

Appendix 7N

Bat Activity Report

Welsh Government

**Global Centre for Rail Excellence
(GCRE)**

Bat Activity Survey Report

Rev A | 18 June 2020

This report takes into account the particular instructions and requirements of our client.




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Job number 264904

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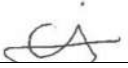


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1 Introduction

1.1 Background

Ove Arup & Partners Ltd (Arup) was commissioned by the Welsh Government (WG) to undertake a range of consultancy services in relation to the Global Centre for Rail Excellence (GCRE), hereafter referred to as ‘the Project’.

As part of that commission, a range of ecological surveys have been undertaken to identify the baseline ecological conditions of the Project area, to inform the assessment of impacts as part of the Environmental Impact Assessment (EIA) process.

This document describes the bat activity survey undertaken for the Project. It should be read in conjunction with the bat roost survey report for the Project¹.

1.2 Survey Objectives

The surveys were conducted with the following objectives:

- To record bat activity levels and make observations on bat behaviour along walked transects, sampling habitats within the Study Area;
- To record and identify levels of bat activity, using static bat detectors at different locations spaced within the Study Area; and
- To identify the range of species present and their relative abundance in terms of activity levels at these locations.

¹ Arup (2020). Nant Helen Bat Roost Survey Report.

2 Project Description and Context

The WG are proposing to develop a rail testing, maintenance, research, development and storage facility (also referred to as the Global Rail Centre for Excellence) at the site of the Onllwyn washery and Nant Helen open cast mine site. The site for development is approximately 475 ha.

The proposed site is currently being mined by Celtic Energy, who will cease extraction operations in 2021, at which point Celtic Energy will be required to restore the land in accordance with regulatory requirements and agreements with Powys County Council (PCC) and Neath Port Talbot County Borough Council (NPTCBC). This includes Section 106 planning obligations and planning conditions that need to be discharged.

Celtic Energy has submitted two recent planning applications for the site, including: the revised restoration strategy for approval (Planning reference number: 19/1899/REM) which would change the existing approved restoration scheme (for planning application ref 18/1070/REM). And, the Nant Helen complementary earthworks application for approval (Planning reference number: 20/0738/FUL) The purpose of these applications is to allow for a 'flexible and adaptable landform for a variety of future uses on restoration, including the use of the site as a rail testing and storage facility, proposed by the WG.

3 Site Description

The site (Figure 1) is within the Dulais Valley located within Powys and Neath Port Talbot, with the Brecon Beacons National Park Authority boundary immediately to the north. Nearby settlements include Onllwyn, Seven Sisters, Ystradgynlais, Caehopkin, Abercrave or Coelbren.

The site is predominantly brownfield land that has been heavily worked by open cast mining. Much of the site has revegetated.

4 Study Area

The Study Area encompasses the majority of land within the Nant Helen open cast operational site, which at the time of commencing the ecological surveys was considered to be the likely boundary of the Project.

The Study Area is shown in Figure 1 and is hereafter referred to as the ‘site’.

5 Relevant Legislation & Biodiversity Framework

All UK bat species are afforded protection under both European and national law. All bats are listed as European Protected Species (EPS) under the provisions of the Conservation of Habitats and Species Regulations 2017 (as amended) (known as the ‘Habitats Regulations’). Additionally, all bat species are afforded protection under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) (WCA).

Together this legislation makes it an offence to:

- Intentionally or recklessly kill, injure or capture a bat;
- Intentionally or recklessly disturb a bat such as to affect its ability to survive, breed or rear its young;
- Damage, destroy or obstruct access to a breeding site or resting place (e.g. roost) used by a bat, or disturb bats while they are using such a place; and
- Possess or control a live or dead bat, or any part of a bat.

Four species of bat, Greater Horseshoe Bat *Rhinolophus ferrumequinum*, Lesser Horseshoe Bat *R. hipposideros*, Bechstein’s Bat *Myotis bechsteinii* and Western Barbastelle *Barbastella barbastellus*, are included on Annex II of the Habitats Directive², which requires the designation of Special Areas of Conservation to ensure the maintenance of favourable conservation status (and these are therefore generally considered as perhaps the most important UK species).

Various bat species are also listed as Species of Principal Importance for the conservation of biodiversity in Wales, under the provisions of Section 7 of the Environment (Wales) Act 2016 (Section 7 species). The Act includes a duty on all public authorities to have regard for the conservation of biodiversity in the exercise of their functions. This duty applies to government bodies, local authorities and statutory undertakers.

Actions that are prohibited by legislation can be made lawful on the approval and granting of a licence from Natural Resources Wales (NRW), subject to conditions.

² Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

6 Methodology

6.1 Desk Study

The desk study element involved two methodologies: a review of existing ecological reports in relation to the site and an ecological data search with the Local Biodiversity Records Centre.

Existing ecological data, obtained in 2011 to inform the Environmental Statement³, was reviewed which included previous desk study results, habitat and species surveys.

Protected and notable⁴ species (including bats), Schedule 9 invasive non-native species and non-statutory site data within 5 km of the site were obtained from the Biodiversity Information Service for Powys & Brecon Beacons National Park (BIS)⁵ on 21 November 2018.

In addition, online searches were carried out using the Multi Agency Geographic Information for the Countryside (MAGIC)⁶, Natural Resources Wales website⁷ and the Joint Nature Conservation Committee (JNCC) website⁸ to identify any statutory designated sites up to 5 km from the site, and any designated European sites within 10 km; for which bats are a qualifying feature.

The full desk study results are provided in the Extended Phase 1 Habitat Report for the Project⁹.

6.2 Field Surveys

Details of transect and static detector monitoring are provided below. All surveys were undertaken in line with guidelines published by the Bat Conservation Trust (BCT)¹⁰.

³ Environmental Statement (2011), Celtic Energy.

⁴ 'Notable' species and habitats considered in this report include species and habitats of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales, under section 7 of the Environment (Wales) Act 2016, in addition to any species considered to be of significance for nature conservation such as species listed in red data books, the Royal Society for the Protection of Birds (RSPB)

⁵ <https://www.bis.org.uk/home>.

⁶ <http://magic.defra.gov.uk/>

⁷ <https://naturalresources.wales/conservation-biodiversity-and-wildlife/find-protected-areas-ofland-and-seas/designated-sites-search/?lang=en>

⁸ <http://jncc.defra.gov.uk>

⁹ Arup (2019) Nant Helen Complementary Restoration Earthworks Extended Phase 1 Habitat Survey Report.

¹⁰ Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

6.2.1 Transect Surveys

Habitats within the site were assessed during the Extended Phase 1 Habitat survey as having moderate suitability to support foraging and commuting bats. Therefore, in line with Good Practice Guidelines¹⁰, transect surveys were carried out once per month between April and October.

Five transect routes (colour coded as Green, Purple, Orange, Yellow and Blue) were designed to sample bat activity around suitable habitat (e.g. hedgerows and treelines) within the site. The locations of the transect routes are shown in Figure 2.

The transect routes were generally circular, and each walked once per month from April to October 2019 inclusive, therefore they were each surveyed seven times. The dates of each survey, along with sunset times, survey start and finish times are given in Table 1. Table 2 details dates of the transect surveys, and weather conditions.

Blue, orange and yellow transect surveys were led by Martyn Owen MCIEEM (Biome Ltd) (NE bat licence no. 2015-1974-CLS-CLS)¹¹, with assistants. Green and purple transects were led by Alex Escott (Arup ecologist), and assistants. Martyn and Alex are both experienced bat surveyors.

¹¹ Martyn Owen is also an accredited agent on an NRW bat licence, although no licences are required to carry out transect surveys.

Table 1. Dates and Times of Transect Surveys

	Transect																			
	Green				Purple				Orange				Yellow				Blue			
	Date	Sunset/ sunrise	Start	End	Date	Sunset/ sunrise	Start	End	Date	Sunset/ sunrise	Start	End	Date	Sunset/ sunrise	Start	End	Date	Sunset/ sunrise	Start	End
Apr	25 th	20:46	20:28	22:28	29 th	20:54	20:35	22:38	15 th	20:26	20:13	22:09	24 th	20:44	20:31	21:58	23 rd	20:42	20:25	22:10
May	16 th	21:25	21:02	23:13	23 rd	21:37	21:12	22:46	9 th	21:13	20:51	23:00	19 th	21:31	21:07	22:48	24 th	21:39	21:14	23:14
Jun	17 th	21:00	21:35	23:36	27 th	21:02	21:37	23:16	13 th	20:59	21:34	23:17	19 th	21:01	21:37	23:21	20 th	21:01	02:55	04:52
Jul	9 th	22:00	21:32	23:33	16 th	21:53	21:26	23:26	17 th	21:51	21:24	23:55	10 th	21:59	23:01	23:01	9 th	22:00	21:36	23:06
Aug	28 th	20:27	20:09	22:09	15 th	20:58	20:39	22:38	4 th	20:21	20:41	22:30	13 th	21:02	20:42	22:18	13 th	21:02	20:42	22:42
Sep	11 th	19:52	19:39	22:06	5 th	20:07	19:53	21:38	19 th	19:29	19:21	20:59	24 th	19:18	19:09	20:40	18 th	19:34	19:23	21:15
Oct	16 th	18:23	18:19	20:38	2 nd	18:58	18:51	20:56	16 th	18:23	18:19	19:59	6 th	18:48	18:40	20:29	13 th	18:31	18:24	20:20

Table 2. Weather Conditions During Transect Surveys

Date	Temperature (°C) at Start	Temperature (°C) at End	Wind Speed (Beaufort)	Wind Direction	Cloud Cover (%)	Conditions
25.04.2019	10	8	1	N/A	60	Dry
29.04.2019	12	11	1	N/A	80	Dry
15.04.2019	11	9	1	SE	90	Dry
24.04.2019	12	11	1	SE	60	Dry
23.04.2019	16	14	1	E	90	Precipitation

Date	Temperature (°C) at Start	Temperature (°C) at End	Wind Speed (Beaufort)	Wind Direction	Cloud Cover (%)	Conditions
16.05.2019	14	11	1	NE	70	Dry
23.05.2019	14	12	2	NW	90	Dry
09.05.2019	10	8	1	SW	90	Dry
19.05.2019	11	10	N/A	N/A	50	Dry
24.05.2019	13	11	1	W	50	Dry
17.06.2019	13		1	E	90	Dry
27.06.2019	18	18	5	NE	0	Sunny. Progressively windier throughout survey
13.06.2019	11	11	1	W	90	Light showers
20.06.2019	10	11	1	SW	60	Dry
19.06.2019	11	10	1	W	10	Dry
09.07.2019	20	17	1	N/A	80	Dry
16.07.2019	18		1	W	10	Dry
17.07.2019	16	14	2	SW	100	Dry
10.07.2019	16	15	1	SW	100	Dry
09.07.2019	18	16	1	SW	40	Dry
29.08.2019	16	14	1	SW	100	Dry
15.08.2019	14	12	1	SW	40	Dry
04.08.2019	16	15	1	W	100	Dry
13.08.2019	13	13	1	SW	40	Dry
13.08.2019	13	13	1	SW	40	Dry

Date	Temperature (°C) at Start	Temperature (°C) at End	Wind Speed (Beaufort)	Wind Direction	Cloud Cover (%)	Conditions
11.09.2019	16	10	1	SW	80	Dry
05.09.2019	12	9	1	SE	5	Dry
19.09.2019	16	15	1	E	0	Dry
24.09.2019	14	14	2	SW	100	Light rain
18.09.2019	13	11	1	NE	0	Dry
16.10.2019	11	9	1	SW	20	Sunny. Light rain 19.30
02.10.2019	10	8	1	NW	70	Dry
16.10.2019	11	10	1	W	40	Dry
06.10.2019	10	9	1	NW	100	Dry
13.10.2019	12	9	1	E	50	Dry

Transect surveys were undertaken at dusk and began at sunset and lasted for 1.5-2.5 hours after sunset. One of the surveys was undertaken at dawn and began 2 hours before sunrise and finished at sunrise.

Batlogger M (Elekon) and Echo Meter Touch (Wildlife Acoustics) bat detectors were used to record bat calls during the surveys. Following the surveys, all bat recordings were analysed to identify species using the relevant bat analysis software packages (see further details below in section 6.2.2.2) to species level where possible.

Observations such as numbers and species of bats heard/seen, the direction of flight, height and the behaviour (e.g. foraging or commuting) were noted when seen.

The Green and Purple transect routes were subject to amendment for the months of June-October due to health and safety concerns with the presence of bulls and cows with young across the survey area. The amended routes are indicated in Figure 3. Due to the open nature of the common land containing the Purple transect, a car based transect survey was deemed more appropriate for health and safety. To ensure a robust survey effort, part of this transect was walked where possible (within the fenced felled conifer plantation habitat) and four 10-minute listening points incorporated within areas of suitable habitat for commuting and foraging bats (see Figure 3).

6.2.2 Static Detector Surveys

6.2.2.1 Data Collection

A static detector survey was carried out to assess bat activity along suitable habitats identified within the site in accordance with best practice survey guidelines¹⁰. Song Meter SM2 BAT detectors were deployed at Locations 1 – 16 (shown in Figure 4) to record bat calls of species commuting and foraging. Static monitoring was completed during the months of April, May, July, August, September and October 2019 (going into November 2019)¹².

Table 3. Static detector monitoring periods

Month (2019)	Start	End
April	25.4.2019	29.4.2019
May	15.5.2019	31.5.2019
July	18.7.2019	25.7.2019
August	1.8.2019	19.8.2019
September	1.9.2019	16.9.2019
October	30.10.2019	03.11.2019

¹² No survey was carried out in June due to logistical difficulties.

Song Meter SM2 BAT detectors are robust and weatherproof, which record full spectrum bat calls over several days. These were installed at the locations shown in Figure 4 and left for five to seven days each time, ensuring the microphones were directed away from dense vegetation to record bat activity for consecutive nights each month in line with the recommended effort within the Good Practice Survey Guidelines¹⁰.

The detectors were set up with the settings shown in Table 4 below to record bat activity between 18:00 and 07.00 each night.

Table 4. SM2 + BAT Settings used during data collection

Parameter	Setting
2.5V Microphone Bias	Off
Low noise filter	1kHz
Microphone pre-amp gain	12dB
Sample rate	354800
Monitoring schedule	Daily from 18:00
Monitoring duration	13 hrs

The microphones used with the detectors during the course of the surveys were regularly checked and calibrated using a Wildlife Acoustics Calibration Unit to ensure that they were functioning properly. Microphones that were found not to show a significant response to the output of the calibration unit were replaced.

Detector locations (Figure 4) remained consistent across the monitoring period. The locations were determined to provide coverage of the site, and included a variety of habitats, as indicated within Table 5 below.

Table 5. Static detector location details

Monitoring Location (Figure 4)	Notes
1	Adjacent to access road, near deciduous woodland and pasture.
2	Next to hedgerow within pasture.
3	Next to hedgerow/trees within pasture.
4	Near road, with trees, housing and pasture (including wet pasture/drains) nearby.
5	Near entrance to Washery. Mature/semi-mature trees, scrub and ponds nearby.
6	Within scrub/semi-mature trees. Ponds nearby
7	Near hedgerow including mature trees, and woodland. Pasture and scrub nearby.
8	Within scattered scrub in pastoral field.
9	On edge of conifer plantation. Scrub nearby.
10	Near pond complex on edge of works area. Coniferous plantation nearby.
11	On edge of plantation coniferous forestry. Wet pasture nearby.
12	On edge of work area. Scrub, pond (ephemeral) and wet grassland nearby.
13	On edge of plantation forestry within wet grassland.

14	Near pond complex, within scrub. Wet grassland nearby.
15	Near stream in wet pasture.
16	Within wet pasture.

Static surveys were undertaken by Neil Also and Ray Houghton: acousticians at Arup.

6.2.2.2 Data Processing and Analysis

Detectors recorded bat activity in Wildlife Acoustics Compression files (.wac). These files were downloaded from the detectors and processed using Kaleidoscope Pro Software to produce audio files (.wav) and zero crossing files. The processing also included the automatic identification of bat species based on the classifiers developed by Wildlife Acoustics (Bats of Europe 3.0.0).

The files produced by the processing were reviewed to ensure correct identification of species and to identify where possible the bat species for any calls which could not be recognised by the software. All calls identified as being either common pipistrelle (*Pipistrellus pipistrellus*) or soprano pipistrelle (*P. pygmaeus*) were not reviewed, except where high levels of insect noise had been recorded leading to uncertainty over the accuracy of identification. All other calls were checked by Richard Moores, a bat specialist with over 20 years of experience in bat work and holder of a current NRW bat survey licence (Licence number: SO87731-1), as well as holding Scottish Natural Heritage (SNH) (27405) and Natural England (NE) licences (2015-12259-CLS-CLS and 2015-12257-CLS-CLS).

The number of files (sound clips) recorded by the detectors each night were taken as a proxy value to the number of bat passes. This was then used to calculate a Bat Activity Index (BAI) by dividing the number of passes by five (the number of monitoring nights) for each species at each location during each session. The BAI is calculated using data from the first five monitoring nights recorded each month. In some cases, the detector also recorded data on the sixth and seventh nights. These additional nights were excluded from the BAI as it could not be certain that the detector had recorded data for the entire night. However, where rarer or more notable species were recorded on these additional nights, they were included to ensure their representation within the data in terms of species diversity.

The average BAIs for all species (sum of individual BAIs) at each location was also calculated over the active months.

The time of recording of the first bat of each species, each night, was also assessed to infer the potential proximity of roost sites.

6.3 Limitations

The findings presented in this report represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys can be limited by factors affecting the presence of plants and animals, such as the time of

year, migration patterns and behaviour. The absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, the likely presence of protected and/or other notable species could be adequately determined from the surveys carried out and further surveys were recommended where any uncertainty on presence or absence remained.

The identification of bat calls can be highly subjective based on decisions on the shape and characteristics of the calls. However, experienced bat ecologists have been used in the analysis of data, as well as Kaleidoscope software that assists in the identification of calls. As is standard practice, no attempt to differentiate between the *Myotis* species or *Plecotus* species has been made.

Whilst every effort was made to programme and undertake surveys during suitable weather conditions, the long-term nature of the static activity monitoring surveys means that, on some occasions, these surveys included nights during which there were lower temperatures, periods of rainfall and strong winds. However, the number and range of recordings made provide a robust indication of bat activity levels across the site during the active season for bats.

The Green and Purple transect routes were subject to amendment from June to October (as shown in Figure 3), due to the presence of bull and cattle with young across the site. However, it is considered that these areas were adequately covered by the amended routes and methodologies used in all surveyed months, and survey effort was therefore not compromised.

Due to logistical difficulties no static data was collected during June, and only one location (Monitoring Location 6) was sampled in August. In addition, detectors deployed at Monitoring Locations 2 (April), 3 (July), 5 (September), 7 (October), 11 (July, September) 12 (April, July, September), 14 (July, September, October), 15 (September, October), 16 (September) failed to record any bat calls indicating detector (or microphone) failure. However, these variations in coverage have been factored into the analyses, and a comprehensive set of surveys have been completed. The omission of these months/monitoring locations is not considered to compromise the objectives of the surveys detailed within this report.

7 Baseline Environment

7.1 Desk Study

7.1.1 Existing Survey Data

A full summary of the existing survey data collated from the surveys undertaken to inform the Environmental Statement for the site in 2011 is provided within the Extended Phase 1 Habitat Report⁹.

7.1.1.1 Bat Activity Surveys (Transect and Static monitoring)

Activity surveys in the form of walked transects and the deployment of static detectors were undertaken³. Seven bat species (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle (*P. nathusii*), brown long-eared (*Plecotus auritus*), noctule (*Nyctalus noctula*), serotine (*Eptesicus serotinus*) and Leisler's (*N. leislerii*)) were recorded commuting/foraging within and adjacent to the site during the static and transect surveys, with most records comprising pipistrelles.

7.1.2 New Data Search

7.1.2.1 Protected and Notable Species

The data provided by BIS in November 2018 detailed records of bat species identified within 5 km of the site, as summarised below. The distance given is that to the closest point on the site boundary.

Table 6. Bat species recorded within 5 km of the site

Species/Group	Scientific Name	Status	Number of Records	Approximate distance of closest record (m)
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	EPS, WCA, Sec 7	10	300
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	EPS, WCA, Sec 7	27	400
Unidentified bat	<i>Chiroptera</i>	EPS, WCA, Sec 7	10	400
Daubenton's bat	<i>Myotis daubentonii</i>	EPS, WCA, Sec 7	7	400
Noctule bat	<i>Nyctalus noctula</i>	EPS, WCA, sec 7	11	400
Pipistrelle species	<i>Pipistrellus</i> spp.	EPS, WCA, sec 7	14	600
Brown long-eared bat	<i>Plecotus auritus</i>	EPS, WCA, Sec 7	7	1000

Species/Group	Scientific Name	Status	Number of Records	Approximate distance of closest record (m)
Myotis bat	<i>Myotis</i> spp.	EPS, WCA, sec 7	2	1700
Nathusius' pipistrelle	<i>Pipistrellus nathusii</i>	EPS, WCA, sec 7	2	2000
Natterer's bat	<i>Myotis nattereri</i>	EPS, WCA, Sec 7	2	2000
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	EPS, WCA, sec 7	1	2000

7.1.2.2 Statutory and Non-Statutory Designated Sites

Fourteen statutorily designated sites were identified within 5 km of the site. They comprised one Special Area of Conservation (SAC), one National Park and 12 Sites of Special Scientific Interest (SSSI), one of which is also designated as a National Nature Reserve (NNR). No sites designated for bats were identified within 10 km of the site however. The identified sites are detailed within the Extended Phase 1 Habitat Report⁹.

7.2 Field Survey

7.2.1 Transect Activity Surveys

Transect survey data are shown on Figures 5 – 11 (a-e). The bat species are labelled on the figures with the time that the bats were recorded. Table 7 provides a summary of the data obtained in relation to each transect during each month. During transect surveys soprano and common pipistrelle were by far the most abundantly logged species, with records from each transect.

Table 7. Summary of Transect Results

Transect	Summary of Results
<i>April</i>	
Purple	Low level of common and soprano pipistrelle activity. Activity recorded at ponds at end of survey (22:16). Majority of activity detected within broadleaved woodland and felled coniferous plantation habitat at the south-western corner of the transect (between 20:49-21:06), and broadleaved woodland at the western extent of the transect (21:26-21:50).
Green	Very low bat activity – two soprano pipistrelle heard towards the end of survey at 21:23 and 21:27. Heavy rain showers prior to start of survey.
Orange	Low bat activity. Common and soprano pipistrelle heard at the south-eastern corner of the transect along a series of hedgerows (20:29-20:44), and at the north-western transect section (21:52).
Yellow	Moderate bat activity. Common and soprano pipistrelle recorded throughout the transect route. Myotis sp. were recorded around the series of ponds to the west of the transect (21:16 and 21:19).
Blue	Low levels of activity. Common and soprano pipistrelles recorded along the northern transect line (20:50-22:01) and a common pipistrelle heard at the centre of the transect (21:40).

Transect	Summary of Results
May	
Purple	Common and soprano pipistrelles heard foraging within the felled forestry area and woodland to the southwest (21:49-22:07). Low levels of activity.
Green	Most activity was observed around hedgerows and the treeline along Onllwyn Road/A4221 (21:26-22:04). Low levels of activity throughout the Washery (22:33-22:50). A noctule was recorded at 21:29.
Orange	Very low activity - one common pipistrelle heard at 22:30.
Yellow	Moderate bat activity - pipistrelle species recorded throughout woodland area (21:20-21:52). Myotis sp. recorded at western ponds (21:57) and north-eastern corner (21:20).
Blue	Low activity, similar to April transect – common and soprano pipistrelle recorded throughout the central transect area, northern extent and south-western corner and around waterbodies.
June	
Purple	Low levels of bat activity. Common and soprano pipistrelles foraging along the Nant Ystalwyn/woodland area (22:23-22:45).
Green	Fairly constant pipistrelle activity throughout the survey, including in the sheep fields (21:44-21:49), along Onllwyn Road and the A4221 (22:05-22:26), and in the Washery (22:28-23:21).
Orange	Low level common and soprano pipistrelle activity. Most activity at southwestern corner of transect and north-western extent. A Myotis sp. was also heard at 22:53 within this area. A tunnel was found at Grid Reference SN80138 09411, where a pipistrelle species was considered likely to have emerged (22:00).
Yellow	Moderate activity – common and soprano pipistrelle. Myotis sp. recorded at north-eastern transect corner at 22:51. The majority of activity recorded at western transect area (22:12-22:27).
Blue	Low level activity – four common/soprano pipistrelles recorded at southern transect line.
July	
Purple	Relatively high bat activity. Pipistrelle species observed within recently felled woodland area and conifer plantation (22:05-22:23). Low level of pipistrelle and Myotis activity along the haulage road (23:19-23:27). Pipistrelles also heard by the sheep fold/broadleaved woodland area at north-western extent of transect (22:45-23:13).
Green	Similar to previous surveys – moderate level of pipistrelle activity, the majority observed along Onllwyn Road/A4221 (22:10-22:24), and over scrub/grassland habitat within the Washery (22:35-23:26).
Orange	Rain during survey and low levels of activity (common and soprano pipistrelle).
Yellow	Moderate activity – common and soprano pipistrelle. Noctule recorded 22:14 at south-western transect extent.
Blue	Moderate common and soprano pipistrelle activity. Noctule recorded at 22:08 at the north-western corner of transect near larger pond.
August	
Purple	Moderate pipistrelle activity, foraging along stream and woodland habitat (21.05 – 21.20). Noctule heard 21.13. Moderate activity along the haulage road. A Myotis species was recorded at 21.57 along the haulage road.
Green	Relatively high pipistrelle bat activity level long Onllwyn Road/A4221 throughout survey. Noctules recorded at 20:32 and 22:04.
Orange	Myotis sp. recorded at the western extent between 21:02 and 21:39, and along the northern extent (22:14-22:17). Common and soprano pipistrelle recorded with these areas also. Low - moderate activity levels.
Yellow	Moderate activity – common and soprano pipistrelle. Noctule recorded at the finish point (22:14) and Myotis sp. recorded at northern edge of the woodland (21:35).

Transect	Summary of Results
Blue	Moderate activity – common and soprano pipistrelle. <i>Myotis</i> sp. recorded at the southern extent near ponds (22:10) and noctule recorded near the start/finish point (22:36 and 22:42).
September	
Purple	Moderate levels of common and soprano pipistrelle activity; observed foraging along the track through woodland/coniferous plantation area (20:30-20:53) and along the haulage road. Noctules heard at 20:11 and 20:39.
Green	Similar activity level of common and soprano pipistrelle to previous surveys and a few <i>Myotis</i> sp. recorded. Noctule observed flying over A4221 at 20:26.
Orange	Low level activity of common and soprano pipistrelle. Likely emerging from tunnel at stone structure at 19:48.
Yellow	Lower activity levels than at previous surveys – sub optimal conditions (rain during survey). Common and soprano pipistrelle activity. <i>Myotis</i> sp. recorded at western ponds (19:50) and along the northern woodland edge (19:57-20:25).
Blue	Moderate common and soprano pipistrelle activity throughout the transect. <i>Myotis</i> sp. recorded around ponds at central transect line (20:39) and eastern extent at larger pond (21:02). Noctule recorded at north-eastern corner (21:12).
October	
Purple	Low bat activity. Few pipistrelle passes within woodland/coniferous plantation area (19:32-19:56). <i>Myotis</i> sp. also recorded here (19:43) and along haulage road (20:21-20:55).
Green	Low bat activity. Pipistrelles recorded foraging along Onllwyn Road and A4221 (18:41-19:08). One common pipistrelle recorded in the washery (19:16).
Orange	Low level of activity of common and soprano pipistrelle throughout the transect. <i>Myotis</i> sp. was recorded at 19:20 at the south-western (19:20) and northern (19:42) corners of the route.
Yellow	Moderate level of activity of common and soprano pipistrelle. <i>Myotis</i> sp. were recorded at the western extent of the transect around the ponds at (19:46-19:29). Noctule were also recorded at the end of the survey (20:27).
Blue	Low-moderate common and soprano pipistrelle activity throughout the survey. Noctule recorded at the end of the transect at 20:11 and 20:17.

7.3 Static Detector Surveys

Static detector survey data are summarised within Tables 8-10 and Charts 1-6. The identification of six species was confirmed, with *Myotis* sp. and long-eared bat *Plecotus* sp. also logged. Figure 12 (a-f) shows the proportion of each bat species recorded at each static location in each month, while Figure 13 (a-f) shows the average BAI at each static location, in each month.

Table 8 summarises activity levels by species across all survey locations. Common pipistrelle and soprano pipistrelle were by far the most commonly recorded species, with both logged at all monitoring locations. *Myotis* sp. and Noctule were also logged at all locations. Of those species identified to species-level, (what was considered to be) serotine (two passes, monitoring locations 1 and 8) and greater horseshoe bat (five passes, monitoring locations 3, 7, 9 and 16) provided the fewest records.

Table 8. Summary of all bat passes by species

Species	Total Number of Bat Passes at all Monitoring Locations
Unidentified bat	1
Serotine	2
<i>Myotis</i> sp.	3,824
Noctule	522
<i>Nyctalus</i> sp.	7
Nathusius' Pipistrelle	21
Common Pipistrelle	69,131
Soprano Pipistrelle	64,394
Pipistrelle sp.	1,914
Long-eared bat <i>Plecotus</i> sp.	242
Greater Horseshoe Bat	5

Table 9 summarises data by monitoring location; due to variations in the duration of monitoring from each location the mean number of bat passes per hour (*i.e.* total number of bat passes divided by total survey hours by location) is provided. These data are illustrated within Chart 1.

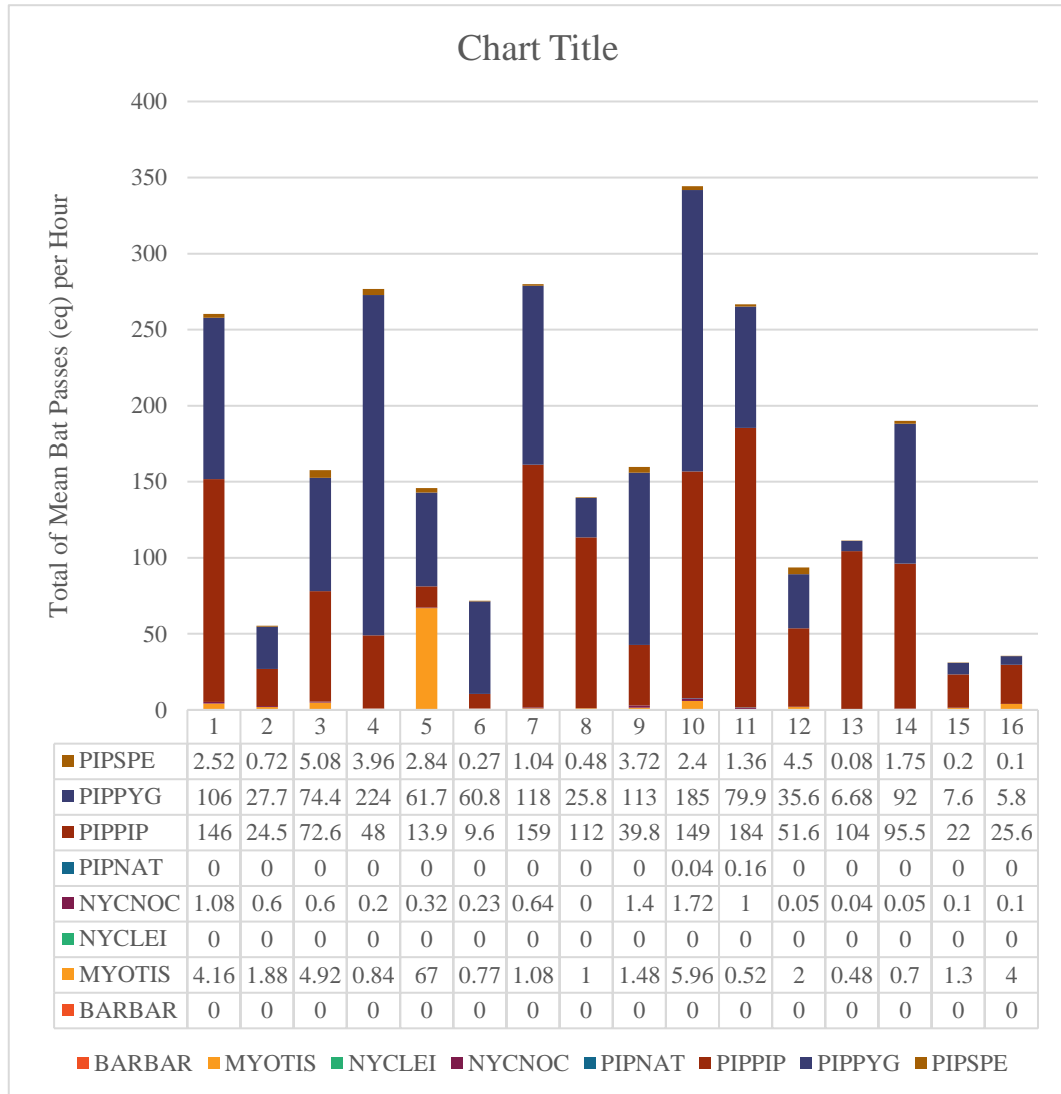
As shown, the greatest level of activity was encountered at monitoring location 4, followed by 10, 1, 14 and 11 all of which recorded in excess of an average of 47 bat passes per hour. Monitoring locations 4, 10 and 1 are located in the north of the site, at relatively low elevations. Locations 14 and 10 are situated near to water. Location 1 is situated near to mature deciduous woodland.

A mean of fewer than ten bat passes per hour were logged at monitoring locations 16, 6, 12 and 2. Locations 12 and 16 are located in the western portion of the site, at relatively high elevations (compared to other locations) whereas locations 2 and 6 are near to roads which may account for the reduced levels of activity.

Table 9. Summary of all bat passes by monitoring location

Monitoring Location	Total Number of Bat Passes	Total Monitoring Hours	Mean Number of Bat Passes Per Monitoring Hour
1	13,856	258.87	53.52
2	1,934	214.6	9.01
3	9,992	355.59	28.10
4	15,633	271.77	57.52
5	9,458	304.02	31.11
6	2,079	362.21	5.74
7	12,092	328.84	36.77
8	15,776	494.66	31.89
9	12,552	492.97	25.46
10	23,775	442.64	53.71
11	7,120	150.56	47.29
12	1,570	180.35	8.71
13	6,973	260.14	26.80
14	4,363	85.5	51.03
15	1,523	133.19	11.43
16	1,368	324.45	4.22

Chart 1. Total of mean bat passes per hour by monitoring location¹³



¹³ RHIFER= greater horseshoe, PLASPE = *Plecotus* sp., PIPSPE = pipistrelle sp., PIPPYG = soprano pipistrelle, PIPPIP = common pipistrelle, PIPNAT = Nathusius’ pipistrelle, NYCNOC = noctule, NYCLEI – Leisler’s bat, MYOTIS = *Myotis* sp, BATSP = bat sp.

Table 10. Summary of static monitoring data by species and location

Monitoring Location (Survey Nights)	Number of Survey Nights Recorded/Mean Bat Passes per Hour (average time that first recorded on each night)										
	Bat sp.	Serotine	Myotis sp.	Noctule	Nyctalus sp.	Nathusius' Pipistrelle	Common Pipistrelle	Soprano Pipistrelle	Pipistrelle sp.	Plecotus sp.	Greater Horseshoe
1 (29)	-	2/0.01 (23:14)	21/1.05 (23:28)	18/0.22 (00:20)	2/0.01 (23:44)	2/0.03 (00:01)	29/32.94 (01:01)	28/18.63 (00:53)	19/0.55 (01:11)	10/0.08 (00:36)	-
2 (24)	-	-	9/0.14 (00:55)	6/0.08 (00:03)	1/0.00 (02:26)	-	18/4.03 (01:09)	18/4.57 (01:05)	12/0.15 (00:30)	4/0.02 (23:03)	-
3 (37)	-	-	32/1.15 (00:00)	12/0.07 (01:48)	-	-	34/13.86 (23:00)	36/12.38 (23:04)	26/0.55 (23:18)	18/0.09 (00:43)	1/0.00 (04:52)
4 (28)	-	-	15/0.42 (01:26)	5/0.03 (23:55)	-	2/0.01 (23:00)	25/8.68 (23:20)	18/46.52 (23:51)	19/1.84 (23:41)	4/0.02 (00:44)	-
5 (35)	-	-	29/6.83 (01:29)	8/0.05 (00:30)	-	-	33/7.08 (23:24)	34/16.17 (23:15)	26/0.98 (00:07)	1/0.00 (00:09)	-
6 (42)	-	-	16/0.11 (01:33)	4/0.03 (03:03)	-	-	39/3.76 (23:44)	40/1.74 (23:55)	17/0.10 (23:59)	1/0.01 (23:50)	-
7 (35)	-	-	24/0.24 (23:47)	20/0.16 (00:03)	-	-	34/21.46 (23:56)	35/14.77 (00:36)	14/0.12 (00:33)	3/0.02 (02:07)	1/0.00 (05:21)
8 (52)	-	1/0.00 (23:24)	29/0.17 (00:44)	5/0.01 (22:50)	-	2/0.00 (21:32)	48/24.21 (23:50)	50/7.3 (23:14)	31/0.15 (00:10)	16/0.05 (01:26)	-
9 (52)	-	-	39/0.23 (00:10)	29/0.44 (23:52)	-	1/0.00 (00:28)	48/7.44 (23:45)	23:26 (52/16.92)	00:49 (20/0.25)	01:40 (23/0.18)	00:28 (2/0.00)
10 (48)	-	-	35/0.66 (00:59)	9/0.14 (02:33)	1/0.00 (00:10)	2/0.00 (23:14)	45/21.47 (00:20)	48/30.62 (23:52)	30/0.75 (00:29)	15/0.07 (00:52)	-
11 (15)	-	-	6/0.10 (20:52)	6/0.19 (06:47)	-	1/0.03 (02:25)	15/32.84 (00:09)	13/13.85 (00:54)	8/0.27 (00:02)	1/0.01 (02:20)	-
12 (22)	-	-	18/0.36 (00:01)	5/0.09 (22:18)	-	-	21/5.61 (23:27)	20/2.39 (23:08)	16/0.25 (23:16)	1/0.01 (23:01)	-
13 (27)	-	-	7/0.17 (01:36)	2/0.01 (01:38)	-	-	24/24.42 (02:28)	23/2.19 (23:51)	5/0.02 (22:46)	-	-
14 (10)	1/0.01 (01:28)	-	7/0.16 (00:36)	1/0.01 (03:40)	1/0.02 (23:48)	-	10/26.82 (00:47)	10/23.59 (23:56)	7/0.41 (23:16)	-	-
15 (16)	-	-	13/0.38 (00:48)	2/0.02 (22:57)	1/0.01 (22:43)	-	16/8.20 (23:48)	13/2.61 (23:06)	8/0.08 (22:39)	5/0.15 (23:48)	-
16 (37)	-	-	23/0.38 (23:47)	4/0.01 (21:41)	-	-	35/3.22 (23:30)	28/0.57 (22:28)	5/0.03 (23:09)	-	1/0.00 (23:47)

Charts 2-6 below summarise the calculated BAI during each month, by species and monitoring location. Due the absence of data from June, and the largely incomplete dataset from August, no charts are provided for these months. Figure 13 (a-f) also show the BAI recorded in each month, at each static location.

April and October provided markedly fewer registrations in comparison to May, July and September.

Chart 2. BAI - April

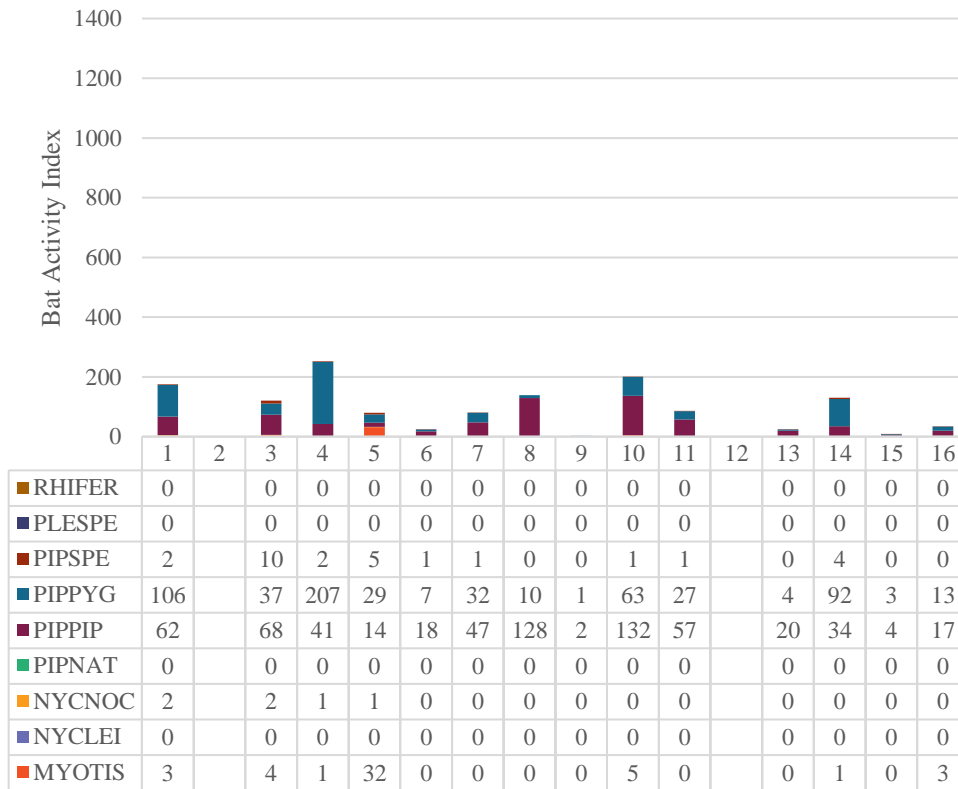


Chart 3. BAI - May

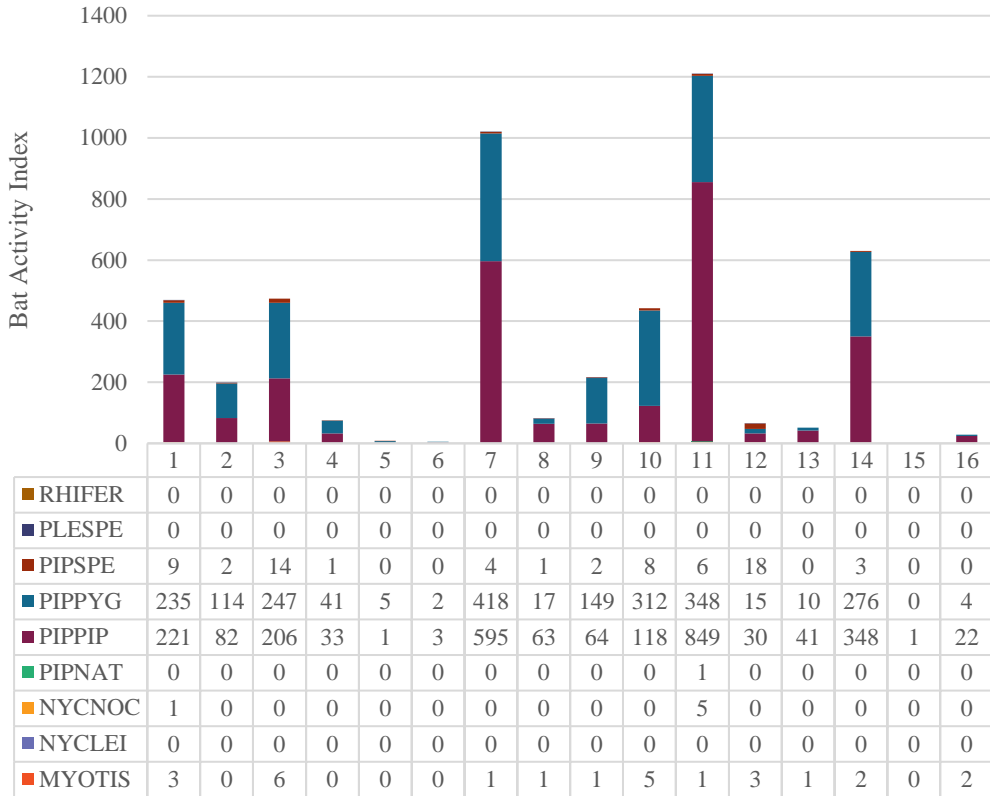


Chart 4. BAI - July

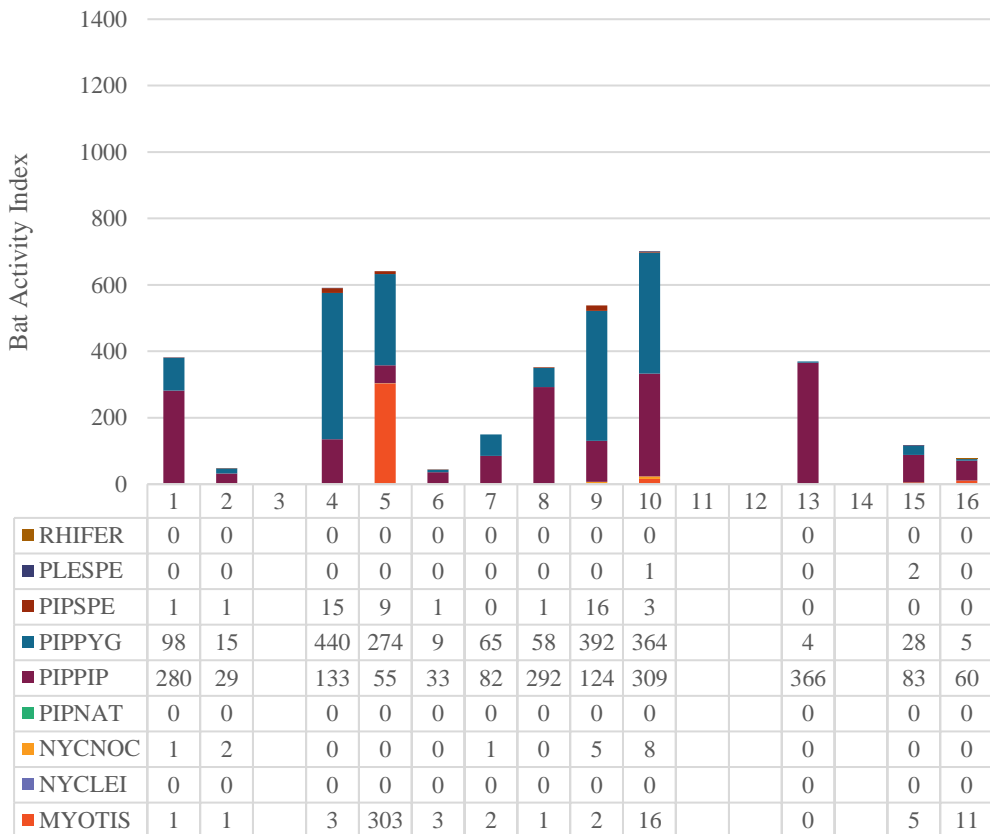


Chart 5. BAI - September

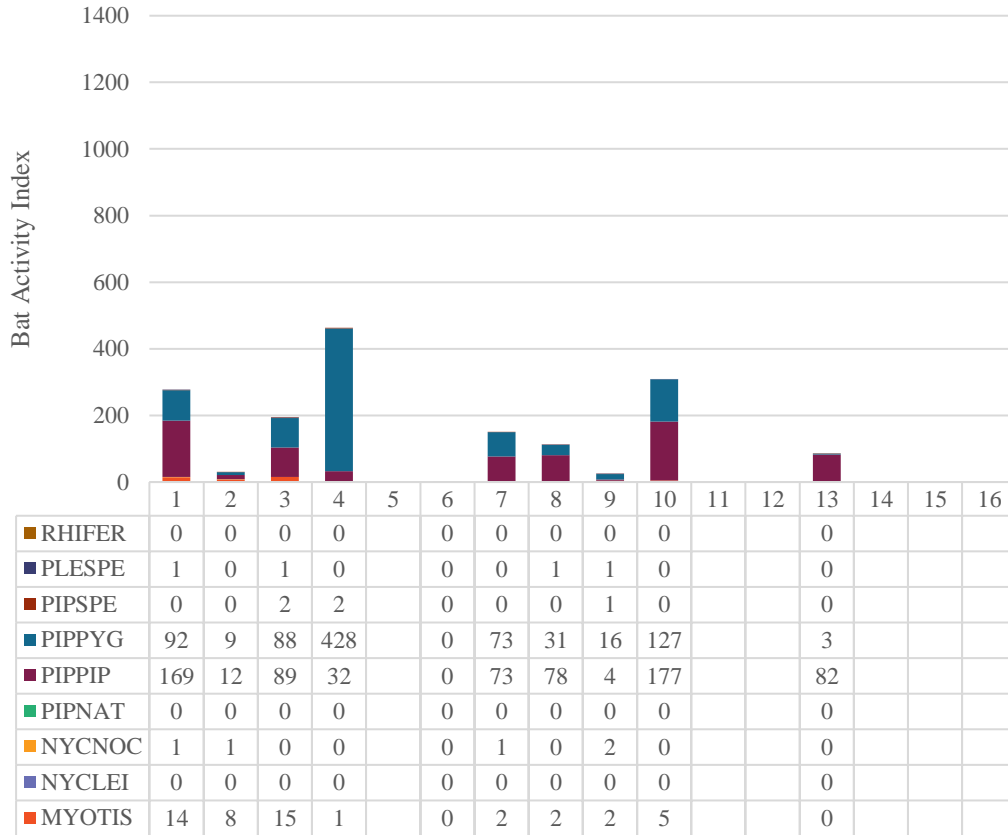
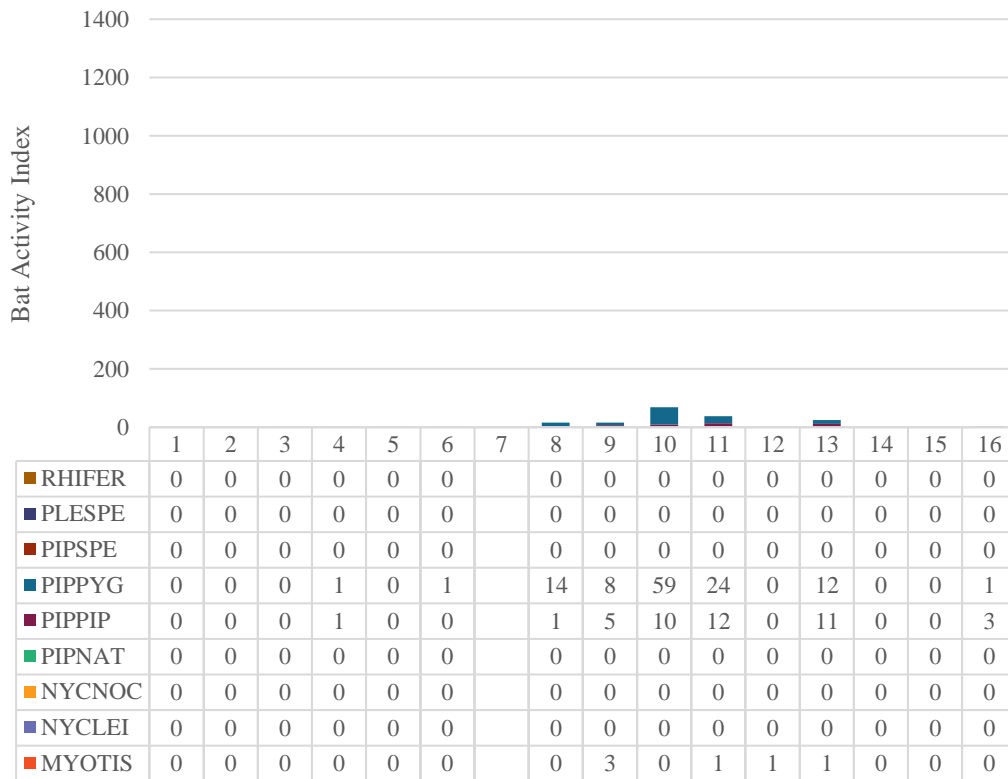


Chart 6. BAI - October



8 Conclusions

A desk study and comprehensive suite of transect surveys and static detector monitoring has been completed at the site. During transect surveys soprano and common pipistrelle were by far the most abundantly logged species, with records from each transect, in addition noctule and *Myotis* species were recorded.

A minimum of eight bat species were recorded during static monitoring, of these, common and soprano pipistrelle were by far the most commonly recorded, comprising 96.78% of all bat calls recorded (common pipistrelle - 49.36%, soprano pipistrelle - 45.97% and pipistrelle species (common or soprano) - 1.37%). *Myotis* sp. (3,824 calls representing 2.73% of all bat calls recorded) and Noctule (522 calls representing 0.37% of all bat calls recorded) were the next most commonly recorded species/species group. Of those species identified to species-level, serotine (two passes, static monitoring locations 1 and 8) and greater horseshoe bat (an Annex II species), (five passes, static monitoring locations 3, 7, 9 and 16) provided the fewest records.

During static monitoring, bat activity levels increased through spring to peak in May and July (no data for June) before tailing off in the autumn, quite considerably in October. Such a pattern is typical, but the large drop in bat activity in October, when bats are still active, would suggest that the site is a 'summer' (maternity period) feeding area predominantly. Bat activity levels (and activity by rarer species: greater horseshoe and serotine) were highest at lower elevations and/or when near to optimal foraging habitat (e.g. woodland/water), and lowest at higher elevations and/or near to busier roads (as opposed to access tracks around the site).

During transect surveys, a likely bat roost was noted at the Orange transect (Grid Reference SN80138 09411) where common and soprano pipistrelle bats are considered likely to have emerged during the June and September surveys. This likely roost consists of an old stone tunnel approximately 20 m long, and open at both ends. A Natterer's bat roost was also recorded here during inspections of buildings and structures, and is reported separately¹⁴.

The results obtained during the surveys fully detailed within this report are broadly consistent with data collected to inform the Environmental Statement in 2011. The differences being an absence of Leisler's and lesser horseshoe records in 2019 while greater horseshoe bat was not recorded prior to 2019.

A full ecological impact assessment will be included within the Environmental Statement for the project and this will include an assessment of the significance of impacts from the project on bats. This will also detail any mitigation or compensation measures required to ensure there is no significant effect on bat species within the site.

This report is the result of the survey work undertaken between April and October 2019. This report refers, within the limitations stated, to the condition or proposed works of the site at the time of the surveys. Changes in legislation, guidance, best

¹⁴ Arup, 2019. Nant Helen earthworks: bat roost survey report.

practice, etc. may necessitate a re-assessment/survey. No warranty is given as to the possibility of future changes in the condition of the site.

The results of these surveys are considered valid for a minimum of 18 months to a maximum of 3 years. If more than 18 months elapses before any planning application is submitted, the requirement for repeat surveys should be reviewed¹⁵.

¹⁵ Chartered Institute of Ecology and Environmental Management (2019) Advice Note on the Lifespan of Ecological Reports and Surveys

Figures

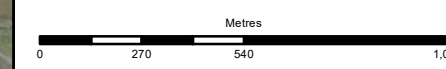


LEGEND

Study Area

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Issue	Date	By	Chkd	Appd
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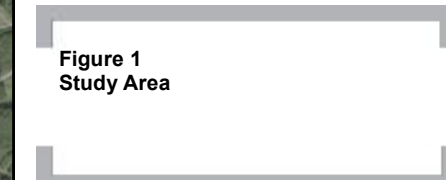


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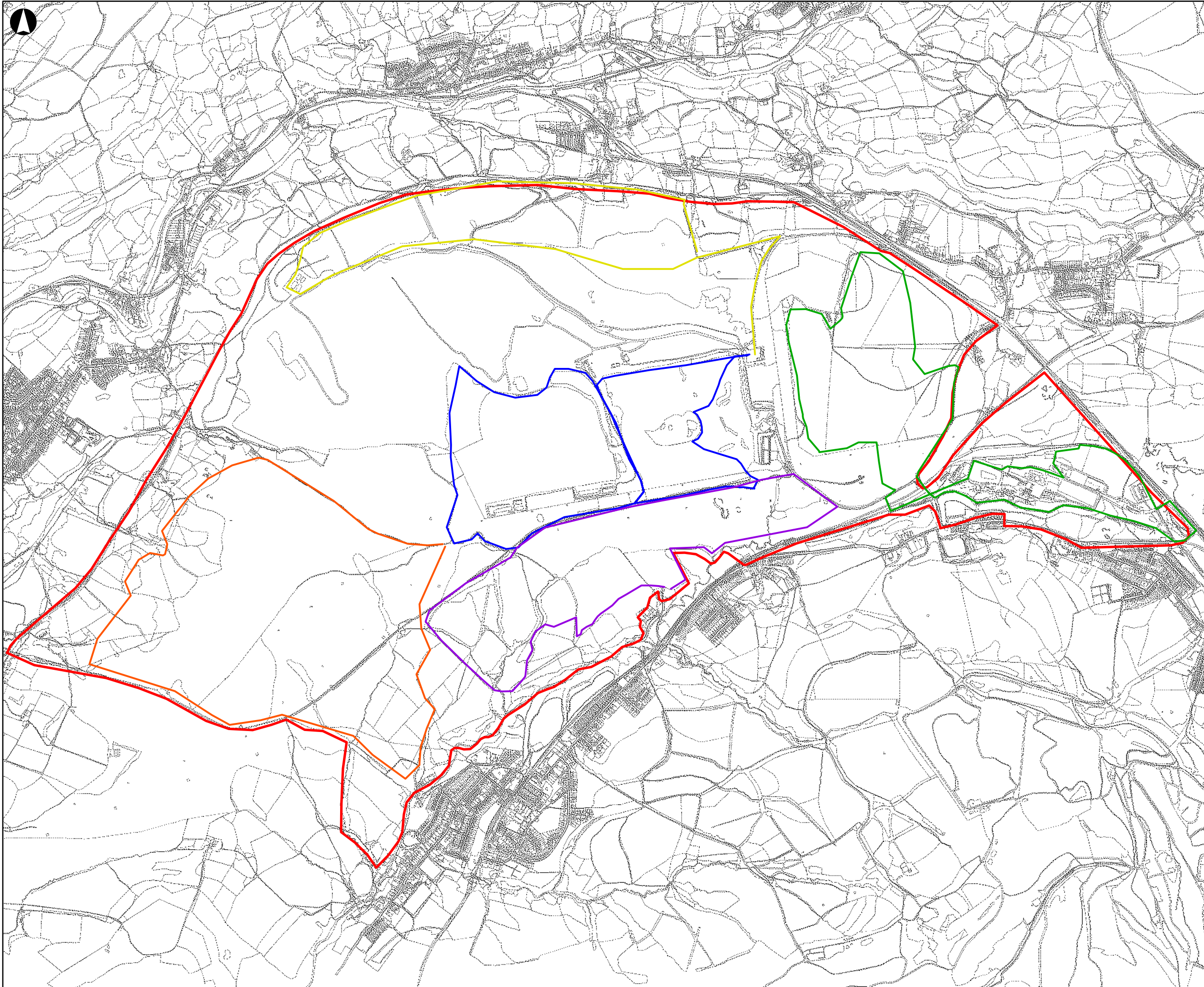
**Figure 1
Study Area**

Scale at A3
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Job No 264904	Drawing Status For Issue
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Drawing No 001	Issue F1
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

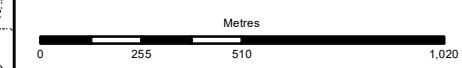
Study Area Boundary

Indicative Transect Routes

- 1
- 2
- 3
- 4
- 5

P0	2019-04-29	PW	PC	DB
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Issue	Date	By	Chkd	Appd



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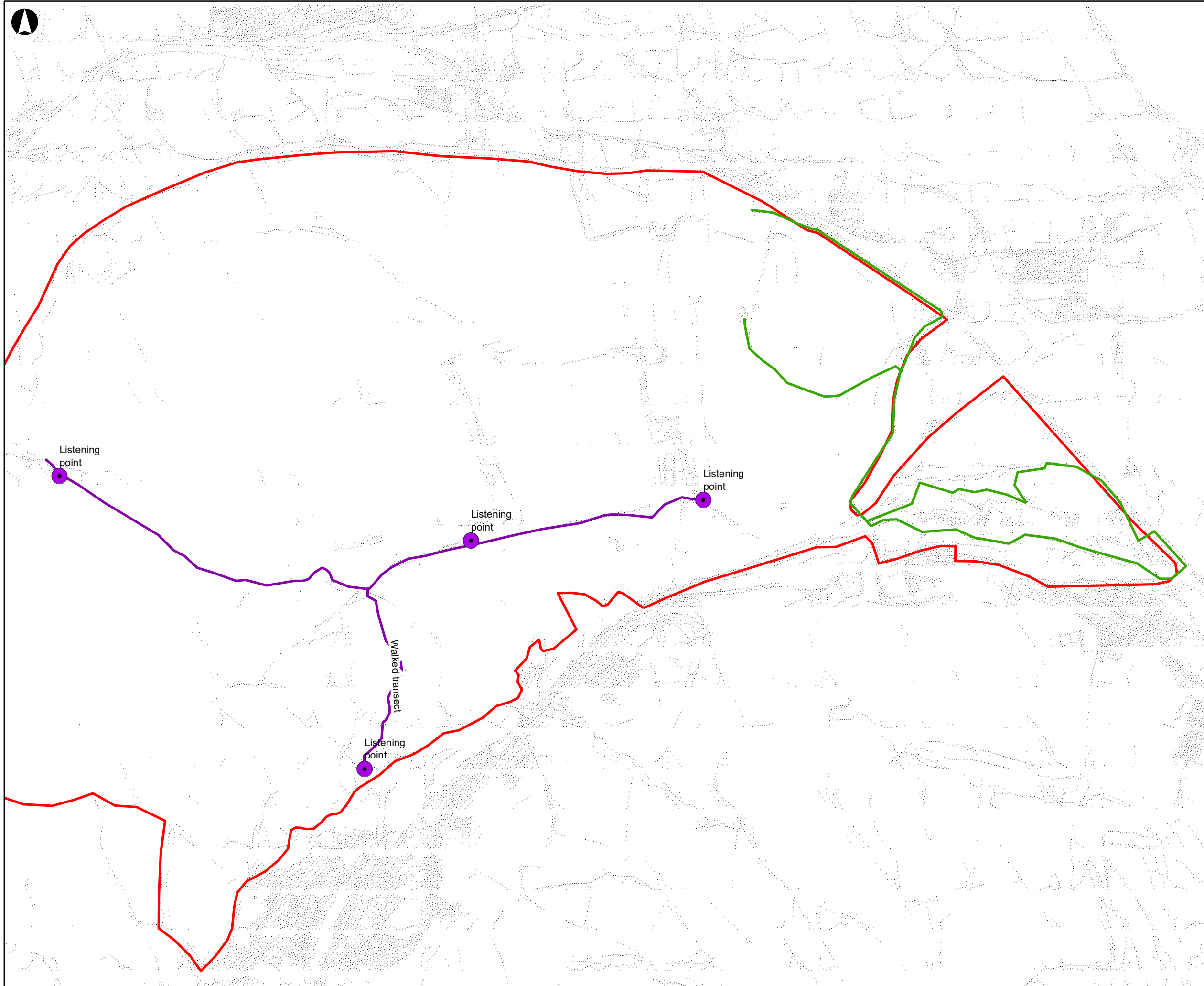
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Job No 264904	Drawing Status For Issue
Drawing No 002	Issue F1



- Legend**
- Listening Points
 - Study Area Boundary
 - Amended Green Transect
 - Amended Purple Transect

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Issue	Date	By	Chkd	Appd

Metres

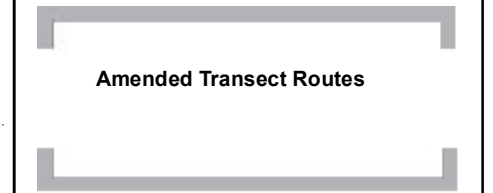
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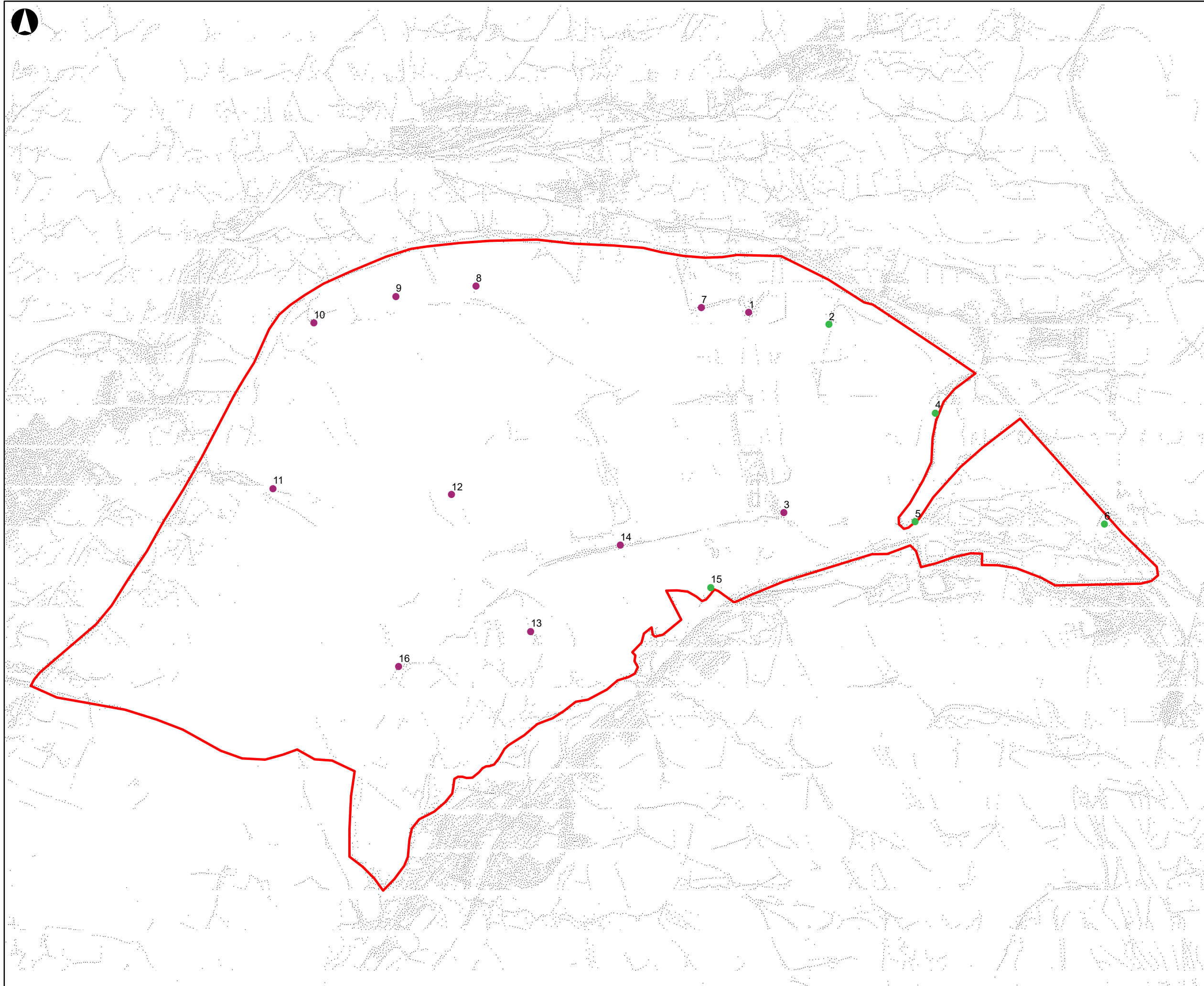
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Job No 264904	Drawing Status For Issue
Drawing No 003	Issue F1



Legend

- Study Area Boundary
- First Deployment
 - 25/04/2019
 - 26/04/2019

P0	2019-03-25	PW	PC	DB
Issue	Date	By	Chkd	Appd

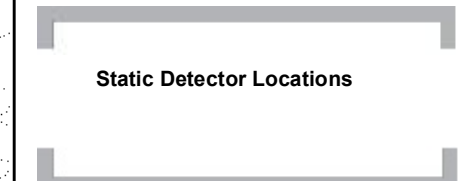
Metres

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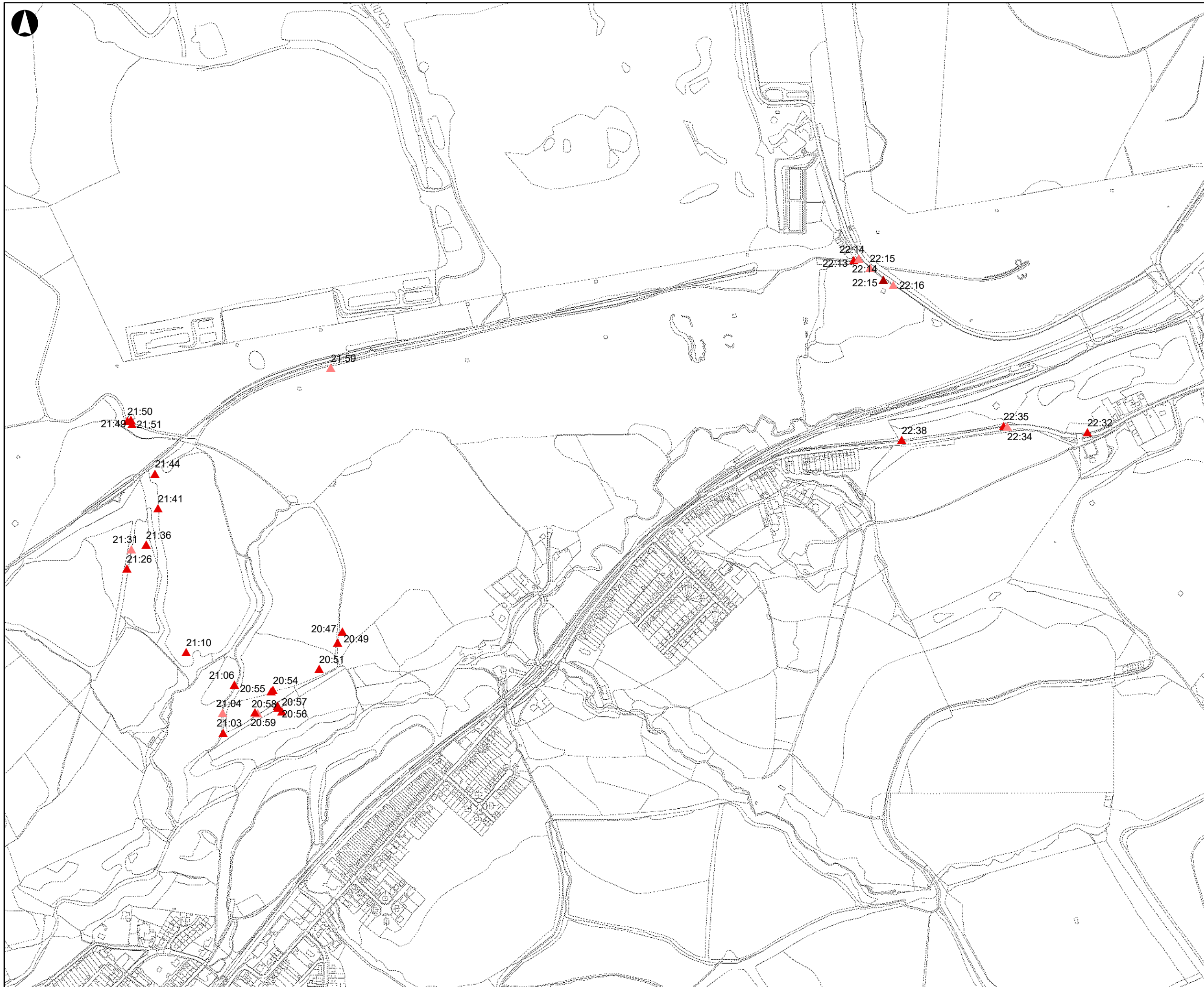
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Scale at A3
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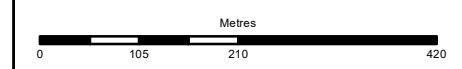
Job No 264904	Drawing Status For Issue
Drawing No 004	Issue F1



- Legend**
- Species**
- ▲ Pipistrelle species
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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**Bat Transect Results April
Purple Transect**

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 005a	Issue F1
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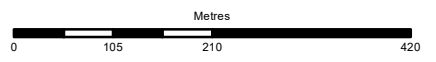


Legend

Species

▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd



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Bat Transect Results April Green Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 005b	Issue F1
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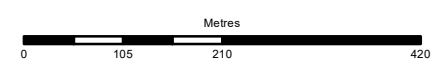
Legend

Species

- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd
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Bat Transect Results April Orange Transect

Scale at A3
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Job No 264904	Drawing Status For Issue
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Drawing No 005c	Issue F1
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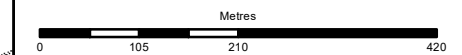


Legend

Species

- ★ Myotis species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd



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Client
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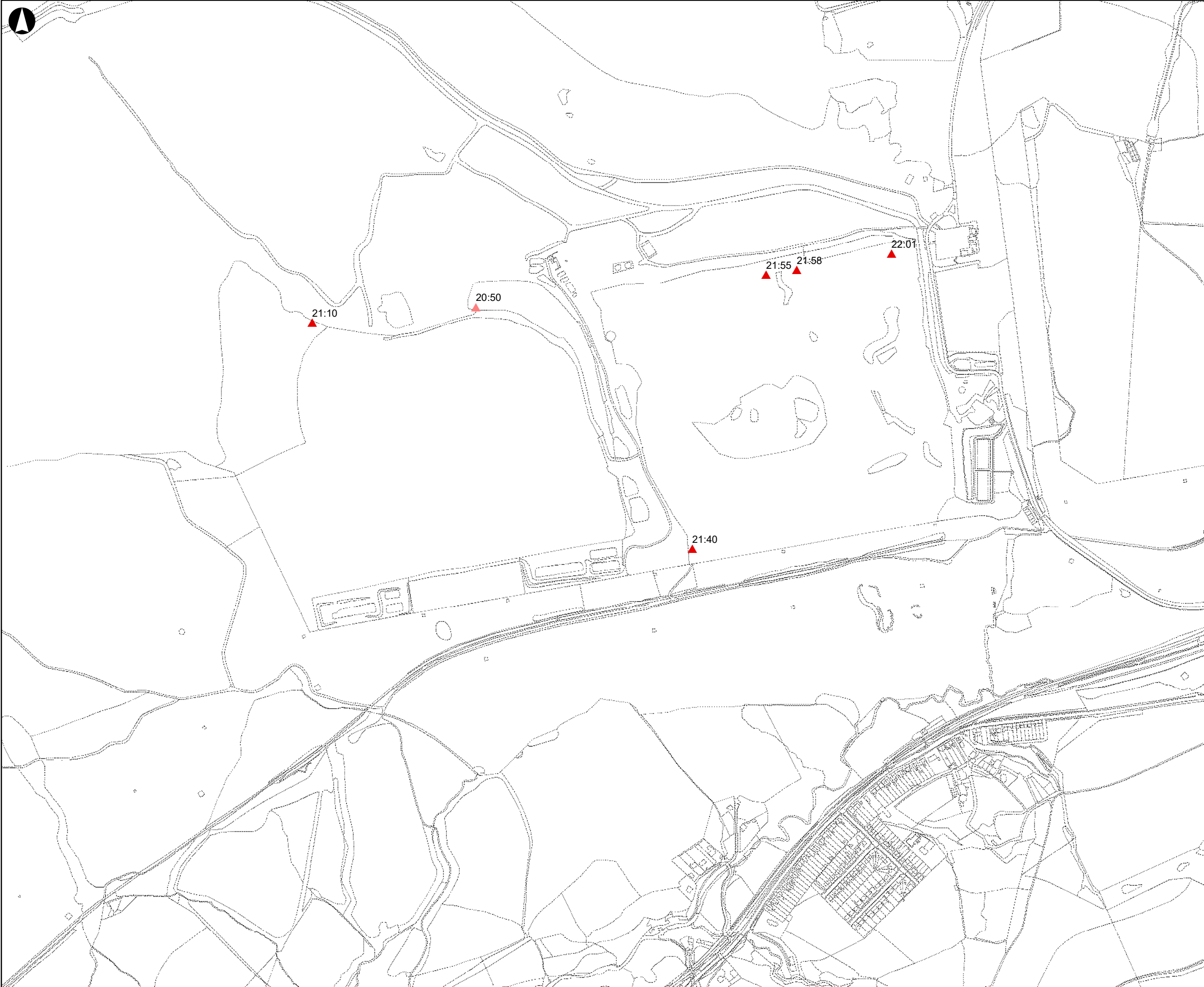
Job Title
**Global Centre for Rail
 Excellence**

**Bat Transect Results April
 Yellow Transect**

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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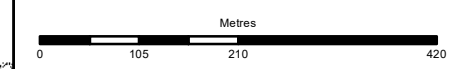
Drawing No 005d	Issue F1
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- Legend
- Species**
- ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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Job Title
Global Centre for Rail Excellence

**Bat Transect Results April
Blue Transect**

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 005e	Issue F1
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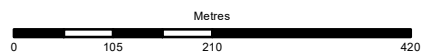


Legend

Species

- ▲ Pipistrelle species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd



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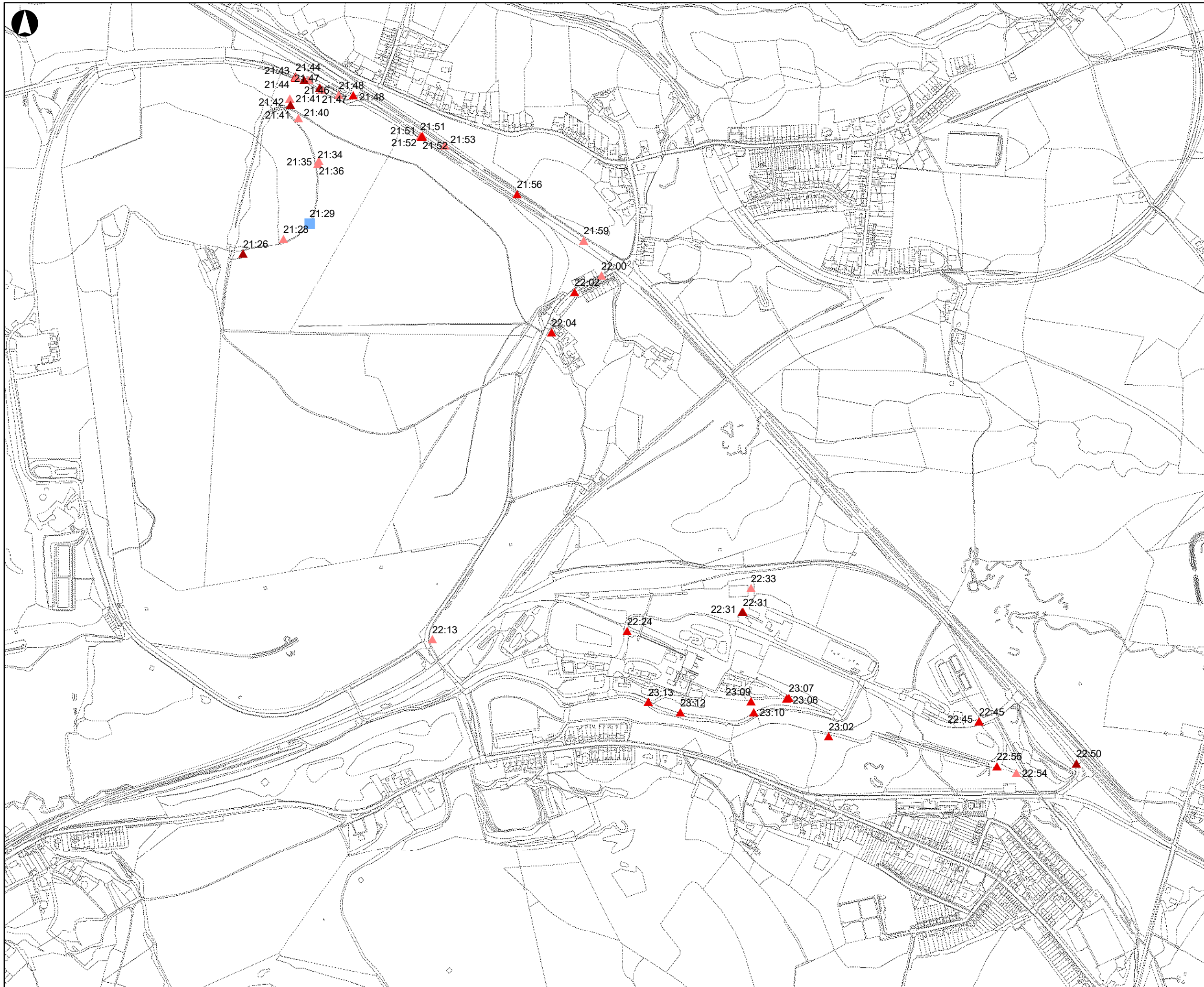
Client
Welsh Government

Job Title
Global Centre for Rail Excellence

Bat Transect Results May Purple Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
Drawing No 006a	Issue F1



Legend

Species

- Noctule
- ▲ Pipistrelle species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 105 210 420

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Client
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Job Title
Global Centre for Rail Excellence

Bat Transect Results May Green Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
Drawing No 006b	Issue F1



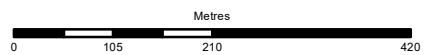
Legend

Species

- ▲ Common pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd
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Job Title
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Bat Transect Results May Orange Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 006c	Issue F1
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- Legend**
- ★ Myotis species
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 105 210 420

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Job Title
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Bat Transect Results May Yellow Transect

Scale at A3
1:8,000

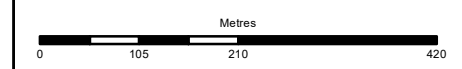
Job No 264904	Drawing Status For Issue
Drawing No 006d	Issue F1



- Legend
- Species**
- ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd
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Job Title
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Bat Transect Results May Blue Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 006e	Issue F1
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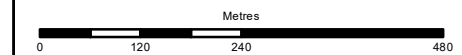


Legend

Species

- ▲ Pipistrelle species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd



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Job Title

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**Bat Transect Results June
Purple Transect**

Scale at A3

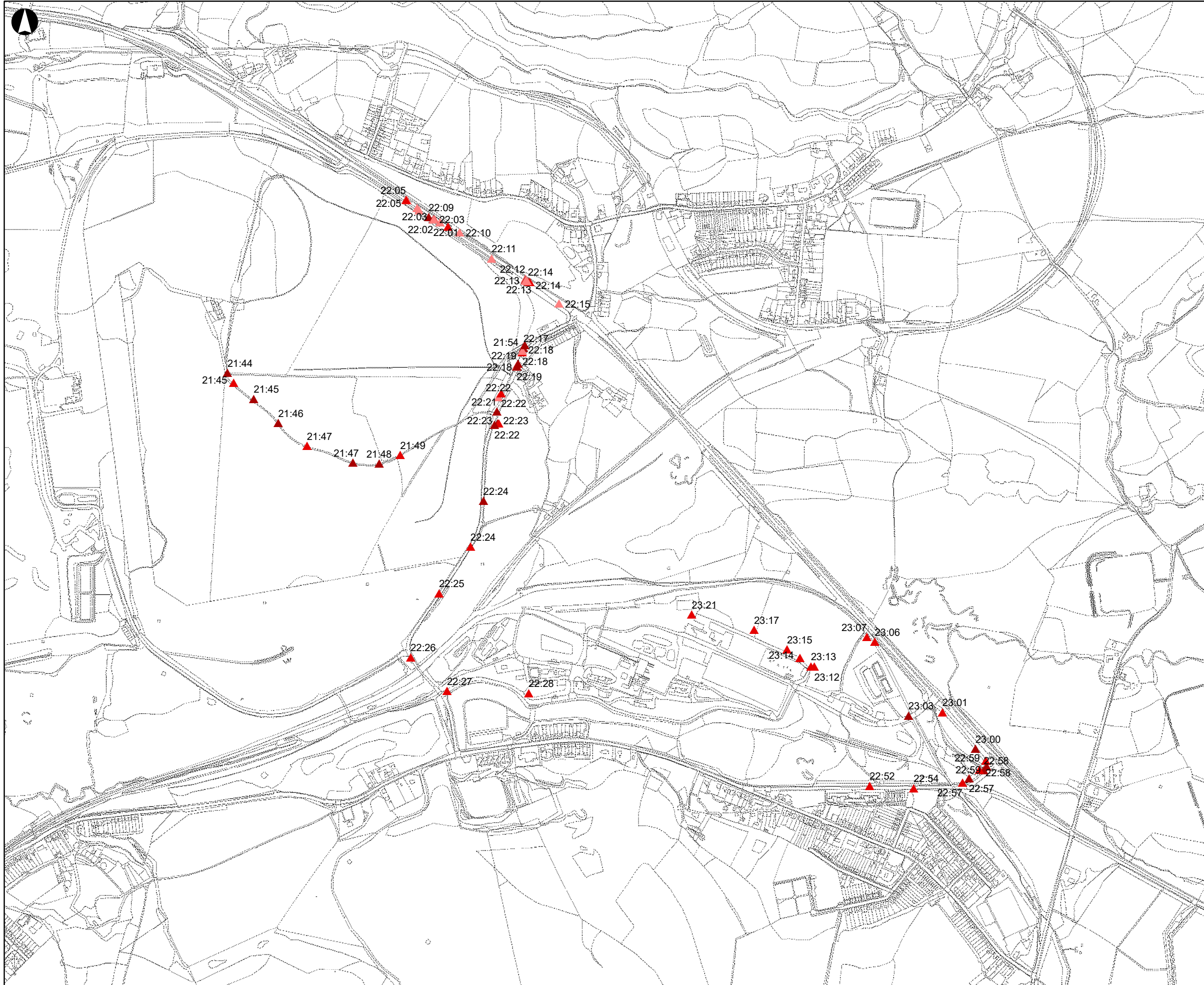
1:9,000

Job No
264904

Drawing Status
For Issue

Drawing No
007a

Issue
F1



- Legend**
- Species**
- ▲ Pipistrelle species
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-30	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

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Client

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Job Title

Global Centre for Rail Excellence

Bat Transect Results June Green Transect

Scale at A3

1:9,000

Job No	Drawing Status
264904	For Issue
Drawing No	Issue
007b	F1



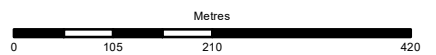
Legend

Species

- ★ Myotis species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd
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Job Title
Global Centre for Rail Excellence

Bat Transect Results June Orange Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 007c	Issue F1
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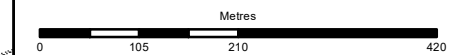


Legend

Species

- ★ Myotis species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd



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Job Title
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**Bat Transect Results June
 Yellow Transect**

Scale at A3
1:8,000

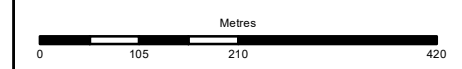
Job No 264904	Drawing Status For Issue
Drawing No 007d	Issue F1



- Legend**
- Species**
- ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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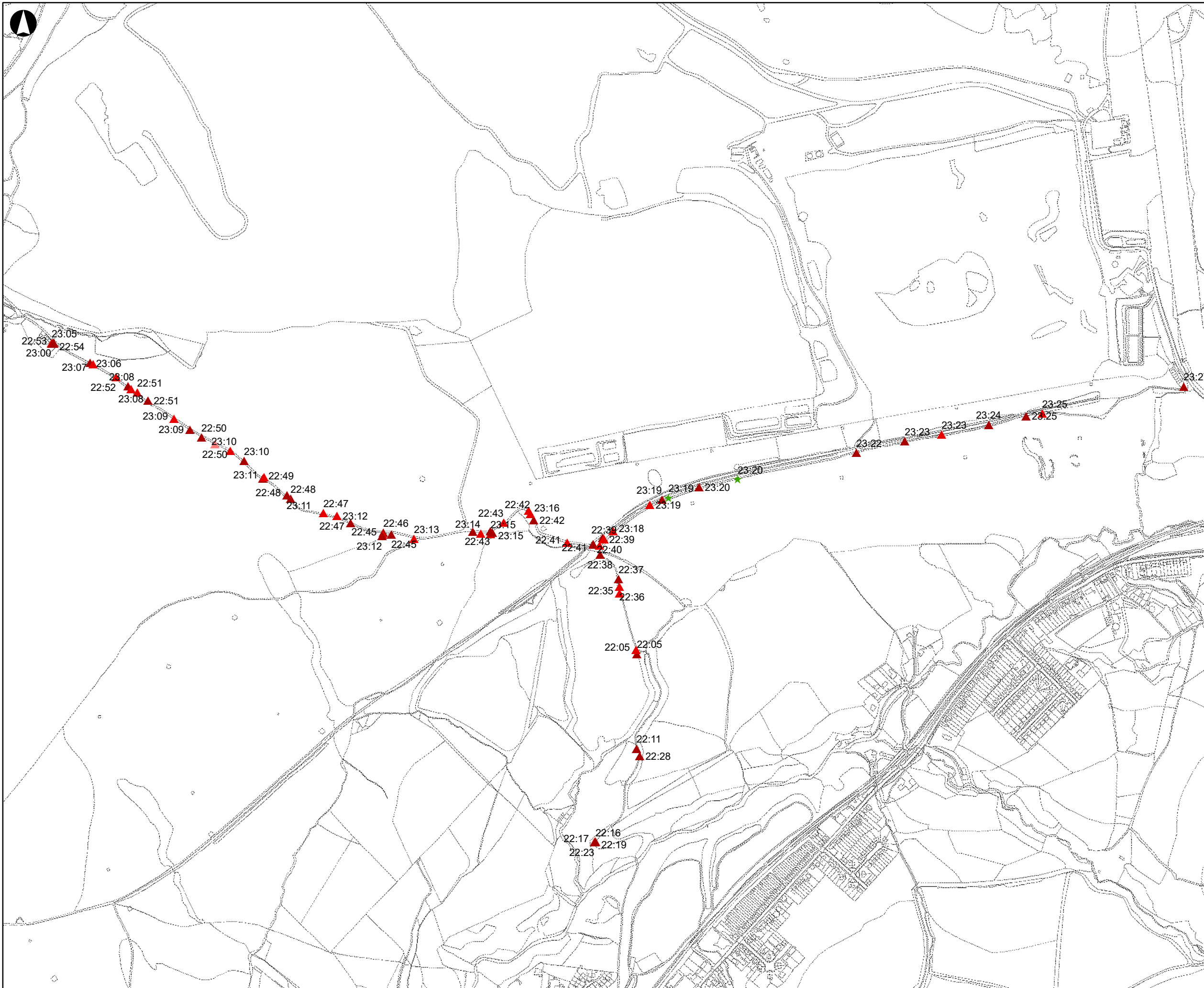
Job Title
Global Centre for Rail Excellence

Bat Transect Results June Blue Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 007e	Issue F1
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Legend

Species

- ★ Myotis species
- ▲ Pipistrelle species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 120 240 480

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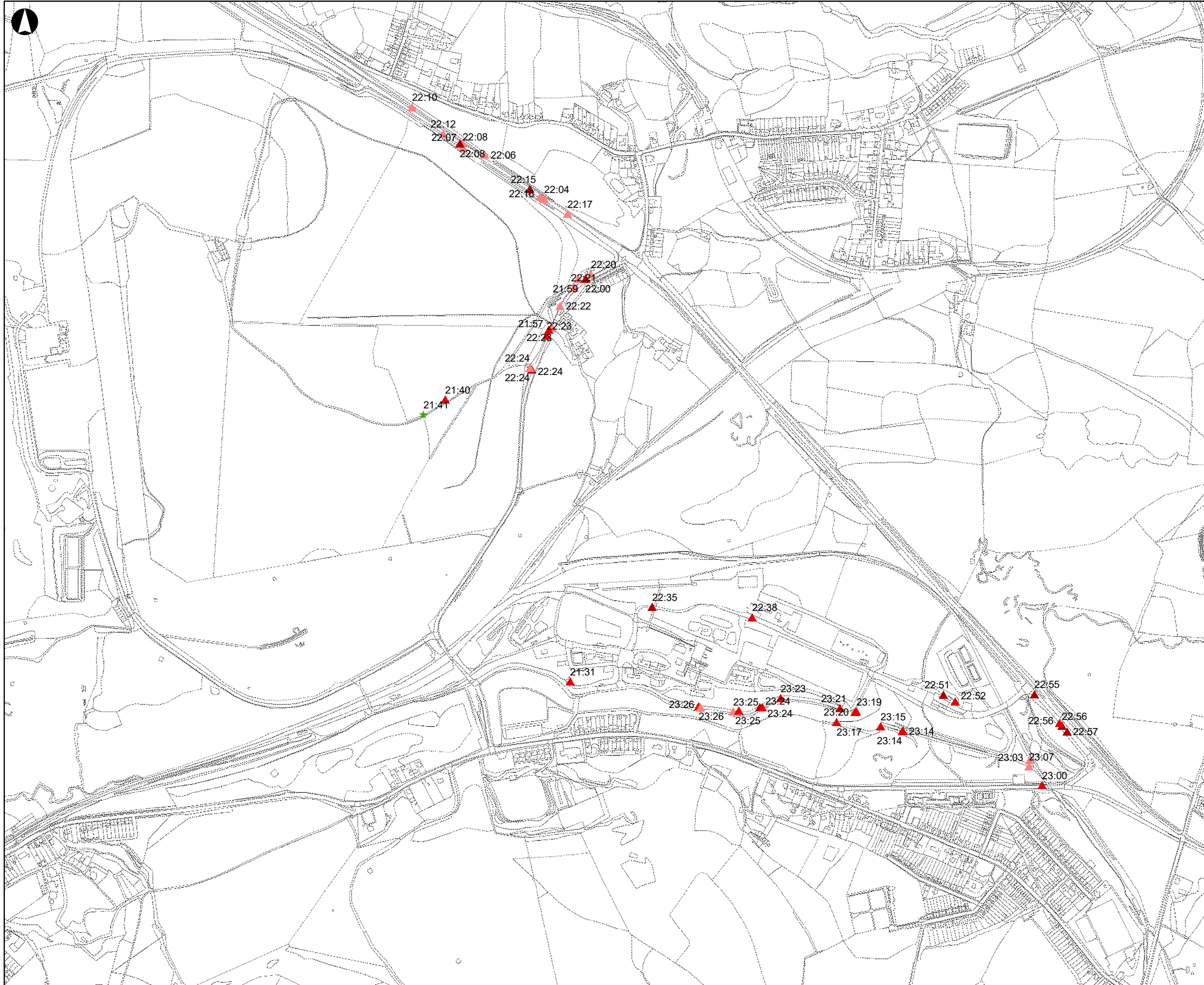
Client
Welsh Government

Job Title
Global Centre for Rail Excellence

Bat Transect Results July Purple Transect

Scale at A3
1:9,000

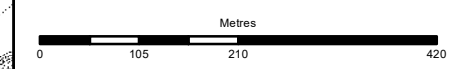
Job No 264904	Drawing Status For Issue
Drawing No 008a	Issue F1



- Legend**
- ★ Myotis species
 - ▲ Pipistrelle species
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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Client
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Job Title
Global Centre for Rail Excellence

Bat Transect Results July Green Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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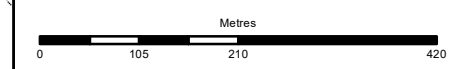
Drawing No 008b	Issue F1
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- Legend
- Species**
- ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd
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Client
Welsh Government

Job Title
Global Centre for Rail Excellence

**Bat Transect Results July
Orange Transect**

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 008c	Issue F1
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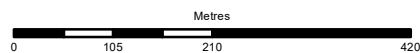


Legend

Species

- Noctule
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd



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Client

Welsh Government

Job Title

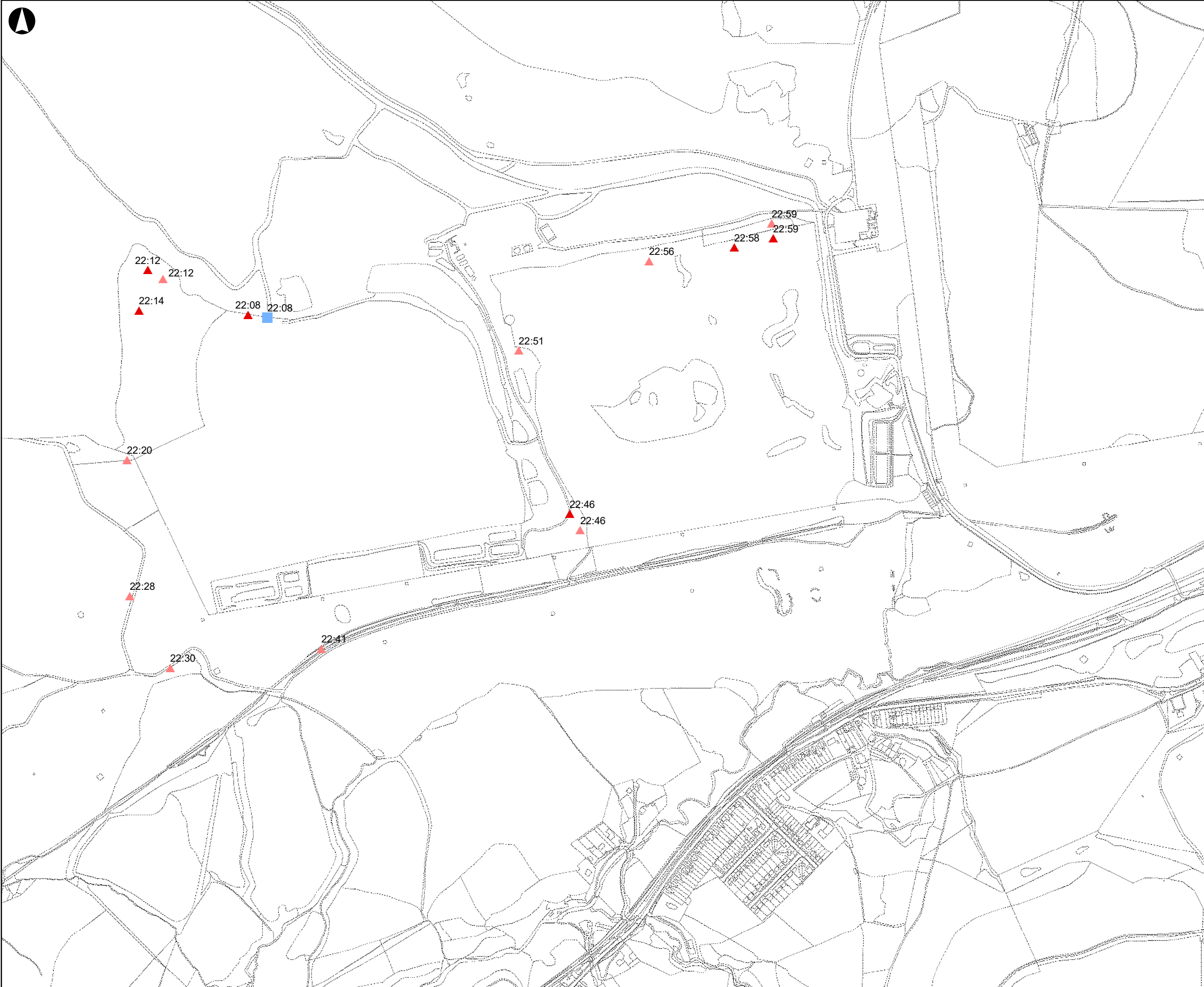
Global Centre for Rail Excellence

Bat Transect Results July Yellow Transect

Scale at A3

1:8,000

Job No 264904	Drawing Status For Issue
Drawing No 008d	Issue F1



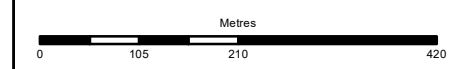
Legend

Species

- Noctule
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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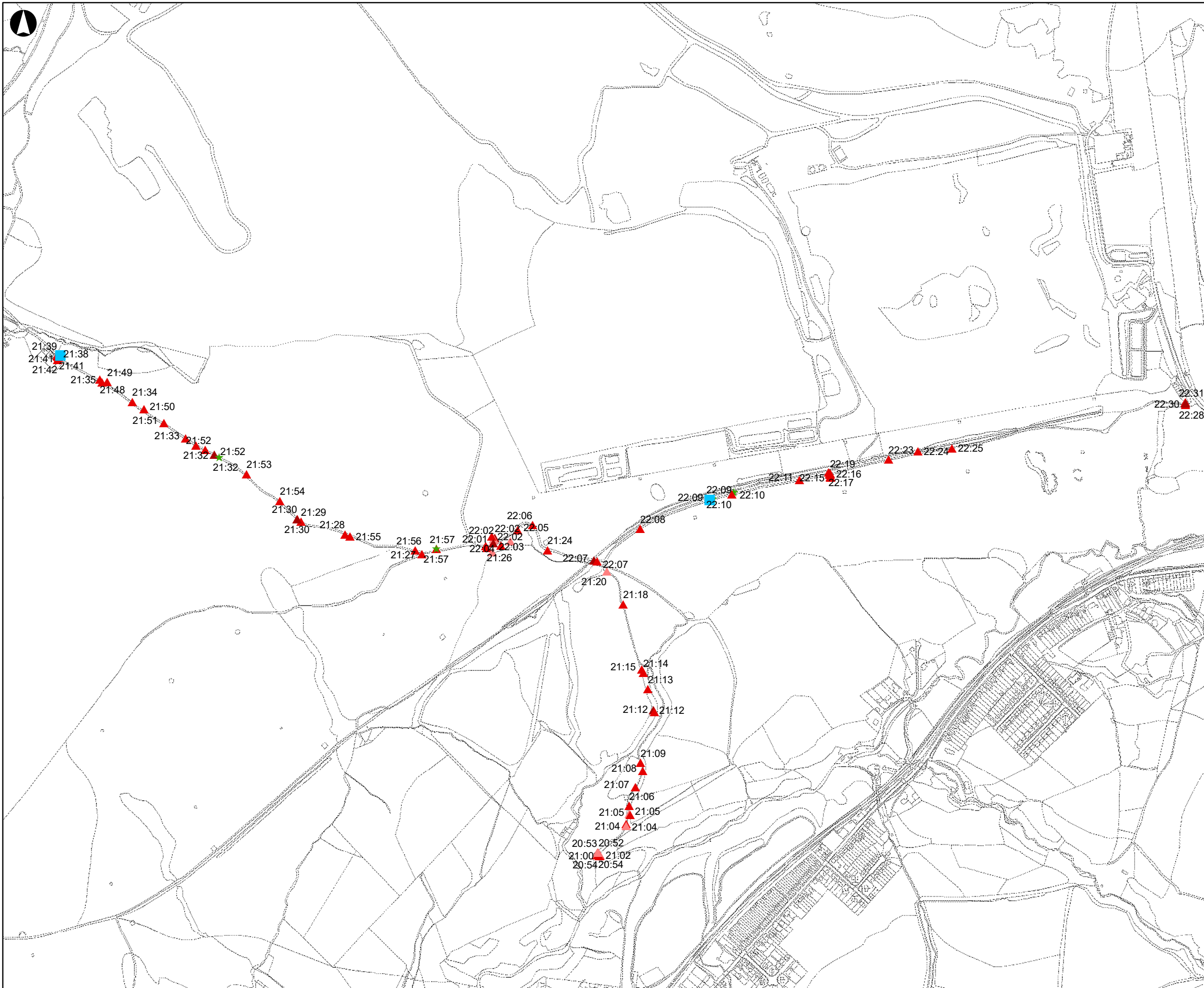
Job Title
Global Centre for Rail Excellence

Bat Transect Results July Blue Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 008e	Issue F1
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- Legend**
- ★ Myotis species
 - Long-eared species
 - ▲ Pipistrelle species
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 120 240 480

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Client
Welsh Government

Job Title
Global Centre for Rail Excellence

**Bat Transect Results August
Purple Transect**

Scale at A3
1:9,000

Job No 264904	Drawing Status For Issue
Drawing No 009a	Issue F1



Legend

Species

- Noctule
- ▲ Pipistrelle species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 105 210 420

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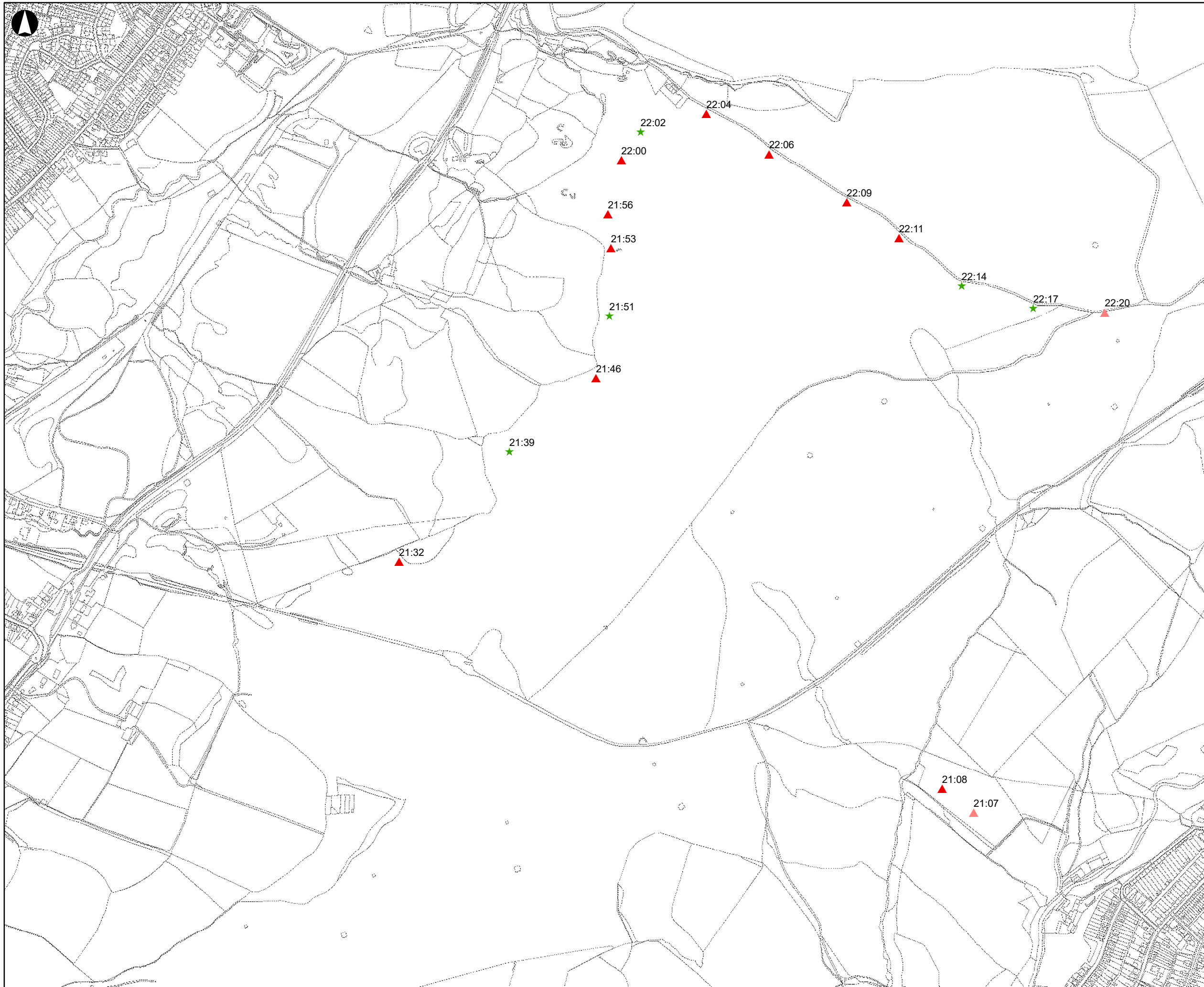
Client
Welsh Government

Job Title
Global Centre for Rail Excellence

Bat Transect Results August Green Transect

Scale at A3
1:8,000

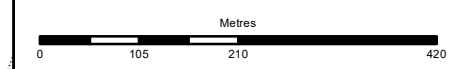
Job No 264904	Drawing Status For Issue
Drawing No 009b	Issue F1



- Legend**
- ★ Myotis species
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd
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Client
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Job Title
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Bat Transect Results August Orange Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 009c	Issue F1
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- Legend**
- ★ Myotis species
 - Noctule
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 105 210 420

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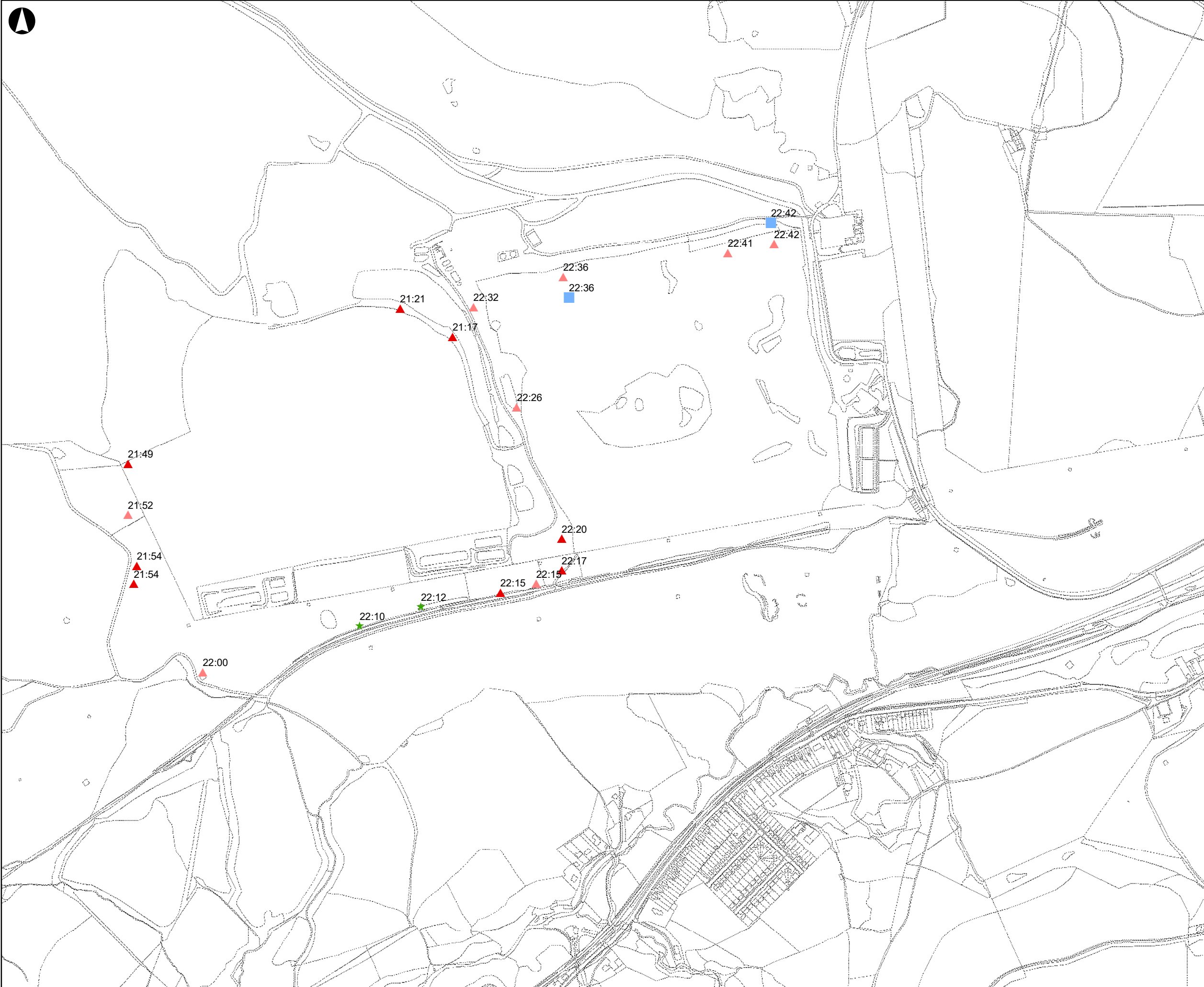
Client
Welsh Government

Job Title
Global Centre for Rail Excellence

Bat Transect Results August Yellow Transect

Scale at A3
1:8,000

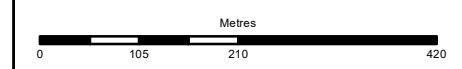
Job No 264904	Drawing Status For Issue
Drawing No 009d	Issue F1



- Legend**
- ★ Myotis species
 - Noctule
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-26	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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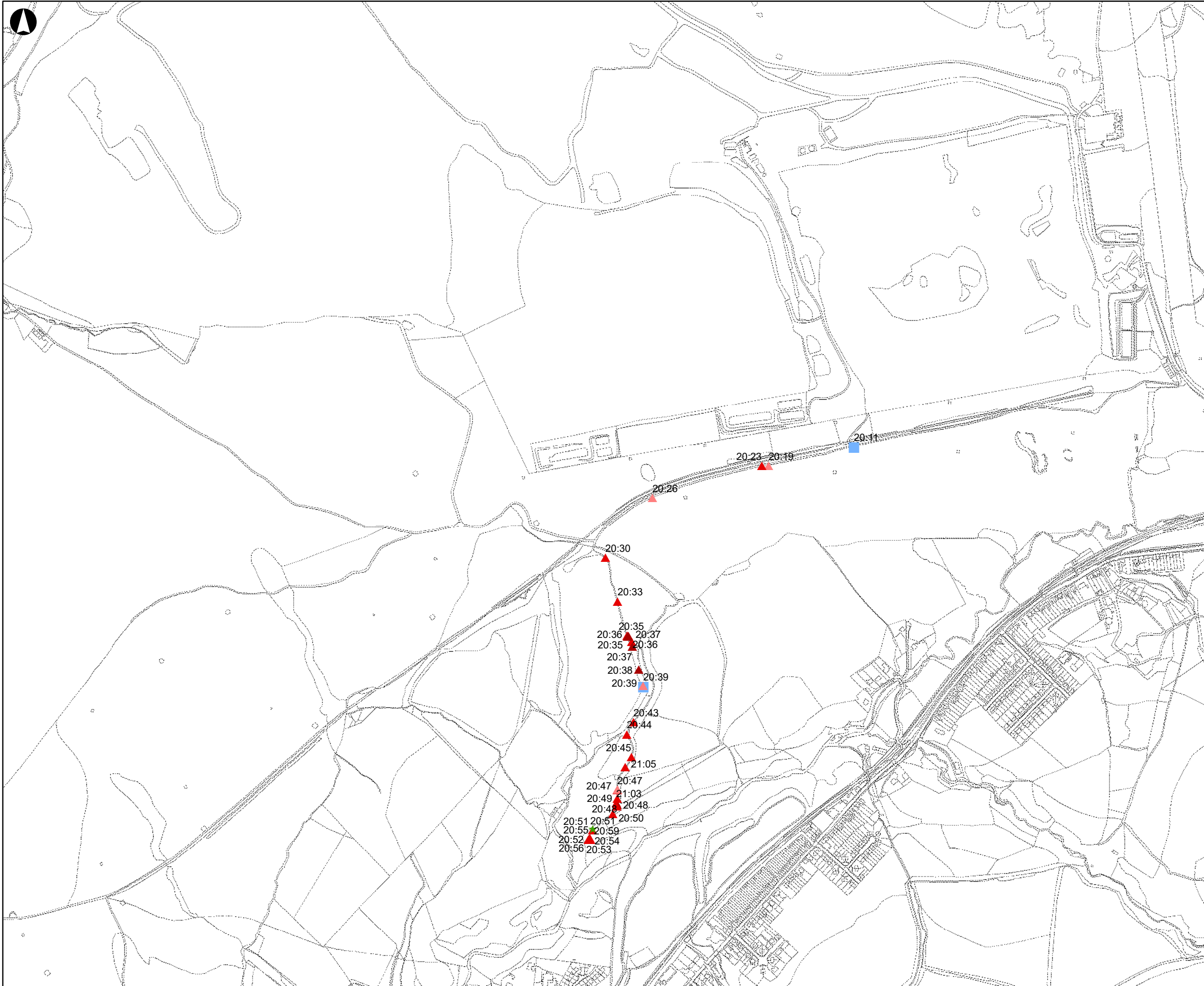
Job Title
Global Centre for Rail Excellence

Bat Transect Results August Blue Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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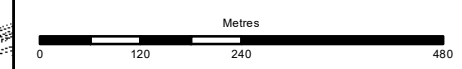
Drawing No 009e	Issue F1
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- Legend**
- ★ Myotis species
 - Noctule
 - ▲ Pipistrelle species
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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Client
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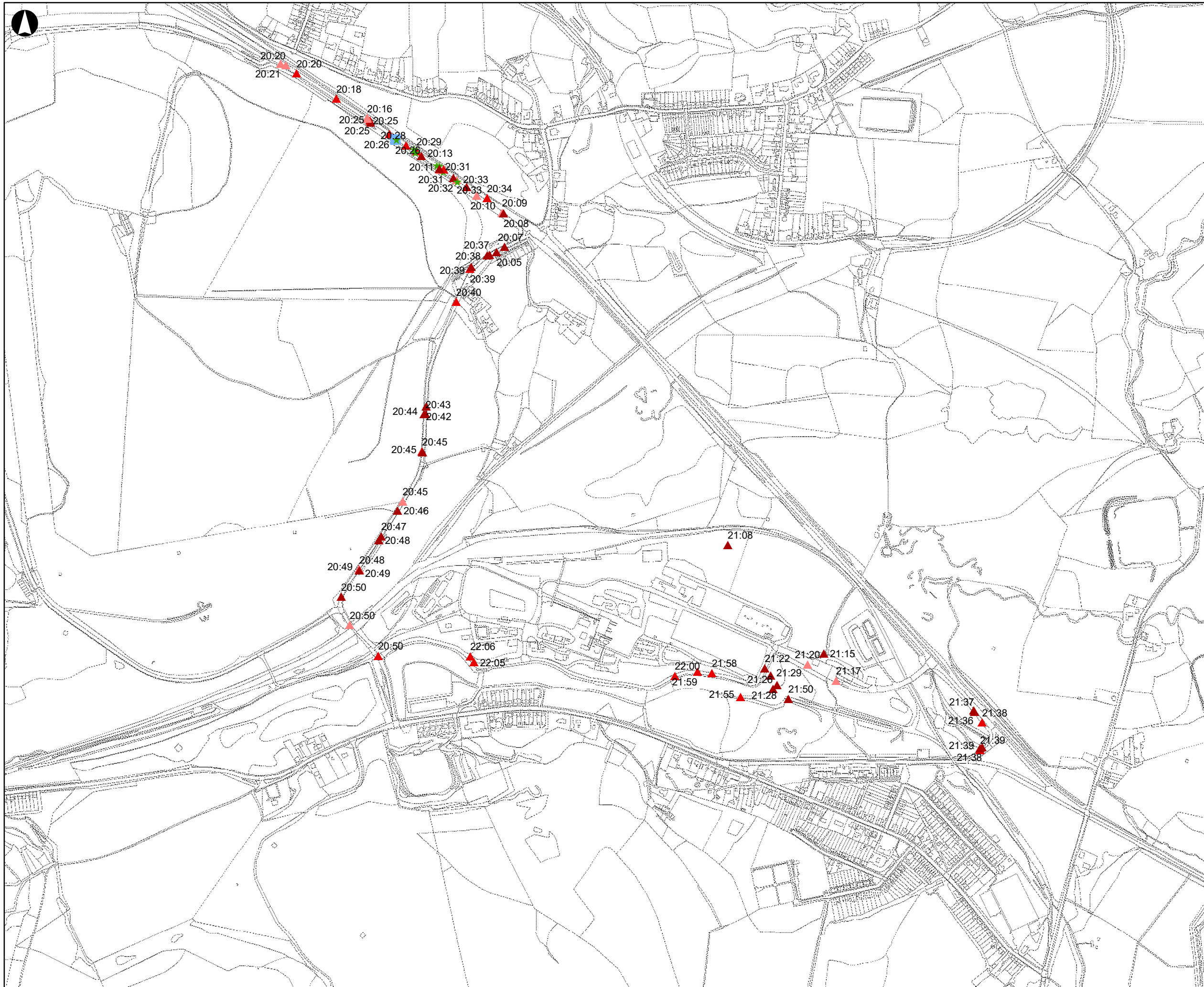
Job Title
Global Centre for Rail Excellence

Bat Transect Results September PurpleTransect

Scale at A3
1:9,000

Job No 264904	Drawing Status For Issue
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Drawing No 010a	Issue F1
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- Legend**
- Species**
- ★ Myotis species
 - Noctule
 - ▲ Pipistrelle species
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 105 210 420

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Client

Welsh Government

Job Title

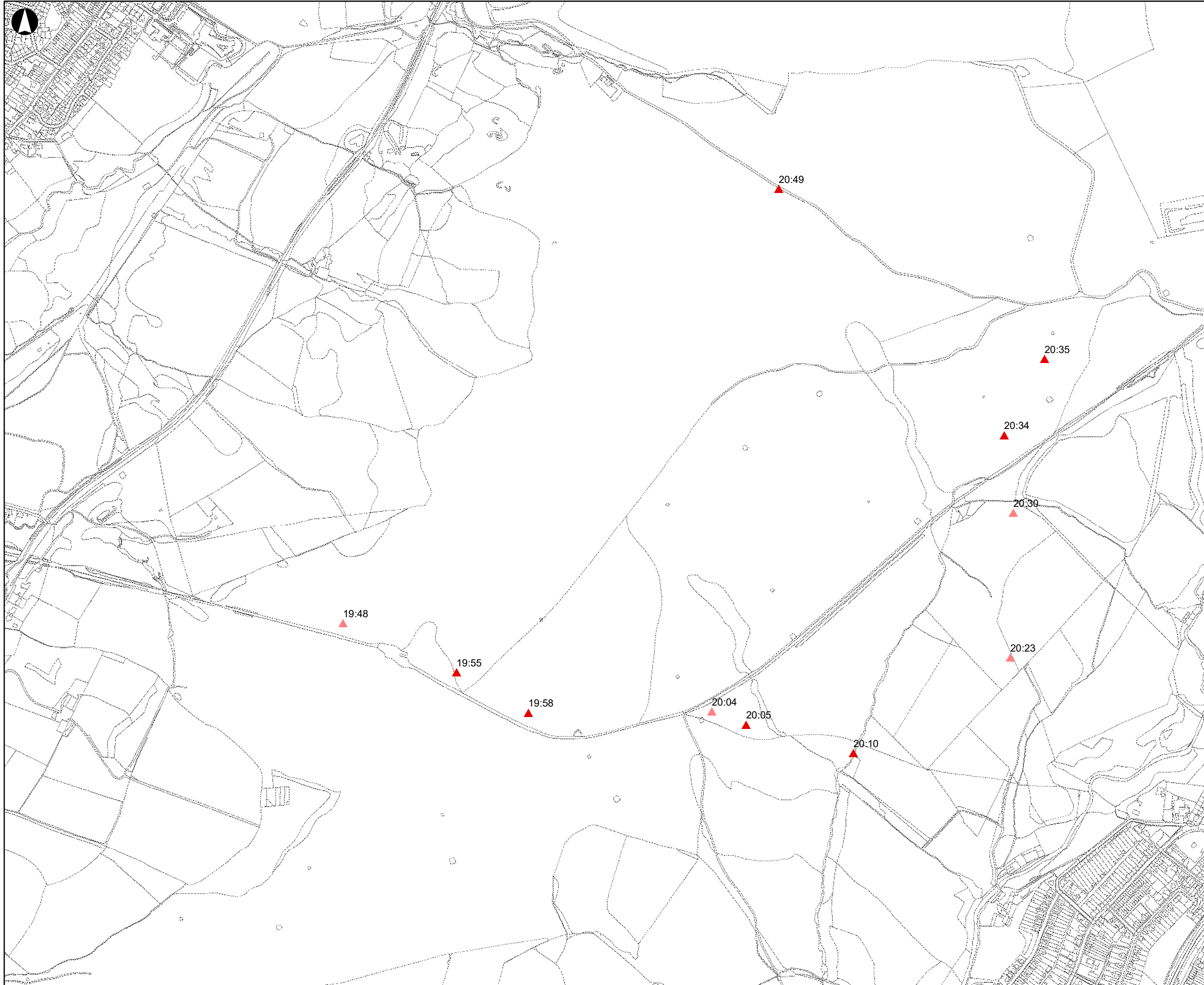
Global Centre for Rail Excellence

Bat Transect Results September GreenTransect

Scale at A3

1:8,000

Job No	Drawing Status
264904	For Issue
Drawing No	Issue
010b	F1



- Legend
- Species**
- ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 105 210 420

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Job Title

Global Centre for Rail Excellence

Bat Transect Results September Orange Transect

Scale at A3

1:8,000

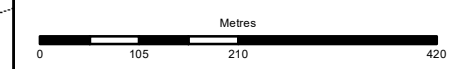
Job No	Drawing Status
264904	For Issue
Drawing No	Issue
010c	F1



- Legend**
- ★ Myotis species
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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Client
Welsh Government

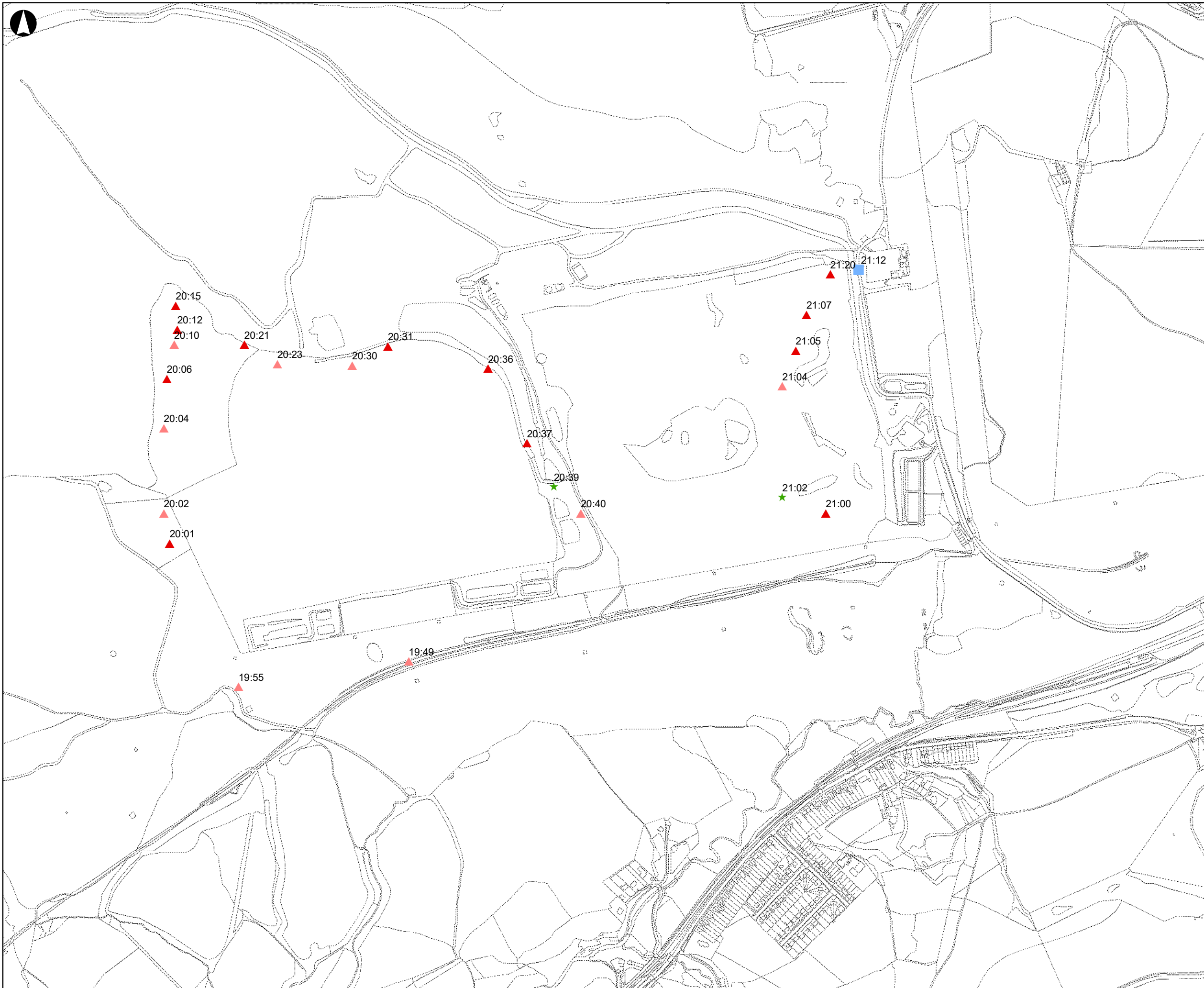
Job Title
Global Centre for Rail Excellence

Bat Transect Results September Yellow Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
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Drawing No 010d	Issue F1
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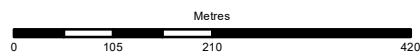
Legend

Species

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

F1	2020-03-27	KJ	CP	PC
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Issue	Date	By	Chkd	Appd
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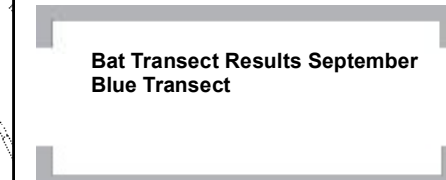
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www.arup.com

Client

Welsh Government

Job Title

Global Centre for Rail Excellence



Scale at A3

1:8,000

Job No	Drawing Status
264904	For Issue

Drawing No	Issue
010e	F1

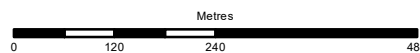


Legend

Species

- ★ Myotis species
- ▲ Pipistrelle species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
Issue	Date	By	Chkd	Appd



ARUP

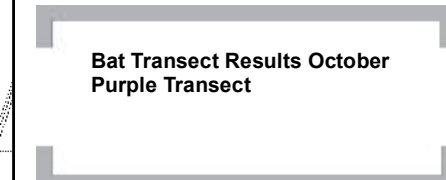
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Client

Welsh Government

Job Title

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Scale at A3

1:9,000

Job No 264904	Drawing Status For Issue
Drawing No 011a	Issue F1

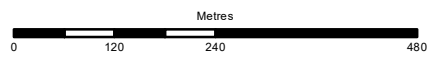


Legend

Species

- ▲ Pipistrelle species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
Issue	Date	By	Chkd	Appd



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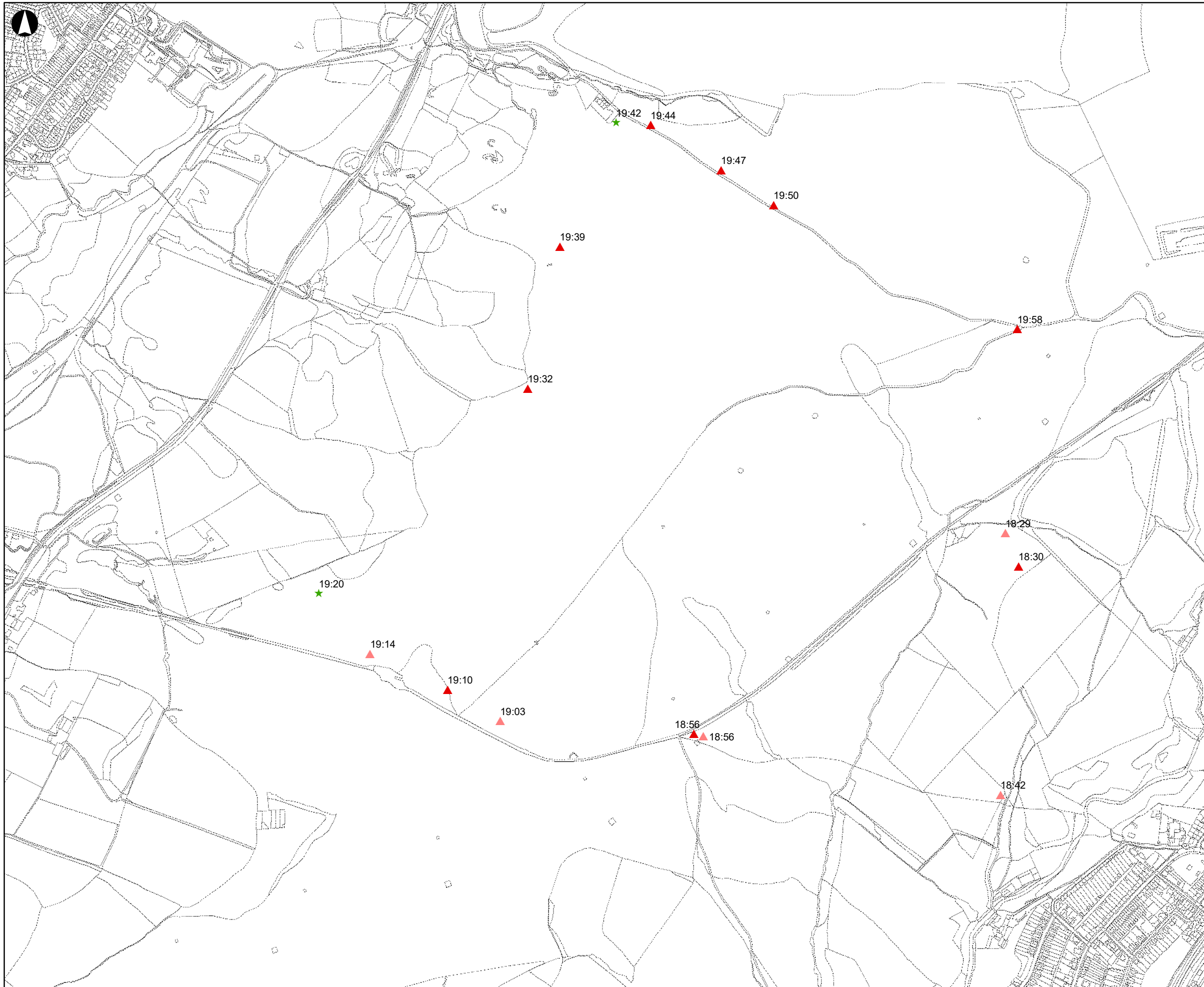
Job Title
Global Centre for Rail Excellence

Bat Transect Results October Green Transect

Scale at A3
1:9,000

Job No 264904	Drawing Status For Issue
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Drawing No 011b	Issue F1
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Legend

Species

- ★ Myotis species
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 105 210 420

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Job Title
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Bat Transect Results October Orange Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
Drawing No 011c	Issue F1



- Legend**
- Species**
- ★ Myotis species
 - Noctule
 - ▲ Common pipistrelle
 - ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 105 210 420

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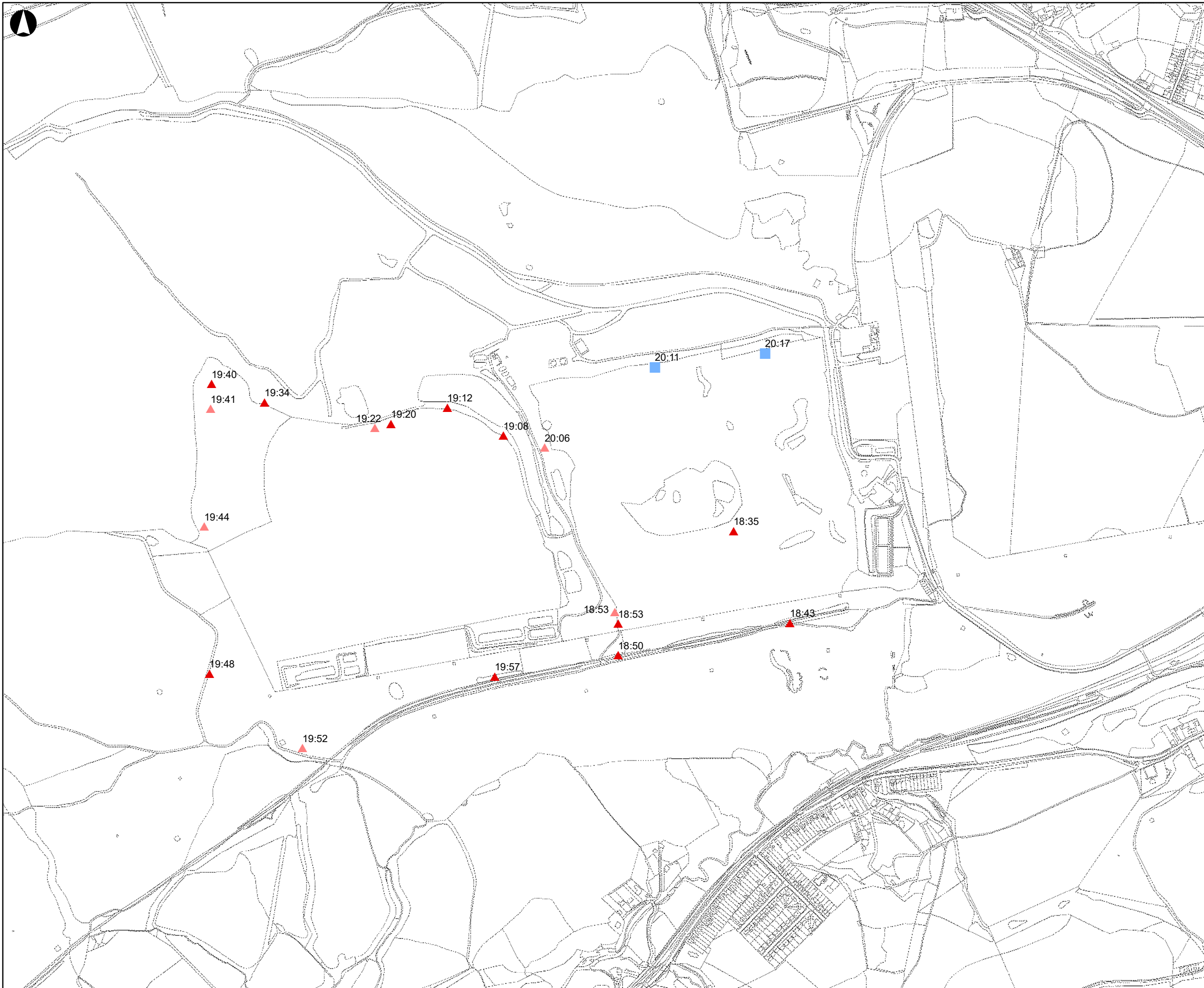
Client
Welsh Government

Job Title
Global Centre for Rail Excellence

Bat Transect Results October Yellow Transect

Scale at A3
1:8,000

Job No 264904	Drawing Status For Issue
Drawing No 011d	Issue F1



Legend

Species

- Noctule
- ▲ Common pipistrelle
- ▲ Soprano pipistrelle

F1	2020-03-27	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 120 240 480

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Bat Transect Results October Blue Transect

Scale at A3

1:8,848

Job No	Drawing Status
264904	For Issue
Drawing No	Issue
011e	F1



Legend

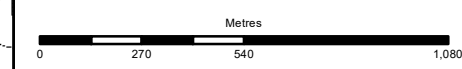
April Bat Species



- BARBAR
- EPTSER
- MYOTIS
- NYCLEI
- NYCNOG
- PIPNAT
- PIPPIP
- PIPPYG
- PIPSPE
- PLASPE
- RHIFER
- RHIHIP

F1	2020-03-30	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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**Bat Static Detector Results
 Bat Species Proportions
 April**

Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
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Drawing No 012a	Issue F1
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Legend

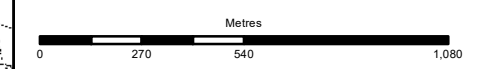
May Bat Species



- BARBAR
- EPTSER
- MYOTIS
- NYCLEI
- NYCNOG
- PIPNAT
- PIPPIP
- PIPPYG
- PIPSPE
- PLASPE
- RHIFER
- RHIHIP

F1	2020-03-30	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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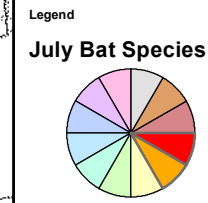
Job Title
Global Centre for Rail Excellence

**Bat Static Detector Results
 Bat Species Proportions
 May**

Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
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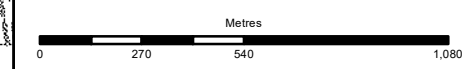
Drawing No 012b	Issue F1
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- BARBAR
- EPTSER
- MYOTIS
- NYCLEI
- NYCNOG
- PIPNAT
- PIPPIP
- PIPPYG
- PIPSPE
- PLASPE
- RHIFER
- RHIHIP

F1	2020-03-30	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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**Bat Static Detector Results
Bat Species Proportions
July**

Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
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Drawing No 012c	Issue F1
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Legend

August Bat Species

- BARBAR
- EPTSER
- MYOTIS
- NYCLEI
- NYCNOC
- PIPNAT
- PIPPIP
- PIPPYG
- PIPSPE
- PLASPE
- RHIFER
- RHIHIP

F1	2020-03-30	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 270 540 1,080

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Welsh Government

Job Title

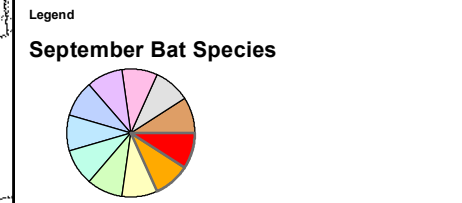
Global Centre for Rail Excellence

**Bat Static Detector Results
Bat Species Proportions
August**

Scale at A3

1:20,000

Job No	Drawing Status
264904	For Issue
Drawing No	Issue
012d	F1



- EPTSER
- MYOTIS
- NYCLEI
- NYCNOC
- PIPNAT
- PIPPIP
- PIPPYG
- PIPSPE
- PLASPE
- RHIFER
- RHIHIP

F1	2020-03-30	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

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Welsh Government

Job Title

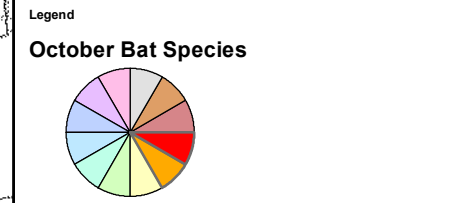
Global Centre for Rail Excellence

**Bat Static Detector Results
Bat Species Proportions
September**

Scale at A3

1:20,000

Job No	Drawing Status
264904	For Issue
Drawing No	Issue
012e	F1



- BARBAR
- EPTSER
- MYOTIS
- NYCLEI
- NYCNOC
- PIPNAT
- PIPPIP
- PIPPYG
- PIPSPE
- PLASPE
- RHIFER
- RHIHIP

F1	2020-03-30	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

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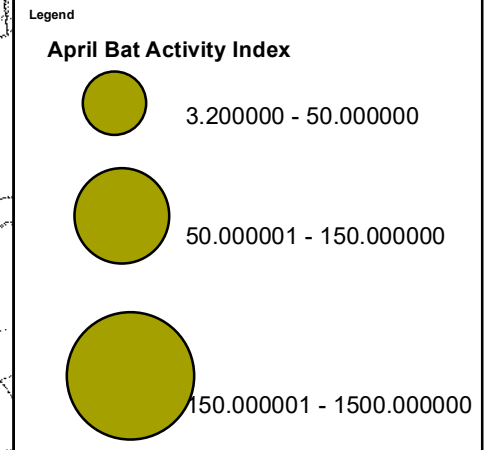
Client
Welsh Government

Job Title
Global Centre for Rail Excellence

**Bat Static Detector Results
Bat Species Proportions
October**

Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
Drawing No 012f	Issue F1



F1	2020-03-30	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 270 540 1,080

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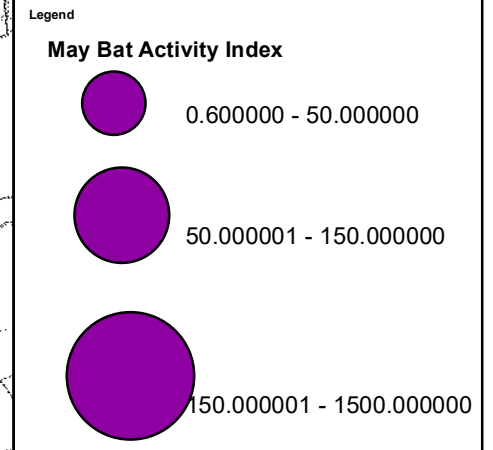
Client
Welsh Government

Job Title
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**Bat Static Detector Results
Bat Activity Index
April**

Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
Drawing No 013a	Issue F1



F1	2020-03-30	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 270 540 1,080

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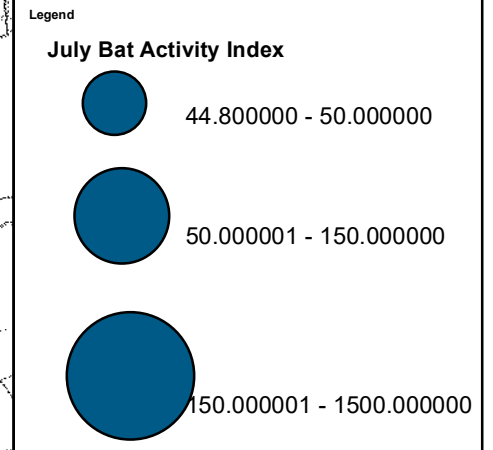
Client
Welsh Government

Job Title
Global Centre for Rail Excellence

**Bat Static Detector Results
Bat Activity Index
May**

Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
Drawing No 013b	Issue F1



F1	2020-03-30	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 270 540 1,080

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**Bat Static Detector Results
Bat Activity Index
July**

Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
Drawing No 013c	Issue F1



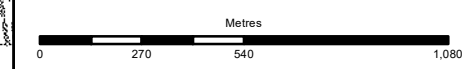
Legend

August Bat Activity Index

● 150.0000001-1500.000000

F1	2020-03-30	KJ	CP	PC
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Issue	Date	By	Chkd	Appd
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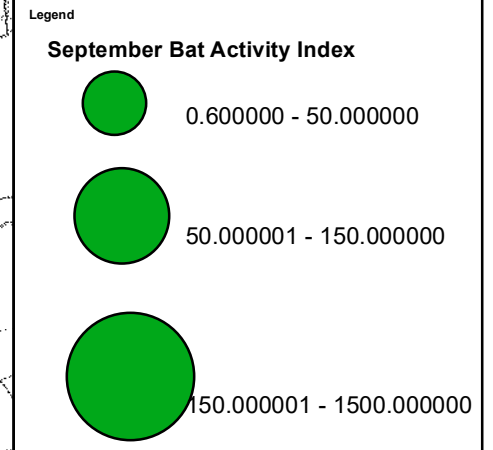
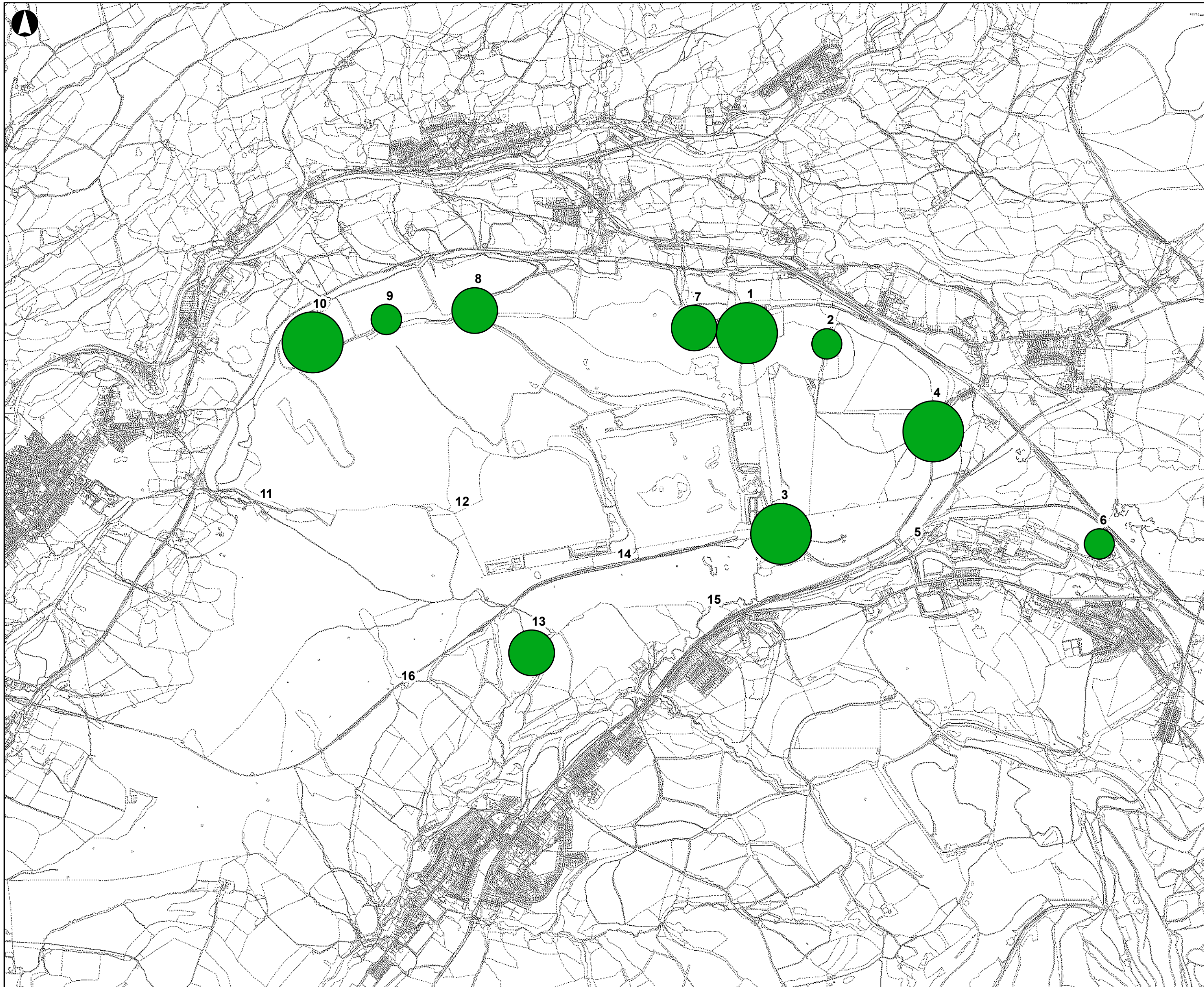
Job Title
Global Centre for Rail Excellence

**Bat Static Detector Results
Bat Activity Index
August**

Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
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Drawing No 013d	Issue F1
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F1	2020-03-30	KJ	CP	PC
Issue	Date	By	Chkd	Appd

Metres

0 270 540 1,080

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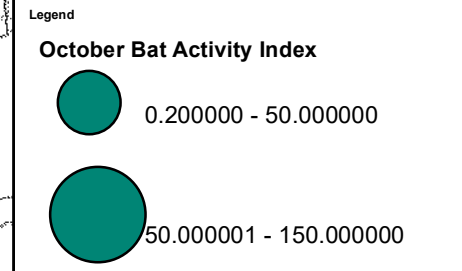
Client
Welsh Government

Job Title
Global Centre for Rail Excellence

**Bat Static Detector Results
Bat Activity Index
September**

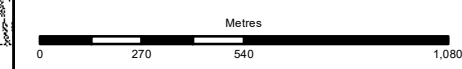
Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
Drawing No 013e	Issue F1



F1	2020-03-30	KJ	CP	PC
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Issue	Date	By	Chkd	Appd



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**Bat Static Detector Results
Bat Activity Index
October**

Scale at A3
1:20,000

Job No 264904	Drawing Status For Issue
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Drawing No 013f	Issue F1
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