-	-	4	1	-	952
39	-	-	14	-	1	-	307	-	-	-	-	-	1	1	324
40	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
41	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
42	-	5	26	2	-	3	1,607	13	-	5	-	-	-	63	1,724
43	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
44	-	2	-	1	21	-	99	1	-	-	-	4	-	-	128
45	-	-	29	3	21	1	197	10	-	1	-	4	-	2	268
46	-	-	64	1	9	-	2,085	2	-	-	-	1	-	-	2,162
47	-	-	4	2	7	-	72	2	-	-	-	2	-	-	89
48	-	-	1	-	-	-	10	-	-	-	-	-	-	-	11
49	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
50	-	-	-	-	-	-	49	-	-	-	-	1	-	-	50
Total Number of Passes	3	12	3,237	32	840	6	25,310	89	38	13	0	84	5	88	**29,757**

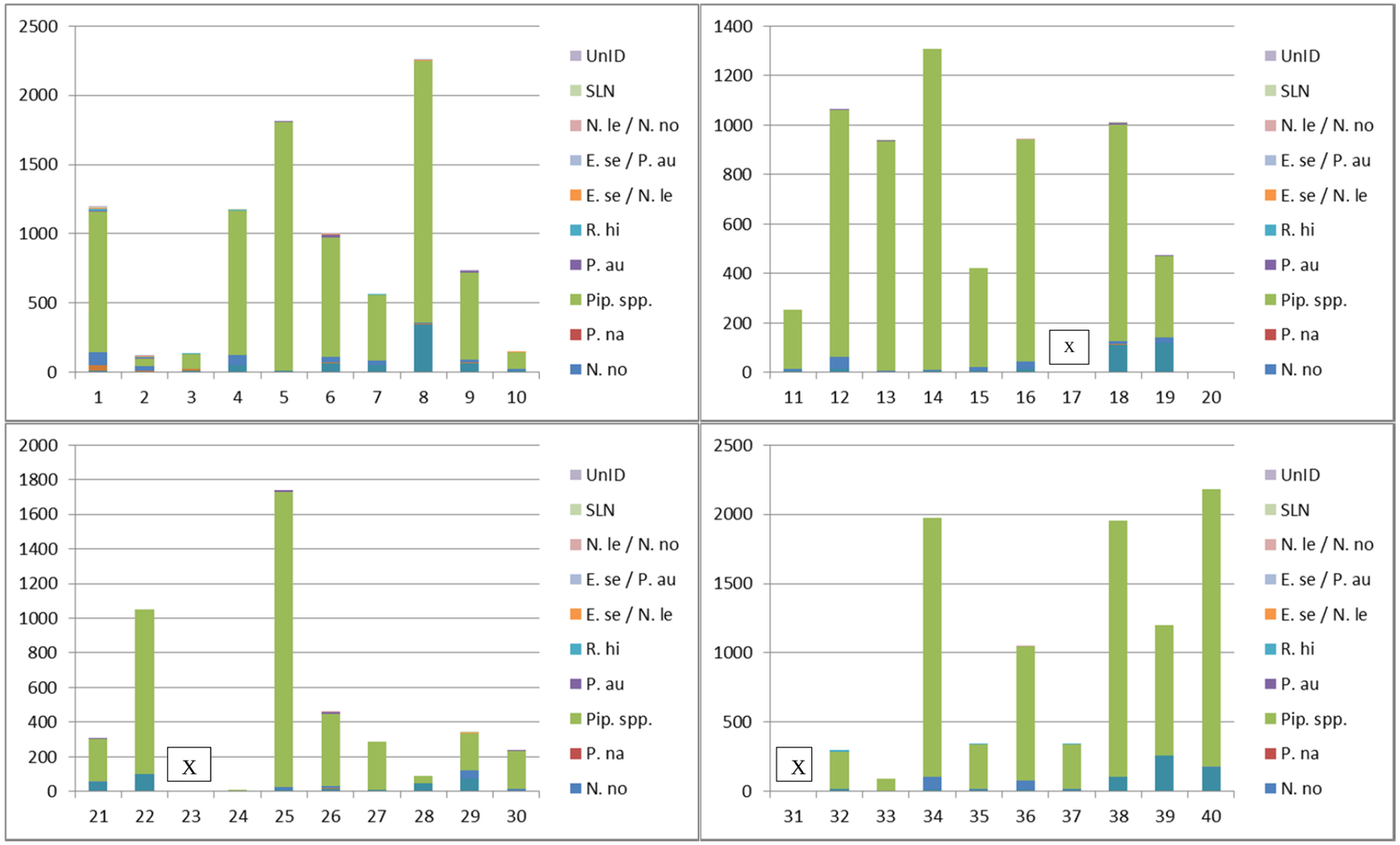
Table C4: Results of Survey Visit 4

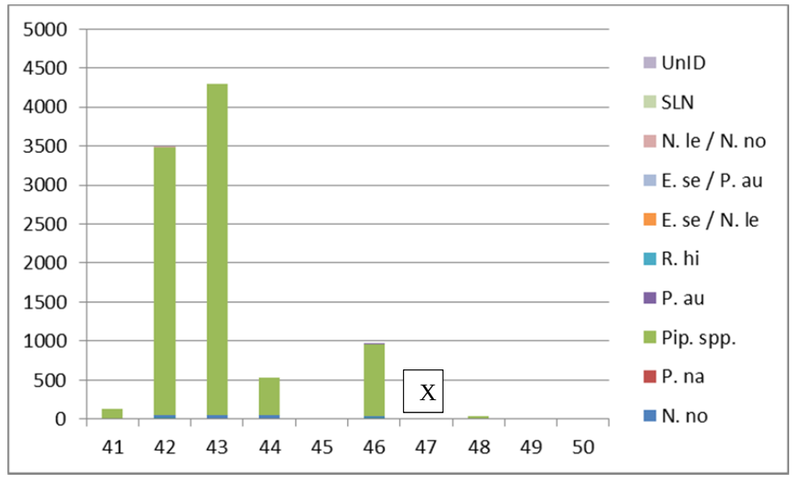
Detector Location	Number of Passes per Species at Each Detector Location														Total
	B. ba	*E. se*	*Myo.* spp.	*N. le*	*N. no*	*P. na*	*Pip.* spp.	*P. au*	*R. hi*	*E. se / N. le*	*E. se / P. au*	*N. le / N. no*	SLN	UnID	
5	-	-	49	-	5	2	395	2	1	2	-	-	1	-	457*
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
21	-	-	126	-	1	-	131	2	-	-	-	-	-	1	261
38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total Number of Passes	0	0	175	0	6	2	526	4	1	2	0	0	1	1	**718**

Annex D – Graphs of Static Bat Detector Results

Survey Visit 1

X – faulty detector

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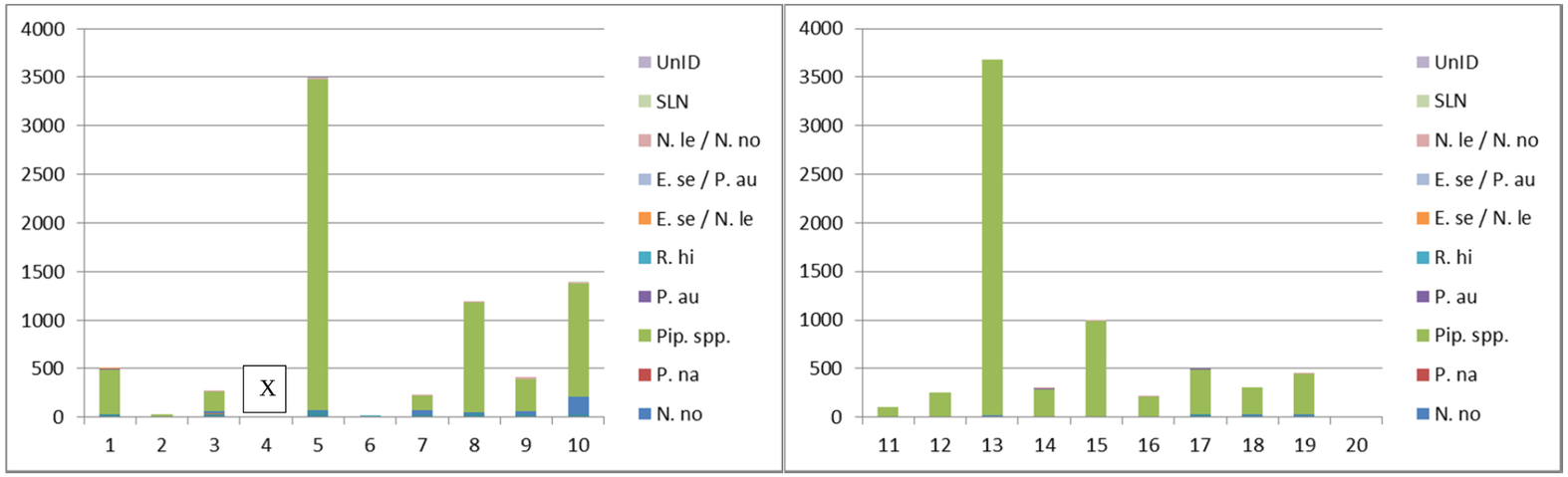
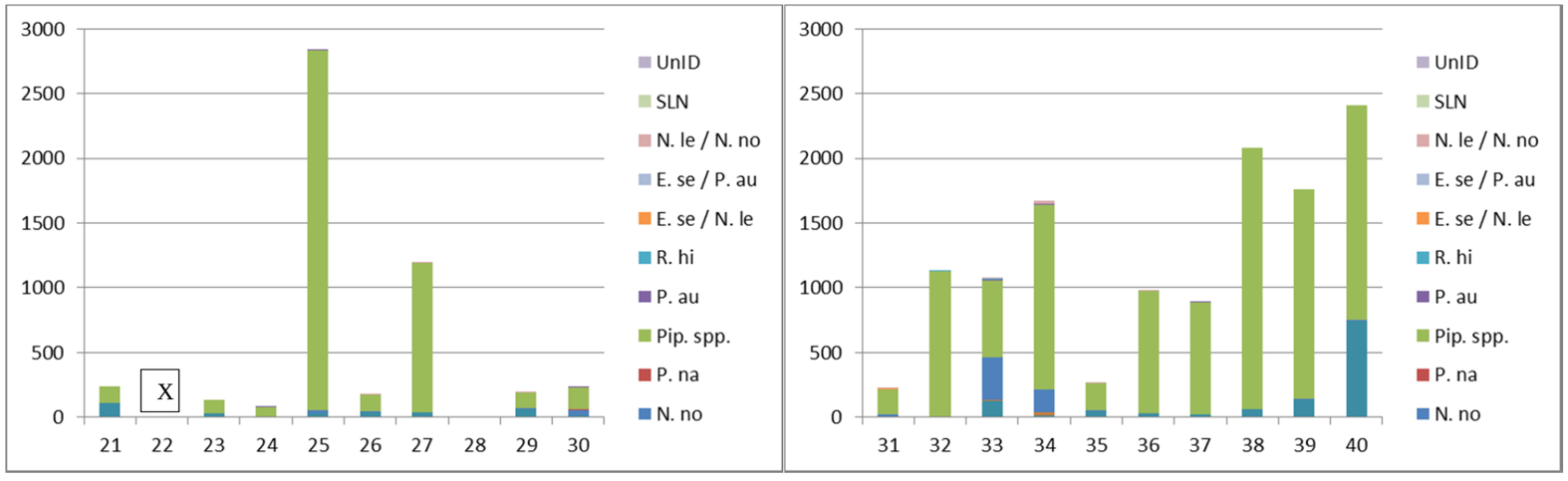
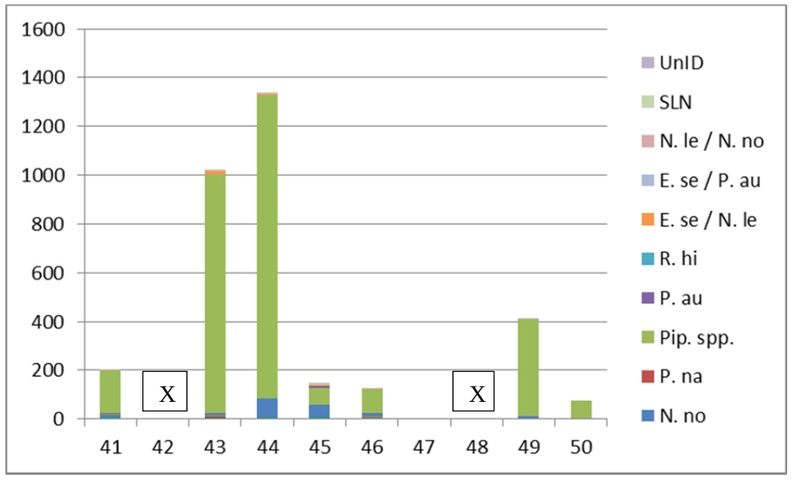
4000
3500
3000
2500
2000
1500
1000
500
0
41
42
43
44
45
46
47
48
49
50
X
UnID
SLN
N. le / N. no
E. se / P. au
E. se / N. le
R. hi
P. au
Pip. spp.
P. na
N. no

Survey Visit 2



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600
400
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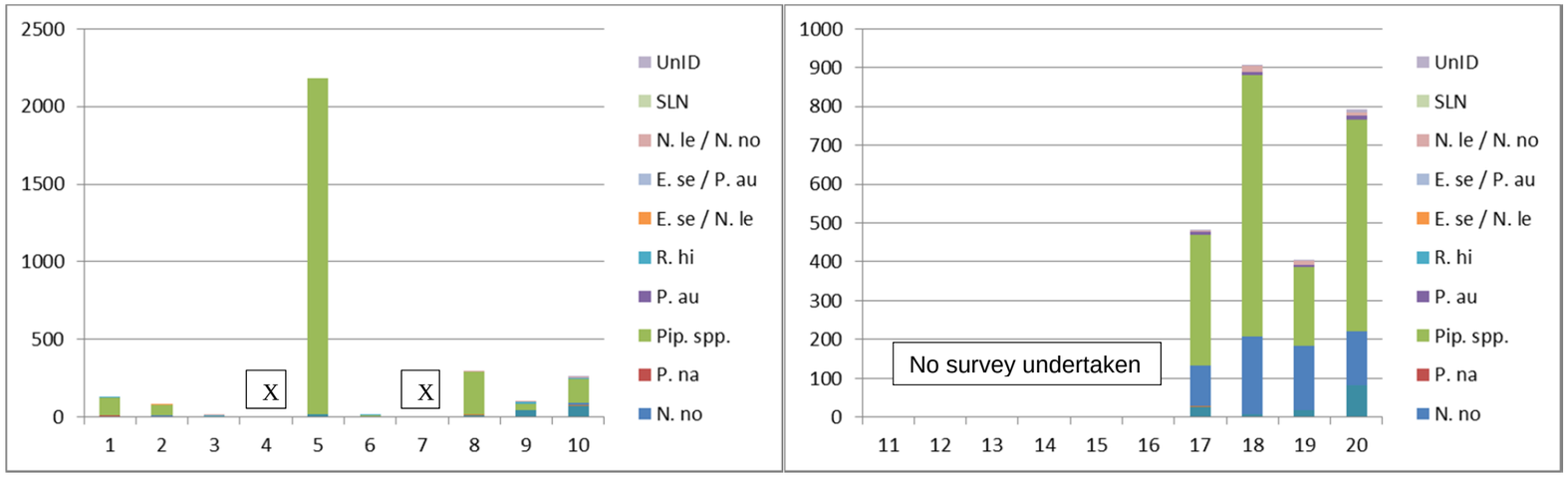
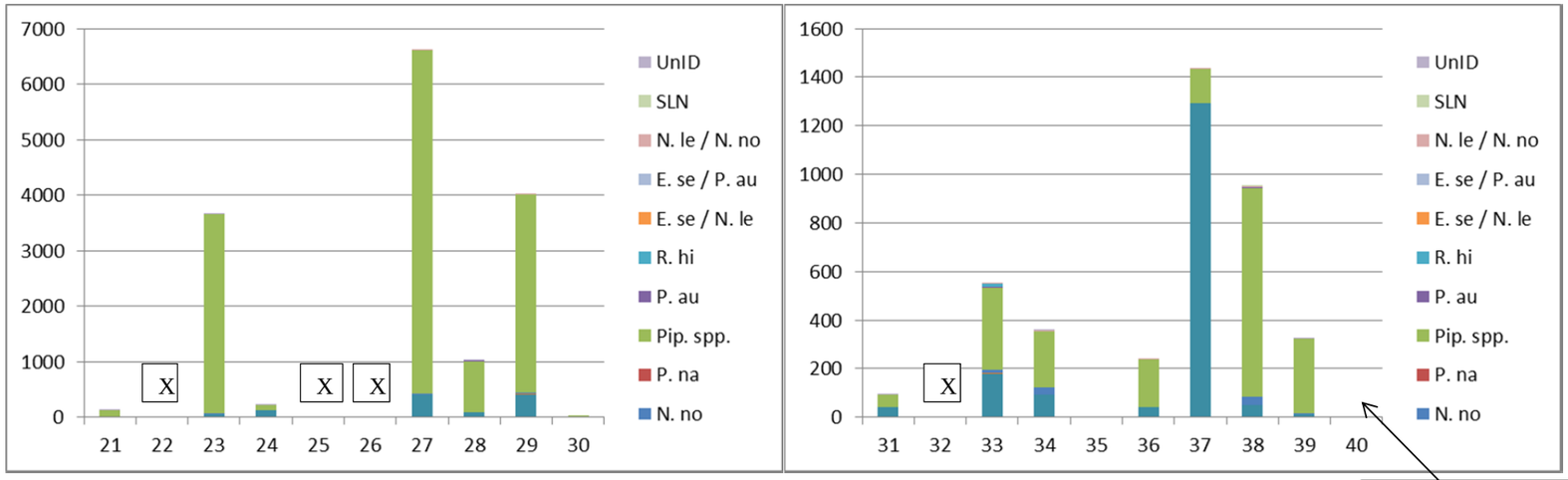
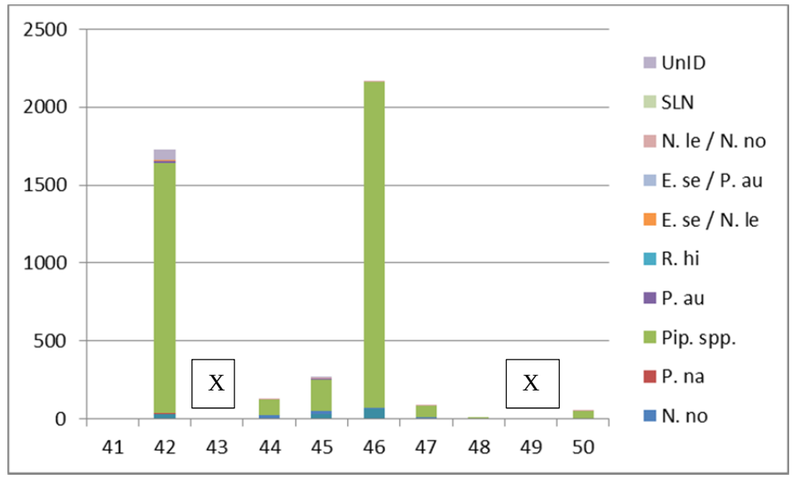
0
41
42
43
44
45
46
47
48
49
50
X
X
UnID
SLN
N. le / N. no
E. se / P. au
E. se / N. le
R. hi
P. au
Pip. spp.
P. na
N. no

Survey Visit 3





No survey undertaken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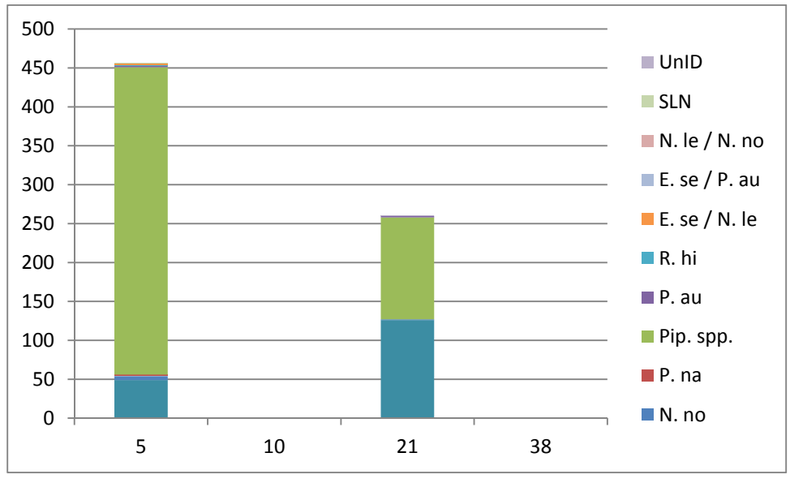
0
41
42
43
44
45
46
47
48
49
50
X
X
UnID
SLN
N. le / N. no
E. se / P. au
E. se / N. le
R. hi
P. au
Pip. spp.
P. na
N. no

Survey Visit 4



Annex E – Underpass Survey Sheets

St Brides Road

1. 24 August 2015

Sunset Start time 2000

Weather: light drizzle at start of survey, 80% cloud, low breeze, 15C

Time	Description	Species
2030	Bat enters from SW, forages under southern half of bridge for approx. 4mins, left southwards again. (very light and birds singing, so likely roosting nearby).	Common pipistrelle
2038	Foraging bat, unseen.	Common pipistrelle
2039	Foraging bat, unseen, possibly leaving southwards.	Common pipistrelle
2045	Two bats unseen.	Common pipistrelle
2046	Faint bat, unseen.	Common pipistrelle
2051	Brief forage, unseen.	Common pipistrelle
2052	Brief forage, unseen.	Myotis sp.
2053	Bat entered from south, forages around southern half of bridge, then out southwards.	Common pipistrelle
2056 - 2105	Bat entered from north, forages at southern end of bridge and left northwards.	Common pipistrelle
2112	Brief bat, unseen.	Myotis sp.
2114	Direction of entry unseen, foraging in southern part of bridge (approx. 2mins). Likely left northwards.	Common pipistrelle
2117	Foraging bat, unseen.	Common pipistrelle
2119	Foraging bat, likely through bridge in southerly direction.	Common pipistrelle
2121	Brief bat, unseen.	Soprano Pipistrelle
2122	Brief bat, unseen.	Common pipistrelle
2130	Brief bat, unseen.	Common pipistrelle
2131	Two bats, unseen.	Common pipistrelle, Myotis sp.

2134	Brief bats, unseen.	Common pipistrelle, Myotis sp.
2140	Brief bat, unseen.	Soprano Pipistrelle
2141	Brief bat, unseen.	Myotis sp.
2145	Brief bat, unseen.	Common Pipistrelle

NB – brief recordings are likely to be fly throughs

2. 9th September 2015

Sunset 1945 Start time 1935

Weather: dry, 10% cloud, no wind, 17C

Time	Description	Species
2000	Brief pass through underpass from north to south.	Common Pipistrelle
2002-04	Bat foraging at entrance of northern entrance.	Common Pipistrelle
2005	Foraging at northern and southern underpass entrances	Soprano Pipistrelle
2008-2020	Bat heard.	Soprano Pipistrelle
2025	Brief bat.	No recording
2033	Brief pass, north to south.	No recording
2034	Brief pass, unseen.	No recording
2046	Brief pass, unseen.	Common Pipistrelle
2048	Brief pass, unseen.	Myotis sp.
2101	Three passes – likely same bat.	Myotis sp.
2109	Brief pass, unseen.	Myotis sp.
2110	Three brief passes unseen.	Myotis sp.
2111	Brief pass, unseen.	Myotis sp.
2113	Three brief passes unseen.	Common Pipistrelle
2115	Brief pass, unseen.	Myotis sp.
2118	Brief pass, unseen.	Myotis sp.

2126	Brief pass, unseen.	No recording
2127	Brief pass, unseen.	No recording
2135	Brief pass, unseen.	Soprano Pipistrelle
2137	Brief pass, unseen.	Common Pipistrelle
2139	Brief pass, unseen.	Common Pipistrelle
2142	Brief pass, unseen.	No recording
2146	Brief pass, unseen.	No recording

3. 21st September 2015

22 July 2014

Sunset 1914 Start time 1855

Weather: dry, 10% cloud, no wind, 14C

Time	Description	Species
1937	Two bats commuting and foraging in underpass – came from the north.	Common Pipistrelle, Soprano Pipistrelle
1941	One bat commuting and foraging in underpass – came from the north.	Common Pipistrelle
1943	One bat commuting and foraging in underpass – south to north.	Common Pipistrelle
1944	One bat commuting and foraging in underpass – north to south.	Common Pipistrelle
1945-49	Foraging/circling in southern entrance of underpass and surrounding trees.	Common Pipistrelle
1947	Foraging/circling in southern entrance of underpass and surrounding trees.	Soprano Pipistrelle
1951	Two bats commuting and foraging through/in underpass, north – south (return).	Common Pipistrelle, Myotis sp.
1953	Three bats commuting and foraging through/in underpass, north – south (return).	Common Pipistrelle, Soprano Pipistrelle, Myotis sp.

1955	Bat commuting through tunnel, north to south.	Common pipipstrelle
1956-57	Two bats commuting through tunnel, north to south.	Common Pipistrelle, Soprano Pipistrelle
2006	Bat heard at northern end of underpass, unseen.	Myotis sp.
2008	Bat heard at northern end of underpass, unseen.	Common Pipistrelle, Soprano Pipistrelle
2011	Bat heard at northern end of underpass, unseen.	Common Pipistrelle
2013	Bat heard at northern end of underpass, unseen.	Myotis sp.
2017	Bat heard at northern end of underpass, unseen.	Myotis sp.
2019	Bat heard at northern end of underpass, unseen.	Common Pipistrelle
2024	Bat heard at northern end of underpass, unseen.	Common Pipistrelle
2033	Bat heard at northern end of underpass, unseen.	Common Pipistrelle
2035	Bat heard at northern end of underpass, unseen.	Myotis sp.
2040	Bat heard at northern end of underpass, unseen.	Soprano Pipistrelle
2043	Bat heard at northern end of underpass, unseen.	Common Pipistrelle
2048	Bat heard at northern end of underpass, unseen.	Common Pipistrelle
2051	Bat heard at northern end of underpass, unseen.	Common Pipistrelle
2102	Bat heard at northern end of underpass, unseen.	Common Pipistrelle
2113	Bat heard at northern end of underpass, unseen.	Myotis sp.

Green Underpass

1. 9th September 2015

Sunset 1941 Start time 1925

Weather: dry, clear, no wind, 17C

Time	Description	Species
2000	Bat recorded in underpass at northern end.	Common Pipistrelle
2001	Bat observed in trees above underpass.	Common Pipistrelle
2005	Bat flew southwards from trees above underpass.	Soprano Pipistrelle
2007	Two bats foraging around southern entrance (didn't enter).	Common Pipistrelle
2010	Bat passes through underpass, northwards.	Common Pipistrelle
2013	Bat passes through underpass, northwards.	Common Pipistrelle
2020	Bat passes through underpass, northwards (three passes within underpass).	Soprano Pipistrelle
2023	Bat passes through underpass, northwards (five passes within underpass).	Common Pipistrelle
2028	Bat passes through underpass, northwards (two passes within underpass).	Common Pipistrelle
2043	Bat passes through underpass, northwards.	No recording.
2051-2100	Bat passes through underpass, northwards (six passes within underpass).	Myotis sp.
2103	Bat passes through underpass, northwards.	No recording
2107	Bat passes through underpass, northwards (three passes within underpass).	Common Pipistrelle
2112	Bat passes through underpass, northwards (two passes within underpass).	Myotis sp.
2114	Bat passes through underpass, northwards.	Common Pipistrelle
2120	Bat passes through underpass, southwards.	Myotis sp.
2123	Bat passes through underpass, northwards.	No recording
2125	Several passes, heard not seen.	Myotis sp.

2132	Heard not seen.	Common Pipistrelle
2135	Heard not seen	Myotis sp.
2137	Heard not seen.	Common Pipistrelle
2140	Heard not seen.	Myotis sp.

2. 21st September 2015

Sunset 1914 Start time 1855

Weather: dry, clear, no wind, 17C

Time	Description	Species
1930	Bat passes through underpass south to north.	Soprano Pipistrelle
1931	Bat passes through underpass south to north.	Common Pipistrelle
1932	Bat passes through underpass south to north.	Common Pipistrelle
1942	Bat passes through underpass south to north.	Common Pipistrelle
1944	Two bats pass through underpass south to north.	Common Pipistrelle, Soprano Pipistrelle
1947	Three bats pass through underpass south to north.	Common Pipistrelle, Soprano Pipistrelle, Myotis sp.
1949	Two bats pass through underpass south to north.	Myotis sp.
1952	Two bats pass through underpass south to north.	Common Pipistrelle, Myotis sp.
1954	Bat passes through underpass north to south.	Common Pipistrelle
1956	Two bats pass through underpass north to south.	Common Pipistrelle, Soprano Pipistrelle
1957	Three bats pass through underpass north to south.	Common Pipistrelle, Soprano Pipistrelle, Myotis sp.
2000	Bat passes through underpass north to south.	Soprano Pipistrelle
2001	Two bats pass through underpass south to north.	Common Pipistrelle

2003	Two bats pass through underpass south to north.	Soprano Pipistrelle, Myotis sp.
2006	Two bats pass through underpass south to north.	Common Pipistrelle, Soprano Pipistrelle
2010	Bat passes through underpass north to south.	Common Pipistrelle
2011	Bat passes through underpass north to south.	Myotis sp.
2012	Bat passes through underpass south to north.	Myotis sp.
2020	Two bats pass through underpass north to south.	Common Pipistrelle, Myotis sp.
2022	Bat passes through underpass north to south.	Soprano Pipistrelle
2025	Bat passes through underpass south to north.	Soprano Pipistrelle
2031	Possibly three bats heard, not seen within centre of underpass.	Soprano Pipistrelle, Myotis sp.
2039	Bat passes through underpass south to north.	Common Pipistrelle
2045	Bat passes through underpass south to north.	Soprano Pipistrelle
2053	Bat passes through underpass north to south.	Myotis sp.
2058	Heard not seen, within centre of underpass.	Myotis sp.
2106	Heard not seen, within centre of underpass.	Myotis sp.

3. 22nd September 2015

Sunset 1911 Start time 1900

Weather: dry, 10% cloud, no wind, 13C

Time	Description	Species
1927	Bat passes through underpass north to south.	Soprano Pipistrelle
1930	Bat passes through underpass south to north.	Common Pipistrelle
1939	Heard not seen (located in centre of underpass).	Common Pipistrelle
1940	Two bats, heard not seen (located in centre of underpass).	Common Pipistrelle, Soprano Pipistrelle

1948	Two bats, foraging in tunnel, south to north.	Soprano Pipistrelle, Myotis sp.
1950	Two bats, foraging and commuting within underpass.	Common Pipistrelle, Soprano Pipistrelle
1951-56	Two bats foraging and commuting within underpass.	Common Pipistrelle, Soprano Pipistrelle
1958	Bat foraging and commuting within underpass	Common Pipistrelle
2000	Two bats foraging and commuting within underpass.	Common Pipistrelle, Soprano Pipistrelle
2001-05	Two bats foraging and commuting within underpass.	Common Pipistrelle, Myotis sp.
2010	Commute through underpass south to north.	Myotis sp.
2013	Foraging within underpass.	Common Pipistrelle
2015	Foraging within underpass	Soprano Pipistrelle
2016	Foraging within underpass.	Common Pipistrelle
2017	Foraging within underpass.	Myotis sp.
2020	Foraging within underpass, bat from southern entrance.	Myotis sp.
2021	Heard not seen, centre of underpass.	Common Pipistrelle
2023	Heard not seen, centre of underpass.	Soprano Pipistrelle
2026	Foraging within underpass, bat from northern entrance.	Myotis sp.
2029	Heard not seen, centre of underpass.	Soprano Pipistrelle
2033	Heard not seen, centre of underpass.	Soprano Pipistrelle
2038	Heard not seen.	Myotis sp.
2045	Two bats pass through underpass, north to south.	Common pipistrelle, Myotis sp.
2050	Two bats pass through underpass, north to south.	Common Pipistrelle
2053	Bat passes through underpass, south to north.	Myotis sp.
2058	Heard not seen, centre of underpass.	Soprano Pipistrelle

The Elms

1. 20th August 2015

Sunset 2025 Start time 2005

Weather: light drizzle at start, 90% cloud, light breeze, 18C

Time	Description	Species
2045	Bat heard not seen.	Common Pipistrelle
2049	Bat heard foraging, not seen.	Common Pipistrelle
2050	Bat heard unseen.	Common Pipistrelle
2052	Bat heard foraging, not seen.	Common Pipistrelle
2053	Bat heard not seen.	Common Pipistrelle
2055	Bat from south, forages under bridge for approx. 3mins, then out southwards	Common Pipistrelle
2058	Bat passes through underpass southwards.	Common Pipistrelle
2059	Two bats pass through underpass, north to south.	Common Pipistrelle, Soprano Pipistrelle, Myotis sp.
2101	Bat passes through underpass, south to north.	Common Pipistrelle
2102	Bat passes through underpass, south to north.	Common Pipistrelle
2104	Bat heard, not seen.	Soprano Pipistrelle
2105	Bat heard, not seen.	Soprano Pipistrelle
2105	Bat passes through underpass, north to south.	Common Pipistrelle
2106	Bat passes through underpass, south to north.	Soprano Pipistrelle
2108	Bat heard, not seen.	Common Pipistrelle
2110	Bat heard, not seen.	Common Pipistrelle
2114	Bat passes through underpass, north to south.	Common Pipistrelle
2116	Two bats pass through underpass, north to south.	Common Pipistrelle, Soprano Pipistrelle
2117	Bat passes through underpass, north to south.	Common Pipistrelle
2119	Bat heard, not seen.	Common Pipistrelle

2120	Bat heard, not seen.	Myotis sp.
2120	Bat passes through underpass, north to south.	Common Pipistrelle
2120	Bat passes through underpass, north to south.	Common Pipistrelle
2122	Bat passes through underpass, north to south.	Common Pipistrelle
2123	Bat passes through underpass, north to south.	Myotis sp.
2124	Bat heard, not seen.	Soprano Pipistrelle
2128	Bat heard, not seen.	Common Pipistrelle
2129	Bat passes through underpass, north to south.	No recording
2130	Bat passes through underpass, north to south.	Soprano Pipistrelle
2130	Bat heard, foraging, not seen.	Common Pipistrelle
2134	Bat heard, not seen.	Common Pipistrelle
2135-36	Bat forages then passes through underpass, north to south.	Common Pipistrelle
2137	Bat heard, foraging, not seen.	Common Pipistrelle
2140	Bat heard, not seen.	Common Pipistrelle
2141	Bat forages then passes through underpass, north to south.	Common Pipistrelle
2144	Bat forages then passes through underpass, north to south, then southwest.	Common Pipistrelle
2146	Bat passes through underpass, north to south.	Common Pipistrelle
2148	Bat heard, not seen.	Common Pipistrelle
2148	Bat passes through underpass, southwest to north.	Myotis sp.
2150	Bat heard, foraging, not seen.	Myotis sp.
2153	Bat heard, foraging, not seen.	Common Pipistrelle
2156	Bat passes through underpass, south to north.	Common Pipistrelle
2158	Bat heard, not seen.	Common Pipistrelle
2200	Bat heard, not seen.	Common Pipistrelle
2203	Bat heard, not seen.	No recording
2207	Bat heard, not seen.	Myotis sp.
2208	Bat heard, not seen.	Common Pipistrelle

2209	Bat passes through underpass, southeast to north.	Common Pipistrelle
2211	Two bats foraging at southern entrance and leaving southwest.	Common Pipistrelle
2219	Bat heard, not seen.	Common Pipistrelle
2220	Bat heard, not seen.	Common Pipistrelle
2220	Bat heard, not seen.	No recording

2. 2nd September 2015

Sunrise 0625 Start time 0425

Weather: dry, clear, no wind, 10C

Time	Description	Species
0433	Heard, not seen.	Common Pipistrelle

3. 7th September 2015

Sunset 1945 Start time 1925

Weather: dry, clear, light breeze, 18C

Time	Description	Species
2011-20	Two bats at southern underpass entrance.	Common Pipistrelle, Soprano Pipistrelle
2024	Two bats continuously foraging within underpass	Common Pipistrelle, Soprano Pipistrelle
2047	Heard, not seen.	Common Pipistrelle
2051	Heard, not seen.	Myotis sp.
2102	Heard, not seen.	Common Pipistrelle
2107	Heard, not seen.	Common Pipistrelle
2109	Bat foraging within underpass, entered at southern entrance.	Common Pipistrelle

2115	Bat foraging within underpass, entered at southern entrance.	Common Pipistrelle
2119	Bat foraging within underpass, entered at southern entrance.	Common Pipistrelle
2124	Bat foraging within underpass, entered at southern entrance.	Common Pipistrelle
2131	Bat foraging within underpass, entered at southern entrance.	Common Pipistrelle
2137	Heard, not seen.	Myotis sp.

Bencroft Lane

1. 18th August 2015

Sunset 2028 Start time 2005

Weather: dry, 50% cloud, light breeze, 18C

Time	Description	Species
2053	Heard, not seen.	No recording
2100	Heard, not seen.	Common Pipistrelle
2120	Bat foraging at southern entrance.	Common Pipistrelle
2120	Bat passes through underpass, south to north.	Common Pipistrelle
2128	Bat passes through underpass, north to south.	Common Pipistrelle
2141	Heard, not seen.	Common Pipistrelle
2143	Bat passes through underpass, north to southwest.	Common Pipistrelle
2147	Heard, not seen.	Common Pipistrelle
2148	Heard, not seen.	Common Pipistrelle, Myotis sp.
2149	Bat passes through underpass, north to south.	Common Pipistrelle
2151	Heard, not seen.	Common Pipistrelle
2157	Three bats pass through underpass, north to south.	Common Pipistrelle
2200	Bat passes through underpass, north to south.	Myotis sp.
2203	Heard, not seen.	Myotis sp.
2212	Heard, not seen.	Common Pipistrelle

2. 4th September 2015

Sunrise 0628 Start time 0428

Weather: dry, 90% cloud, no wind, 10C

Time	Description	Species
	No bats recorded	

3. 8th September 2015

Sunset 1944 Start time 1930

Weather: dry, clear, light breeze, 14C

Time	Description	Species
2016	Bat passes through underpass, south to north.	Common Pipistrelle
2025	Bat foraging within underpass, from south.	Common Pipistrelle
2029	Bat passes through underpass, south to north.	Common Pipistrelle
2030	Bat passes through underpass, north to south.	Common Pipistrelle
2135	Bat passes through underpass, south to north.	No recording

Pound Hill

1. 3rd September 2015

Sunset 1955 Start time 1940

Weather: dry, 90% cloud, light breeze, 13C

Time	Description	Species
2029	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle
2036	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle
2040	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle
2043	Heard, not seen.	Common Pipistrelle
2045	Heard, not seen.	Common Pipistrelle
2101	Heard, not seen.	Common Pipistrelle
2102	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle
2104	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle
2106	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle
2111	Heard, not seen.	Common Pipistrelle
2114	Heard, not seen.	Common Pipistrelle
2119	Heard, not seen.	Soprano Pipistrelle
2121	Bat observed along tree edge on southern side of bridge.	Soprano Pipistrelle
2134	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle
2144	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle

1. 10th September 2015

Sunrise 0639 Start time 0430

Weather: dry, 100% cloud, light breeze, 9C

Time	Description	Species
0441	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle
0446	Bat observed along tree edge on southern side of bridge.	Common Pipistrelle

2. 23rd September 2015

Sunrise 0659 Start time 0500

Weather: dry, clear, no wind, 8C

Time	Description	Species
	No bats recorded	

B4545

1. 20th August 2015

Sunset 2025 Start time 2005

Weather: dry, 90% cloud, light breeze, 16C

Time	Description	Species
2054	Bat passes through underpass west to east.	Common Pipistrelle
2100	Bat heard within scrub	Noctule
2108	Bat foraging within underpass	Common Pipistrelle
2111	Bat passes through underpass east to west.	Common Pipistrelle
2127-29	Bats heard unseen, foraging within underpass.	Common Pipistrelle, Noctule
2137	Bat heard unseen, foraging within underpass.	Common Pipistrelle
2141	Bat heard unseen, foraging within underpass.	Common Pipistrelle
2143	Bat heard unseen.	Noctule
2148	Bat heard unseen, foraging within underpass.	Common Pipistrelle
2154	Bat heard unseen.	Noctule
2156	Bat passes through underpass west to east.	Common Pipistrelle
2201	Bat heard unseen.	Noctule
2206	Bat heard unseen.	Noctule
2209	Bat heard unseen.	Noctule
2213	Bat heard unseen.	Noctule
2217	Bat heard unseen.	Myotis sp.

2. 3rd September 2015

Sunrise 0627 Start time 0425

Weather: dry, 90% cloud, no wind, 10C

Time	Description	Species
	No bats recorded	

3. 9th September 2015

Sunrise 0635 Start time 0435

Weather: dry, 100% cloud, light breeze, 11C

Time	Description	Species
	No bats recorded	

Grange Road

1. 25th August 2015

Sunset 2000 Start time 2014

Weather: dry, 50% cloud, light breeze, 16C

Time	Description	Species
2036	Heard, not seen.	Common Pipistrelle
2039	Bat observed north of the bridge, didn't cross.	Common Pipistrelle
2041	Bat observed foraging north of the bridge, didn't cross.	Common Pipistrelle
2054	Bat observed foraging north of the bridge, didn't cross.	Common Pipistrelle
2057	Bat observed foraging north of the bridge, didn't cross.	Common Pipistrelle
2102	Bat observed foraging north of the bridge, didn't cross.	Common Pipistrelle

2. 1st September 2015

Sunset 1959 Start time 2045

Weather: dry, 60% cloud, light breeze, 14C

Time	Description	Species
2020	Bat observed along tree line at edge of southern side of bridge.	Pipistrelle sp.
2042	Bat observed along tree line at edge of southern side of bridge.	Common Pipistrelle
2044	Bat observed along tree line at edge of southern side of bridge.	Common Pipistrelle
2104	Bat observed along tree line at edge of southern side of bridge.	Common Pipistrelle
2107	Bat observed along tree line at edge of southern	Noctule

	side of bridge.	
2117	Bat observed along tree line at edge of southern side of bridge.	Common Pipistrelle
2126	Bat observed along tree line at edge of southern side of bridge.	Common Pipistrelle
2131	Bat observed along tree line at edge of southern side of bridge.	Common Pipistrelle
2143	Bat observed along tree line at edge of southern side of bridge.	Common Pipistrelle
2150	Bat observed along tree line at edge of southern side of bridge.	Common Pipistrelle

3. 8th September 2015

Sunset 0625 Start time 0425

Weather: dry, 60% cloud, light breeze, 9C

Time	Description	Species
0433	Bat observed along tree line at edge of southern side of bridge.	Noctule
0445	Bat observed along tree line at edge of southern side of bridge.	Noctule
0449	Bat observed along tree line at edge of southern side of bridge.	Noctule
0537	Bat observed along tree line at edge of southern side of bridge.	Noctule