

Appendix 8.8

Bat Survey Report 2014

Abergelli
Abergelli Power Project

Bat Survey Report

BLANK PAGE

Issuing office

Wyastone Business Park | Wyastone Leys | Monmouth | NP25 3SR
 T: 01600 891576 | W: www.bsg-ecology.com | E: info@bsg-ecology.com

Client	Stag Energy
Job	Abergelli Power Project
Report title	Complete Bat Survey Report
Draft version/final	FINAL
File reference	7399_R_Bats_full_APPR (v3)_100315

	Name	Position	Date
Originated	Rachel Taylor	Ecologist	17 October 2014
Reviewed	Matt Hobbs	Principal Ecologist	21 October 2014
Approved for issue to client	Matt Hobbs	Principal Ecologist	21 October 2014
Issued to client	Matt Hobbs	Principal Ecologist	21 October 2014
Updated and 2nd issue to client	Matt Hobbs	Principal Ecologist	06 November 2014
Updated and 3rd issue to client	Matt Hobbs	Principal Ecologist	10 March 2015

Disclaimer

This report is issued to the client for their sole use and for the intended purpose as stated in the agreement between the client and BSG Ecology under which this work was completed, or else as set out within this report. This report may not be relied upon by any other party without the express written agreement of BSG Ecology. The use of this report by unauthorised third parties is at their own risk and BSG Ecology accepts no duty of care to any such third party.

BSG Ecology has exercised due care in preparing this report. It has not, unless specifically stated, independently verified information provided by others. No other warranty, express or implied, is made in relation to the content of this report and BSG Ecology assumes no liability for any loss resulting from errors, omissions or misrepresentation made by others.

Any recommendation, opinion or finding stated in this report is based on circumstances and facts as they existed at the time that BSG Ecology performed the work.

Nothing in this report constitutes legal opinion. If legal opinion is required the advice of a qualified legal professional should be secured.

Contents

1	Summary	2
2	Introduction	3
3	Methods	4
4	Results	9
5	References	22
	Appendix 1: Figures	23
	Appendix 2: Materials and Data Analysis	24
	Appendix 3: Building Descriptions	26
	Appendix 4: Photographs of Buildings	29
	Appendix 5: Photographs of Trees	38

1 Summary

- 1.1 Abergelli Power Limited (APL) is promoting a new Power Generation Plant with its associated Gas and Electricity Connections (the 'Project') on agricultural land within Abergelli Farm, north of Swansea in the City and County of Swansea (approximately at National Grid Reference 265284, 201431).
- 1.2 The Preliminary Ecological Appraisal (PEA) (BSG Ecology, 2014) identified records of a number of bat species within 2 km of the Project Site boundary, and suitable habitat to support these species within the Project Site boundary, as defined at the time of the survey (hereafter referred to as the 'Survey Site'). APL commissioned BSG Ecology to undertake surveys for bats within the 150 ha of pastoral farmland at and around Abergelli Farm between April and October 2014 within the Survey Site, as part of a range of ecological surveys to inform and support an application for Development Consent for the Project.
- 1.3 A range of surveys were carried out in accordance with published best-practice guidance focusing on investigating the distribution and variety of bat species present within the Survey Site. These included; walked transects, automated bat detector surveys, and internal and external inspections of trees and buildings.
- 1.4 At least seven species of bats were recorded during transect surveys; common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, *Myotis* sp., long-eared bat *Plecotus* sp., noctule *Nyctalus noctula*, Leisler's bat *Nyctalus leisleri*, and lesser horseshoe bat *Rhinolophus hipposideros*. All of these species and an additional three were recorded during automated bat detector surveys; Nathusius' pipistrelle *Pipistrellus nathusii*, serotine *Eptesicus serotinus*, and greater horseshoe bat *Rhinolophus ferrumequinum*. By far the most frequently recorded species were common and soprano pipistrelle with 90 % of calls identified as one or other of these two species. *Myotis* sp. bats were also recorded frequently with noctule recorded infrequently but regularly. The six other species of bats were recorded occasionally or singly.
- 1.5 Roost surveys of buildings within the Survey Site confirmed that at least three buildings contained bat droppings and were used as bat roosts. Droppings from at least three species of bats (pipistrelle sp., long-eared bat sp. and lesser horseshoe bat) were found. Thirty three trees were located within the Survey Site that are thought to have potential to support roosting bats. Emergence and / or re-entry surveys were carried out on eight trees all of which would potentially be directly affected by the Project. No bats were recorded emerging from or entering these potential tree roosts.

2 Introduction

- 2.1 Abergelli Power Limited commissioned BSG Ecology to undertake surveys for bats between April and October 2014 as part of a suite of ecological surveys to inform and support an application for Development Consent for the Project described below.

Site Description

- 2.2 The Survey Site consists of approximately 150 ha of pastoral farmland, primarily grazed by horses. The extent of the Survey Site is shown in (Figure 1, Appendix 1) and is centred at National Grid Reference 265284, 201431. The nearest settlement is Felindre, which is located approximately 2 km to the north of the Survey Site, with Swansea approximately 5 km to the south.
- 2.3 The Survey Site is largely agriculturally improved pasture with several areas of marshy grassland, particularly in the north, south and north-western extents of the Survey Site. The fields are bounded by fences, running along the line of defunct hedgerows, and often accompanied by ditches. There is a block of broadleaved woodland on the eastern boundary of the Survey Site and other areas of woodland around the marshy grassland to the west of the Survey Site, and around Felindre Gas Compressor Station and the two National Grid 400 kV electrical substations that lie at the south-west end of the Survey Site. The habitats in the surrounding landscape are similar to those within the Survey Site and comprise a mixture of improved and marshy grassland interspersed with occasional patches of woodland.

Description of Project

- 2.4 APL is promoting a new Power Generation Plant with associated Gas and Electricity Connections within Abergelli Farm. The Power Generation Plant would operate as a Simple Cycle Gas Turbine (SCGT) peaking plant and would be designed to provide an electrical capacity of up to 299 Megawatts (MW). It would be fuelled by natural gas, supplied by a new underground gas pipeline connecting Power Generation Plant to the existing National Grid Gas (NGG) National Transmission System (NTS). It would also connect to the National Grid Electrical Transmission System (NETS) via underground cable or overhead lines.
- 2.5 BSG Ecology has been appointed as the ecological consultant to undertake an ecology survey, which includes a PEA as well as a range of Phase 2 surveys, including bat surveys. These baseline surveys will be included in an appendix to an ecology chapter of an Environmental Statement, which is intended for submission in support of the application for Development Consent.

Aims of Study

- 2.6 The aims of the bat surveys within the Survey Site were to:
- Identify the bat species using the Survey Site and the activity levels of bats within the Survey Site;
 - Identify whether there are any features that are capable of supporting roosting bats; and
 - If the above features are likely to be affected by the Project, establish whether they are used by roosting bats.

3 Methods

Desk Study

- 3.1 Existing ecological information for the Survey Site and the surrounding area was requested from the South East Wales Biodiversity Records Centre (SEWBRc). Information on European and nationally protected¹ species, including bats, was requested covering the Survey Site and land up to 2 km from the Survey Site boundary.

Site Appraisal

- 3.2 The areas of marshy grassland, trees, scrub, woodland and streams within the Survey Site potentially provide good foraging habitat for bats, with similar habitat present in the surrounding landscape providing habitat continuity and connectivity throughout the landscape. The desk study returned records of five species of bats, which are all fairly common and widespread. In addition, the Survey Site has habitat that is capable of supporting roosting and foraging habitat for rarer species of bat that have been recorded in the Swansea area, for example lesser horseshoe bat, greater horseshoe bat and barbastelle *Barbastella barbastellus*.
- 3.3 Overall, the Survey Site has been assessed as being of 'Medium Habitat Quality' following consideration of the current best practice bat survey guidelines (Hundt, 2012). Therefore the following methods were used at the appropriate level of survey effort, as recommended by the guidelines:
- Walked transects; and
 - Automated detector surveys.
- 3.4 In addition, a number of buildings and trees within the Survey Site were surveyed for presence / likely absence of roosting bats. The following methods were used:
- Internal and external building inspection or tree roost climbing inspection; and
 - Dusk emergence and pre-dawn re-entry surveys of potential roosts that are likely to be affected by the Project.

Bat Activity Surveys

Walked Transects

- 3.5 Walked surveys of two pre-determined transect routes (northern and southern, see Figure 1) were undertaken monthly between April and October 2014. The pre-determined transect routes were largely contained within the Survey Site, with the southern route extending a short distance to the east of the Survey Site in one area.
- 3.6 Each transect started around sunset and took approximately 2-3 hours to complete. The timing of the surveys therefore covered the bat emergence period and the period of most intense foraging activity when invertebrate prey is most abundant (Altringham, 2003).
- 3.7 The same transect route was walked on each survey visit with the start points and direction changed on each visit to ensure that different parts of the Survey Site were surveyed at different times of the night. This approach was adopted to remove any bias that could be introduced into the survey data if each survey was walked in the same direction. This bias could otherwise have resulted in any given point on the transect route being visited at approximately the same interval after sunset. Static recording points were selected for each transect. At these points the surveyors were stationary for three minutes to listen and record all bat passes.
- 3.8 Bat activity was recorded using Anabat hand-held electronic bat detectors. This model of detector automatically records all the bat passes they detect, which significantly reduces the chances that

¹ Wildlife and Countryside Act 1981 Schedules 1, 5 & 8; Conservation of Habitats and Species Regulations 2010; Protection of Badgers Act.

bats could be missed due to human error. Wherever possible, surveyors recorded the observed behaviour and numbers of bats onto a field proforma. This was to aid identification and also to provide additional detail on the behaviour of observed bats. Field notes included a record of the time of each bat encounter, allowing results to be cross-referenced with the recorded data.

- 3.9 The main aim of the transect walks was to identify areas of high bat activity, such as foraging areas and/or commuting routes (e.g. wet ditches, marshy grassland and hedgerows). Accordingly, the transect routes focussed on such areas.
- 3.10 When possible, all walked transects avoided heavy rain, strong winds and dusk temperatures below 10°C as recommended in the BCT guidelines (Hundt, 2012).

Automated detector surveys

- 3.11 In addition to the transect surveys, automated surveys were conducted using Wildlife Acoustics Song Meter 2 (SM2BAT+) bat detectors which are full spectrum detectors that are triggered automatically to record bat echolocation calls. These detectors can be deployed and left to remotely record bat activity for a period of several nights.
- 3.12 The BCT guidance recommends that two locations per transect route are surveyed each month. In this case, eight survey locations were used across the Survey Site with four in each half of the Survey Site (north and south). Each location was surveyed every other month to enable a larger number of survey locations to be sampled over the survey season but ensure that each location was sampled in spring, summer and autumn. Bat detectors would be deployed at four locations (two in the north and two in the south) in April, June, August and October with the other half of the locations sampled in May, July and September.
- 3.13 The detectors were deployed for five nights at each of the locations, which allowed continuous monitoring to take place during the period when bats are active, i.e. sunset to sunrise. They were programmed to begin recording from half an hour before sunset until half an hour after sunrise. Survey hours varied throughout the survey season according to daylight hours and have been calculated for each recording session in order to accurately calculate activity indices.

Materials and Data Analysis

Full details of the equipment used for surveys and the data analysis methods are provided in Appendix 2.

Bat Roost Surveys

Internal and External Building Inspection

- 3.14 The internal/external survey of eleven buildings within the Survey Site was undertaken on 25th June 2014 by Principal Ecologist and experienced bat worker Matthew Hobbs MCIEEM (Natural Resources Wales (NRW) Licence number 52240:OTH:CSAB:2014) with assistance from Rachel Taylor ACIEEM and Caitlin McCann. Eleven buildings (Buildings B1 – B11) (see Figure 2, Appendix 1) were inspected to assess their potential to support roosting bats and to search for evidence of bat activity.
- 3.15 The survey included all the buildings within the Survey Site, except for those contained within the Felindre Gas Compressor Station and the two National Grid 400 kV electrical substations that lie at the south-west end of the Survey Site, which were visually inspected using binoculars from boundary fences during the PEA survey in July. The buildings within these sites do not apparently have any features that could support roosting bats and it was not necessary to arrange access to these sites to carry out a more detailed inspection of any of the buildings.
- 3.16 During the survey a thorough search was made of the buildings including all accessible areas and crevices for bats, their droppings, food remains or characteristic grease marks at potential roost exit/entrance points. The exterior of the buildings were searched, paying particular attention to window ledges, where droppings can gather undisturbed, and under potential roost access points, such as loose tiles and gaps between boarding. Where possible, internal inspections were also undertaken.

3.17 Signs of bat activity searched for included:

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

3.18 All buildings were assigned a category defining their potential to support roosting bats in accordance with Table 1 below.

Table 1: Categories defining the potential for buildings to support roosting bats.

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

Internal and External Tree Inspection

Preliminary Ground Level Inspection of Trees

3.19 The Preliminary Ecological Appraisal conducted (on 24 February, 14 April and 9 July 2014) included a preliminary ground-level assessment of trees for their potential to support roosting bats. Features of trees that may be used by roosting bats include:

- Natural holes;
- Woodpecker holes;
- Cracks or splits in major limbs;
- Loose bark; and
- Hollows or cavities.

3.20 Any trees with apparent roosting features were recorded and assigned a category defining their potential to support roosting bats in accordance with Table 2 below, as adapted from Hundt, 2012 (Table 8.4, p. 60). The locations of these trees are shown in Figure 3a, Appendix 1.

Table 2: Categories defining the potential for trees to support roosting bats.

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

Roped Access Survey of Trees

- 3.21 Any trees that were identified during the Phase 1 survey as category 2 or above, i.e. have potential to support roosting bats were further assessed by Anton Kattan² and Ted Bodsworth, during a roped access (or tree climbing) survey. The aim of this survey was to closely inspect features identified during the Phase 1 survey and re-categorise trees as necessary. The trees were surveyed from 15-17 July 2014. Weather conditions during the three day period were generally good with light rain on 16 July 2014.

Dusk emergence and Dawn Re-entry Surveys

- 3.22 Following on from the internal and external inspections described above, dusk emergence and dawn re-entry surveys were undertaken between 12 and 28 August 2014. The survey was undertaken in a smaller area than the Survey Site described above; due to refinements in the Project design and extent of the Project Site which assisted in determining which potential roosts would be affected by the Project and, therefore, would require further survey. A plan of the reduced area was provided on 8 August 2014 and the trees within this reduced area, along with their roost potential categorisation are shown in Figure 3b, Appendix 1. No buildings are anticipated to be directly affected by the Project, and therefore all the buildings were excluded from further surveys. The recommendations included in the BCT guidance (Hundt, 2012) for the level of survey effort required to determine the presence or absence of bats from a structure are shown in Table 3.

Table 3: Survey effort required for determining presence / absence of bats at a potential roost

Level of bat potential	Survey effort required
High roost potential	3 dusk emergence and/or pre-dawn re-entry surveys during May-September including 2 between mid-May and August.
Low to moderate roost potential	2 dusk emergence and/or pre-dawn re-entry surveys during May-September including 2 between mid-May and August.
Low roost potential	1 dusk emergence and/or pre-dawn re-entry surveys during May-September.

- 3.23 The roped access surveys are considered equal effort to one emergence or re-entry survey, therefore reducing the number of further activity surveys by one. The tree categories were split into the three roost potential categories as follows: 1* - high roost potential; 1 – low to moderate potential; 2 – low roost potential; and 3 – no roost potential. Table 4 shows the additional activity surveys required on each of the trees. Where it was not possible to carry out a roped access survey on the trees within the reduced area, namely T5, T32 and T35, an additional emergence or re-entry survey was carried out.

² Natural Resources Wales licence number - 51661:OTH:CSAB:2013

Table 4: Trees within the reduced area for which additional surveys were required (see Figure 3b).

Tree Number	Species	BCT Potential	BCT Tree Category	Roped access survey	Additional surveys required
T3	Birch	Low - Moderate	1	Yes	1
T4	Oak	High	1*	Yes	2
T5	Birch	Low - Moderate	2	No	2
T6	Birch	Low - Moderate	1	Yes	1
T9	Oak	Low - Moderate	1	Yes	1
T23	Oak	High	1*	Yes	2
T32	Elm	Low	2	No	1
T35	Birch	Low - Moderate	1	No	2

- 3.24 The dusk emergence surveys commenced approximately 15 - 30 minutes before sunset and continued until approximately 1½ - 2 hours after sunset. The dawn re-entry survey commenced approximately 1½ - 2 hours before sunrise and finished 15 minutes after sunrise.
- 3.25 Surveyors used two different bat detectors on each survey to supplement visual observations: a Batbox Duet detector for listening to bat calls from the combined heterodyne/frequency division output and an Anabat frequency division detector for recording calls for subsequent identification.

Limitations of Study Methods

- 3.26 No significant limitations to the study methods were noted. The access route in the south-west of the Survey Site (Access Road Option 2) and the western part of the land surrounding the Felindre Gas Compressor Station and the two National Grid 400 kV electrical substations were not included in the transect surveys as access to these areas could not be arranged until late in June and was not permitted at night for security reasons. This area is a small proportion of the Survey Site that does not contain habitats significantly different to those present in other parts of the Survey Site, and is unlikely to support a more diverse species assemblage than the rest of the Survey Site. As such, it is not considered that this is a significant limitation to the survey methods.
- 3.27 No access was granted to the roof voids of the three residential buildings (buildings 1, 2, and 5 – see Table 12) surveyed for roosting bats. This limitation to the survey is unlikely to be significant given that these buildings will not be directly affected by the Project.

4 Results

Desk Study

- 4.1 There were 126 bat records provided by SEWBREC from the 2 km radius search area. Of these the majority were recorded during bat transects carried out to inform a separate unrelated development proposal, named 'Felindre development site' in the records which was located approximately 1 km to the south west of the Survey Site boundary.
- 4.2 The bat species recorded from the desk study include brown long-eared bat *Plecotus auritus*, common pipistrelle, Natterer's bat *Myotis nattereri*, noctule, and whiskered bat *Myotis mystacinus*. There were also records of unidentified *Pipistrellus sp.* and other records where the bat species was not specified.
- 4.3 There are four bat roosts amongst the records provided. The closest of these is a record of 50 unspecified bat species 1.8 km to the south-east of the Survey Site at Ynystawe, Swansea from 1992. The next closest is a night / feeding roost of an unspecified species 1.9 km south west of the Survey Site boundary in Tredegar-Fawr farm buildings from 1998. A record of a roost of 87 whiskered bats also comes from approximately 1.9 km to the north west of the Survey Site boundary in Felindre, Swansea from 1993. The fourth record is a roost of 70 bats of unspecified species, 2.5 km to the south east of the Survey Site in Ynysforgan, Swansea from 1993.

Bat Activity Surveys

Walked transects

- 4.4 Details of transect surveys along with survey timings and weather conditions are provided in Table 5. A map of walked transect routes is presented in Figure 1, Appendix 1, with maps showing the number of passes and species recorded during each transect survey presented in Figures 4a – c (north transect) and 5a – c (south transect), Appendix 1.

Table 5: Details of walked transect surveys. (GL – Gareth Lang, MH – Matt Hobbs, RT - Rachel Taylor, ST – Stuart Thomas, CMC – Caitlin McCann, NL – Niall Lusby)

Date	Survey Area	Surveyor	Time	Weather ³
24/04/14	North	GL, MH	20:28-22:42	START: Wind F0-1 SE, 70% cloud, no rain, 12.5°C FINISH: Wind F0-1 SE, 70% cloud, no rain, 8.8°C
30/04/14	South	RT, ST	20:15-22:45	START: Wind F1, 100% cloud, light rain, 14.2°C FINISH: Wind F1 SW, 90% cloud, no rain, 10.4°C
22/05/14	North	GL, RT	21:17-00:33	START: Wind F1-2 NW, 50% cloud, no rain, 11.3°C FINISH: Wind F2-3 SW, 50% cloud, no rain, 10.8°C
03/06/14	South	GL, MH	21:25 – 23:56	START: Wind F0 SE, 60% cloud, no rain, 15.0°C FINISH: Wind F0-1 SE, 90% cloud, no rain, 13.0°C
19/06/14	North	RT, CMC	21:22-00:28	START: Wind F0-1 SE, 5% cloud, no rain, 15.3°C FINISH: Wind F0-1 SE, 0% cloud, no rain, 11.9°C
25/06/14	South	RT, CMC	21:19-00:24	START: Wind F0, 70% cloud, no rain, 16.0°C FINISH: Wind F0, 0% cloud, no rain, 16.0°C
17/07/14	South	CMC, GL	21:11-23:45	START: Wind F1, 60% cloud, no rain, 23.0 °C FINISH: Wind F0, 80% cloud, moderate rain, 23.0 °C

³ Wind strength is given in the Beaufort scale. This is an empirical measure that relates wind speed to observed conditions at sea or on land.

Date	Survey Area	Surveyor	Time	Weather ³
30/07/14	North	CMC, NL	20:52-23:31	START: Wind F2, 50% cloud, no rain, 17.0 °C FINISH: Wind F2, 80% cloud, no rain, 18.0 °C
19/08/14	South	GL, RT	20:20-23:05	START: Wind F1-2W, 20% cloud, no rain, 11.4 °C FINISH: Wind F1, 10% cloud, no rain, 7.0 °C
26/08/14	North	GL, CMC	20:00-22:41	START: Wind F1-2, 40% cloud, no rain, 16 °C FINISH: Wind F2-3 NW, 0% cloud, no rain, 14 °C
03/09/14	South	GL, NL	19:43-22:21	START: Wind F1, 50% cloud, no rain, 18 °C FINISH: Wind F1, 50% cloud, no rain, 19 °C
18/09/14	North	RT, CMC	19:09-21:40	START: Wind F0-1, 100% cloud, no rain, 21 °C FINISH: Wind F1-2NE, 40% cloud, no rain, 20 °C
01/10/14	South	GL, NL	18:40-21:20	START: Wind F2, 25% cloud, no rain, 14 °C FINISH: Wind F1, 25% cloud, no rain, 12.5 °C
06/10/14	North	RT, GL	18:35-20:54	START: Wind F0-1, 30% cloud, no rain, 9 °C FINISH: Wind F0-1, 90% cloud, no rain, 8 °C

- 4.5 In total 958 bat passes (B) of at least seven species of bats were recorded during walked transect surveys in 2014. Table 6 summarises the relative activity level (Bat passes per hour (B/h)) recorded during walked transects for all species; for the definition of B and B/h used in this analysis see 'Materials and Data Analysis' in Appendix 2.

Table 6: Number of passes recorded (B) and relative activity (B/h) for each species during all walked transects.

Species	B	B/h
Common pipistrelle	577	15.4
Soprano pipistrelle	240	6.4
<i>Myotis</i> species	67	1.8
Noctule	26	0.7
Leisler's bat	1	>0.1
Long-eared bat sp.	1	>0.1
Lesser horseshoe bat	1	>0.1
Total	958	25.6

- 4.6 There were 43 *Pipistrelle* sp. passes recorded during the walked transect that could not be identified to species level, as the peak frequency of the calls were within a frequency range used by more than one species (see 'Materials and Data Analysis' in Appendix 2 for details of how pipistrelle bats were identified). These have not been included in the results tables.
- 4.7 A total of 464 bat passes (B) were recorded during the north transect, including at least five species, a total of 494 bat passes were recorded during the south transect, including at least seven species. The relative activity level (Bat passes per hour (B/h) for the definition of B and B/h used in this analysis see 'Materials and Data Analysis' in Appendix 2) recorded during the north and south transects is recorded in Table 7.

Table 7: Number of passes and relative activity recorded during walked transect surveys.

Species	North		South	
	B	B/h	B	B/h
Common pipistrelle	318	16.9	259	13.9
Soprano pipistrelle	86	4.6	154	8.3
<i>Myotis</i> species	29	1.5	38	2.0
Noctule	9	0.5	17	0.9
Leisler's bat	0	0	1	>0.1
Long-eared bat sp.	1	>0.1	0	0
Lesser horseshoe bat	0	0	1	>0.1
Total	464	24.7	494	26.6

Relative Activity of Bats

- 4.8 Across the survey season, common pipistrelle was the most frequently encountered species during walked transects with 15.4 B/h and 60.2 % of all passes recorded as this species (B = 577). Soprano pipistrelle was the second most numerous with 6.4 B/h. When passes from unidentified pipistrelles are added to the total, 89.8 % of all the recorded passes were identified as bats from the *Pipistrellus* genus⁴. Activity levels of 1.8 B/h and 0.7 B/h were recorded for *Myotis* sp. and noctule respectively with one pass recorded for Leisler's bat, lesser horseshoe bat and long-eared bat sp.
- 4.9 Bat activity levels varied between transects, with a mean of 26.1 B/h (range; 7.3–70.4 B/h). Fluctuations between surveys are within normal limits, being influenced by factors such as short-term variations in weather conditions and prey availability and seasonal variations. During April, an average across both surveys of 49.8 B/h was recorded, which then declined in May to 22.3 B/h and in June (14.4 B/h) and then rose again in July (36.5 B/h). In the autumn bat activity declined again with an average of 24.2 B/h recorded in September, which dropped again in October (12.2 B/h). The highest level of activity recorded during a single transect survey occurred during the April transect in SA2 when an activity rate of 70.4 B/h (B = 176) was recorded.

Spatial Distribution of Bats

- 4.10 Common and soprano pipistrelle bats were recorded during every survey and occurred in most of the Survey Site. The highest number of passes was recorded along linear features such as hedges or streams, with lower activity over open fields. Passes were recorded throughout transect surveys, with the majority being recorded later in the night; however, 12 passes were recorded within 20 minutes of sunset.
- 4.11 A total of 67 passes of *Myotis* bats were recorded, with a relatively wide scatter of records throughout the Survey Site. The highest proportion of passes was recorded along the stream to the east and woodlands in the south of the Survey Site. No passes were recorded within 20 minutes of sunset.
- 4.12 Noctule was recorded infrequently and in low numbers with just 26 passes recorded. Most passes were recorded during the southern transect, with single passes scattered throughout the Survey Site. Twelve of the passes recorded were within the first 20 minutes after sunset.
- 4.13 One pass of lesser horseshoe bat was recorded on 3 June near the woodland at the north corner of the National Grid gas compressor station. This was recorded 67 minutes after sunset.

Automated Detector Surveys

- 4.14 Automated bat detectors were operating for a total of 132 nights, equating to 1,266 hours and 50 minutes of survey time between April and October 2014. Table 8 gives details of automated bat detector deployment dates and locations with the latter illustrated in Figure 1, Appendix 1. Table 9

⁴ See Appendix 2 for identification parameters used for the *Pipistrellus* genus.

gives details of the number of passes and relative activity recorded during automated detector surveys.

Table 8: Numbers and deployment dates of automated detectors.

No.	OS Grid Ref	Apr	May	Jun	Jul	Aug	Sep	Oct
D1	SN6482401614	24-29/04		17-22/06		19-24/08		01-05/10
D2	SN6517902032	24-29/04		17-22/06		19-24/08		01-05/10
D3	SN6538401492	26-30/04		17-22/06		19-24/08		01-05/10
D4	SN6567100799	24-26/04		17-22/06		19-24/08		01-05/10
D5	SN6506701490		16-21/05		17-22/07		18-22/09	
D6	SN6582902329		16-19/05		17-22/07		18-22/09	
D7	SN6494702070		16-21/05		17-22/07		18-22/09	
D8	SN6525501006		16-21/05		17-19/07		18-22/09	

Table 9: Number of bat passes (B) and relative activity (B/h) at automated detector locations.

Detector number	B	B/h
D1	416	2.0
D2	3573	32.8
D3	4273	115.7
D4	3898	157.9
D5	3257	77.2
D6	843	11.1
D7	3249	46.8
D8	2613	75.9
Total	22122	56.2

Relative Activity of Bats

- 4.15 A total of 27,634 passes from at least ten species of bat were recorded. Figure 6 illustrates the proportion of activity recorded for different species at each automated survey location, for the whole survey period as well as spring (April-May), summer (June-August) and autumn (September-October) in Figures 7 to 9. Data for bats not identified to species-level (e.g. common/soprano pipistrelle), or for which there were so few calls recorded that the activity rate cannot be meaningfully illustrated (e.g. greater and lesser horseshoe bat), have not been illustrated in the Figures provided in Appendix 1. The relative activity of bat species recorded at all detector locations is recorded in Table 10.

Table 10: The relative activity of bat species recorded at all detector locations.

Species	Detector Number								Total B/h
	D1	D2	D3	D4	D5	D6	D7	D8	
Nathusius' pipistrelle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.01	<0.01
Common / Nathusius' pipistrelle	0.0	<0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Common pipistrelle	1.5	14.6	19.1	13.4	20.7	5.5	19.5	22.7	14.2
Common / soprano pipistrelle	0.1	0.2	0.6	1	0.8	0.4	1.1	0.7	0.6
Soprano pipistrelle	0.6	5.2	2.6	13.0	3.0	2.6	3.1	9.5	4.8
Greater horseshoe bat	0.0	0.0	0.0	0.0	<0.1	0.0	0.0	<0.1	<0.1
Lesser horseshoe bat	0.0	0.0	<0.1	<0.1	<0.1	0.0	<0.1	0.0	<0.1
Long-eared bat sp.	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
<i>Myotis</i> / long-eared bat sp.	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	<0.1
<i>Myotis</i> species	0.1	0.9	1.6	2.7	5.0	1.5	1.8	2.2	1.8
Noctule	0.2	0.2	0.3	0.2	0.1	0.3	<0.1	0.1	0.2
Noctule / Leisler's bat	<0.1	<0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1
Leisler's bat	0.0	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	<0.1
Serotine / Leisler's bat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	<0.1
Serotine	0.0	0.0	<0.1	0.0	0.0	0.0	0.0	<0.1	<0.1
Noctule / Leisler's bat / serotine	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	0.2	<0.1
Unidentified bat species	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	0.2	<0.1
Total B/h	2.6	21.1	24.4	30.5	29.9	10.4	25.6	35.7	21.8

- 4.16 Across the survey season, the highest relative activity rate recorded was for common pipistrelle, at an average of 14.2 B/h (B = 17975) followed by soprano pipistrelle (4.8 B/h) with 90.0% of all the recorded passes identified as bats from the *Pipistrellus* genus. The next most frequently recorded species were *Myotis* sp. with 1.8 B/h (B = 2328) and noctule (0.2 B/h). There were also 45 long-eared bat *Plecotus* sp. passes recorded, with six passes for lesser horseshoe bat, two for greater horseshoe bat, three for serotine *Eptesicus serotinus* and just one Nathusius' pipistrelle *Pipistrellus nathusii* pass.
- 4.17 The data presented in Table 11 indicates that overall bat activity dropped from spring (April and May; 43.0 B/h) to summer (June - August; 19.1 B/h) and again in autumn (September and October 11.4 B/h). The pattern of activity was the same for all species of bats except long-eared bat sp. which increased from <0.1 to 0.1 B/h from spring to summer, and serotine and Nathusius' pipistrelle which were only recorded in the spring and autumn respectively.

Table 11: Number of passes (B) and relative activity (B/h) of bats at each detector location.

Detector number	Spring (April-May)		Summer (June-August)		Autumn (September-October)		Total
	B	B/h	B	B/h	B	B/h	
D1	75	1.6	341	4.0	86	1.4	2.6
D2	1240	26.3	2333	27.3	547	8.8	21.1
D3	3252	87.1	1021	11.9	258	4.1	24.4
D4	1508	79.2	2390	27.9	1198	19.2	30.5
D5	2546	62.0	710	17.9	895	15.4	29.9
D6	184	7.4	659	16.6	439	7.5	10.4
D7	1542	37.5	1707	42.9	312	5.4	25.6
D8	2501	60.9	112	4.7	1778	30.5	35.7
Total	12848	43.0	9273	19.1	5513	11.4	21.8

Distribution of Bats

4.20 The highest activity levels came from three detectors that each recorded 29.9-35.7 B/h as follows:

- D5 (29.9 B/h) - located at the corner of a patch of woodland to the west of the Survey Site. The large majority of passes were from common pipistrelle bats (20.7 B/h). Two of the six lesser horseshoe bat passes were recorded at this location, as was one of two greater horseshoe bat passes. The highest *Myotis* activity (5.0 B/h) was recorded at this location.
- D4 (30.5 B/h) - located at the south corner of the Survey Site in trees along a stream corridor. High activity levels of common (13.4 B/h) and soprano (13.0 B/h) pipistrelle bats were recorded, as well as two of the six lesser horseshoe bat passes were recorded at this location.
- D8 (35.7 B/h) – located on the corner of woodland surrounding the National Grid Gas compressor station to the west of the Survey Site. High levels of activity were recorded from common (22.7 B/h) and soprano (9.5 B/h) pipistrelle bats. One of two greater horseshoe bat passes was recorded.

Myotis bats

4.21 In total, 2,328 *Myotis* sp. passes were recorded at an average rate of 1.8 B/h. *Myotis* bats were recorded at all of the static locations and during every deployment. Higher activity rates were recorded in the spring (4.0 B/h) than the summer (0.9 B/h) with a slight increase again in autumn (1.4 B/h).

4.22 Higher levels of activity were recorded in the south of the Survey Site than the north (2.8 B/h and 1.0 B/h, respectively). The highest relative activity was recorded at D5 (5.0 B/h), in the most southerly part of the Survey Site.

4.23 The nocturnal activity of *Myotis* bats showed that passes were typically being recorded first by detectors at around 40 minutes after sunset, with a peak around one hour after sunset and consistent activity throughout the night until around 40 minutes before sunrise.

Noctule bats

- 4.24 In total, 228 Noctule passes were recorded at an average rate of 0.2 B/h. Noctule bats were recorded at all of the static locations. Higher activity rates were recorded in the spring (0.5 B/h) which then dropped away during the summer (0.1 B/h) with a further drop in autumn (<0.1 B/h).
- 4.25 Higher levels of activity were recorded in the south of the Survey Site compared to the north (0.2 B/h and 0.2 B/h, respectively). The highest relative activity was recorded at D3 and D6 (0.3 B/h), along the eastern side of the Survey Site.
- 4.26 The nocturnal activity of Noctule bats showed that passes were typically being recorded first by detectors at around 20 minutes after sunset, with three calls in total recorded before sunset, and a peak in activity around 40 minutes after sunset followed by consistently low activity throughout the night until around 20 minutes before sunrise.

Leisler's and Serotine bats

- 4.27 In total four Leisler's bat and three serotine bat passes were recorded on the Survey Site, with an additional 24 passes that were identified as either Leisler's bat or serotine.
- 4.28 Leisler's bat passes were recorded at detector numbers D5 and D6, in the west and north-east of the Survey Site respectively. Serotine passes were recorded at detectors D3 and D8, in the woodland in the east of the Survey Site and the woodland around the Gas Compressor Station in the west respectively. All passes of Leisler's bat / serotine occurred at detector D8.
- 4.29 All of the bat passes were recorded within the first 60 minutes after sunset with the exception of one Leisler's bat pass and one Leisler's bat / serotine pass which were both recorded in the middle of the night.

Pipistrelle bats

- 4.30 This section covers common, soprano and Nathusius' pipistrelles and also any pipistrelle calls that could have been from either species (see Appendix 2). In total, 17,975 common pipistrelle passes were recorded (14.2 B/h), with 6,019 soprano pipistrelle (4.8 B/h), and a total of 772 unidentified pipistrelle passes (0.6 B/h); 97% of all pipistrelle calls were therefore recorded to species level. Common and soprano pipistrelle bats were recorded from all detectors during every deployment. Much higher activity rates were recorded for common pipistrelle in the spring (29.6 B/h) than the summer (12.2 B/h) and autumn (11.4 B/h). This was also true for soprano pipistrelle, with 7.4 B/h in spring, 5.3 B/h in summer and 2.7 B/h in autumn. Only one Nathusius' pipistrelle pass was recorded, during the autumn at D8 (in the south east of the Survey Site).
- 4.31 Higher levels of common and soprano pipistrelle activity were recorded in the south of the Survey Site than the north (25.5 B/h and 12.9 B/h, respectively). The highest relative activity for common pipistrelle was recorded at D8 (22.7 B/h). For soprano pipistrelle highest relative activity was at D4 (13.0 B/h), the only location at which soprano pipistrelle levels nearly matched common pipistrelle, along the eastern side of the Survey Site.
- 4.32 The nocturnal activity of pipistrelle bats showed that passes were typically being recorded first by detectors at around 20 minutes after sunset, with a peak from 40 to 80 minutes after sunset. There was constant activity recorded throughout the night until around 20 minutes before sunrise, with a secondary peak around 60 to 40 minutes before sunrise.

Long-eared bat sp.

- 4.33 In total, 45 long-eared bat sp. passes were recorded at an average rate of 0.04 B/h. Long-eared bat sp. were recorded at low levels at all of static locations, with a peak activity level of 0.1 B/h at D1. A higher number of passes were recorded in the summer (31 passes) than the autumn (13 passes) and the spring when only one pass was recorded.
- 4.34 Long-eared bat sp. was recorded at all detectors with peak activity levels at D1 and D3, both on the western side of the Survey Site next to woodland.

Horseshoe bats

- 4.35 Six lesser horseshoe bat passes were recorded across four detector locations, D3, D4, D5 and D7, located in the centre of the Survey Site. Four of these passes were recorded in spring, with one in the summer and one in autumn. A single pass was recorded from D3 on 18 June, with two passes recorded from D4 on 25 April, single passes recorded on 18 and 19 May from D5 and a further single pass recorded at D7 on 20 September. Bat passes were recorded between 1-1.5 hours after sunset or 55 minutes – 1.5 hrs before sunrise in spring and summer, and in the middle of the night (23:45) in autumn.
- 4.36 Two greater horseshoe bat passes were recorded at detector locations D5 and D8 during the middle of the night in July and September respectively.

Bat Roost Surveys***Internal and External Building Inspection***

- 4.37 The results of the building inspection are included in Table 12, which shows the category assigned to each building. Full descriptions of the buildings are included in Appendix 3 and Photographs of each building in Appendix 4.

Table 12: Potential of the surveyed buildings to support roosting bats.

Building Number	Bat roost potential	Brief description	Key features and evidence of use by bats
Building 1	Moderate	Detached house.	A number of missing slates and gaps under ridge tiles offer potential for roosting bats. No signs of use by bats were observed. There was no access available to the roof void.
Building 2	Moderate	Detached house.	A number of missing slates and gaps under ridge tiles offer potential for roosting bats. No signs of use by bats were observed. There was no access available to the roof void.
Building 3	Negligible	Corrugated iron barn, used as horse stable.	No potential roost features or signs of use by bats were observed.
Building 4	Confirmed roost	Stone built stable block	Numerous roosting opportunities and access points under missing slate, through broken windows, gaps above door frames. A scattering of long-eared bat, pipistrelle and lesser horseshoe bat droppings were found in the store rooms, with no piles of droppings found anywhere.
Building 5	Moderate	Terraced housing	Some missing tiles, lifted lead flashing and access to boxed eaves due to damage could be used by bats. No signs of use by bats were observed. There was no access available to the roof void.
Building 6	Negligible	Corrugated iron barn, used as horse stable and machinery store.	No potential roost features or signs of use by bats observed.
Building 7	Low	Brick outbuilding with corrugated roof.	The cavity wall may be accessible through broken vents. No signs of use by bats were observed.
Building 8	Confirmed	Single storey brick barn	Multiple fly-in opportunities to both

	roost	with second story tower at the northern end.	storeys. Small piles of long-eared bat and pipistrelle droppings found in both first and second storey at the north of the building.
Building 9	Negligible	Breeze block shed with corrugated roof.	No potential roost features or signs of use by bats observed.
Building 10	Confirmed roost	Brick out-house, single room, no doors or windows. Flat concrete roof.	Missing bricks allow access to the cavity wall in a number of places. Two pipistrelle droppings were found on the floor.
Building 11	Moderate	Derelict stone cottage, two distinct standing walls, no roof.	Walls are very exposed. Some roosting opportunities between the stone, and gaps into a rubble filled wall. No signs of use by bats were observed.

4.38 None of the buildings will be affected by the Project and therefore no further survey has been carried out on the buildings.

Internal and External Tree Inspection

Preliminary Ground Level Inspection of Trees

4.39 A total of 33 trees were identified during the preliminary ground level inspection of trees as having potential bat roosting features. The details of each tree are recorded in Table 13 below with their locations shown in Figure 3a, Appendix 1.

4.40 All but four of the trees that were identified were further assessed during the roped access survey (see below).

Roped Access Survey of Trees

4.41 A total of 29 trees were climbed using ladders or rope access. Four trees were inaccessible or unsafe to climb. Table 13 includes descriptions of the potential roosting features and the BCT category (see Table 1) assigned to each tree following the roped access survey.

Table 13: Categorization of trees assessed during preliminary ground level survey and subsequently during roped access survey.

Tree	Grid Reference	Species	Bat Roost Feature	Evidence of bats	Potential	BCT Category
T1	SN 65384 02528	Oak	Ivy - Extensive ivy cover on stem with lifted plates	None	Moderate	1
T2	SN 65249 01932	Birch	Decay in dying tree - Cavity- small hollows on both stems	None	Negligible	3
T3	SN 65249 01916	Birch	Woodpecker rot hole	None	Moderate	1
T4	SN 65340 01850	Oak	Two splits in large limbs	Unconfirmed dropping	High	1*
T5	SN 65451 01405	Birch	Single rot hole in trunk	None	Moderate	1
T6	SN 65471 01413	Birch	Single rot hole in trunk	None	Moderate	1
T7	SN 65398 01677	Oak	Thick ivy and hollow trunk near ground level	None	Low	2
T8	SN 64862 01980	Oak	Splits in small limbs	None	Moderate	1
T9	SN 65170 02031	Oak	Split limb - Single feature with high potential	None	Moderate	1
T11	SN 64722 02068	Oak	2 woodpecker holes	None	High	1*
T10	SN 64703 02063	Oak	Single cavity at base of trunk	None	Low	2
		Oak	Split in branch	None		
T12	SN 64844 02030	Oak	Split in trunk	None	Low	2
		Oak	Split limb	None		
T13	SN 64843 02034	Oak	Dense ivy	None	Low	2
T14	SN 64843 02040	Alder	Rot hole and Woodpecker hole	Unconfirmed droppings	High	1*
T15	SN 64857 01978	oak	Rot hole - hollow trunk	None	Moderate	1

Tree	Grid Reference	Species	Bat Roost Feature	Evidence of bats	Potential	BCT Category
T16	SN 64868 01915	Oak	Woodpecker rot hole in trunk	None	Moderate	1
T17	SN 64987 01560	Birch	Thick stem ivy	None	low	2
T18	SN 64994 01468	Ash	Rot hole in trunk	None	low	3
		Ash	Hollow limb	None		
T19	SN 65513 02439	Oak	Decay in canopy - one cavity with potential	None	Moderate	1
		Oak	Cavity in main stem	None		
		Oak	Split / hollow limb	None		
T20	SN 65632 02412	Oak	Slit in main stem	None	Low	2
		Oak	Rot hole /hollow	None		
T22	SN 65620 01318	Willow	Broken trunk	None	Low	2
T23	SN 65506 01089	Oak and nearby rowan	Rot holes in limbs	None	High	1*
T24	SN 65460 01068	Oak	Dense ivy plate lifted from trunk	None	Low	2
T25	SN 65112 01204	Oak	Hollow at base, cut limb.	None	Low	2
T26	SN 64979 01428	Rowan	Cavity in dead limb	None	Moderate	1
T27	SN 65147 01494	dead Oak	Standing dead wood	None	Low	2
		dead Oak	Hollows in trunk	None		
		dead Oak	Hollow Branch	None		
T28	SN 65061 01605	Oak	Large rip out scar with possible fissures behind scar regrowth	None	Moderate	1
T30	SN 64863 01925	S. Birch	Branch rip out scar with upwards leading cavity	None	None	3
T31	SN 64825 02000	Oak	Rot hole in split	None	Low	2
T32	SN 64190 00698	Elm	Small plates of lifted bark	None	Low	2
T33	SN 64387 00771	Oak	Small snapped branch	None	none	3
T34	SN 64418 00785	Oak	Crack at base of overhanging branch	None	none	3
T35	SN 64448 00798	Birch	Two woodpecker holes	None	Moderate	1

Emergence/re-entry surveys

4.42 Additional survey was considered necessary for a total of eight trees within the updated Survey Site boundary. The location and category assigned to each of these trees is shown in Figure 3b, Appendix 1. Details of the emergence and re-entry surveys are shown in Table 14 below. Photographs of each tree are included in Appendix 5.

Table 14: Details of the emergence / re-entry surveys of potential tree roosts. (GL – Gareth Lang, RT - Rachel Taylor, CMC – Caitlin McCann, NL – Niall Lusby).

Tree	Date	Emergence / re-entry	Time	Surveyor	Weather conditions
T3	21/08	Emergence	20:15-22:10	CMC	START: Wind F2 NW, 100% cloud, light rain, 12.2°C FINISH: Wind F1 NW, 50% cloud, no rain, 13.2°C
T4	12/08	Emergence	20:28-22:20	CMC, RT	START: Wind F2 NE, 90% cloud, light rain, 14°C FINISH: Wind F2 NE, 50% cloud, no rain, 12.8°C
	29/08	Re-entry	04:15-06:30	RT, NL	START: Wind F1-2 NW, 50% cloud, no rain, 14.4°C FINISH: Wind F1-2 NW, 60% cloud, no rain, 13.7°C
T5	13/08	Re-entry	04:00-06:15	RT	START: Wind F0-1, 50% cloud, no rain, 9.8°C FINISH: Wind F0-1, 10% cloud, no rain, 10.7°C
	28/08	Emergence	20:00-21:45	GL	START: Wind F1-2 NW, 60% cloud, no rain, 16.3°C FINISH: Wind F1-2 NW, 40% cloud, no rain, 15°C
T6	13/08	Re-entry	04:00-06:15	CMC	START: Wind F0-1, 50% cloud, no rain, 9.8°C FINISH: Wind F0-1, 10% cloud, no rain, 10.7°C
T9	21/08	Emergence	20:15-22:10	RT	START: Wind F1-2 NW, 60% cloud, no rain, 16.3°C FINISH: Wind F1-2 NW, 40% cloud, no rain, 15°C
T23	21/08	Emergence	20:15-22:10	GL	START: Wind F2 NW, 100% cloud, light rain, 12.2°C FINISH: Wind F1 NW, 50% cloud, no rain, 13.2°C
	29/08	Re-entry	04:15-06:30	GL	START: Wind F1-2 NW, 50% cloud, no rain, 14.4°C FINISH: Wind F1-2 NW, 60% cloud, no rain, 13.7°C
T32	22/08	Re-entry	04:15-06:15	RT	START: Wind F0-1, 0% cloud, no rain, 12.2°C FINISH: Wind F0-1, 90% cloud, no rain, 11.8°C
	28/08	Emergence	20:00-21:45	RT	START: Wind F1-2 NW, 60% cloud, no rain, 16.3°C FINISH: Wind F1-2 NW, 40% cloud, no rain, 15°C
T35	22/08	Re-entry	04:15-06:15	CMC	START: Wind F0-1, 0% cloud, no rain, 12.2°C FINISH: Wind F0-1, 90% cloud, no rain, 11.8°C

	28/08	Emergence	20:00-21:45	NL	START: Wind F1-2 NW, 50% cloud, no rain, 14.4°C FINISH: Wind F1-2 NW, 60% cloud, no rain, 13.7°C
--	-------	-----------	-------------	----	---

4.43 No bats were recorded emerging or re-entering the potential tree roosts during the surveys.

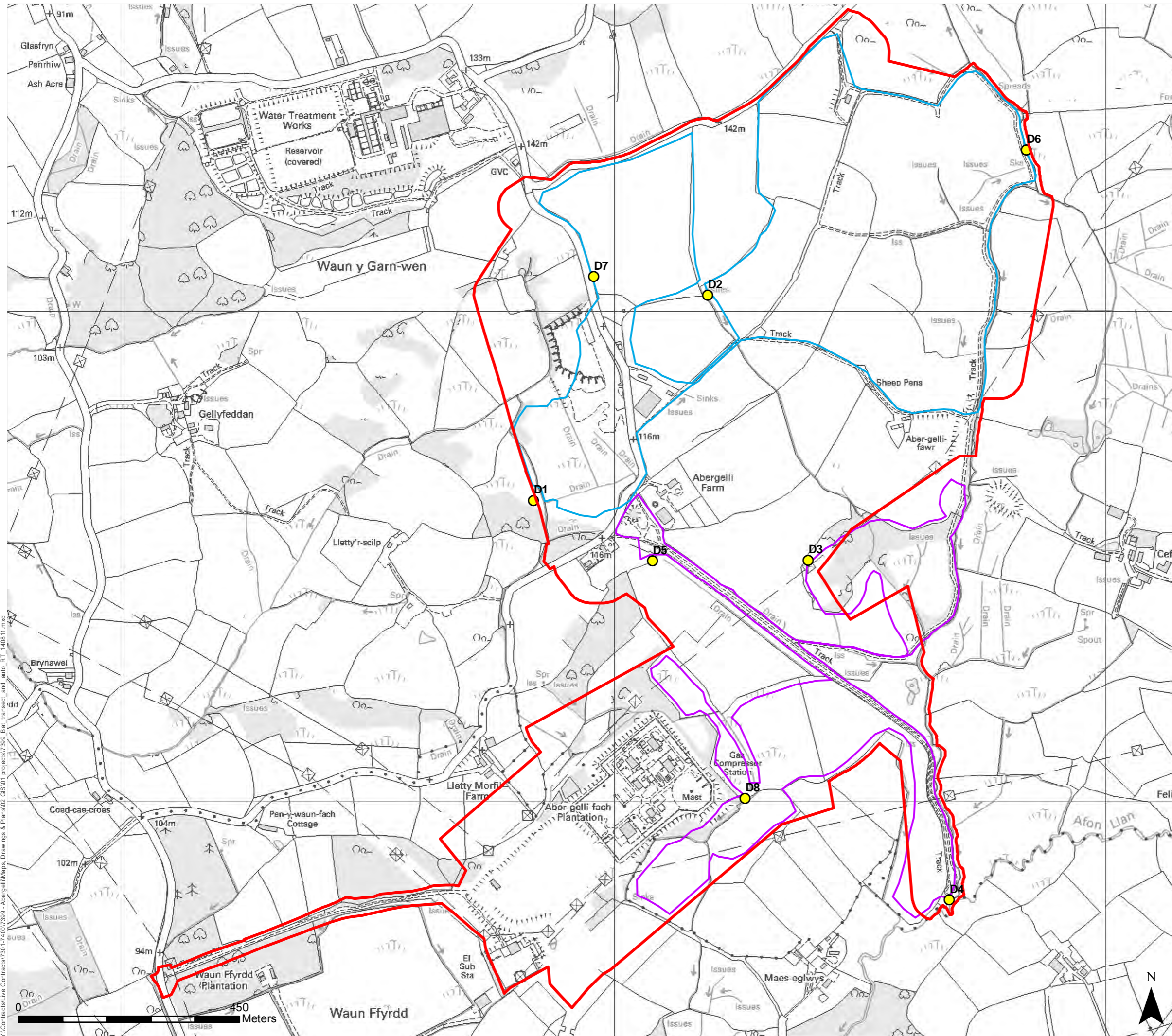
5 References

Altringham, J.D. (2003). *British Bats*. HarperCollins. London.

BSG Ecology (2014). Abergelli Power Project: Preliminary Ecological Appraisal.

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

Appendix 1: Figures



LEGEND

- Survey Site boundary
- Bat detector locations
- North Transect
- South Transect

BSG | ecology

OFFICE: Monmouth
T: 01600 891576

JOB REF: 7399.00

PROJECT TITLE
ABERGELLI POWER PLANT

DRAWING TITLE
Figure 1 - Bat transect route and automated detector locations

DATE: 11.08.2014 CHECKED: MH SCALE: 1:7,500
DRAWN: RT APPROVED: MH STATUS: FINAL

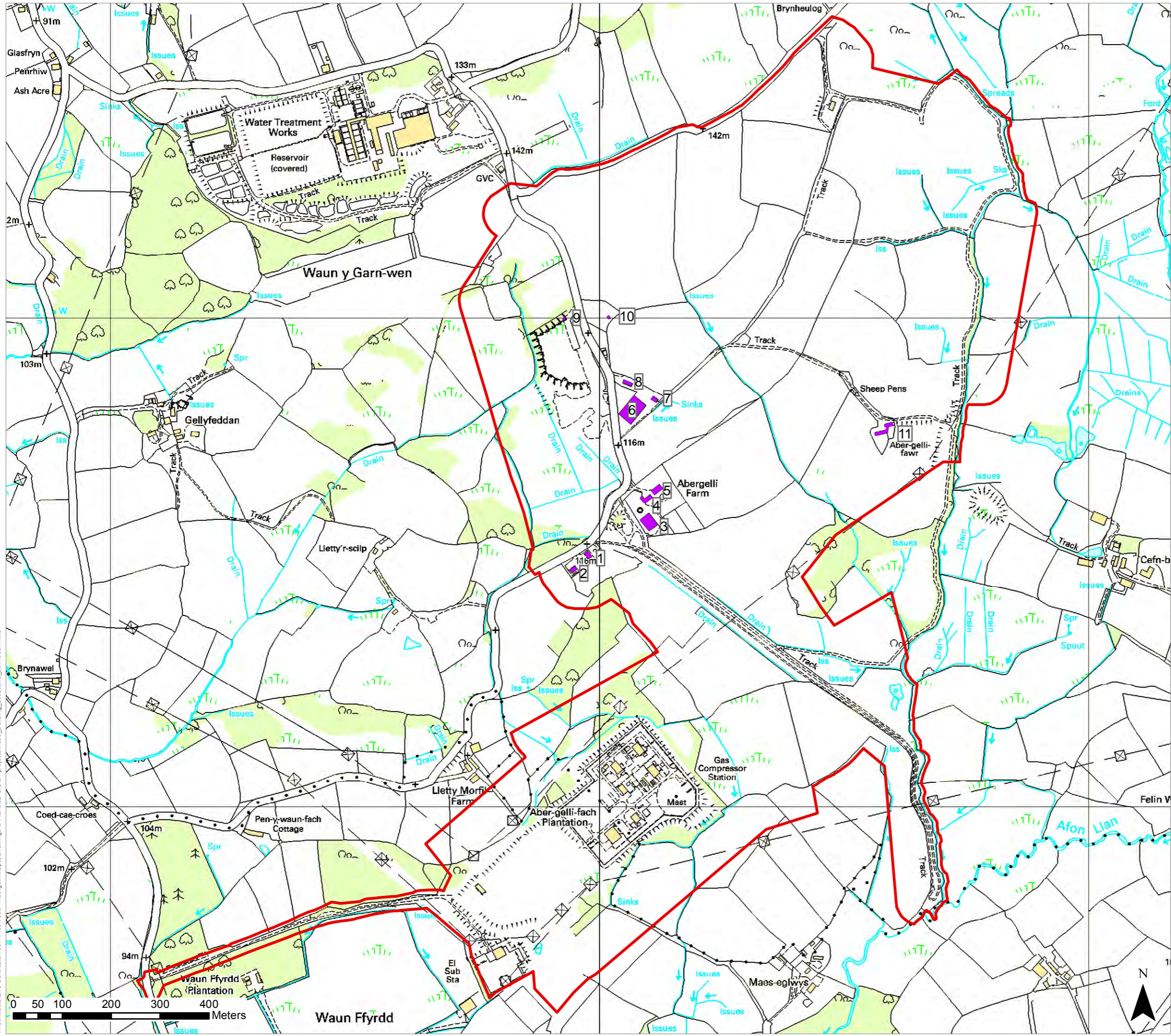
Copyright © BSG Ecology

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2012. All rights reserved. Reference number: 10048980

OS Open data © Crown copyright and database right 2012 | Aerial Photography © Bing Maps
Sources: BSG Ecology survey data

Y:\Contracts\Live Contracts\730174007399 - Abergelli\Maps, Drawings & Plans\02_GIS\01_projects\7399_Bat_transect_and_auto_RT_140811.mxd



LEGEND

- Survey Site Boundary
- Buildings with potential for roosting bats



OFFICE: Monmouth
 T: 01600 891576
 JOB REF: 7399

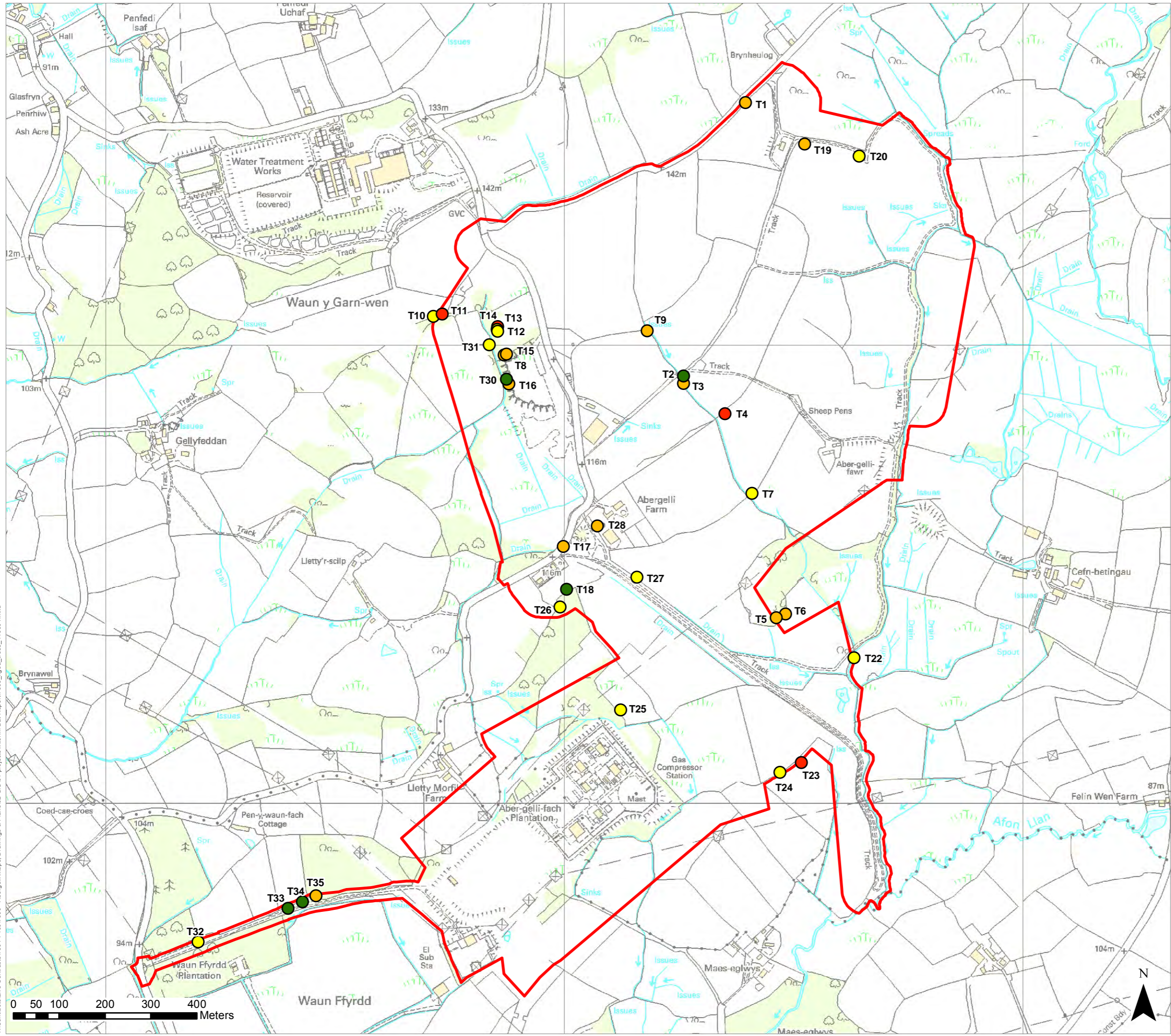
PROJECT TITLE
 ABERGELLI POWER PROJECT

DRAWING TITLE
 Figure 2 - Buildings with potential for roosting bats and requirement for further survey

DATE: 07.08.2014 CHECKED: MH SCALE: 1:7,500
 DRAWN: RT APPROVED: MH STATUS: FINAL

Copyright © BSG Ecology
 No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.
 This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2012. All rights reserved. Reference number: 10048980
 OS Open data © Crown copyright and database right 2012 | Aerial Photography © Bing Maps

Y:\Contracts\Live Contracts\730174007399 - Abergelli\Maps, Drawings & Plans\02_GIS\01_projects\7399_Building_Locations_20140807.mxd



LEGEND

Survey Site Boundary

Potential Tree Roost - BCT Category

- 1 □
- 1
- 2
- 3



OFFICE: Monmouth
 T: 01600 891576
 JOB REF: 7399.00

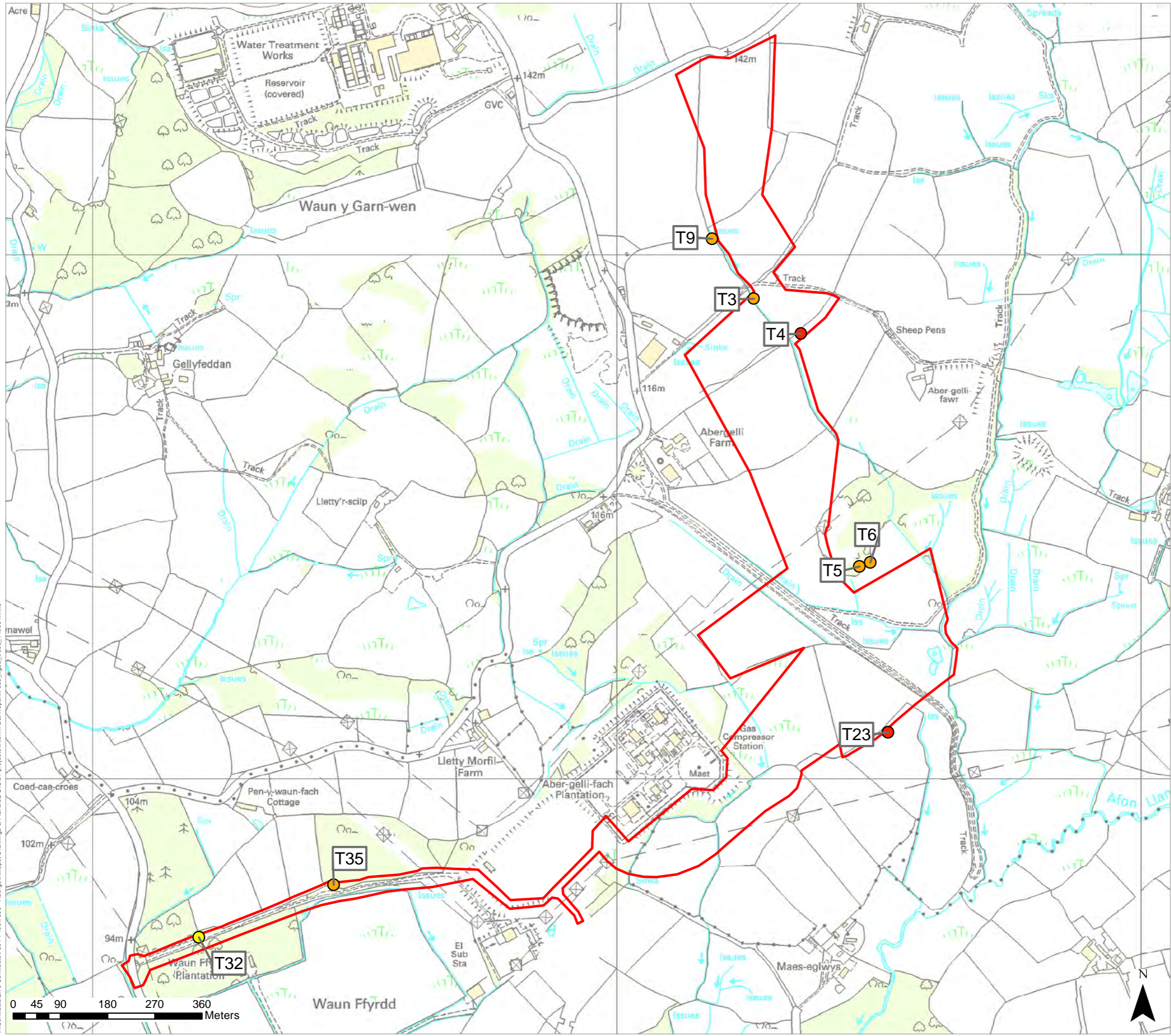
PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 3a - Potential tree roost locations within accessible areas of the Survey Site


DATE: 07.08.2014 CHECKED: MH SCALE: 1:8,000
 DRAWN: RT APPROVED: MH STATUS: FINAL

Copyright © BSG Ecology
 No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.
 This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980
 OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri
 Sources: BSG Ecology survey data




Y:\Contracts\Live Contracts\730174007399 - Abergelli\Maps, Drawings & Plans\02_GIS\01_projects\Interim Bat Report\7399_fig3a_trees_140904.mxd



LEGEND

 Amended Survey Site boundary

Potential Tree Roost - BCT Category

-  1*
-  1
-  2

BSG | ecology

OFFICE: Monmouth
T: 01600 891576

JOB REF: 7399.00

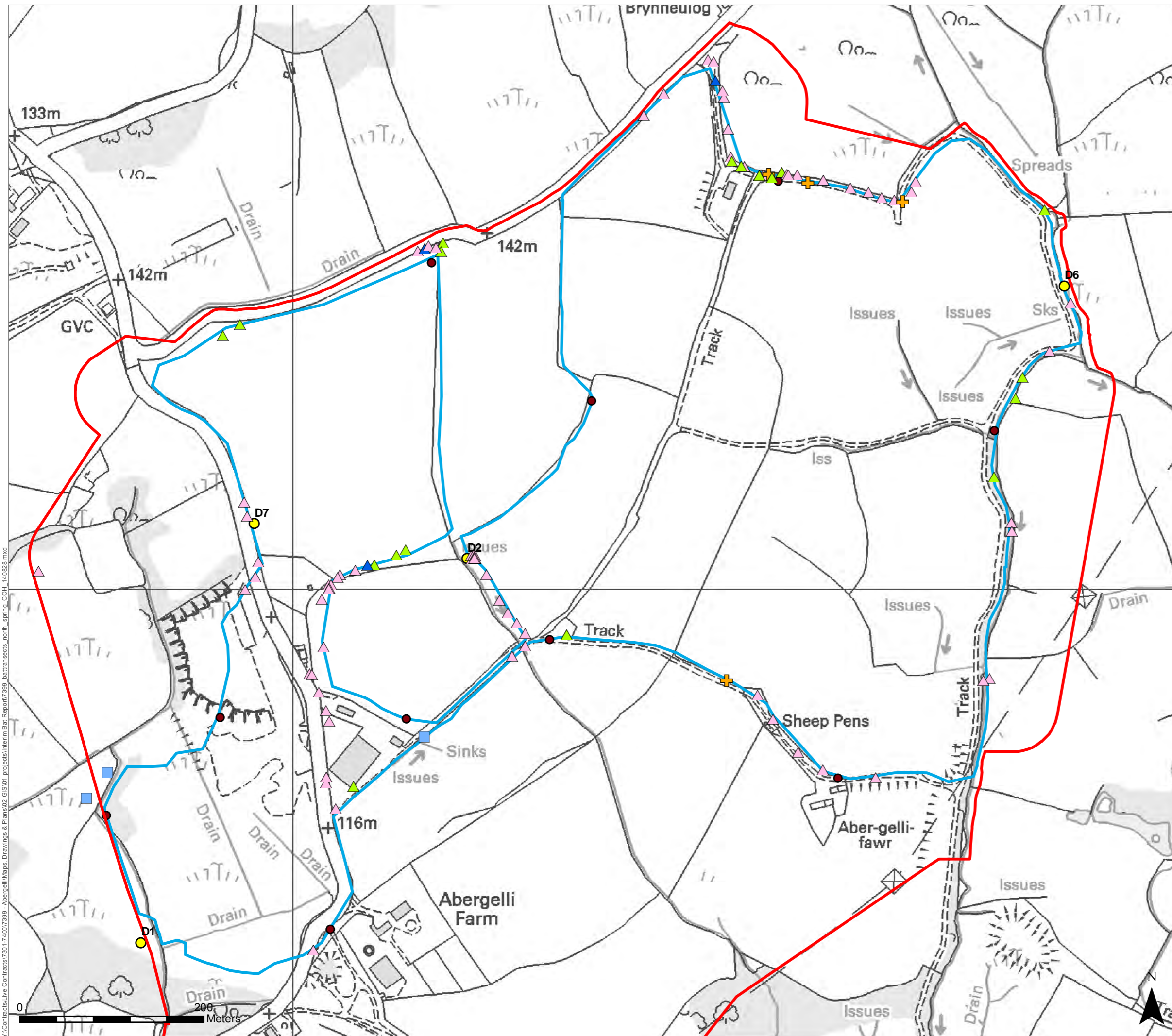
PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 3b - Potential tree roost locations where emergence / re-entry surveys were carried out'

DATE: 07.08.2014 CHECKED: MH SCALE: 1:7,000
DRAWN: RT APPROVED: MH STATUS: FINAL

Copyright © BSG Ecology
No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.
This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980
OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri
Sources: BSG Ecology survey data

V:\Contracts\Live Contracts\73017-0007399 - Abergelli\Maps, Drawings & Plans\02 GIS\01 projects\Interim Bat Report\7399_fig3b_trees_140904.mxd



LEGEND

- Survey Site boundary
- Bat detector locations
- Stopping Points
- North Transect

Bat observations

- ▲ Common pipistrelle
- ▲ Soprano pipistrelle
- ▲ Common + Soprano pipistrelle
- Noctule
- + Myotis species

BSG | ecology

OFFICE: Monmouth
T: 01600 891576

JOB REF: 7399.00

PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 4a - Number of passes plotted along northern walked transect. Spring 2014 (April-May)

DATE: 28.08.2014 CHECKED: RT SCALE: 1:4,000
DRAWN: COH APPROVED: MH STATUS: FINAL

Copyright © BSG Ecology

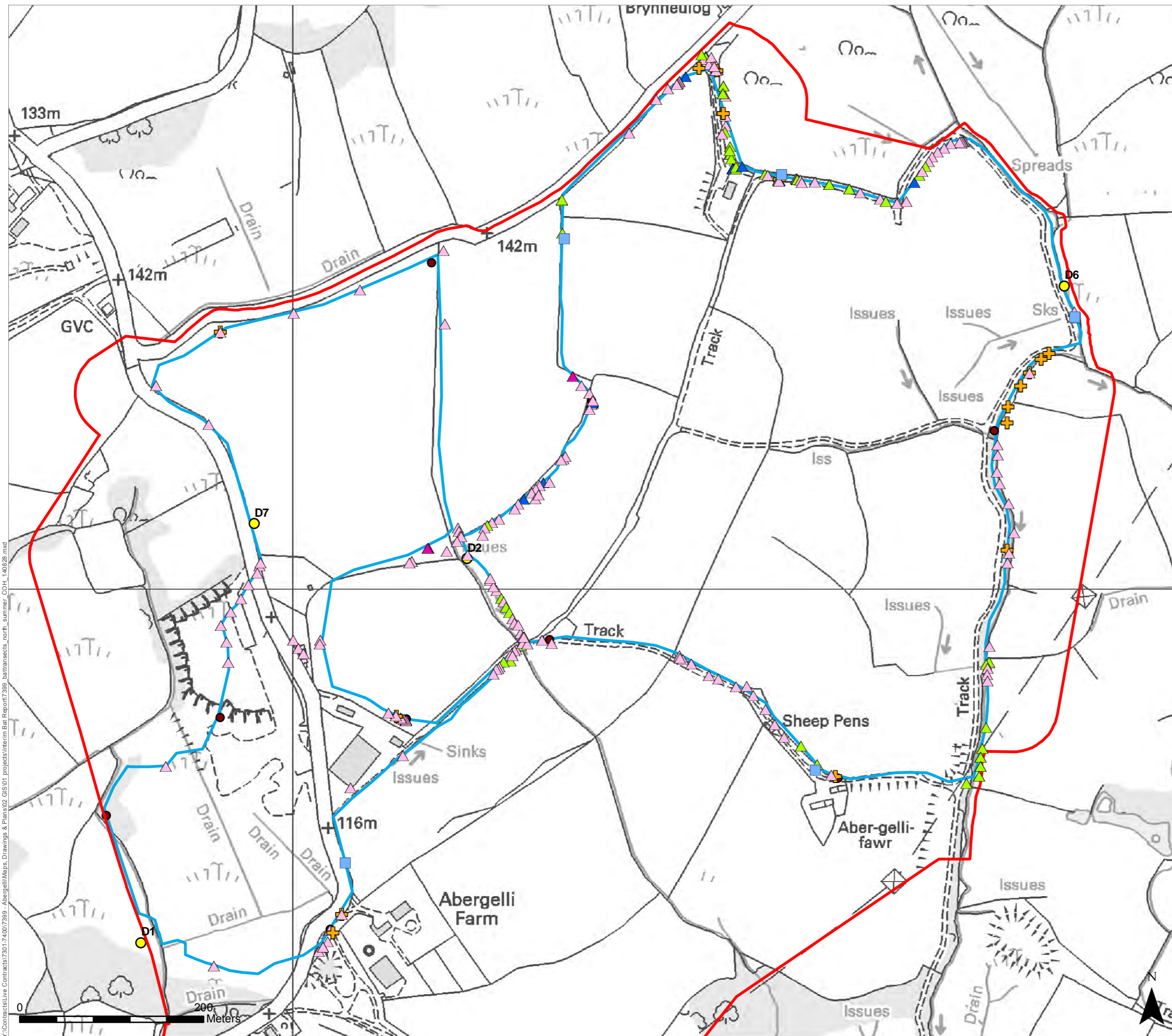
No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.

This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980

OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri

Sources: BSG Ecology survey data

Y:\Contracts\Live Contracts\7399-174007399 - Abergelli\Maps, Drawings & Plans\02_GIS\01_projects\Interim Bat Report\7399_battransects_north_spring_COH_140826.mxd



LEGEND

- Survey Site boundary
- Bat detector locations
- Stopping Points
- North Transect

Bat observations

- ▲ Common pipistrelle
- ▲ Soprano pipistrelle
- ▲ Common/Soprano pipistrelle
- ▲ Common/Nathusius pipistrelle
- Noctule
- + Myotis species

BSG | ecology

OFFICE: Monmouth
T: 01600 891576

JOB REF: 7399.00

PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 4b - Number of passes plotted along northern walked transect. Summer 2014 (June-August)

DATE: 28.08.2014 CHECKED: RT SCALE: 1:4,000
DRAWN: COH APPROVED: MH STATUS: FINAL

Copyright © BSG Ecology

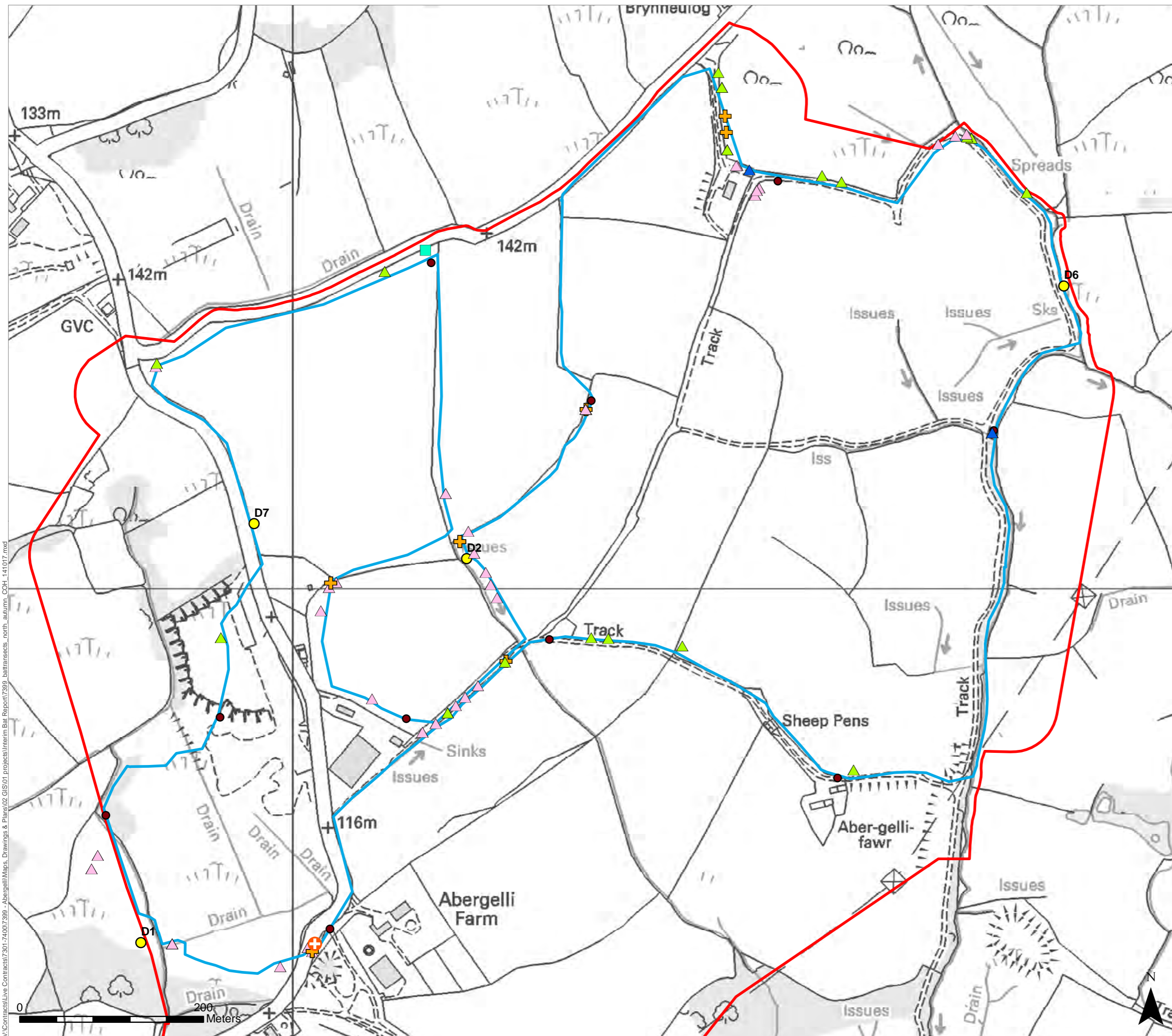
No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.

This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980

OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri

Sources: BSG Ecology survey data

Y:\Contracts\Live Contracts\7399-174007399 - Abergelli\Maps, Drawings & Plans\02_GIS\01_projects\Interim Bat Report\7399_battransects_north_summer_COH_140828.mxd



LEGEND

- Survey Site boundary
- Bat detector locations
- Stopping Points
- North Transect

Bat observations

- + Long eared bat sp.
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle
- ▲ Common / Soprano pipistrelle
- Noctule / Leisler's bat
- + Myotis species

BSG | ecology

OFFICE: Monmouth
 T: 01600 891576
 JOB REF: 7399.00

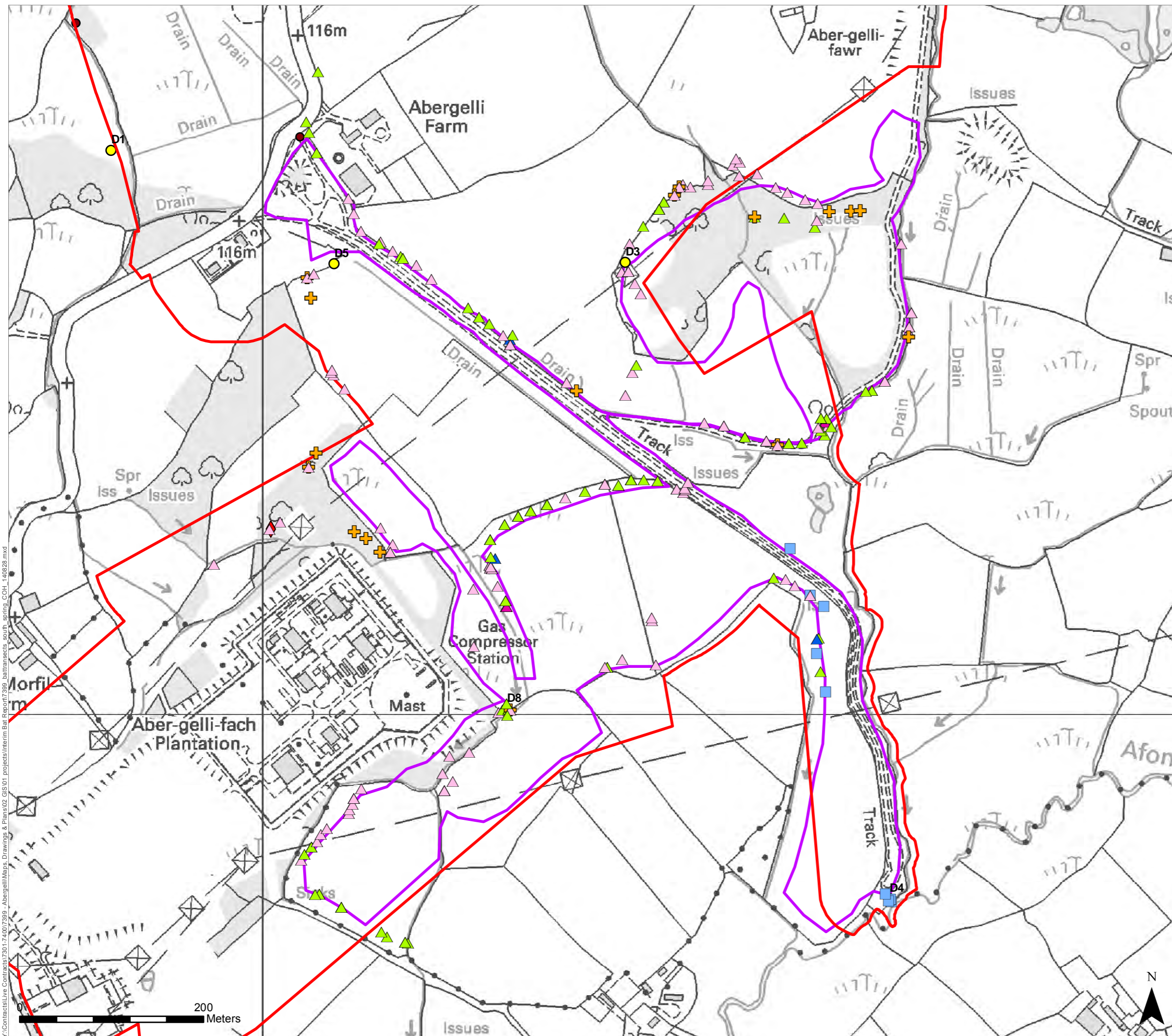
PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 4c - Number of passes plotted along northern walked transect. Autumn 2014 (September-October)

DATE: 28.08.2014 CHECKED: RT SCALE: 1:4,000
 DRAWN: COH APPROVED: MH STATUS: FINAL

Copyright © BSG Ecology
 No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.
 This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980
 OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri
 Sources: BSG Ecology survey data

V:\Contracts\Live Contracts\7301-74007399 - Abergelli\Maps, Drawings & Plans\02 GIS\01 projects\Interim Bat Report\7399_battranssects_north_autumn_COH_141017.mxd



LEGEND

- Survey Site boundary
- Bat detector locations
- Stopping Points
- South Transect

Bat observations

- ▲ Common pipistrelle
- ▲ Soprano pipistrelle
- ▲ Common [Soprano pipistrelle
- ▲ Common [Nathusius] pipistrelle
- Noctule
- + Myotis species

BSG | ecology

OFFICE: Monmouth
 T: 01600 891576
 JOB REF: 7399.00

PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 5a - Number of passes plotted along southern walked transect. Spring 2014 (April-May)

DATE: 03.09.2014 CHECKED: RT SCALE: 1:4,000
 DRAWN: COH APPROVED: MH STATUS: FINAL

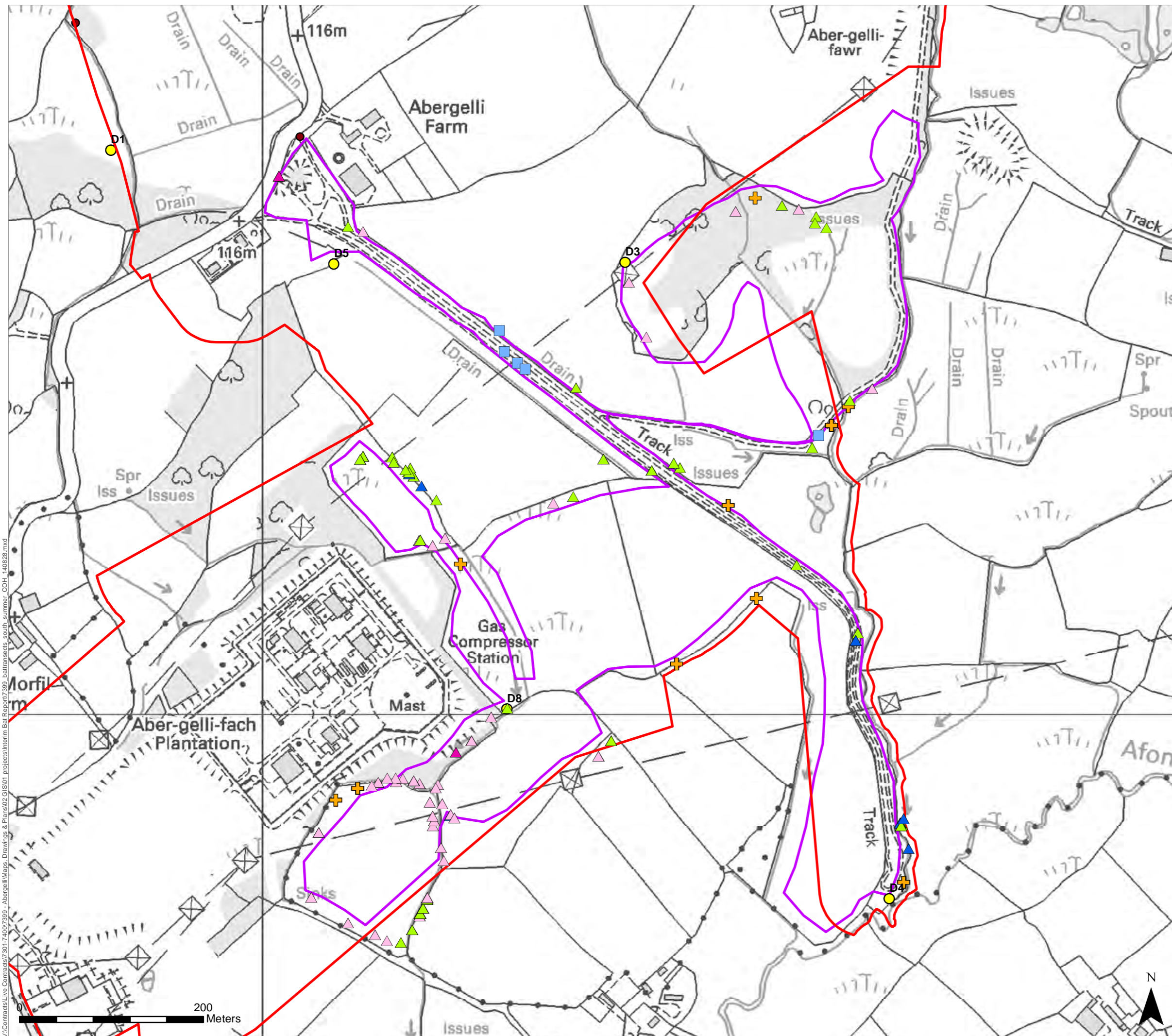
Copyright © BSG Ecology

No dimensions are to be scaled from this drawing.
 All dimensions are to be checked on site.
 Area measurements for indicative purposes only.

This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980

OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri
 Sources: BSG Ecology survey data

Y:\Contracts\Live Contracts\730174007399 - Abergelli\Maps - Abergelli\Maps - Drawings & Plans\02_GIS\01_projects\Interim Bat Report\7399_battranssects_south_spring_COH_140828.mxd



LEGEND

- Survey Site boundary
- Bat detector locations
- Stopping Points
- South Transect

Bat observations

- ◆ Lesser horseshoe bat
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle
- ▲ Common / Soprano pipistrelle
- ▲ Common / Nathusius' pipistrelle
- Noctule
- + Myotis species

BSG | ecology

OFFICE: Monmouth
 T: 01600 891576
 JOB REF: 7399.00

PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 5b - Number of passes plotted along southern walked transect. Summer 2014 (June-August)

DATE: 28.08.2014 CHECKED: RT SCALE: 1:4,000
 DRAWN: COH APPROVED: MH STATUS: FINAL

Copyright © BSG Ecology

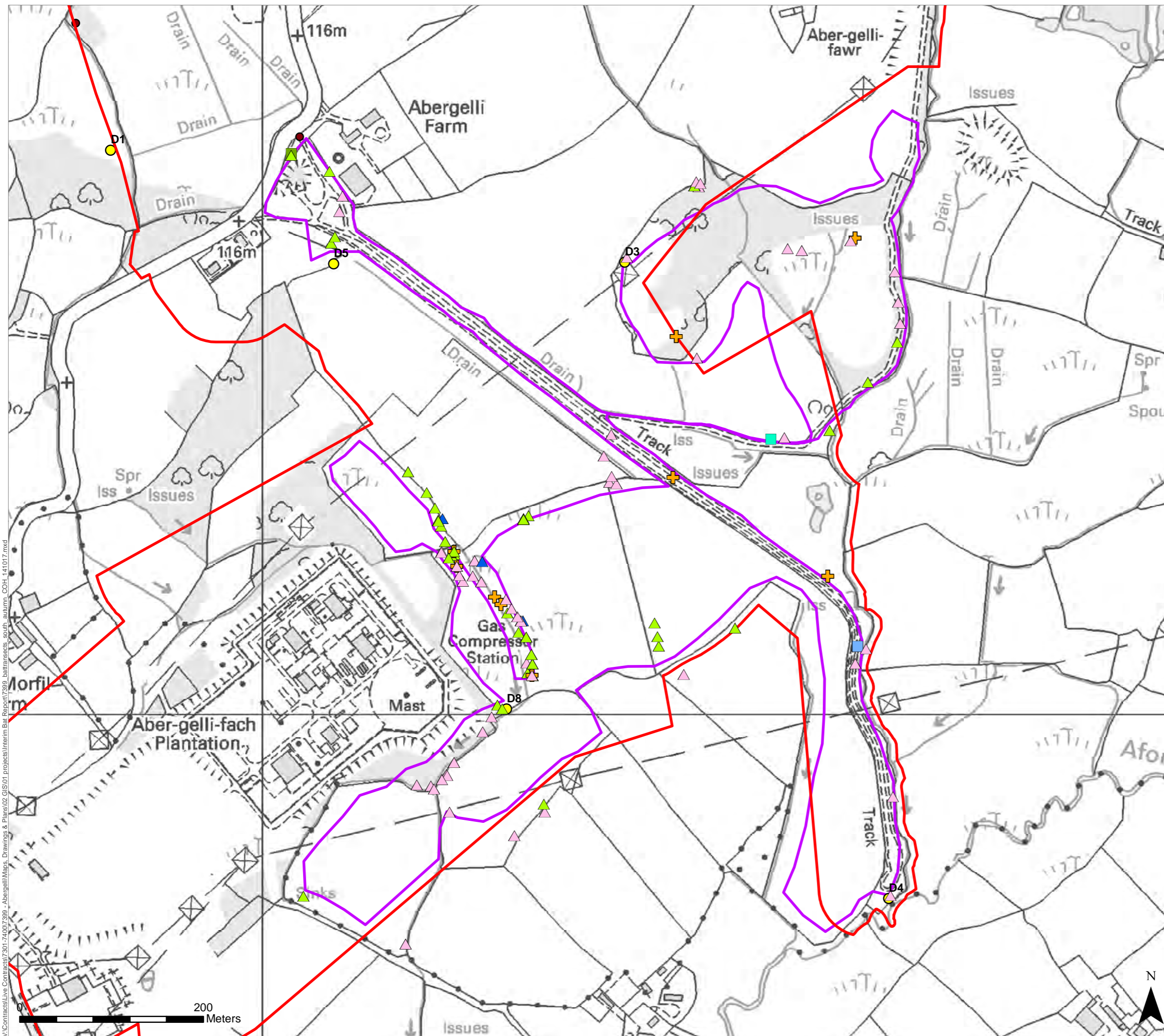
No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.

This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980

OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri

Sources: BSG Ecology survey data

V:\Contracts\Live Contracts\730174007399 - Abergelli\Maps - Drawings & Plans\02 GIS\01 projects\InTerm Bat Report\7399_battranssects_south_summer_COH_140828.mxd



LEGEND

- Survey Site boundary
- Bat detector locations
- Stopping Points
- South Transect

Bat observations

- Leisler's bat
- Noctule
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle
- ▲ Common / Soprano pipistrelle
- Noctule / Leisler's bat
- + Myotis species

BSG | ecology

OFFICE: Monmouth
T: 01600 891576

JOB REF: 7399.00

PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 5c - Number of passes plotted along southern walked transect. Autumn 2014 (September-October)

DATE: 17.10.2014 CHECKED: RT SCALE: 1:4,000
DRAWN: COH APPROVED: MH STATUS: FINAL

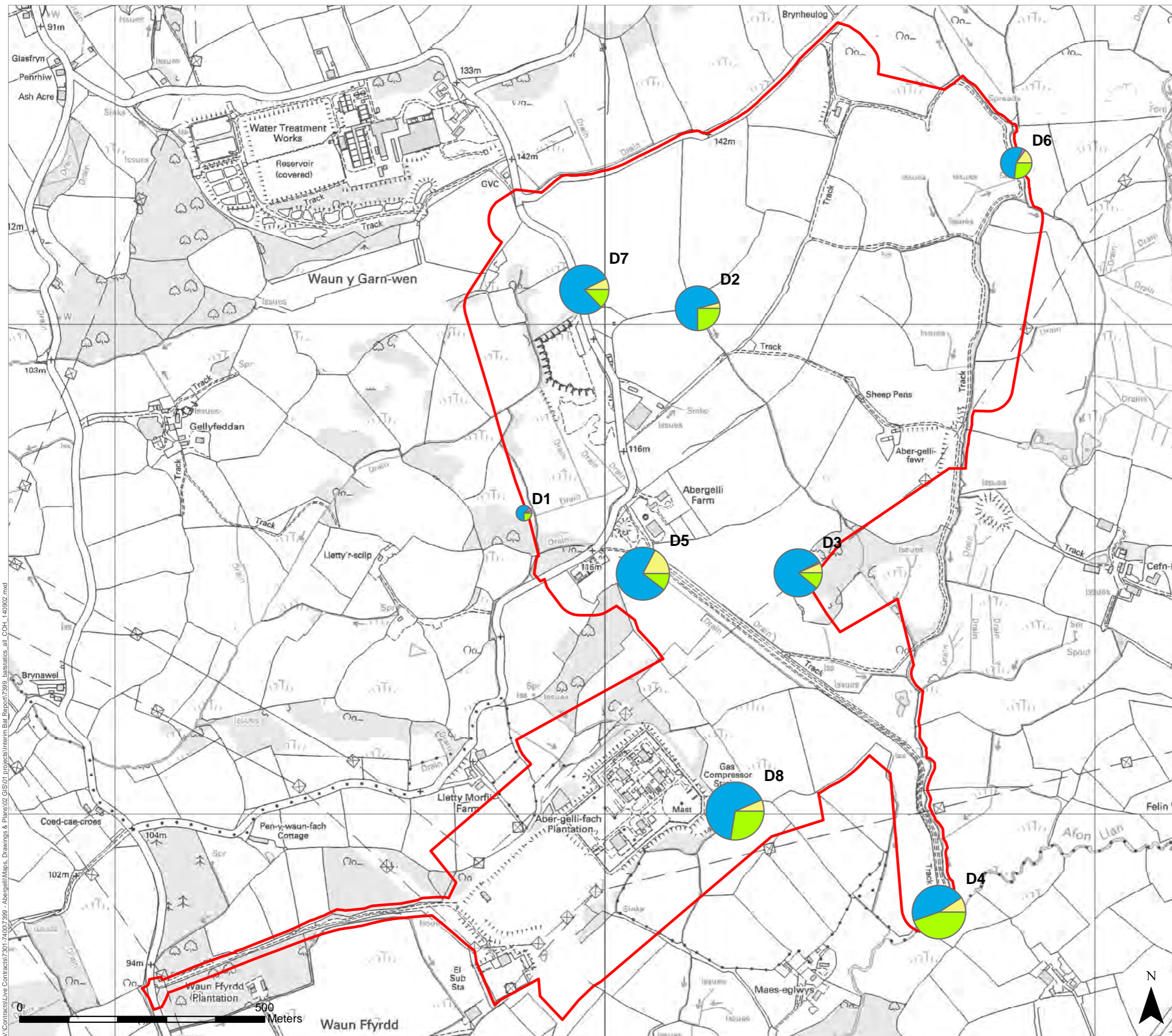
Copyright © BSG Ecology

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.







This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved.
Reference number: 10048980

OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri
Sources: BSG Ecology survey data

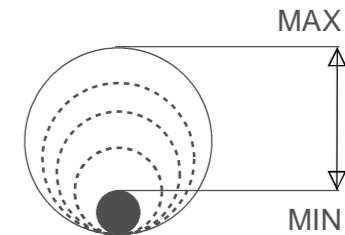
V:\Contracts\Live Contracts\7301-740077399 - Abergelli\Maps, Drawings & Plans\02 GIS\01 projects\Interim Bat Report\7399_battranssects_south_autumn_COH_141017.mxd



LEGEND

-  Survey Site boundary
-  Relative activity (b/h) at automated locations
-  *Myotis* species
-  Noctule
-  Common pipistrelle
-  Soprano pipistrelle

Circle size proportional to B/h



BSG | ecology

OFFICE: Monmouth
T: 01600 891576

JOB REF: 7399.00

PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 6 - Proportion of bat activity (by species) at automated survey locations in 2014

DATE: 17.10.2014 CHECKED:MH SCALE: 1:7,500
DRAWN: COH APPROVED:MH STATUS: FINAL

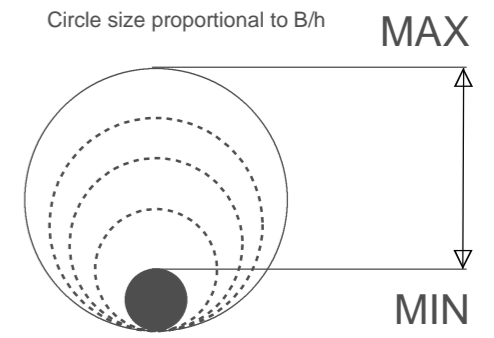
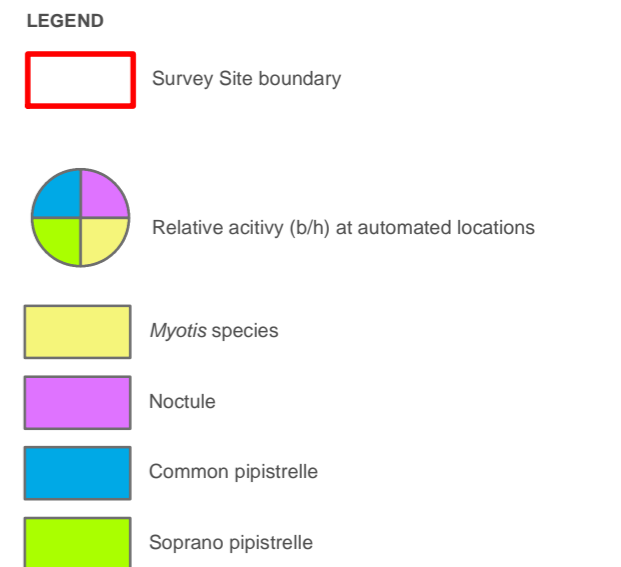
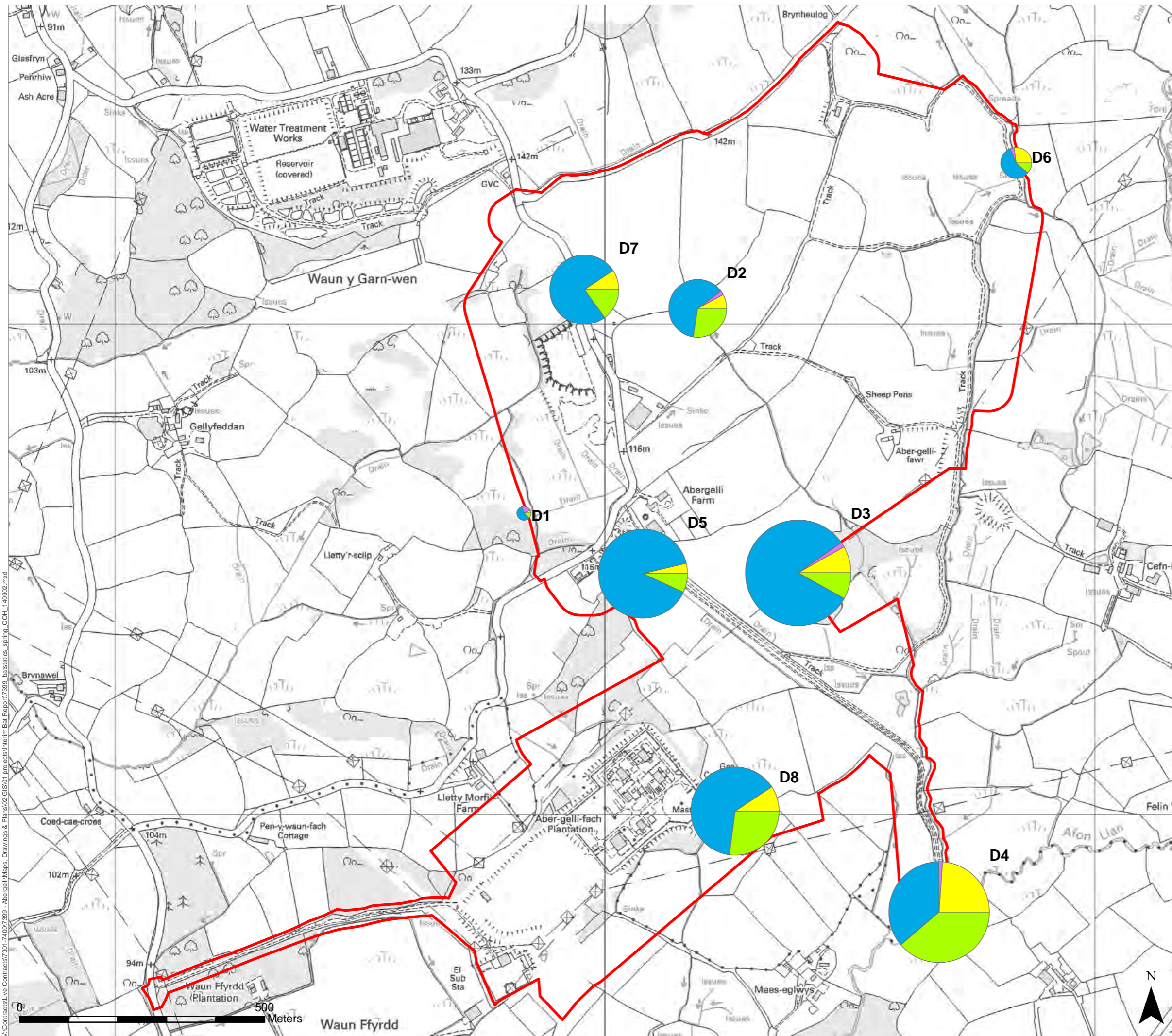
Copyright © BSG Ecology

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980

OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri
Sources: BSG Ecology survey data

V:\Contracts\Live Contracts\7301-74007399 - Abergelli\Maps, Drawings & Plans\02 GIS\01 projects\Interim Bat Report\7399_batstatistics_all_COH_140902.mxd



BSG | ecology

OFFICE: Monmouth
T: 01600 891576

JOB REF: 7399.00

PROJECT TITLE
ABERGELLI POWER PROJECT

DRAWING TITLE
Figure 7 - Proportion of bat activity (by species) at automated survey locations in Spring 2014 (April-May)

DATE: 17.10.2014 CHECKED: MH SCALE: 1:7,500
DRAWN: COH APPROVED: MH STATUS: FINAL

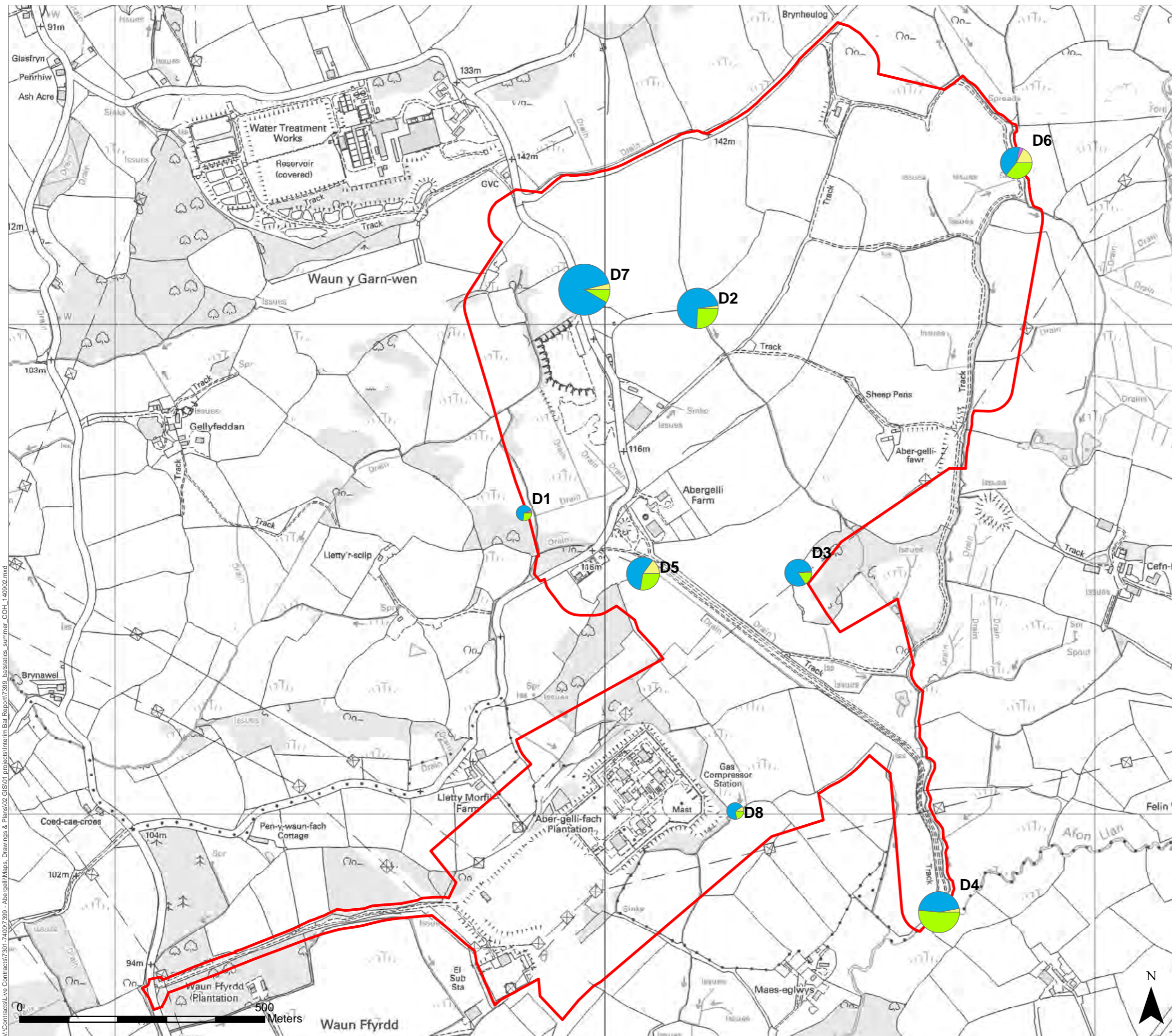
Copyright © BSG Ecology

No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.







This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980

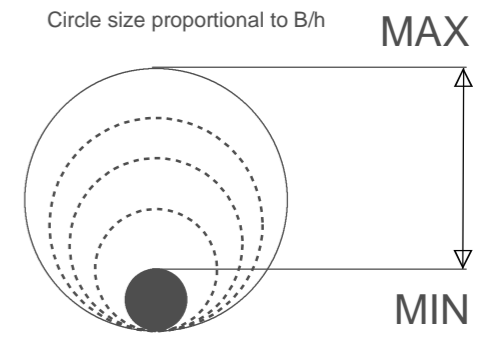
OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri

Sources: BSG Ecology survey data



LEGEND

-  Survey Site boundary
-  Relative activity (b/h) at automated locations
-  *Myotis* species
-  Noctule
-  Common pipistrelle
-  Soprano pipistrelle



BSG | ecology

OFFICE: Monmouth
 T: 01600 891576
 JOB REF: 7399.00

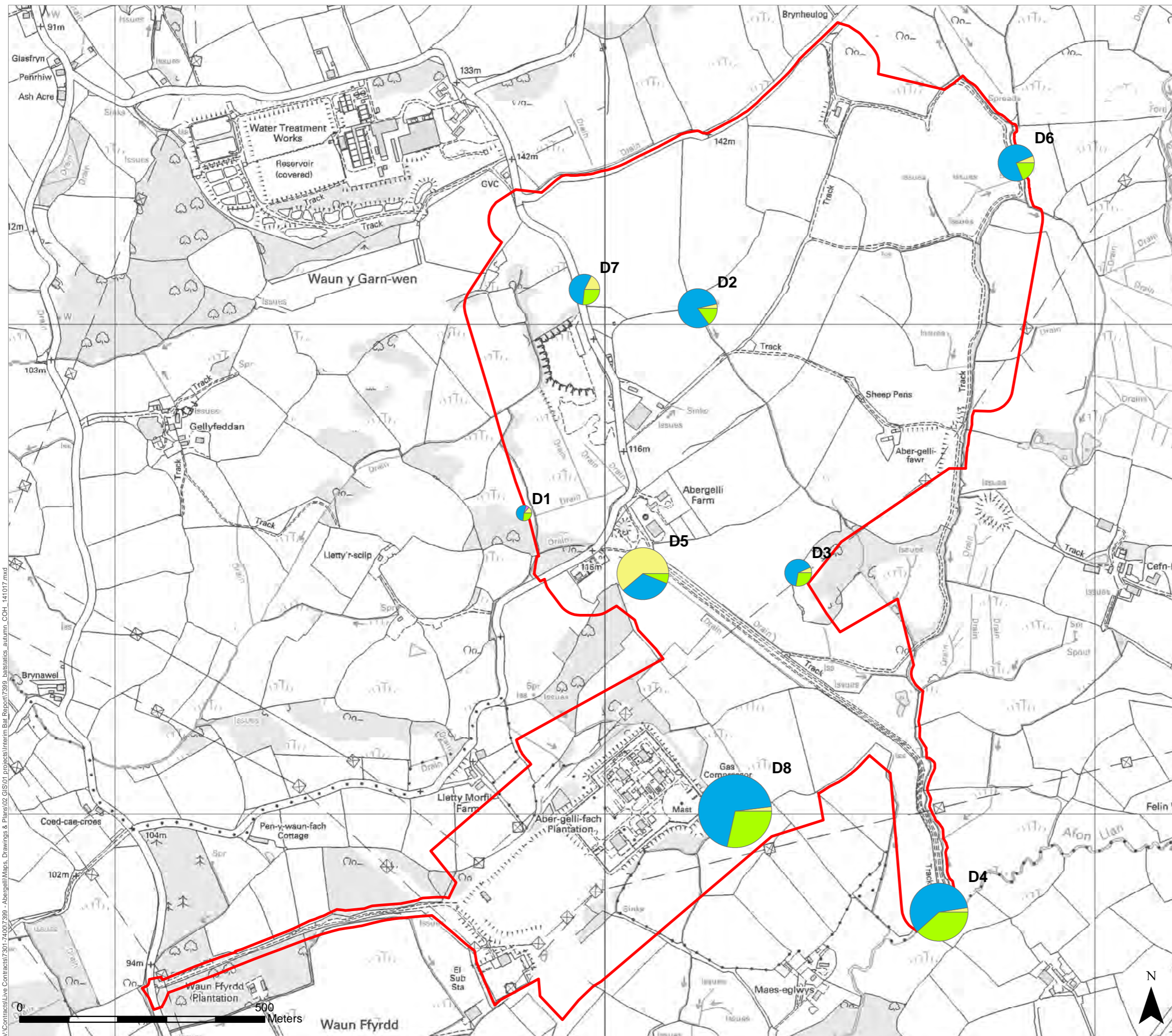
PROJECT TITLE
ABERGELLI POWER PLANT

DRAWING TITLE
Figure 8 - Proportion of bat activity (by species) at automated survey locations in Summer 2014 (June-August)







DATE: 17.10.2014 CHECKED:MH SCALE: 1:7,500
 DRAWN: COH APPROVED:MH STATUS: FINAL

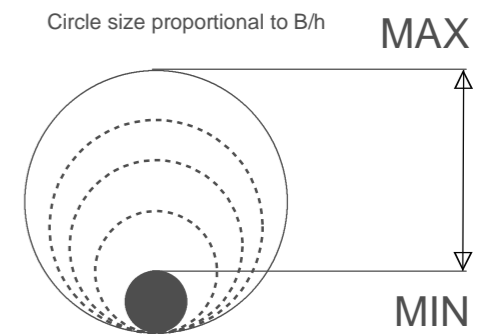
Copyright © BSG Ecology
 No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.
 This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980
 OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri
 Sources: BSG Ecology survey data

V:\Contracts\Live Contracts\7301-74007399 - Abergelli\Maps, Drawings & Plans\02 GIS\01 projects\Interim Bat Report\7399_batstatus_summer_COH_1409102.mxd



LEGEND

-  Survey Site boundary
-  Relative activity (b/h) at automated locations
-  *Myotis* species
-  Noctule
-  Common pipistrelle
-  Soprano pipistrelle



BSG | ecology

OFFICE: Monmouth
T: 01600 891576

JOB REF: 7399.00

PROJECT TITLE
ABERGELLI POWER PLANT

DRAWING TITLE
Figure 9 - Proportion of bat activity (by species) at automated survey locations in Autumn 2014 (September-October)

DATE: 17.10.2014

CHECKED: MH

SCALE: 1:7,500

DRAWN: COH

APPROVED: MH

STATUS: FINAL

Copyright © BSG Ecology

No dimensions are to be scaled from this drawing. All dimensions are to be checked on site. Area measurements for indicative purposes only.

This drawing may contain: Ordnance Survey material by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright 2014. All rights reserved. Reference number: 10048980

OS Open data © Crown copyright and database right 2014 | Aerial Photography © Esri
Sources: BSG Ecology survey data

Appendix 2: Materials and Data Analysis

Use of Bat Detectors

The bat detectors used for automated surveys were Wildlife Acoustics SM2Bat and SM2Bat+. These are 16-bit full-spectrum bat detectors with internal storage and computing power that allows the unit to be used as a remote fixed-point detector. Recording is triggered by ultrasound, such as bat calls, in the vicinity of the detector, and any bat calls are stored as sound files on an internal SD card.

SM2 detectors were placed in water-proof boxes connected by a 10 m cable to an omnidirectional Wildlife Acoustics SMX-US microphone. The microphones were attached to a telescopic pole at 3.5 m above ground level on, and angled at 45° to the ground to allow water to run off, as recommended by the manufacturers.

For walked transect surveys and emergence/re-entry surveys, surveyors used two different bat detectors on each survey to supplement visual observations: a Batbox Duet detector for listening to bat calls from the combined heterodyne/frequency division output and an Anabat (SD1 or SD2) detector or Wildlife Acoustics Echo Meter 3 (EM3) for recording calls for subsequent identification.

Assessment of data from bat detectors

The likelihood of detecting bats acoustically depends on the propagation of sound through air, the characteristics of bat calls, and the way sound is received and processed by the bat detector. Recent unpublished collaborative research by BSG Ecology and Bristol University has shown that bat detectors detect calls from some species of bats at greater distances than others. In general, bats with calls that can be detected over greater distances are larger bats which use calls that are both high amplitude and low frequency such as the noctule and the most difficult to detect are those which use low amplitude calls, such as the brown long-eared bat and barbastelle, or high frequencies, such as horseshoe bats (*Rhinolophus* spp.). Table 1 shows the mean frontal detection range of SM2 detectors for echolocation calls from UK bat species based on research undertaken by BSG Ecology in collaboration with Bristol University.

Table 1: Estimated mean frontal detection ranges for selected bat species using SM2 detectors at standard 'field' settings and converting to zero-crossing recordings.

Species	Mean Frontal Detection Range (m)
Noctule	47
Soprano pipistrelle	17
<i>Myotis</i> sp. ⁵	6
Long-eared bat	4
Lesser horseshoe bat	5

Data Analysis

Bat Call Identification

Recorded bat calls were analysed using Anlook software to confirm the identity of the bats present. Where possible, the bat was identified to species level. For species of long-eared bats records were not identified to species level due to the overlapping call parameters of each species but were assumed to refer to brown long-eared bats. It is unlikely that grey long-eared bat (*Plecotus austriacus*) occurs in Swansea, given the species' known distribution and rarity (Harris & Yalden, 2008). Species of the genus *Myotis*⁶ were grouped together as many of the species have overlapping call parameters, making species identification problematic (BCT, 2012).

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

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

⁵ Refers to any bat species of the genus *Myotis*.

⁶ This genus includes several regularly occurring species in the UK that include, Natterer's bat, Daubenton's bat *Myotis daubentonii*, Brandt's bat *Myotis brandtii*, whiskered bat and Bechstein's bat *Myotis bechsteinii*.

Common pipistrelle / Soprano pipistrelle ≥ 49 and < 51 kHz

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

Bat calls which could not be ascribed to any of these categories were not used in the analysis.

Calculation of relative activity

The SM2 detectors were configured to record above the level of ambient noise, such as from wind or rain, and set to define a bat pass (B) as a call note of > 2 ms which is separated from another by more than one second.

AnalookW (Version 3.8, 2010) software was used for all analysis of bat calls. It enables analysis of the relative activity of different species of bats by counting the number of bat passes (B) recorded within a unit of time – hour (h) was used. More than one pass of the same species was counted within a sound file if multiple bats were recorded calling simultaneously. During analysis of sound files, it was possible to estimate the minimum number of bats recorded on individual sound files but not whether consecutive sound files had recorded, for example, a number of individual bats passing as they commute to a feeding habitat or one bat calling repeatedly as it flies up and down the edge of forestry. Although relative abundance cannot be estimated from this analysis, the number of bat passes does reflect the relative importance of a feature/habitat to bats by assigning a level of bat activity that is associated with that feature, regardless of the type of activity.

Analysis by sunset-sunrise times

As part of the analysis of nocturnal patterns of behaviour for bats the data were split into discrete time periods relating to their proximity to sunset or sunrise. The time categories (time codes: TC) were as follows:

TC 0 = before sunset

TC 1 = 0-20 min after sunset

TC 2 = 20-40 min after sunset

TC 3 = 40-60 min after sunset

TC 4 = 60-80 min after sunset

TC 5 = 80-100 min after sunset

TC 6 = 100-120 min after sunset

TC 7 = Middle of night (varies across seasons)

TC 8 = 120-100 min before sunrise

TC 9 = 100-80 min before sunrise

TC 10 = 80-60 min before sunrise

TC 11 = 60-40 min before sunrise

TC 12 = 40-20 min before sunrise

TC 13 = 20-0 min before sunrise

For each of these categories B/h was calculated to allow a comparison between the activity level recorded in different time periods and TC7 was corrected to allow for variation in night length throughout the survey season.

Appendix 3: Building Descriptions

Internal/External inspection

The building layouts and referencing as described in the following section is illustrated in Appendix 1: Figures. In order to assist with the building descriptions, each building has been given a letter/number combination identifier.

B1

This is a two storey domestic property approximately 40-50 years old. It sits east to west on the Survey Site, with footprint dimensions 20 m x 8 m. The roof is constructed from hanging slate tiles and has a pronounced pitch, with boxed-in eaves on the gable ends. There are sections of lead flashing around the chimneys and eaves. There are opportunities for bat roosting in the following external features:

- Under gaps in the eaves where boxed in sections have sagged or are broken;
- Under lead flashing;
- Under broken or missing hanging slate tiles; and
- In space under ridge tiles.

No internal inspection of this building was undertaken as it is currently inhabited and access was not granted.

The building is considered to have moderate bat roosting potential. Although there are a number of features with potential to be used as bat roosts, there is no evidence that it is currently being utilised as a roost.

N.B. A shed in close proximity to B1 is constructed of wood cladding and has an open soffit into its roof space under felt. Owing to its high exposure and well-lit features, it was also deemed to have low potential for bat roosting potential.

B2

This property is a two storey domestic abode, approximately 40-50 years old but sitting 90° N of B1. This is an identical build to B1 but varies in specific features for roosting potential. There are opportunities for bat roosting in the following external features:

- Under broken or missing hanging slate tiles on south facing roof and water heater to the east side of the property;
- Under lead flashing around entrance, on the roof and gable ends;
- Under lifted ridge tiles where lifted; and
- In gaps between boxed eaves and flashing.

No internal inspection of this building was undertaken as it is currently inhabited and access was not granted.

The building is considered to have moderate bat roosting potential. Although there are a number of features with potential to be used as bat roosts, there is no evidence that is currently being utilised as a roost.

B3

This building is a corrugated metal framed agricultural building, its footprint dimensions are approximately 30 mx20 m and it is situated on the south side of the Survey Site at the top of a track leading to a gallops track. The building is single storey with lower block curtain walling and with low profile metal sheet on the upper side of the walls and roof. It is currently being utilised as a stable for horses.

Although there is lead flashing below the corrugated metal roof, upon internal inspection, an exposed interior with a lack of suitable roosting features means this building is considered to have negligible bat roosting potential. The building was however, considered to have some feeding potential.

B4

This is a stable block of stone, a solid wall construction, one storey tall. The roof is pitched with felt lined hanging tiles concluding in boxed eaves. There is considerable over hang in the boxed eaves. On internal inspection of the building there is a false ceiling made of plywood.

- Room with partition and false ceiling, very dark;
- Gaps above door frames;

- Cracks in existing stable walls;
- Space between breeze block gable ends (roof); and
- Several open windows (1m in width, opening 1ft wide) and garage doors often ajar.

B4 is a confirmed roost. There were stains and droppings (pipistrelle sp., long-eared bat sp. and lesser horseshoe) found upon internal investigation in one room of the stable block, and the majority of the building lends itself to roosting and feeding potential.

B5

This is a two storey terraced house approximately 50-60 years old. The roof is constructed from hanging slate tiles and has a pronounced pitch, with boxed-in eaves on the gable ends. There are sections of lead flashing around the chimneys and eaves. There are opportunities for bat roosting in the following external features:

- Under gaps in the eaves where boxed in sections have sagged or are broken;
- Under lifted lead flashing;
- Under broken or missing hanging slate tiles; and
- In space under ridge tiles.

No internal inspection of this building was undertaken as it is currently inhabited and access was not granted.

The building is considered to have moderate bat roosting potential. Although there are a number of features with potential to be used as bat roosts, no signs of roosts were found.

B6

This building is a corrugated metal framed agricultural building with lower block curtain walling and with low profile metal (and some plastic) sheet on the upper side of the walls and roof. The building is currently being utilised as storage for farm equipment such as disused vehicles & tools and hay bales. The footprint dimensions are roughly 30 m x 20 m and it is one storey tall. The area behind the hay bales at the far end of the building which is being used as stables for several horses could not be accessed for further investigation.

No evidence of bats roosting was found during the internal/external search and no potential roost features were identified. Therefore this building is considered to have negligible potential for roosting bats.

B7

This is a single storey brick outbuilding with a corrugated metal roof. The building has several small vents and cavity walls. There are opportunities for bat roosting in the following features:

- Accessible cavity walls through external vents.

No evidence of bat roosting was found during the internal/external search and therefore this building is considered to have low potential for roosting bats.

B8

This building is comprised of three sections. The first two are part of the original structure which is over 100 years old (est. 1900) and is constructed from brick walls with a corrugated, pitched metal roof with a series of fly ins and open access points on the roof apex. There is also a second storey tower on the north end of the building. The far north section is a single storey porta cabin style building approximately 4 m x 2 m with open windows and doors. There are opportunities for bat roosting in the following features:

- Gaps under the corrugated metal roof;
- In the stone vents/access points at the apex of the structure;
- In the series of lead flashing found around the top of the tower portion of the main brick building;
- Multiple fly-in opportunities in both storeys; and
- In the tower block, historic roost evidence, several small piles of disintegrated droppings, identified as long-eared bat *Plecotus auritus* droppings and at least one Pipistrelle sp. in both first and second storeys.

B8 is a confirmed roost. There were droppings from at least two bat species found upon internal investigation of both storeys and the majority of the building lends itself to roosting and feeding potential.

B9

This building is a single storey breeze block shed of recent build with a footprint of 3 m x 3 m. The building has solid walls and a flat corrugated metal roof. No evidence or potential or actual roost points were noted upon internal or external investigation.

Owing to the lack of signs and potential roosting features this building is considered to have negligible bat roosting potential.

B10

This property is a single storey, one-room brick outbuilding with footprint dimensions of 4 m x 3 m. The building has no doors or windows and the roof is concrete and flat with the internal ceiling exhibiting cracks and fissures. The brick walls are cavity walls with many missing bricks and openings. Although there is no door, there is an east facing entrance. Upon internal investigation two *Pipistrelle* sp. droppings were found on the floor. There are opportunities for bat roosting in the following features:

- Cavity walls with missing bricks;
- East facing entrance, fly-in;
- Cracked ceiling; and
- Also, bat droppings found in building.

This building is a confirmed roost owing to the discovery of bat droppings and a variety of optimal features for roosting potential.

B11

This is a derelict stone cottage over 100 years old. Its footprint dimensions are 15 m x 10 m. There are two distinct standing walls and there is no roof remaining. The walls are rubble filled and many stones are missing. There are opportunities for bat roosting in the following features:

- Missing stones leading to rubble filled internal wall.

Because the structure sits in a cluster of trees and has some notable roosting features, this building is considered to have moderate roosting potential.

Appendix 4: Photographs of Buildings



Photograph 1: Buildings 1 and 2. These houses are the same design.



Photograph 2: Building 3.



Photograph 3: Building 3.



Photograph 4: Building 4.



Photograph 5: Building 4.



Photograph 6: Building 5.



Photograph 7: Building 6.



Photograph 8: Building 7.



Photograph 9: Building 7.



Photograph 10: Building 8 – tower.



Photograph 11: Building 8 – droppings in tower.



Photograph 12: Building 8 – ground floor.



Photograph 13: Building 9.



Photograph 14: Building 9.



Photograph 15: Building 10.



Photograph 16: Building 10.



Photograph 17: Building 11.



Photograph 18: Building 11 – Wall structure.

Appendix 5: Photographs of Trees

Photograph 1: Tree 3.



Photograph 2: Tree 4.



Photograph 3: Tree 5.



Photograph 4: Tree 6



Photograph 5: Tree 9.



Photograph 6: Tree 23.



Photograph 7: Tree 32



Photograph 8: Tree 35.

