



Llanwern Rail Facilities - Phase 1 Planning

Bat Survey Report

September 2018

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Executive Summary

Mott MacDonald (MM) has been commissioned by Transport for Wales (TfW), on behalf of Welsh Government, to prepare and submit a planning application, seeking full planning permission for the design and construction of a 1.6km long Major Events Stabling Line (MESL) on land adjacent to the existing Tata Steelworks Service Lines in Llanwern, South Wales known as Phase 1. The Site lies within the City of Newport and is located at Ordnance Survey Grid Reference ST 36907 87302. The purpose of this report is to document the findings of the bat surveys on Site to inform the development of the proposal.

The ecological survey work for this report has been undertaken in respect of the entire woodland (including the site and surrounds), this is shown by the dotted black line as detailed in Appendix A. The survey area was selected prior to the finalisation of Phase 1 of the Llanwern Rail Facilities Programme and is considered to provide important ecology context to the site-specific results. Phase 1 of the planning application is indicated by the red line boundary and is hereafter referred to as the 'site'.

A review of biological records and previous surveys undertaken in the area to support the M4 Corridor Around Newport Development, indicate that common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaes*), noctule (*Nyctalus noctula*), serotine (*Eptesicus serotinus*), *Myotis* species, Nathusius pipistrelle (*Pipistrellus nathusii*), lesser horseshoe bat (*Rhinolophus hipposideros*), Leisler's bat (*Nyctalus leisleri*), barbastelle (*Barbastelle barbastellus*) and brown long-eared bats (*Plecotus auritus*) were recorded close to the survey area.

All trees within the survey area were assessed for their suitability to support roosting bats and were subject to further survey based on these assessments. Only completion of surveys, the following were identified:

- Twenty-two confirmed bat roosts;
- Fifteen trees with high potential to support roosting bats;
- Twenty-nine trees with moderate potential to support roosting bats; and
- Two hundred and one trees with low potential to support roosting bats.

Of the 22 confirmed roosts, these have been identified as supporting the following species; common pipistrelle (6), soprano pipistrelle (2), pipistrelle sp. (3), noctule (1), serotine (7), unknown species (3). All roosts have been assessed as being transitional, non-breeding roosts supporting individual or low numbers of bats. Serotine transitional roosts are assessed as being of low-moderate conservation value, all other transitional roosts recorded are assessed as being of low conservation value (English Nature, 2004). Due to the assemblage of roosts identified, the survey area is assessed as being of county level importance for roosting bats.

All buildings within 20m of the construction zone were assessed for their suitability to support roosting bats. All buildings within the Tata Steelworks site were assessed for their suitability to support lesser horseshoe bats only. Three buildings within 20m of the construction zone were assessed as being suitable to support bats and were subject to further survey. One building; Building B7 was identified as a pipistrelle species roost from the emergence/re-entry surveys. This roost is assessed as being a transitional, non-breeding roost supporting individual or low numbers of bats and is of low conservation value (English Nature, 2004). Two additional buildings on the Tata Steelworks site were assessed as being suitable to support lesser

horseshoe bats and were subject to automated activity surveys. No lesser horseshoe calls were recorded and as such no further surveys of these buildings were undertaken.

Manual and automated activity surveys identified pipistrelle sp., noctule and *Nyctalus* sp. bats as the most abundant species using the site. *Myotis* sp. and *Plecotus* sp. bats were occasionally recorded, with rare recordings of serotine and lesser horseshoe bats. Bat activity was primarily focussed around reens/reen systems and floodlighting towers. With reference to Wray *et al.* (2010) the survey area has been assessed as being of County level importance for foraging bats.

A Natural Resources Wales European Protected Species Licence (EPSL) will be required if there is a need to destroy or disturb any confirmed roosts.

A licence would only be granted under the condition that mitigation and compensation is put in place to ensure that the potential impacts on bats are minimised to an acceptable level. Licence conditions are likely to include a period of post construction monitoring to measure the efficacy of the mitigation and compensation measures employed.

1 Introduction

1.1 Project Description

Mott MacDonald (MM) has been commissioned by Transport for Wales (TfW), on behalf of Welsh Government, to prepare and submit a planning application, seeking full planning permission for the design and construction of a 1.6km long Major Events Stabling Line (MESL) on land adjacent to the existing Tata Steelworks Service Lines in Llanwern, South Wales. This is Phase 1 of the Llanwern Rail Facilities Programme.

The MESL will be used for stabling of rolling stock for major events in the area, to enable flexibility for future train requirements, and of trains prior to use on the rail network. The MESL will be electrified in a future phase of work. This proposed 1.6km length of MESL to the west of Monks' Ditch was formerly known as Option 6a.

The wider Llanwern Rail Facilities Programme will include an extension of the MESL by circa 2.4km east (to achieve a total length of circa 4km), electrification of the MESL, a new Llanwern railway station and passenger line (including Park & Ride and footbridge), and connections to the South Wales Main Line (Relief Lines). The further phases of the project will be the subject of a subsequent planning application.

The key parameters for the Scheme are listed below:

- Whole Site area is 3.1 hectares. This land is contained within the red line boundary shown on the Site Location Plan (Drawing number 367590-MMD-48-XX-DR-C-0001); and
- The Site length is approximately 1.6km long and 19m wide.

1.2 Scope of Works

The General Arrangement drawings (Drawing numbers 367590-MMD-48-XX-DR-C-0002 to 367590-MMD-48-XX-DR-C-0005) demonstrate the project scope which includes the design and construction of the following:

- A single track stabling line (MESL) circa 1.6km long;
- Rail connection between the MESL and Tata Steel's adjacent service lines; and
- Passive provision for 25kV electrification of the MESL.

In order to obtain full planning permission for Phase 1, we have carried out the outline design and technical assessment of the above scope, as well as multiple assessments in terms of ecology, environment, heritage and archaeology.

1.3 Site Location

The proposed rail development site is located approximately 8 miles east from the centre of Newport, South Wales (Figure 1.1).

The Site is aligned roughly west – east and bordered by the existing South Wales Mainline to the north and the Tata Steelworks to the south. Along the southern boundary of the steelworks site runs the A4810 which links the M4 from junction 23A at Magor with the A48 at Liswerry (a predominantly residential suburb on the south-eastern side of Newport). The Site is more widely bordered by the M4 which runs approximately two and a half miles to the north and the Severn Estuary which lays approximately three miles to the south. The Gwent Levels to the south is a significant area of wetlands.

The existing South Wales Mainline passes north of the proposed site and provides opportunity for transport links for both passengers and freight.

Figure 1.1: Proposed Location Plan



Source: OS Open Data

The ecological survey work for this report has been undertaken in respect of the entire woodland (including the site and surrounds), this is shown by the dotted black line as detailed in Appendix A. The survey area was selected prior to the finalisation of Phase 1 of the Llanwern Rail Facilities Programme and is considered to provide important ecology context to the site-specific results. Phase 1 of the planning application is indicated by the red line boundary and is hereafter referred to as the 'site'.

1.4 Previous Survey Work

The Preliminary Ecological Assessment (Mott MacDonald Ltd, 2018) identified the majority of the survey area as being suitable for bats. The survey area is dominated by woodland with reens running throughout, offering roosting potential in trees and foraging/commuting opportunities. Scrub habitat lines the edges of the woodland with ephemeral/short perennial habitats running adjacent along the railway ballast could also be used by foraging and commuting bats.

As such, further surveys have been undertaken to ascertain presence/likely absence of roosting bats as well as to understand use of the survey area by foraging and commuting bats.

1.5 Scope of the Report

The objectives of this report are:

- To present the results of the desk study and field surveys;
- Evaluate the conservation status of the bat population using the survey area and the importance of the survey area for bats;
- To identify potential constraints on the Scheme posed by bats to any future development; and

- To provide high level recommendations for further survey work and/or mitigation and licensing requirements.

2 Methodology

2.1 Desk Study

A desk study was undertaken as part of the PEAR (Mott MacDonald Ltd, 2018). The has been refined for the purpose of this report to determine the presence of any sites designated specifically for bats within 30.0km of the survey area. Records of bats collected in the last ten years and within a 2.0km radius of the survey area were requested from the South East Wales Biodiversity Information Centre¹.

The desk study involved consulting the following sources:

- South East Wales Biodiversity Information Centre (SEWBRc);
- Multi Agency Geographical Information for the Countryside (MAGIC) website (<http://www.natureonthemap.naturalengland.org.uk/MagicMap.aspx>);
- National Resources Wales (NRW) (<http://naturalresources.wales>); and
- Joint Nature Conservation Committee.

2.2 Field Surveys

Due to the size and potential impacts of the Scheme several methods have been used to collate suitable information to inform the Scheme. This has included:

- An assessment of the roosting status of trees and buildings;
- Manual activity surveys; and
- Automated activity surveys.

All surveys were undertaken in accordance with the best practice guidance set out within the Bat Conservation Trust 'Bat Surveys Good Practice Guidelines' (2016).

All field surveys for roosting features and habitats have been classified using Table 2.1 below.

Table 2.1: Bat Suitability Classification

Suitability	Description Roosting Habitats	Commuting and Foraging Habitats
Negligible	Negligible habitat features within the survey area likely to be used by roosting bats.	Negligible habitat features within the survey area to be used by commuting or foraging bats.
Low	<p>A structure with one or more potential roost features (PRF) that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation).</p> <p>A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.</p>	<p>Habitat that could be used by small numbers of commuting bats such as a hedgerow with gaps or un-vegetated stream, but isolated, (i.e. not very well connected to the surrounding landscape by other habitat).</p> <p>Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.</p>
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens.

¹ This data has been further curtailed to the nearest record for each species recorded, raw data is available on request following the terms and conditions.

Suitability	Description Roosting Habitats	Commuting and Foraging Habitats
	conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.	<p>Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge.</p> <p>High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broad-leaved woodland, tree-lined watercourses and grazed parkland.</p> <p>Site is close to and connected to known roosts.</p>

Source: Collins (2016)

2.2.1 Roosting Bats - Trees

2.2.1.1 Bat Roost Inspections – Trees

Ground-based assessments of all trees accessible within the survey area were undertaken between August and December 2017 and from May to July 2018. The trees were inspected for Potential Roost Features (PRF) as identified within Collins (2016). Where possible, PRFs were inspected using an endoscope to assess their shape and depth, as well as to look for bats within the feature. All assessment and inspection surveys were undertaken by a bat licensed ecologist or otherwise suitably experienced ecologist. Trees were assessed as per the classification detailed in Table 2.1 above.

PRFs may include the following:

- Woodpecker holes;
- Rot holes;
- Hazard beams;
- Other vertical or horizontal cracks;
- Partially detached bark;
- Knot holes;
- Man-made holes;
- Cankers;
- Other hollows or cavities;
- Double-leaders;
- Gaps between overlapping stems or branches;
- Partially detached ivy with stem diameters in excess of 50mm; and
- Bat, bird or dormouse boxes.

Any evidence of bats using PRFs was also noted and may include the following:

- Bat droppings in, around or below the PRF;
- Odour emanating from a PRF;
- Audible squeaking at dusk or in warm weather; and
- Staining below the PRF.

Hibernation potential was also noted during the survey. Hibernation roosts are roosts where bats may be found individually or together during winter. They have a constant cool temperature and high humidity. Hibernation PRFs were therefore identified as those which would be likely to provide these more stable conditions.

Trees assessed to provide potential for roosting bats were subject to further survey. Appendix B outlines the survey type(s) that were undertaken for each tree.

2.2.1.2 Emergence/Re-entry Surveys

Emergence/re-entry surveys were undertaken in accordance with the best practice guidance set out within the Bat Conservation Trust 'Bat Surveys Good Practice Guidelines' (Collins, 2016). Details of the surveys, including trees surveyed, timings and weather conditions, are presented in Appendix C. Dusk emergence surveys started 15 minutes before sunset and continued 1.5 hours after. Dawn re-entry surveys began 1.5 hours before sunrise and continued 15 mins after.

2.2.1.3 Endoscopy – Ground based and Tree Climbing

Where possible, all features suitable for use by bats were fully inspected using an endoscope to search for signs of bat presence such as droppings, staining, feeding remains, scratch marks or actual presence of bats (in addition to checking suitability of features, as stated above). Where accessible, endoscopy was undertaken from ground level. Where required, trees were climbed to allow access to features that could not be inspected from ground level. All endoscopy surveys were undertaken by a licensed bat ecologist.

Any bat droppings identified during the endoscopy surveys were collected and sent for DNA analysis to confirm species. Droppings collected before August 2018 were sent to Swift Ecology for analysis, and droppings collected after August 2018 were sent to Ecowarwicker Ecological Forensics.

2.2.2 Roosting Bats – Buildings

2.2.2.1 Bat Roost Inspection – Buildings

An assessment of buildings within 20.0m of the construction zone was undertaken on the 29 January 2018. The buildings were inspected externally for features that could support roosting bats and/or signs of bat presence (such as droppings, staining, feeding remains, scratch marks or actual presence of bats).

Each building was classified as having negligible, low, moderate or high potential for roosting bats (during the bat active season), or as a confirmed bat roost as per the classification detailed in Table 2.1.

An assessment of all buildings within the Tata Steelworks site were assessed for their suitability to support lesser horseshoe bats was also undertaken on 29 January 2018. This assessment also considered any potential flyways to and from the buildings, as well as access points and suitable features, that could be used by this species.

2.2.2.2 Emergence/Re-entry Surveys - Buildings

Buildings within 20.0m of the survey area assessed as having potential to support roosting bats and considered likely to be affected by the current scope of works were subject to further emergence/re-entry surveys. All surveys were undertaken in accordance with the best practice guidance set out within the Bat Conservation Trust 'Bat Surveys Good Practice Guidelines'

(Collins, 2016). Details of the surveys are presented in Table 2.2 and a plan of building locations is provided in Appendix D.

Table 2.2: Building Emergence/Re-entry Survey Details

Date	Sunrise/ Sunset (BST)	Start - End Time	Temperature (C)	Rain	Wind (Beaufort Scale)	Buildings Surveyed
08/05/2018	n/a / 20:46	20:36 - 22:46	13 / 11	Dry	2	B6
07/06/2018	04:56 / n/a	03:24 - 05:11	15 / 12	Dry	1	B6
10/05/2018	n/a / 20:49	20:46 - 22:49	11 / 8	Dry	2	B7
05/06/2018	n/a / 21:24	21:09 - 23:00	18 / 13	Dry	0	B7
03/08/2018	05:37 / n/a	04:07 - 05:53	18 / 16	Dry	0	B7
08/05/2018	n/a / 20:46	20:30 - 22:46	14 / 9	Dry	3	B3
08/06/2018	04:50 / n/a	03:21 - 05:10	17 / 16	Dry	1	B3

Source: Mott MacDonald Ltd.

The surveys were carried out by experienced surveyors using Batlogger detectors to identify the species of bats and behaviours observed. The recordings made during the surveys were then analysed using 'Analook' software.

2.2.2.3 Automated Surveys – Buildings (Lesser Horseshoe Bat Survey)

Two additional buildings within the Tata Steelworks site, Buildings B8 and B9, were assessed as being suitable to support lesser horseshoe bats. These buildings were not considered safe to access for internal inspections and so were therefore subject to automated surveys to identify the presence of lesser horseshoe bats and determine the need for any further survey. This approach was agreed with NRW via email on 26 April 2018.

As these buildings were directly adjacent to one another a single static detector was placed between these two structures in May, June and July 2018. Detectors were left at this location and setup to automatically switch on and record any bat calls 30 minutes before sunset and switch off 30 minutes after sunrise. Recordings were analysed as described in Section 2.3. below. Details of the surveys completed area included within Table 2.3 below. Weather conditions for the dates analysed are provided in Table 2.4.

Table 2.3: Automated (Static) Building Survey Details

Month Deployed	Date Out	Date In	Nights Analysed
May	10/05/2018	17/05/2018	5
June	15/06/2018	25/06/2018	5
July	17/07/2018	23/07/2018	5

Source: Mott MacDonald Ltd.

Table 2.4: Building Emergence/Re-entry Survey Details

Date	Sunrise Time	Sunset time	Sunset Sunrise Temperature (C)	/ Rain	Maximum Wind (Beaufort Scale)
10/05/2018	05:27	20:49	8 / 10	None	3
11/05/2018	05:25	20:51	8 / 9	None	3
12/05/2018	05:24	20:52	6 / 10	None	2
13/05/2018	05:22	20:54	7 / 10	None	3

Date	Sunrise Time	Sunset time	Sunset Sunrise Temperature (C)	/ Rain	Maximum Wind (Beaufort Scale)
14/05/2018	05:21	20:55	6 / 11	None	3
15/06/2018	04:53	21:30	12 / 13	None	3
16/06/2018	04:53	21:31	13 / 13	Light/dry	4
17/06/2018	04:53	21:31	13 / 15	Light	4
18/06/2018	04:53	21:32	14 / 16	Light	5
19/06/2018	04:53	21:32	15 / 17	Light/dry	4
17/07/2018	05:14	21:20	14 / 17	None	3
18/07/2018	05:15	21:19	16 / 18	None	2
19/07/2018	05:16	21:18	14 / 18	None	3
20/07/2018	05:17	21:17	15 / 16	None	2
21/07/2018	05:19	21:16	16 / 21	None	3

Source: Mott MacDonald Ltd.

2.2.3 Activity Surveys – Manual

Using knowledge gained during the PEAR, four transects were designed to encompass all habitats and feature types within the survey area, where safe access permitted. Walked dusk transects were surveyed once a month between July and October 2017 and between April and June 2018. The August 2017 comprised a dusk and dawn survey. Surveyors walked the transect routes stopping at pre-determined sample points for periods of five minutes. Appendix E shows the sample point locations along with the routes of the transects. After the September 2017 survey, the transect route for Transect 3 had to be modified for health and safety reasons relating to train movements within the survey area. This change is illustrated within Appendix E.

Dusk surveys commenced at sunset and continued for approximately two hours. Dawn surveys commenced two hours before sunrise and continued for approximately two hours.

All surveys were carried out by experienced bat ecologists using Batloggers to identify the species of bats and behaviours observed. Surveyors recorded all observed bat passes on a detailed plan of the site noting the time, their location, and where possible the species, direction of flight and behaviour of the bat.

The weather conditions were recorded at the beginning of the survey. A summary of the weather recorded is shown in Table 2.5 below.

Table 2.5: Manual (Transect) Activity Survey Details

Date	Transects	Survey Type	Sunset/Sunrise	Start Time	End Time	Temperature (°C)	Rain	Cloud Cover (%)	Wind (Beaufort Scale)
27/07/17	3, 4	Dusk	21:18	21:16	23:24	18	Intermittent	100	2
27/07/17	1, 2	Dusk	21:08	21:08	23:08	15	Intermittent	70	2
15-16/08/17	1, 2	Dusk & Dawn	20:35/ 05:58	20:30/ 03:56	23:35/ 05:58	17/ 11	None	0	1-3

Date	Transects	Survey Type	Sunset/Sunrise	Start Time	End Time	Temperature (°C)	Rain	Cloud Cover (%)	Wind (Beaufort Scale)
22-23/08/17	3, 4	Dusk & Dawn	20:20/ 06:09	20:20/ 04:09	22:20/ 06:09	21/ 17	Light drizzle dawn	100	2
11/09/17	1, 2	Dusk	19:35	19:35	21:35	15	Dry	50	3
19/09/17	3	Dusk	19:15	19:15	21:30	15	Dry	0	0
21/09/17	4	Dusk	19:14	19:16	21:24	16	Dry	20	0
09/10/17	1, 2	Dusk	18:30	18:30	20:30	16	Dry	50	2-3
12/10/17	3, 4	Dusk	18:28	18:24	20:30	16	Dry	0	1
19/04/18	1, 2	Dusk	20:14	20:14	22:21	17	Dry	0	1
23/04/18	3, 4	Dusk	Survey called off due to Health and Safety concerns*						
14/05/18	1, 3	Dusk	20:55	20:55	22:55	126	Dry	20	0
15/05/18	2, 4	Dusk	20:57	20:57	23:00	17	Dry	20	1
11/06/18	1, 2	Dusk	21:29	21:27	23:29	21	Dry	0	1
14/06/18	4	Dusk	21:31	21:31	23:31	19	Dry	0	2
28/06/18	3	Dusk	21:33	21:33	23:33	22	Dry	0	1

* relating to third parties on site.

2.2.4 Activity Surveys – Automated

Two static detectors (Anabat Expresses) were deployed on each transect once per month between July and October 2017 and April and June 2018 (in total eight detectors were placed across the survey area each month). These were placed in the same location each month to allow data to be compared across the survey area, these locations can be seen in Appendix F. Detectors were left at each location and setup to automatically switch on and record any bat calls 30 minutes before sunset and switch off 30 minutes after sunrise. A summary of these surveys is detailed in Table 2.6. Weather conditions for the automated surveys are given in Appendix G.

Table 2.6: Automated (Static) Activity Survey Details

Transect	Static Location	Month Deployed	Date Out	Date In
1-4	A-H	July	17/07/2017	24/07/2017
1-4	A-H	August	25/08/2017	30/08/2017
1-4	A-H	September	15/09/2017	22/09/2017
1-4	A-H	October	13/10/2017	20/10/2017
1-4	A-H	April	16/04/2018	26/04/2018
1-4	A-H	May	21/05/2018	31/05/2018
1	A-B	June	15/06/2018	25/06/2018
2	C	June	15/06/2018	25/06/2018
2	D	June	11/06/2018	26/06/2018
3	E	June	20/06/2018	26/06/2018
3	F	June	15/06/2018	26/06/2018
4	G-H	June	11/06/2018	26/06/2018

The number of nights analysed for each detector was capped at 5 nights but was reduced where equipment errors meant fewer nights of data were recorded. The number of nights analysed per detector per month is included within Table 2.7 below.

Table 2.7: Number of Nights Analysed

Transect Number	Detect or	July '17	August '17	September '17	October '17	April '18	May '18	June '18
1	A	5	5	5	0	5	0	5
1	B	4	5	0	5	5	5	5
2	C	5	5	5	4	5	5	5
2	D	1	5	0	4	0	5	0
3	E	5	5	5	0	0	5	5
3	F	5	5	5	2	5	0	5
4	G	5	4	5	5	5	5	5
4	H	5	0	5	5	5	0	5

2.3 Analysis

2.3.1 Bat Call Analysis and Species Identification

The recordings made during the manual and automated surveys were subsequently analysed using Anlook and BatExplorer software. All data has gone through an internal quality control process whereby at least 10% of all bat registrations and 100% of registrations identified as less common species (Long eared bats, serotine and lesser horseshoe bat) were double checked by an experienced bat ecologist. For the purposes of this report bat registrations are synonymous with bat calls.

Due to extreme similarities in their sonograms, it is difficult to identify certain species of bat to species level. For this reason, *Myotis* species will not be identified to species level without further supporting evidence such as DNA analysis of droppings or identification of bats in hand (no capture of bats is proposed at this time), *Plecotus* species will be grouped together as long-eared bats and noctule and Leisler's bats will be grouped together under the genus *Nyctalus* when the calls are not clear. Furthermore, noctule, Leisler's bats and serotine will also be grouped together under big bats when the calls aren't distinct. The species within these groups also use the survey area features in a similar way and as such the proposed mitigation will be similar for all species groups.

Due to the large amount of data common pipistrelle and soprano pipistrelle species will be grouped together as pipistrelle species. This is considered sufficient to inform the assessment of impacts and mitigation strategy.

2.3.2 Data Analysis and Manipulation

In order to interpret the data, the manual transect data (in the form of individual registrations with GPS locations) has been analysed using ArcGIS in order to create 'heat maps', whereby a 50.0m buffer is applied to each point and an "intensity" assigned based on how many other points are present within the buffer. Using this method, clusters of points/bat registrations in one location would be plotted as an area of higher activity than individual points. A blue to red colour scale has been applied to illustrate peaks in bat activity.

In order to understand temporal and spatial trends in the automated activity data, as night length changes throughout the year, bat activity has been calculated on a per night and per hour basis to allow accurate comparison. The number of nights analysed is included in Table 2.7 above.

Average night lengths that have been used for per hour calculations are provided in Table 2.8 below.

Table 2.8: Average Night Length

Month	Average Night Length (hrs)
April	10
May	8
June	7.5
July	8
August	10
September	11.5
October	13

Source: Mott MacDonald Ltd.

Analysis of the data and production of graphs was undertaken using Microsoft Excel ©.

2.4 Limitations

Biological records obtained from third parties do not represent a full and complete species list for the area, not all areas within the biological records search area have been surveyed so lack of records do not represent a lack of species present. They are mostly given by individuals on an *ad-hoc* basis, often meaning there are areas of deficiency in the data.

Using an endoscope to inspect the internal structure of cavities (PRF's) for evidence of bats can be very effective however, bats can crawl high up into the apex of a feature and evidence can quickly get washed or eroded away which can make presence difficult to establish. Other signs of use were therefore searched for (such as droppings, etc) to supplement this approach.

The results taken from bat detector recordings are biased towards bats that use louder echolocation calls. Therefore, quiet species such as brown long-eared bats may be under recorded due to the limited recording range of the equipment. This is an unavoidable limitation for all surveys using bat detectors, the implications of which have been considered when analysing the results. It is also difficult to confidently relate calls registered to numbers of bats present, even if more than one bat pass is detected simultaneously. The number of bat passes do not provide any indication of bat abundance; it is intended to only indicate the level of activity at a particular point.

Due to the active nature of the survey area (a working service line) and health and safety restrictions, some stopping points were missed or delayed on some transect surveys as movement or placement of trains on the line meant that surveyors could not cross the track safely to undertake the survey. Where safe access allowed the stops were taken as close as possible to the pre-determined stop point. As the transect activity surveys picked up good levels of bat activity and a variety of species this is not considered to be a constraint to the results.

On eleven occasions, the static detectors failed to record any data, whilst on a further seven occasions the static detectors failed to record for the full five nights each month due to equipment malfunctions, detailed in Table 2.7. As the interpretation of this data has been based on per night and per hour activity as opposed to total recordings, this is not deemed to have significantly impacted any patterns relating to either special or temporal bat activity within the survey area. Additionally, in October, one static was placed further west of its usual position. Given the good levels of bat activity and variety of species picked up by the remaining detectors each month these are not considered to be a constraint to the results. As a general limitation, static surveys produce data relating to the number of bat passes at the detector location;

however, they cannot provide information regarding the direction of flight or the number of bats in an area. This is taken into consideration in the analysis and interpretation of the data.

Due to access issues, the dusk emergence of Building B7 on 10 May 2018 started 11 minutes after the required start time. As a possible emergence was still recorded during this survey, and the building was confirmed as a roost in a subsequent survey, this is not considered to have impacted the findings of the surveys in relation to this building.

In April 2018, surveys of Transect 3 and Transect 4 were cancelled on health and safety grounds, associated with third parties.

Due to sections of dense woodland along transect routes, bat detectors used for the manual activity surveys were not always able to allocate a GPS location to the bat call recorded, 65.4% of all calls recorded had an attached GPS locations to allow data to be plotted. The analysis is therefore based on this data and verified using the manual activity descriptions and mapping (collected by surveyors on the ground).

A small section of land within the centre of the survey area is currently being used as a compound by a third party. This section of the survey area could not be accessed to allow survey.

3 Legislation, Ecology and Species Status

3.1 Legislation

All UK bat species and their roosts are fully protected under Section 9 of the Wildlife and Countryside Act 1981 (as amended) (WCA) and the Conservation of Habitats and Species Regulations 2017. It is an offence to:

- Deliberately capture, injure or kill a bat;
- Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats;
- Damage or destroy any structure or place used for shelter or protection by a bat (even if bats are not present in the roost);
- Intentionally or recklessly obstruct access to a structure or place which it uses for that purpose; or
- Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat.

To undertake an activity which is prohibited under wildlife legislation, a protected species development licence may be applied for from Natural Resources Wales (NRW) as the statutory regulator. By holding a development licence, the works can be conducted in accordance with an agreed method statement and as such an offence will not be committed.

3.2 Ecology

British bats are insectivorous, occupying many habitat types and have the potential to disperse over large areas (Collins, 2016). They are cryptic species and require warm summer breeding roosts and cool, secure hibernation sites.

They spend much of the winter (dependent on conditions) in torpor at hibernation sites. During the spring bats feed more during the night and the period from April to early June is a time of intense feeding to recover weight lost during the winter. During this time, females gather together at maternity roosts that provide appropriate conditions to rear young. In some species, males are also present in maternity roosts although for many species the males roost elsewhere either individually or in small groups.

Birthing times can be highly variable but the main period for births is June. The young begin to fly in July and August. As the young become independent, the adult females disperse to find mates and gain weight before winter.

During autumn, many *Myotis* bats swarm at caves and mines to mate and/or find a hibernation site. Males of some species establish mating territories where they may fly or call specifically to attract females.

As weather turns colder, bat activity declines and foraging becomes restricted to warmer nights. Bats spend progressively more time in torpor and slowly return to their hibernacula.

3.3 Status of Bat Species at the National Level

There are 18 species of bat in the UK, 17 of which are known to be breeding within the UK. Historically, severe declines in bat populations have been reported, and bats have yet to recover from these losses.

The main factors currently causing loss or decline of bat species include:

- **Habitat loss** - decreasing areas of deciduous woodland, hedgerows, wetlands and grasslands reduce the availability of feeding and roosting sites. Loss and drainage of wetlands and inappropriate riparian management leads to loss of feeding and roosting areas. Undeveloped land which does not meet the standards for designation as a Site of Special Scientific Interest (SSSI) or Local Site probably forms the bulk of bats' foraging areas;
- **Habitat fragmentation** - the presence of linear features and wildlife corridors such as hedgerows and former railway lines between habitats can reduce the impact of fragmentation;
- **Disturbance:**
 - Disturbance in the summer may lead to the abandonment of young;
 - Disturbance in the winter may arouse hibernating bats and force them to use up essential food reserves too quickly, with fatal consequences;
- **Tree felling and arboricultural works to dead/hollow trees** - all bat species, and particularly noctules, will use hollow trees for both summer and winter roosting;
- **Lack of awareness** - there is a tendency for the needs of bats to be under-emphasised during the planning process;
- **Development** - the loss of rear gardens to small scale housing developments results in habitat loss and reduces the structural diversity of foraging habitats for bats. Development of brownfield land is likely to lead to further habitat loss for bats;
- **Refurbishment and demolition of man-made structures and buildings** - roost sites in cellars, roof spaces and under eaves in buildings are lost through building maintenance, renovation and the installation of cavity wall insulation. It is now thought that bats may use cavity walls as hibernation roost sites. Bats have very specific roost requirements therefore it cannot be assumed that they will relocate to another apparently suitable site if a roost site is destroyed;
- **Remedial timber treatment** - these can be poisonous to bats. Because of their communal nature, entire roosts may be lost due to insensitive timber treatment exercises. Lindane, a chemical that was widely used in the past, has been implicated in the eradication of entire bat colonies. Treatments carried out during the 1980s are still toxic today; and
- **Changes to external lighting** - may pose a threat to existing and potential bat roosts.

3.4 Status of Bat Species at the Local Level

Nine bat species are recorded in the Newport Biodiversity Action Plan (BAP) as detailed below (Newport Biodiversity Action Plan, 2014):

- Common pipistrelle*;
- Soprano pipistrelle*;
- Lesser horseshoe bat*;
- Greater horseshoe bat (*Rhinolophus ferrumequinum*)*;
- Brown long-eared bat*;
- Noctule*;
- Daubenton's bat (*Myotis daubentonii*);
- Natterer's bat (*Myotis nattereri*); and
- Whiskered bat (*Myotis mystacinus*);

* These species are listed as priority species under the Environment (Wales) Act 2016.

4 Results

4.1 Desk Study

The results of the desk study are presented below.

4.1.1 Designated Sites

There are six European designated sites for bats within 30.0km of the survey area all of which are Special Areas of Conservation (SAC) and are detailed in Table 4.1 below.

One Site of Special Scientific Interest (SSSI) was identified within 10.0km of the survey area that bats are known to use: River Usk (lower Usk) / Afon Wysg (Wysg Isaf) SSSI.

Table 4.1: Designated Sites

Name	Status	Detail	Distance
River Usk (lower Usk)/Afon Wysg (Wysg Isaf)	SSSI	Riparian woodland along the course of the river Usk provides valuable feeding and roosting habitats for several bat species including Daubenton's bat.	1.9km SW
Avon Gorge Woodlands	SAC	Avon Gorge Woodlands are designated for the following habitats and species: <ul style="list-style-type: none"> • <i>Tilio-Acerion</i> forests of slopes, screes and ravines; • Semi-natural dry grasslands and scrubland facies on calcareous; • Lesser horseshoe bat; and • Greater horseshoe bat. 	11.3km NE
North Somerset and Mendip Bat Sites	SAC	North Somerset and Mendip bat sites are designated for the following habitats and species: <ul style="list-style-type: none"> • Semi-natural dry grasslands and scrubland facies on calcareous; • substrates (<i>Festuco-Brometalia</i>) (*important orchid sites); • <i>Tilio-Acerion</i> forests of slopes, screes and ravines; • Caves not open to the public; • Lesser horseshoe bat; and • Greater horseshoe bat. 	17.8km NE
Mendip Limestone Grasslands	SAC	Mendip Limestone Grasslands are designated for the following habitats and species: <ul style="list-style-type: none"> • Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (*important orchid sites); • European dry heaths; • Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (*important orchid sites); • Caves not open to the public; • Submerged or partially submerged sea caves; • Greater horseshoe bat; and • Early gentian. 	20.6km SE
Wye Valley Woodlands and Forest of Dean Bat Sites	SAC	The Wye Valley Woodlands and Forest of Dean Bat Sites are designated for their populations of lesser and greater horseshoe bat.	25.7km NW
Wye Valley Woodlands	SAC	The Wye Valley Woodlands are designated for the following habitats and species: <ul style="list-style-type: none"> • <i>Asperulo-Fagetum</i> beech forests; 	27.0km SE

Name	Status	Detail	Distance
		<ul style="list-style-type: none"> • <i>Tilio-Acerion</i> forests of slopes, screes and ravines; • <i>Taxus baccata</i> woods of the British Isles; and • Lesser horseshoe bat. 	
Usk Bat Sites	SAC	<p>The Usk Bat Sites are designated for the following habitats and species:</p> <ul style="list-style-type: none"> • European dry heaths; • Degraded raised bogs still capable of natural regeneration; • Blanket bogs (*if active bog); • Calcareous rocky slopes with chasmophytic vegetation; • Caves not open to the public; • <i>Tilio-acerion</i> forests of slopes, screes and ravines; and • Lesser horseshoe bat. 	28.9km S

Source: MAGiC & JNCC

4.1.2 Bat Records

A total of 18 records of bats were returned from within 2.0km of the survey area. A summary of the bat records returned are listed in Table 4.2 below.

Table 4.2: Bat Species Records within 2.0km of the Survey Area

Species	Number of Records	Closest Record
Brown long-eared bat	1	0.2km SE
Common pipistrelle	7	0.5km SE
Nathusius's pipistrelle	1	0.6km W
Noctule bat	1	0.6km SW
Serotine	1	1.1km NE
Soprano pipistrelle	3	1.1km NE
Unidentified bat (<i>Myotis sp.</i>)	1	1.5km SW
Pipistrelle bat species	2	1.6km SE
Bats (<i>Chiroptera</i>)	1	1.6km SE

Source: SEWBRcC

Bat surveys were undertaken within the footprint of the M4 Corridor around Newport scheme in 2014 and 2015. 14 of the 17-species known to breed within the UK were recorded along the route (RPS, 2014c).

In 2014, common pipistrelle, soprano pipistrelle, noctule, serotine, *Myotis* species, Nathusius's pipistrelle, lesser horseshoe and barbastelle were recorded on transects and/or on static detectors to the south-west, south, south-east and east of site (Arup, 2014c).

One building in Grangefield, to the south of the survey area, was also recorded as it contained bat droppings. This building is approximately 2.1km away from the survey area (Arup, 2014c).

In 2015, linear features were selected for static detector deployment to the east and west of the survey area. These detectors recorded common pipistrelle, soprano pipistrelle, *Myotis* species, Leisler's bat, lesser horseshoe, noctule and brown long-eared (RPS, 2015a).

Bat roost surveys were undertaken in 2015 to inform the M4 Corridor around Newport scheme. The closest known roost is located within a farm and consists of two pipistrelle bats approximately 1.6km away from the survey area (RPS, 2015b).

4.2 Field Surveys

4.2.1 Roosting Bats – Trees

Ground based assessments of all trees within the survey area were undertaken between August and December 2017 and May and July 2018 to assess potential suitability to support roosting bats. Upon further survey, including endoscopy and tree climbing surveys as described in Section 2.2.2, assigned potentials of some trees were revised. Original and revised assessments of bat roosting potential for all trees are set out within in Appendix H.

In order to then ascertain presence/likely absence of roosting bats, all trees assessed as moderate or high bat roosting potential were subject to further surveys in the form of endoscopy checks or emergence/re-entry surveys (see Appendix B for a breakdown).

Upon completion of all surveys, a total of 267 trees were identified as either supporting bat roosts or as having potential to support roosting bats as follows:

- Twenty-two confirmed bat roosts;
- Fifteen trees with high potential to support roosting bats;
- Twenty-nine trees with moderate potential to support roosting bats; and
- Two hundred and one trees with low potential to support roosting bats.

Roosts of at least four confirmed bat species were identified within the survey area as described in Table 4.3 below, with species identification confirmed through DNA analysis of droppings and/or sound analysis of calls. Additional roosts of unconfirmed species were also identified from droppings (sent for analysis but returned as failed or inconclusive).

Where possible, these roosts have therefore been assessed and assigned to likely bat species based on the characteristics of the droppings, location, number, type of roost feature and taking into consideration the bat activity recorded in the general vicinity of the tree. Where species could not be confidently estimated, these have been reported as unknown species. However, on the basis of the activity survey results and the nature of the PRFs, it is considered unlikely that any rare or uncommon bat species would be present, whilst the small number of droppings would indicate these to be minor roosts of low importance.

Table 4.3: Confirmed Tree Roosts

Species	Number of roosts	Tree Number
Common pipistrelle	6	36, 601, 1545, 1634, 1677, 1679
Soprano pipistrelle	2	1667, 1681
Noctule	1	2000
Serotine	7	61b, 62, 135, 141, 1633a, 1644, 1652
Pipistrelle sp*	3	60, 1654, 1671
Unknown species*	3	133, 602, 1624

Source: Mott MacDonald Ltd.; * species for which identification cannot be not confirmed through sound analysis or DNA analysis

All trees surveyed are shown on Appendix I. Locations of the 22 confirmed roosts are given in Appendix J. Survey results for all trees are given in Appendix K. An extract of the survey results for 23 confirmed roosts and a summary of findings are given in Table 4.4 below.

Table 4.4: Bat Tree Survey Results – Confirmed Roosts (Extract from Appendix K)

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Roost (Y / N)	Species	Summary
36	Moderate	Confirmed	E / R	E / R	E / R	Y	Common pipistrelle	On the first survey on 26/06/18 a common pipistrelle was recorded emerging from the tree at 21:04.
60	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	Y	Pipistrelle sp.	Bat droppings were found during the initial assessment of the tree Droppings (crushed to confirm bat; no others available for DNA analysis). No droppings were subsequently found during the three 2018. Droppings were recorded were identified as likely being from a pipistrelle species bat due to the shape and size.
61b	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	Y	Serotine	Bat droppings were found during the first survey which was carried out on the 23/07/2018. The droppings were sent off to Swift Ecology for DNA analysis and determined to be serotine droppings
62	High	Confirmed	E – Gr	E – Gr	E – Gr	Y	Serotine	A large amount of bat droppings were found inside the cavity during the first survey carried out on the 12/06/2018. However, they could not be reached to collect a sample. During the second survey fresh droppings were observed and collected, whilst historic droppings were found during the third survey. The droppings collected during the second survey were sent off to Swift Ecology for DNA analysis which determined them to be serotine droppings.
133	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	Y	Unknown	Bat droppings were found during the initial assessment of the tree (crushed to confirm bat; no others available for DNA analysis). No droppings were subsequently found during the three 2018 visits.
135	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	Y	Serotine	Bat droppings were found during the initial assessment of this tree. Historic bat droppings were found then found during the first check survey and a single fresh dropping was found on the final survey. The droppings were sent off to Swift Ecology for DNA analysis and were determined to be serotine droppings.
141	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	Y	Serotine	Bat droppings were found during the initial assessment of the tree. The droppings were sent off to Swift Ecology for DNA analysis and determined to be serotine droppings.
601	High	Confirmed	E / R	E / R	E / R	Y	Common pipistrelle	During the third surveys two common pipistrelles emerged from a split in the trunk of the tree at 7m high, which was carried out on 31/07/2018. The first bat emerged at 21:34 and the second at 21:38.
602	Confirmed	Confirmed	E – Gr	E – Gr	E / R	Y	Unknown species	Bat droppings were found during the first survey which was carried out on the 06/08/2018. These were sent for DNA analysis to Ecowarwicker Ecological Forensics. The droppings collected failed

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Roost (Y / N)	Species	Summary
								the DNA analysis process and therefore could not be identified to species level.
1545	Moderate	Confirmed	E - TC	E / R	E / R	Y	Common pipistrelle	On the second survey on 26/07/18 a single common pipistrelle was observed re-entering the tree at 04:46.
1624	Moderate	Confirmed	E - TC	E - TC	E / R	Y	Unknown species	Bat droppings were found at the back of the cavity during the second survey (crushed to confirm bat; no others available for DNA analysis).
1633a	High	Confirmed	E - TC	E / R	E / R	Y	Serotine	During the second survey on 27/05/18 a single serotine bat (identified from sound analysis) was recorded emerging from a woodpecker hole at 21:25. On the third survey visit on 10/08/2018 a single big bat was recorded re-entering the same feature at 05:29, this bat could not be identified to species level.
1634	Moderate	Confirmed	E - TC	E / R	E / R	Y	Common pipistrelle	Staining was noted underneath the feature during the first survey which was carried out on the 04/06/2018. On the third survey visit on 20/07/18 a single common pipistrelle was recorded re-entering a woodpecker hole on the south-west side of the tree at 04:46.
1644	Moderate	Confirmed	E – Gr	E – Gr	E – Gr	Y	Serotine	Droppings were found during the second survey on the 23/07/2018. The droppings were sent off to Swift Ecology for DNA analysis and were determined to be serotine droppings
1652	High	Confirmed	E – Gr	E – Gr	E – Gr	Y	Serotine	During the second survey a single dropping was found inside the hollow on 12/06/2018. The droppings were sent off to Swift Ecology for DNA analysis and determined to be serotine droppings.
1654	Moderate	Confirmed	E – Gr	E / R	E / R	Y	Pipistrelle sp.	One historic dropping was found on the bark underneath entrance to the cavity during the first survey which was carried out on the 30/04/2018. No emerging or re-entering bats were recorded. Given the characteristics of the dropping and PRF, this is considered likely to be a pipistrelle sp. roost.
1667	High	Confirmed	E / R	E / R	E / R	Y	Soprano pipistrelle	On the first survey visit on 05/06/18 a single soprano pipistrelle was recorded emerging from the base of the tree at 21:49.
1671	Low	Confirmed	E - TC	E / R	E / R	Y	Pipistrelle sp.	Bat droppings were found on the bottom of the entrance on the 03/05/2018. The dropping was small and had a fine texture, indicating that it likely belonged to a pipistrelle. More droppings were collected on a later survey and sent for DNA analysis to Ecowarwicker Ecological Forensics, results were not returned. The original assessment of the droppings has therefore been used and this has been assessed as a pipistrelle sp. roost.

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Roost (Y / N)	Species	Summary
1677	Moderate	Confirmed	E / R	E / R	E / R	Y	Common pipistrelle	On the first survey visit on 07/06/18, a single common pipistrelle was observed emerging from this tree at 21:43.
1679	Low	Confirmed	E - TC	E / R	E / R	Y	Common pipistrelle	On the second survey visit on 07/06/18 a single common pipistrelle was recorded emerging from a rot hole at 21:44.
1681	High	Confirmed	E - TC	E / R	E / R	Y	Soprano pipistrelle	On the second survey on 06/06/2018, a single soprano pipistrelle was observed emerging from the tree at 22:18.
2000	High	Confirmed	E - TC	E / R	E - TC	Y	Noctule	Staining was observed below the entrance of a woodpecker hole on the 15/05/2018. During the final survey on the 16/07/2018 a noctule was observed within the tree. The bat was high in the cavity facing downwards.

Source: Mott MacDonald Ltd

E / R = Emergence / Re-entry, E - TC = Endoscopy by Tree Climbing, E - Gr = Endoscopy from the ground.

It was not possible to rule out hibernation potential on the majority of trees assessed with moderate or high potential. This is because they contained suitable hibernation features such as splits and cracks with deep cavities that could provide a constant cool temperature with high humidity in the protective environment of the dense woodland. It is estimated that approximately 66 trees have hibernation potential (see Appendix H for individual trees).

4.2.2 Roosting Bats – Buildings

4.2.2.1 Building Inspections

Seven buildings within 20.0m of the construction zone were assessed for their suitability to support roosting bats (see Appendix L for locations). Descriptions of the buildings and an assessment of their potential to support roosting bats is given in Table 4.5, whilst photographs are included in Appendix M.

Table 4.5: Bat Assessment and Inspection Results for Buildings within 20.0m of Construction Zone

Building	Description	Assessment of Bat Potential and Evidence of Bats
B1 – Pumphouse	This building is a large asbestos coated structure, with external corrugated panels and a large roll shutter door. The sheeting is single skinned, containing gaps where the sheeting overlaps. Internally, the building was undisturbed, but only contained single skinned asbestos and no real features. No features suitable for use by bats were recorded.	No evidence of bats. Negligible potential to support roosting bats.
B2 – Control building	This is a two-storey pre-fabricated building with a flat roof. Connected is a one storey brick extension with a flat, sealed felt roof. The main building is actively used for rail control which is well sealed. The extension is used as a toilet, whilst the locker room downstairs is in use as a locker room. Asbestos ceiling were present which may have a loft space for wires, however, there are no access points into this feature. No features suitable for use by bats were recorded.	No evidence of bats. Negligible potential to support roosting bats.
B3 – DB Schenker	This is a large single storey brick building with a flat felt roof and cavity wall, in use as DB Schenker control. Gaps were found between bricks under the plastic fascia, behind wooden cladding, under a window ledge fitted to fascia, in the roofing felt and in mortar. These features are on the south side of the building. There is also some felt lifting on the northern elevation with a hole in the wall approximately 1.0m off the ground where a pipe is fixed to the building.	No evidence of bats. Moderate potential to support roosting bats.
B4 – Gas station	This is a large single storey building. It is of breeze block construction with a pitched, corrugated metal roof featuring skylights. Gaps in between the fascia boards and stone walls, as well as gaps in the vents were noted as potential entry points. On internal inspection, wire was present behind vents and no features for roosting bats were observed. The building is in active use and regularly inspected by workers.	No evidence of bats. Negligible potential to support roosting bats.
B5 – Gas station associated	This is a small, well-sealed, single storey brick building, with a flat roof. Small gaps were noted in the fascia, however, thick dirt was present in these gaps.	No evidence of bats. Negligible potential to support roosting bats.
B6 - Derelict 1	Single storey building with a gap in soffit (insects were noted around this entry point). Windows are present and the door is open. There is also a roll shutter on the front of the building.	No evidence of bats. Moderate potential to support roosting bats.
B7 - Derelict 2	Two buildings in group with a small alleyway separating them. Both of brick construction with the doors open. Large gaps were noted in the soffit of the westernmost building along with a number of missing roof tiles. The westernmost building also contains a loft void.	No evidence of bats. High potential to support roosting bats.

Source: Mott MacDonald Ltd.

No evidence of bats was recorded during any of the inspection surveys. Three buildings; Building B3, B6 and B7 were assessed as having moderate (Buildings B3 and B6) or high (Building B7) potential to support roosting bats and were therefore subject to further emergence/re-entry surveys.

Given the potential for lesser horseshoe bats to be present in the area, further surveys of buildings in the Tata Steelworks site were undertaken for this species. Two additional buildings within the Tata Steelworks site; Buildings B8 and B9 were assessed as having potential to support lesser horseshoe bats, albeit this suitability was reduced by the active and well-lit nature of the site. Descriptions of these buildings and an assessment of their potential to support roosting bats is given in Table 4.6, whilst photographs are included in Appendix M.

Table 4.6: Bat Assessment and Inspection Results for Buildings within Tata Steelworks site suitable for Lesser Horseshoe bats

Building	Description	Assessment of Bat Potential and Evidence of Bats
B8	This is a single storey, pre-fabricated office building which is not in current use. Wooden boarding is present on some of the windows. The vents allow entry into the building for bats as does a doorway. The building is surrounded by windows and is likely to be light inside.	No evidence of lesser horseshoe bats but internal access was not available for health and safety reasons. Low potential to support roosting lesser horseshoe bats.
B9	This is a large brick building with a wooden vent on the southern elevation. This allows access into the building. From the area of the building that could be viewed from the outside, the ceiling appeared smooth with wooden boarding and metal beams. A window is smashed on the eastern elevation and a window is open on the west side of the building, both offering potential access opportunities.	No evidence of lesser horseshoe bats but internal access was not available for health and safety reasons. Low potential to support roosting lesser horseshoe bats.

Source: Mott MacDonald Ltd.

On the basis of the above assessments, Buildings B8 and B9 were precautionarily subject to automated surveys to ascertain presence or likely absence of lesser horseshoe bats (see relevant section below and Appendix N for locations).

4.2.2.2 Emergence/Re-entry Surveys

Bats were detected and observed during all emergence/re-entry surveys. A possible emergence of a common pipistrelle was recorded during the first survey of Building B7 on 10 May 2018. During the second survey on 5 June 2018, a bat was seen emerging from Building B7 without emitting a call. The adjacent surveyor recorded a soprano pipistrelle (registering as the next minute after this emergence) which is considered likely to be the same bat. It is therefore assumed that the emerging bat was likely to be a soprano pipistrelle. No bats were recorded emerging from or re-entering Buildings B3 or B6.

The results of the surveys are summarised in Table 4.7 below. Emergence location and surveyor locations for surveys of Building B7 are shown on Figure 4.1.

Table 4.7: Emergence / Re-entry Survey Results (Buildings)

Building number	Date	Survey Type	Emergence/Re-entry Results
B3	08/05/2018	Dusk Emergence	No bats recorded emerging from B3

Building number	Date	Survey Type	Emergence/Re-entry Results
B3	08/06/2018	Dawn Re-entry	No bats recorded returning to B3
B6	08/05/2018	Dusk Emergence	No bats recorded emerging from B6
B6	07/06/2018	Dawn Re-entry	No bats recorded returning to B6
B7	10/05/2018	Dusk Emergence	A possible emergence of a common pipistrelle from B7 (see Figure 4.1)
B7	05/06/2018	Dusk Emergence	A single bat was recorded emerging from B7 without emitting a call (see Figure 4.1).
B7	03/08/2018	Dawn Re-entry	No bats recorded returning to B7

Source: Mott MacDonald Ltd.

Figure 4.1: Building B7 – Emergence Location Plan



Source: Mott MacDonald Ltd.

4.2.2.3 Automated Surveys – Buildings (Lesser Horseshoe Surveys)

No lesser horseshoe calls were recorded during the automated surveys of Buildings B8 and B9. As such, this species is considered highly unlikely to be present and no further surveys of these buildings were undertaken.

4.2.3 Activity Surveys – Manual

The manual activity surveys were undertaken each month between July and October 2017 and April and June 2018. These surveys identified the following species within the survey area:

- Pipistrelle species;

- Noctule;
- Serotine;
- Long-eared species (*Plecotus* sp.);
- *Myotis* species;
- *Nyctalus* species; and
- Big bats.

All bat call registrations with GPS locations from the manual activity surveys have been collated and analysed using GIS software to create 'heat maps' (see Appendix O) to display relative activity levels across the survey area. This map shows that bat activity was relatively uniform across the survey area (except for a small central section of the survey area could not be surveyed (as described in Section 2.4) and therefore shows no bat activity), with three distinct areas with higher levels of activity. The highest levels of activity were recorded in the eastern end of the survey area between the Transect 1 and Transect 2 routes. This location is associated with a large reen and a section of railway which links the Tata Steelworks site with the mainline. This location is where Transects 1 and 2 converge, and there is therefore a high density of transect listening stops in this location. Areas of high activity were also recorded at the western end and centre points of Transect 3. Both of these peaks in activity are related to large reens/reen systems, additionally, the central point of Transect 3 is also adjacent to a floodlighting tower. Higher levels of activity were also recorded at the far east of the site on Transect 1, this location is also associated with a large reen/reen system that borders the edge of the Tata Steelworks site.

As the greatest activity levels were recorded from pipistrelle sp, *Nyctalus* sp and *Myotis* sp, trends in bat activity have been assessed separately for these groups and can be described as follows:

- **Pipistrelle species** were observed foraging along the woodland edges and over reens as well as commuting along the woodland edges. Pipistrelle sp. activity showed a similar pattern to that of the all bat data (shown on Appendix O), with three peaks of activity in the locations as mentioned above;
- **Noctule and *Nyctalus* sp.** were largely observed foraging in small numbers around the floodlights and commuting over the woodland and land to the south. When considered together, *Nyctalus* sp. activity differed from the all bat data pattern with two locations of increased activity; one in Transect 1 and one in Transect 3 (see Appendix O). These locations are both associated with floodlighting towers; and
- ***Myotis* sp** bats were observed foraging over the reens, it is likely that a proportion of these calls are Daubenton's bats as they favour riverine habitats (Collins, 2016). *Myotis* sp. activity was highest in the east and west ends of the site (see Appendix O) associated with reens/reen systems.

Occasional long-eared and serotine activity was observed within the woodland but not at significant enough levels to assess any patterns in activity.

No notable temporal trends in bat activity were noted across the different months from the manual activity surveys.

4.2.4 Activity Surveys – Automated

The automated activity surveys were undertaken each month between July and October 2017 and April and June 2018. A total of 70,312 call registrations across 214 'detector nights' were recorded across all the bat detectors and subsequently analysed.

These surveys identified the following species within the survey area:

- Pipistrelle species;
- Noctule;
- Long-eared species (*Plecotus* sp.);
- *Myotis* species;
- *Nyctalus* species
- Serotine;
- Lesser horseshoe bat; and
- Big bats (*Nyctalus* / *Eptesicus* sp.).

Pipistrelle species had the most call registrations (just over 50% of all registrations), followed by Noctule and *Nyctalus* species (together totalling almost 46%). For the purposes of the sound analysis, common and soprano pipistrelle bats were lumped together but both are known to be present within the survey area such that the relative abundance of each species is likely to be lower than that of all *Nyctalus* sp. It is also possible that both *Nyctalus* sp. are present within the survey area, with some calls registering within the range for Leisler’s bat. However, given the large number of noctule calls and noted noctule foraging activity during manual surveys, it is considered likely that the majority of the *Nyctalus* sp. activity also represents noctules. On this basis, it is reasonable to interpret that noctules are likely to represent the greatest percentage of the total bat activity recorded.

The call registrations of *Myotis* species were recorded in low numbers (less than 4%), whilst big bats and long-eared species bats were only recorded occasionally (each less than 1%). Serotine bats and lesser horseshoe and were recorded rarely (individual passes only).

The relative abundance and percentage of total activity attributed to each species or group is summarised in Table 4.8 below.

Table 4.8: Species Recorded within the Survey Area

Species	Total number of call registrations	Percentage (%) of total number of call registrations
Pipistrelle species	35416	50.37
Noctule	17274	24.57
<i>Nyctalus</i> species	15009	21.35
<i>Myotis</i> species	2434	3.47
Big bats	75	0.11
Long-eared species (<i>Plecotus</i> sp.)	65	0.10
Serotine	35	0.05
Lesser horseshoe bat	4	0.01
Total	70312	100

Source: Mott MacDonald Ltd.

In order to assess patterns in activity, in line with guidance, the data has been transformed average activities per night and also per hour (as night length changes throughout the year) to allow accurate comparison across locations and months. Tables and graphs of the total number of registrations per night and per hour across the different detectors and months are set out in Appendix P. These show that spatial and temporal patterns in the data set do not appear to vary greatly between per night and per hour data. As such the following sections are based on per hour bat activity only.

4.2.4.1 Spatial patterns

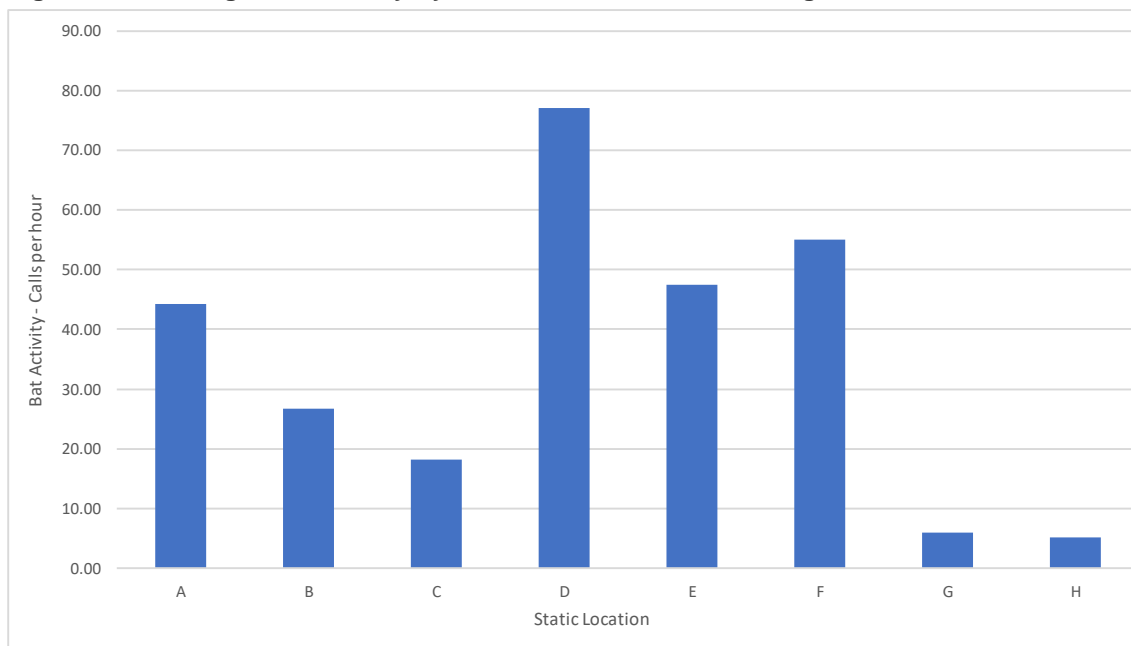
The relative distribution of bat call registrations per hour across the different static detectors is set out within Table 4.9 and Figure 4.2 below, whilst patterns in activity are also illustrated in Appendix Q):

Table 4.9: Average Bat Call Registrations per Hour Across Static Detector Locations and Species

Transect	1		2		3		4	
Static Location	A	B	C	D	E	F	G	H
Big Bat	0.031	0.201	0.003	0	0.012	0	0.005	0
Serotine	0.046	0.059	0	0.024	0	0	0.003	0
<i>Myotis</i> species	5.446	0.893	0.130	0.036	0.040	0	0.025	0.011
Noctule	7.450	9.048	1.014	42.048	20.432	0.382	0.157	0.044
<i>Nyctalus</i> species	9.231	8.728	3.083	15.509	24.568	0.323	0.074	0.095
Pipistrelle species	22.073	7.766	13.983	19.339	2.472	53.639	4.992	4.356
<i>Plecotus</i> Species	0.058	0.096	0.006	0.036	0.004	0	0.025	0.011
Lesser horseshoe bat	0	0	0.003	0	0	0.010	0	0
Grand Total	44.335	26.791	18.222	76.994	47.528	55.118	5.984	5.229
Percentage of total	15.82%	9.56%	6.50%	27.48%	16.96%	19.67%	2.14%	1.87%

Source: Mott MacDonald Ltd.

Figure 4.2: Average Bat Activity by Static Location – All Bat Registrations



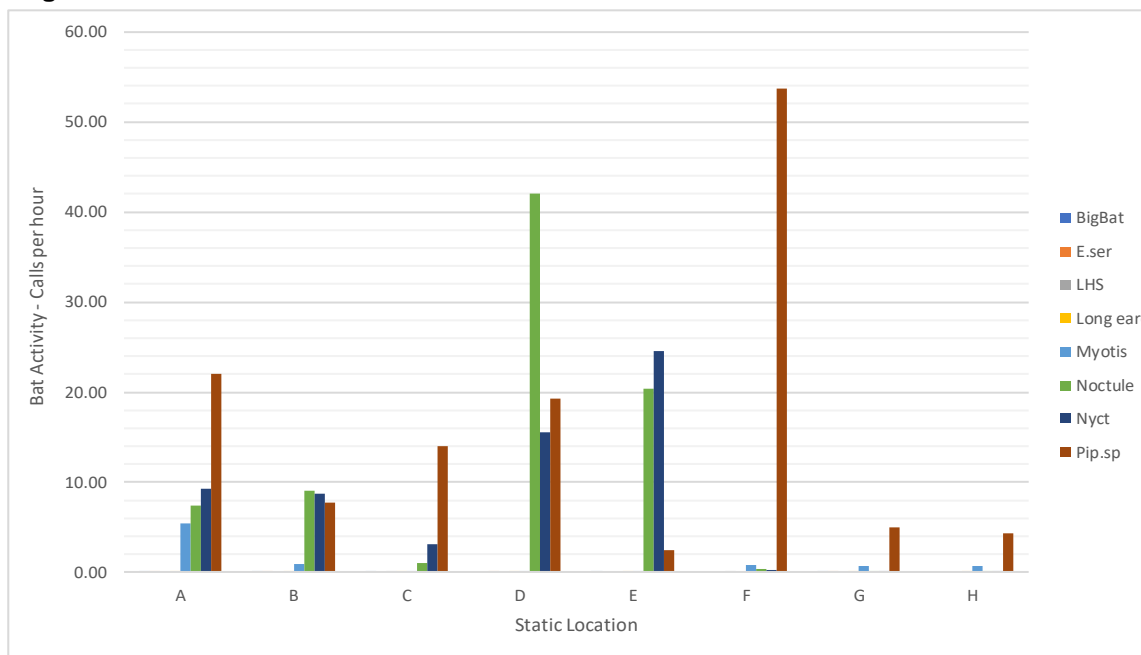
Source: Mott MacDonald Ltd.

When all bat species are considered together, bat activity levels were highest in static detector locations D, F, E and A, respectively. The most abundant activity was recorded at location D (approximately 27% of total registrations). This detector was placed on the southern edge of the woodland, facing south, and in proximity to flood lighting. Locations A, E and F are all

associated with large reens. Locations G and H registered the lowest levels of bat activity (4% of total calls when considered together) and were both located at the far west of the survey area. Relative to other locations, B and C showed moderate levels of bat activity and are associated with smaller reen systems. Average bat activity in calls per hour is given for all eight static locations in Appendix Q.

The distribution of activity across detector locations by species is shown in Table 4.9 and Figure 4.3:

Figure 4.3: Average Bat Activity by Static Location – Species/Species Group Registrations



Source: Mott MacDonald Ltd.

A description of the spatial pattern of activity for each species is set out below:

- **Pipistrelle sp.** bats were the most abundant call registrations in five out of the eight locations (A, C, F, G and H). Pipistrelle sp. bats call registrations were particularly high in locations F and A where pipistrelle sp. bat calls make up 97% and 49% of all bat calls registered, respectively. Pipistrelle sp. were significantly lower in locations E with only 2% of all pipistrelle calls recorded in this location. Excluding location E, pipistrelle sp. calls followed the same general distribution patterns across the survey area as the all bat species registrations;
- **Noctule and Nyctalus sp.** are the next most abundant call registrations, respectively. Call registrations for these two groups are concentrated in locations D and E, where they dominate the activity recorded in these locations (together representing 75% and 95% of all bat activity in D and E respectively). These two locations are associated with floodlighting towers. Relatively lower levels of activity were registered in locations A, B and C, whilst calls for these groups are very low in locations F, G and H representing less than 1% of all registrations for both noctules and *Nyctalus* sp.;
- **Myotis sp.** call registrations were most commonly associated with location A, with 62% of call registrations for this species recorded at this location;

- **Plecotus sp. and serotine bats** were most commonly associated with locations A and B with 65% and 80% of all call registrations for these species/species groups coming from these two locations, respectively; and
- **Lesser horseshoe bats** represent 0.01% of total call registrations are were recorded in locations C and F only.

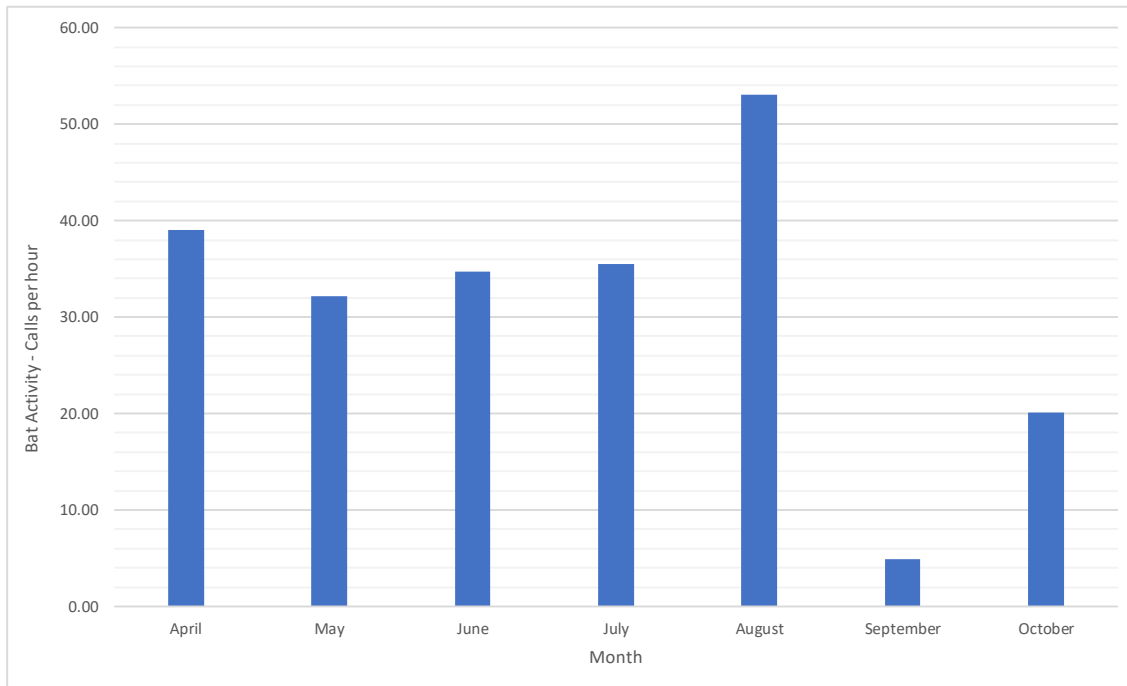
4.2.4.2 Temporal Patterns

The relative distribution of bat call registrations per hour across the different survey months is set out within Table 4.10 and Figure 4.4 below:

Table 4.10: Average Bat Call Registrations per Hour Across Survey Months and Species

Species	April	May	June	July	August	September	October
Big Bat	0	0.271	0.020	0.010	0.011	0.003	0
Serotine	0.009	0.093	0.030	0.006	0	0	0
<i>Myotis</i> species	1.070	0.182	1.338	2.152	1.495	0.560	0.557
Noctule	7.655	10.618	8.760	0.990	22.540	0.216	2.657
<i>Nyctalus</i> species	8.242	5.591	3.815	16.095	3.992	0.136	9.377
Pipistrelle species	22.048	15.271	20.756	16.190	24.973	3.941	7.460
<i>Plecotus</i> Species	0.003	0.129	0.020	0.048	0.027	0	0.011
Lesser horseshoe bat	0.009	0.004	0	0	0	0	0
Grand Total	39.036	32.160	34.739	35.492	53.037	4.856	20.063
Percentage of Total	17.79%	14.66%	15.83%	16.18%	24.18%	2.21%	9.15%

Figure 4.4: Average Bat Activity by Month – All Bat Registrations

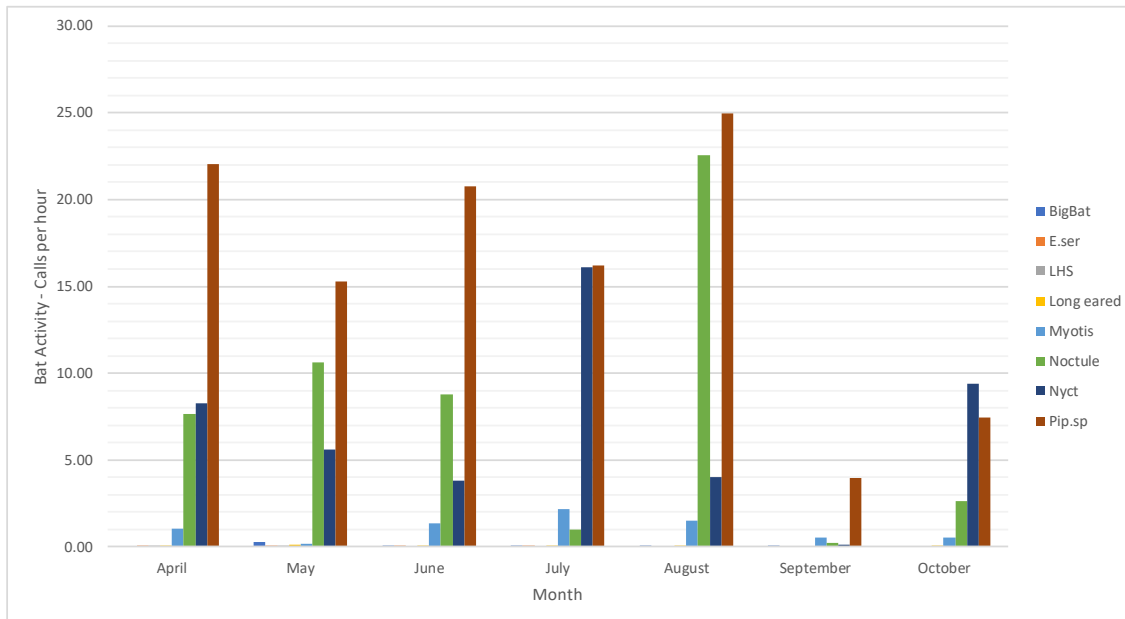


Source: Mott MacDonald Ltd.

When all bat species are considered together, levels of bat activity are relatively similar between April and July, with a peak in activity in August. Activity was significantly lower in September and October, with these months representing 2% and 9% of total call registrations respectively across the survey period.

Call registrations for each species/species group by month are shown in Table 4.10 and on Figure 4.5:

Figure 4.5: Average Bat Activity by Month – Species/Species Group Registrations



Source: Mott MacDonald Ltd.

A description of the temporal pattern of activity for each species is set out below:

- **Pipistrelle sp.** bats were the most abundant call registrations in six out of the seven months surveyed. Pipistrelle sp. calls followed the same general distribution patterns across the survey area as the all bat species registrations, including a distinct drop in abundance in September with only 3.5% of call registrations being recorded in this month;
- **Noctule and Nyctalus sp.** are the next most abundant call registrations. When these two species groups are considered together, they follow the same general distribution patterns as the all bat data with a significant drop in number in September, accounting for 4% and 2% of call registrations for each group respectively;
- **Myotis sp.** call registrations were relatively constant across the seven months surveyed with a small increase in abundance in June, July and August. *Myotis* sp. calls did not significantly drop in September as per the all bat data;
- **Plecotus sp.** bats were recorded in all months except September, call registrations for this species group were most abundant in May with 54% of call registrations (a total of 29 registrations) being recorded in this month;
- **Serotine** call registrations were only recorded in April, May, June and July only, with 67% of these calls (21 in total) being recorded in May; and
- **Lesser horseshoe bats** were recorded in April and May only (3 and 1 calls respectively).

5 Conclusions and Recommendations

5.1 Interpretation and Conclusions

5.1.1 Roosting Bats – Trees

Upon completion of the surveys, a total of 22 confirmed bat roosts of at least four species were identified within trees. Due to the low numbers of bats recorded and/or low numbers of droppings recorded, and as surveys have been undertaken across the suitable maternity period (such that if maternity roosts were present these would be expected to have been found), all roosts recorded are considered to be transitional, non-breeding roosts likely supporting individual or small numbers of bats.

On this basis, the conservation status of the 22 confirmed roosts has been assessed in line with bat mitigation guidelines (English Nature, 2004) and is set out in Table 5.1 below.

Table 5.1: Conservation Significance of Confirmed Bats Roosts on-Site.

Roost Type	Number of Roosts	Tree Number(s)	Conservation Significance (Individual Roosts)
Common pipistrelle - transitional roost	6	36, 601, 1545, 1634, 1677, 1679	Low conservation value
Soprano pipistrelle - transitional roost	2	1667, 1681	Low conservation value
Pipistrelle sp. – transitional roost	3	60, 1654, 1671	Low conservation value
Noctule – transitional roost	1	2000	Low conservation value
Serotine – transitional roost	7	61b, 62, 135, 141, 1633a, 1644, 1652	Low – moderate conservation value
Unknown species – minor roost, low importance	3	133, 602, 1624	Considered unlikely to be of more than low conservation value
Total	22	n/a	n/a

Source: Mott MacDonald Ltd.

The recorded presence of serotine roosts in trees is unusual given the known roosting preferences of this species (typically preferring buildings) and surprising given the low levels of serotine activity recorded during the static assessments and the variability in size of the droppings sent off. The identification of so many samples of droppings (of variable sizes) as serotine has been queried with the laboratory and assurance has been provided that these are accurate, whilst this species was also recorded during one emergence/re-entry survey confirming use of the survey area for roosting by this species. An assessment has therefore been made based on the data available and on a precautionary basis. This species is less common in the local area than pipistrelle and noctule and so, despite the roosts considered to be transitional only, the conservation significance assigned has been elevated to “low – moderate” to reflect this.

As set out in Table 5.1, with the exception of the above described serotine roosts, all of the remaining roosts recorded within the survey area are considered to be individually of low conservation significance.

In addition, 201 trees with low potential to support roosting bats have been identified across the Site which were not subject to survey (in line with guidance) but which provide some potential bat roosting opportunities. These are considered in the recommendations below.

In terms of the assemblage of bat roosts within the woodland as a whole, this has been assessed based on the guidance in Wray *et al.* (2010) which looks at the rarity and distribution of bats along with the status of these roosts. This guidance lists noctule and serotine bats in the 'rarest' category for Wales when considered as a whole. However, this is not considered to be representative of the known distribution of these species in South Wales or at a County level, where both species are known to be relatively widespread (BCT (2018)). Both species were also returned in the desk study and were recorded in the area as part of the M4 Corridor around Newport scheme surveys confirming that neither species are locally 'rare'. As such, for this assessment the value of the Site has been made based on scores for 'rarer' species as opposed to 'rarest'. Following this approach, given the presence of transitional roosts of 'rarer' species, the survey area as a whole is considered to be of value at a County level.

5.1.2 Roosting Bats – Buildings

Only one bat roost was identified within buildings near to the survey area. Possible emergences of both common pipistrelle and soprano pipistrelle were recorded from Building B7. Due to the low numbers of bats recorded and as the emerging bats could not be confirmed to species level, this building is considered to be a transitional roost for pipistrelle species bats, support individual or low numbers of bats. In line with bat mitigation guidelines (English Nature, 2014), this roost is considered to be of low conservation value.

5.1.3 Bat Activity

The survey work recorded moderate to high levels of bat activity across the survey area, dominated by pipistrelle sp. (both common and soprano pipistrelle being present) and *Nyctalus* sp. (the vast majority of which is likely to be noctule), all of which are known to be common and widespread in the local area. Species recorded more occasionally include *Myotis* sp., *Plecotus* sp. (likely brown long-eared bat given the location of the survey area), serotine and very rare passes of lesser horseshoe bat.

5.1.3.1 Spatial Patterns

Results from the automatic activity surveys show that Location D, F, E and A (located across the survey area) have the most bat activity, respectively, when considering all bat species. These four locations are associated with large reens/reen systems, additionally location D is located near to a large flood lighting tower. High levels of invertebrates relating to both the reen systems and floodlighting are likely the reason for higher levels of bat activity as these locations will provide optimum foraging conditions, whilst the trends in bat activity appear to be driven by foraging patterns of pipistrelle and *Nyctalus* bats observed during manual surveys and recorded by the detectors (i.e. pipistrelle sp. highly associated with reen and woodland edge habitats and *Nyctalus* sp. bats regularly observed in low numbers, continually foraging in close proximity to lighting towers).

Myotis sp. call registrations were most commonly associated with location A (a large reen) and at the west end of the survey area (Locations G and H). This pattern is likely due to the lower levels of light and noise from floodlights and steel work activities compared to the rest of the survey area which are favoured by this species group. *Plecotus* sp. bats, which also favour these conditions were associated with these locations but were also abundant in location D which is likely to have

relatively high levels of light and noise disturbance. However, the low number of registrations for this species group may mean this pattern is unreliable.

Levels of other bat activity (serotine and lesser horseshoe bat) were so low that reliable patterns cannot be drawn. It is considered likely that these calls are from single or small number of bat(s) commuting past/over the survey area.

5.1.3.2 Temporal Patterns

In terms of temporal patterns in the data, when all bat species are considered together, levels of bat activity are relatively similar across most of the early part of the survey period (April and July), with a peak in activity in August and a noticeable drop in September and October. This pattern is likely to be driven again by the activity patterns of pipistrelle sp. and *Nyctalus* sp. data which also follow this trend.

It is notable that in September detectors D and A did not record data. These have been shown to be associated with high numbers of *Nyctalus* sp and pipistrelle sp. respectively and so the lack of data from these locations may have influenced the overall trend, such that patterns should be interpreted with caution. This pattern could also be attributed to a seasonal drop in temperature, however weather conditions during the survey period largely fell within ranges assessed as suitable in the guidelines (Collins, 2016), see Appendix G.

Taking on board the above, the relative abundance and constancy in activity levels from April to August may indicate the importance of the habitats within the survey area (particularly features such as reens and tower lights as well as woodland edge habitats) for as a foraging resource for bats at a local level up to and during the breeding season. This could therefore suggest the presence of maternity roosts for these species groups within the near vicinity (whilst no maternity roosts were identified in the woodland the wider landscape supports a number of suitable habitats including woodland, hedgerow trees and buildings in Llanwern Village to the north, all within a close distance to the survey area). Following this hypothesis, a peak in call registrations in August could be associated with the dispersal of juvenile bats from maternity roosts and the drop in activity in September and October would coincide with bats dispersing greater distances away from the local area to forage and reach swarming or hibernation sites, therefore being less reliant on local foraging resources.

Myotis sp. call registrations were relatively constant across the seven months surveyed with a small increase in abundance in June, July and August. *Myotis* sp. calls did not significantly drop in September as per the all bat data. This pattern of activity may suggest that the woodland within the survey area provides a foraging and or commuting resource throughout the year for local *Myotis* sp. bats. This could also be true for *Plecotus* sp. bats which were recorded in all months except September, although at lower levels such that trends are less reliable to interpret for this species.

Serotine call registrations were only recorded in April, May, June and July, whilst lesser horseshoe bats were only recorded in April and May. However, as set out above, so few calls were registered for these species groups it is difficult to reliably infer reasoning for the temporal patterns observed.

5.1.4 Overall Value

An assessment of the importance of the survey area as a foraging resource has been made with reference to the proposed methodology in Wray *et al.* (2010), which sets out a scoring system that enables bat foraging areas and commuting routes to be assigned a value. This

approach recommends that where multiple species are recorded within the survey area, each species should be valued individually, and the highest value obtained should be used.

As set out above in respect of roosting bats, given the local distribution of serotine and noctule bats, these have been assessed as 'rarer' rather than 'rarest' species for the purposes of this assessment.

The highest value for foraging areas and commuting routes reflects the use of the survey area by noctule and serotine bats, which would be calculated as follows:

- **Species:** A figure of **5** is assigned to reflect that noctule are considered to fall within the 'rarer' category;
- **Number of Bats:** A figure of **10** is assigned to reflect that bat activity recorded and observed appears to represent continuous foraging from small numbers of bats;
- **Roosts / Potential Roosts Nearby:** A figure of **4** is precautionarily assigned to reflect an 'unknown' number of roosts nearby (given that this species could be roosting outside of the survey area); and
- **Foraging Habitat Characteristics** (*for foraging assessment*): A figure of **4** is assigned to reflect the presence of a large block of woodland and adjacent industrial habitats; or
- **Type and Complexity of Linear Features** (*for commuting assessment*): The habitats on site do not neatly fit the descriptions but given the presence of continuous woodland on site and reens, a precautionary value of **5** is assigned (the highest possible for commuting features).

These calculations result in a total score of **23** for foraging value and **24** for commuting value, both of which fall within the lower end of the 21-30 scoring bracket and a resultant valuation at a County level. Should noctule or serotine be considered as 'rarest', this would give a valuation at Regional level which is considered disproportionate to the survey area. Indeed, given the activity observed on site, dominated by locally common and widespread species, the survey area is certainly considered to be a valuable foraging and commuting resource for local bats and County valuation is considered to be suitably precautionary.

5.2 Assessment and Recommendations

The current proposals for the Scheme required some work within woodland habitats suitable for use by bats. The survey works has confirmed the presence of bats and bat roosts across the survey area.

The assessment of impacts on bats from Phase 1 of Llanwern Rail Facilities Programme is included in a separate Ecological Impact Assessment (EclA) which sets out site specific recommendations (Mott MacDonald 2018, Report Reference: 367590-WTD-CAR-2648). However, on the basis of the results of this report, the following general recommendations are relevant:

5.2.1 Avoidance

Removal of trees within the woodland suitable for use by roosting bats should be minimised through the design process wherever possible. Works should minimise loss, damage or disruption to the woodland and reens habitats. Tower lights should remain unaffected as these appear to provide an important foraging resource for *Nyctalus* sp. bats.

5.2.2 Licensing

An NRW European Protected Species Development Licence would be required to remove any trees or buildings confirmed as bat roosts.

A licence would only be granted under the condition that mitigation and compensation is put in place to ensure that the potential impacts on bats are minimised to an acceptable level. This is likely to include ecological supervision of works, delivery of a toolbox talk to brief tree workers, sensitive tree felling methodology (soft-felling) and replacement roost provision (in the form of bat boxes on retained trees).

Licence conditions would be likely to include a period of post construction monitoring to measure the efficacy of the mitigation and compensation measures employed.

5.2.3 Mitigation

Should woodland loss be required, depending on scale of this loss it is recommended that in line with best practice this should be compensated by either replacement planting or enhancement of retained woodland to increase the roosting and foraging resource at a local level.

5.2.4 Construction Safeguards

In line with BCT guidelines, should felling of low potential trees be required this should be undertaken under an ecological method statement which would include:

- Briefing of all contractors via a toolbox talk by a suitably qualified ecologist;
- Soft-felling of trees i.e. limbs should be carefully removed and left overnight before being removed or chipped; and
- In the unlikely event a bat is recorded, works would cease in that area, an ecologist contacted and NRW consulted as required.

Retained trees and woodland should be safeguarded in line with BS5837:2012.

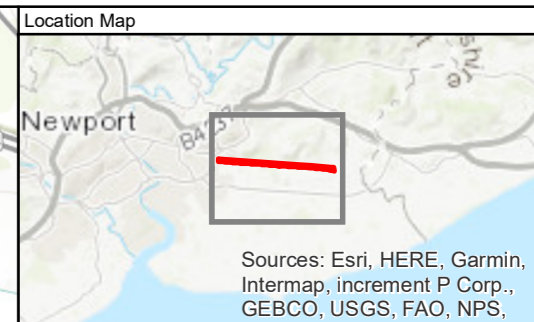
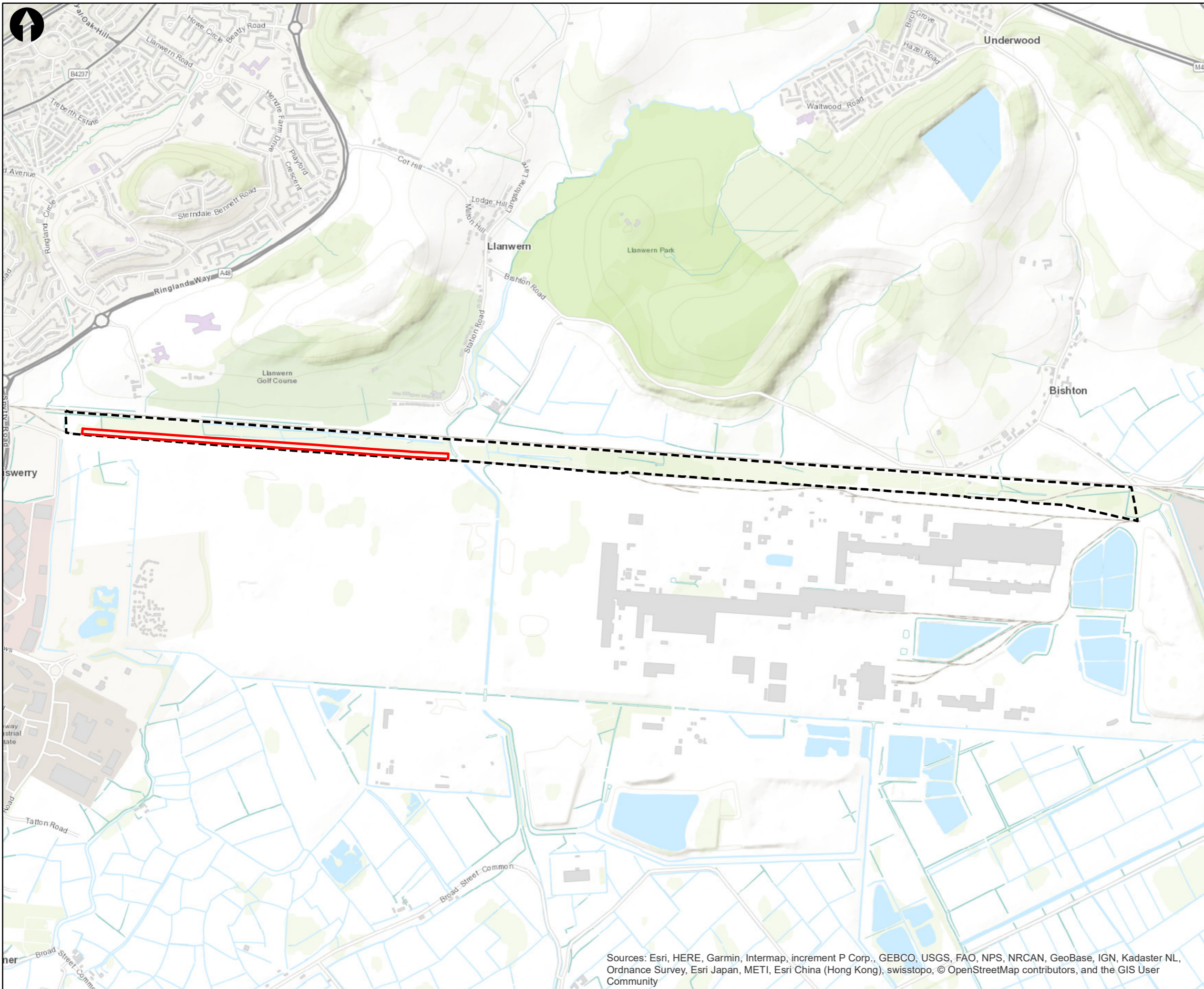
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A. Site Location Plan



Key to Symbols

- Site extent
- Survey area

Notes

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Rev	Date	Drawn	Description	ZCM	XX
P1	24/09/18	TR	For information	ZCM	XX

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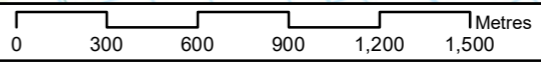
Transport for Wales
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Title

South Wales Metro - Task Order 26
 Llanwern Site Location Plan

Designed	Z Costas	ZC	Eng. Check	Z Costas	ZCM
Drawn	T Ruff	TR	Coordination	L Woolley	LKW
GIS Check	G O'Donovan	GO	Approved	XX	XX
Scale at A3	Status	Rev	Security		
1:25,000	INF	P1	STD		

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community



B. Tree Survey Methods

Table B.1: Bat Tree Survey Methodology

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4*
1	High	Low	E – Gr 04/05/2018	E – Gr 02/07/2018	-	-
2	Moderate	High	E – TC 04/05/2018	E – TC 25/06/2018	E – TC 17/07/2018	-
4	Low	Moderate	E – TC 04/05/2018	E – TC 25/06/2018	-	-
14	Moderate	Low	E – TC 17/07/2018	-	-	-
15	Moderate	Low	E – TC 17/07/2018	-	-	-
17	Moderate	Negligible	E – TC 17/07/2018	-	-	-
19	Moderate	Low	E – TC 17/07/2018	-	-	-
27	Moderate	High	E – TC 17/07/2018	E / R 07/08/2018	E / R 21/08/2018	-
28	High	Moderate	E – TC 17/07/2018	E / R 08/08/2018	-	-
34	Moderate	Low	E – TC 11/05/2018	-	-	-
36	Moderate	Confirmed	E / R 26/06/2018	E / R 26/07/2018	E / R 28/08/2018	-
36a	Moderate	Moderate	E / R 09/08/2018	E / R 21/08/2018	-	-
43	Moderate	Negligible	E – TC 15/05/2018	E / R 14/06/2018	-	-
44	Moderate	Low	E – TC 11/05/2018	-	-	-
45	High	High	E – TC 15/05/2018	E / R 25/06/2018	E / R 18/07/2018	-
46	Moderate	Moderate	E – Gr 14/05/2018	E – Gr 12/06/2018	-	-
56	Moderate	High	E – TC 15/05/2018	E / R 12/06/2018	E / R 18/07/2018	-
57	Moderate	Moderate	E – TC 15/05/2018	E / R 12/06/2018	-	-
58	Moderate	Low	E – TC 14/05/2018	-	-	-
60	Confirmed	Confirmed	E – Gr 12/06/2018	E – Gr 02/07/2018	E – Gr 23/07/2018	-
61	Confirmed	Confirmed	E – Gr 12/06/2018	E – Gr 02/07/2018	E – Gr 23/07/2018	-
61b	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	-

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4*
			23/07/2018	06/08/2018	20/08/2018	
62	High	Confirmed	E – Gr 12/06/2018	E – Gr 02/07/2018	E – Gr 23/07/2018	-
64	Moderate	Low	E – Gr 06/04/2018	-	-	-
66	Moderate	Moderate	E – TC 15/05/2018	E / R 11/06/2018	-	-
67	Moderate	High	E / R 11/06/2018	E- Gr 12/07/18	E - Gr 02/07/18	E / R 20/07/2018
69	High	Moderate	E – Gr 14/05/2018	E – Gr 12/06/2018	-	-
75	Moderate	Low	E – TC 14/05/2018	-	-	-
81	Moderate	Low	E – Gr 30/04/2018	-	-	-
94	Moderate	Low	E – TC 14/05/2018	-	-	-
96	Moderate	Low	E – TC 14/05/2018	-	-	-
118	Moderate	Low	E – Gr 12/06/2018	-	-	-
119	Moderate	Negligible	E – TC 29/04/2018	-	-	-
120	High	High	E – Gr 30/04/2018	E – Gr 11/06/2018	E – Gr 02/07/2018	-
121	Moderate	Low	E – TC 01/05/2018	-	-	-
122	High	Low	E – TC 01/05/2018	-	-	-
124	High	Low	E – TC 01/05/2018	-	-	-
125	High	High	E – TC 01/05/2018	E / R 29/05/2018	E – TC 25/06/2018	-
126	Moderate	Low	E – Gr 01/05/2018	E / R 29/05/2018	-	-
127	Moderate	Low	E – Gr 11/06/2018	-	-	-
130	Low	Moderate	E – TC 01/05/2018	E / R 30/05/2018	-	-
133	Confirmed	Confirmed	E – Gr 11/06/2018	E – Gr 23/07/2018	E – Gr 06/08/2018	-
134	Moderate	Low	E – Gr 11/06/2018	-	-	-
135	Confirmed	Confirmed	E – Gr 11/06/2018	E – Gr 02/07/2018	E – Gr 23/07/2018	-
139	Moderate	Moderate	E – TC 15/05/2018	E / R 30/05/2018	-	-
140	High	Low	E – TC 09/05/2018	-	-	-

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4*
141	Confirmed	Confirmed	E – Gr 14/05/2018	E – Gr 11/06/2018	E – Gr 23/07/2018	-
155	Moderate	Negligible	E – TC 09/05/2018	-	-	-
160	High	Moderate	E – TC 04/05/2018	E / R 31/05/2018	-	-
161	Moderate	High	E – TC 15/05/2018	E / R 31/05/2018	E – TC 25/06/2018	-
162	Moderate	Low	E – TC 09/05/2018	-	-	-
166	High	Low	E – Gr 14/05/2018	E – Gr 11/06/2018	-	-
167	Moderate	Low	E – TC 04/05/2018	-	-	-
171	Moderate	Negligible	E – TC 04/05/2018	-	-	-
174	Moderate	Negligible	E – TC 04/05/2018	-	-	-
176	Moderate	Low	E – TC 04/05/2018	-	-	-
181	Moderate	Low	E – TC 04/05/2018	-	-	-
184	Moderate	Moderate	E / R 19/06/2018	E / R 10/07/2018	-	-
194	Low	Negligible	E – Gr 14/05/2018	-	-	-
195	High	Low	E – Gr 14/05/2018	E – Gr 06/06/2018	E – Gr 23/07/2018	-
196	Moderate	Low	E – Gr 04/05/2018	-	-	-
197	Moderate	Moderate	E – Gr 04/05/2018	E – Gr 06/06/2018	-	-
198	Moderate	Moderate	E – Gr 04/05/2018	E – Gr 06/06/2018	-	-
199	Moderate	Negligible	E – Gr 04/05/2018	-	-	-
202	Moderate	Low	E – Gr 04/05/2018	-	-	-
204	Moderate	Moderate	E – Gr 02/05/2018	E – Gr 05/09/2018	-	-
204a	Moderate	Low	E – Gr 04/05/2018	E – Gr 06/06/2018	-	-
205	High	Low	E – TC 03/05/2018	-	-	-
207	Moderate	Moderate	E – Gr 04/05/2018	E – Gr 06/06/2018	-	-
600	High	High	E / R 20/06/2018	E / R 12/07/2018	E / R 30/07/2018	-
601	High	Confirmed	E / R	E / R	E / R	-

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4*
			20/06/2018	13/07/2018	31/07/2018	
602	Confirmed	Confirmed	E – Gr 06/08/2018	E – Gr 20/08/2018	E / R 03/09/18	-
1545	Moderate	Confirmed	E – TC 25/06/2018	E / R 26/07/2018	E / R 30/08/2018	-
1624	Moderate	Confirmed	E – TC 04/06/2018	E – TC 25/06/2018	E / R 24/07/2018	-
1625	Moderate	Moderate	E – TC 04/06/2018	E – TC 25/06/2018	-	-
1629	Moderate	Moderate	E / R 28/06/2018	E / R 19/07/2018	-	-
1631	High	High	E / R 19/06/2018	E / R 11/07/2018	E / R 01/08/2018	-
1632	Moderate	Moderate	E – TC 04/06/2018	E – TC 25/06/2018	-	-
1633	Moderate	Moderate	E / R 27/06/2018	E / R 20/07/2018	-	-
1633a	High	Confirmed	E / R 25/07/2018	E / R 10/08/2018	E / R 24/08/18	-
1633b	Moderate	Moderate	E – Gr 18/07/2018	E – Gr 20/08/2018	-	-
1634	Moderate	Confirmed	E – TC 04/06/2018	E / R 27/06/2018	E / R 20/07/2018	-
1634a	Moderate	Moderate	E – Gr 04/05/2018	E – Gr 02/07/2018	-	-
1635	Moderate	Low	E – TC 04/06/2018	-	-	-
1636	Moderate	Low	E – TC 04/06/2018	-	-	-
1638	Moderate	Low	E – TC 04/06/2018	-	-	-
1640	Moderate	Moderate	E / R 21/06/2018	E / R 06/07/2018	-	-
1641	High	High	E / R 21/06/2018	E / R 17/07/2018	E / R 02/08/2018	-
1642	Moderate	Low	E – Gr 06/06/2018	E – Gr 23/07/2018	-	-
1644	Moderate	Confirmed	E – Gr 06/06/2018	E – Gr 23/07/2018	E – Gr 06/08/2018	-
1645	Moderate	Moderate	E – Gr 06/06/2018	E – Gr 23/07/2018	-	-
1646	Moderate	Low	E – Gr 06/06/2018	-	-	-
1650	Moderate	Moderate	E / R 25/06/2018	E / R 17/07/2018	-	-
1651	Low	High	E – TC 01/05/2018	E / R 14/06/2018	E – Gr 17/07/2018	-
1652	High	Confirmed	E – Gr 30/04/2018	E – Gr 12/06/2018	E – Gr 02/07/2018	-

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4*
1653	Moderate	High	E – TC 01/05/2018	E / R 04/06/2018	E / R 08/08/2018	-
1654	Moderate	Confirmed	E – Gr** 30/04/2018	E / R 04/06/18	E / R 06/07/2018	E / R 23/07/2018
1655	Low	Negligible	E – TC 25/04/2018	-	-	-
1656	Moderate	Low	E – TC 29/04/2018	-	-	-
1658	Low	Negligible	E – Gr 30/04/2018	-	-	-
1659	Moderate	Low	E – Gr 30/04/2018	-	-	-
1660	Low	Negligible	E – TC 24/04/2018	-	-	-
1661	Moderate	Moderate	E / R 05/06/2018	E / R 19/07/2018	-	-
1662	High	High	E – Gr 30/04/2018	E / R 02/08/2018	E / R 17/08/2018	-
1665	Moderate	Low	E – TC 18/07/2018	-	-	-
1667	High	Confirmed	E / R 05/06/2018	E / R 19/07/2018	E / R 09/08/2018	-
1669	Moderate	Low	E – TC 24/04/2018	-	-	-
1671	Low	Confirmed	E – TC 04/05/2018	E / R 14/06/2018	E / R 01/08/2018	-
1672	Moderate	Negligible	E – Gr 04/05/2018	-	-	-
1674	High	Low	E – TC 01/05/2018	-	-	-
1676	High	Moderate	E – Gr 18/07/2018	E – Gr 06/08/2018	-	-
1677	Moderate	Confirmed	E / R 07/06/2018	E / R 03/07/2018	E / R 05/09/2018	-
1678	Low	Moderate	E – TC 24/04/2018	E / R 29/08/2018	-	-
1679	Low	Confirmed	E – TC 01/05/2018	E / R 07/06/2018	E / R 05/07/2018	-
1680	Moderate	Moderate	E / R 06/06/2018	E / R 05/07/2018	-	-
1681	High	Confirmed	E – TC 01/05/2018	E / R 06/06/2018	E / R 05/09/2018	-
2000	High	Confirmed	E – TC 14/05/2018	E / R 14/06/2018	E – TC 17/07/2018	-
AD1	Moderate	Moderate	E / R 03/07/2018	E / R 14/08/2018	-	-

Source: Mott MacDonald E / R = Emergence / Re-entry, E – TC = Endoscopy by Tree Climbing, E – Gr = Endoscopy from the ground, * as required, **couldn't undertake a complete survey

C. Emergence/Re-entry Survey Details – Trees

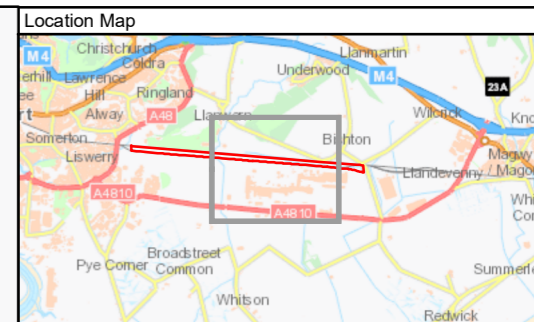
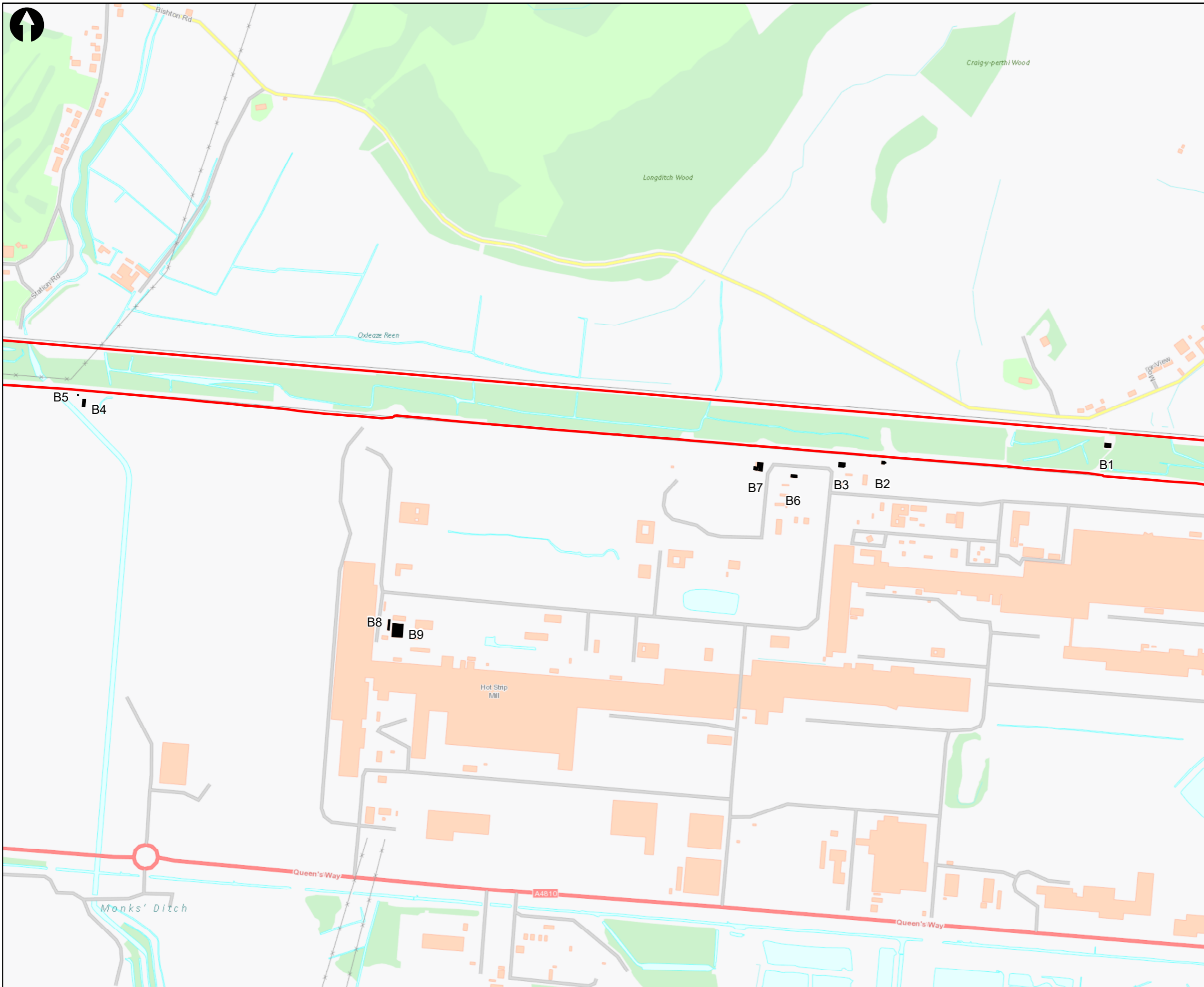
Table C. 1 Emergence / Re-entry Survey Details

Tree Number	Date	Sunrise / Sunset (BST)	Start / End Time	Temperature (°C)	Precipitation	Wind (Beaufort Scale)
27	07/08/18 (V2)	05:44 / N/A	04:14 / 06:01	14-19	Dry	0
	21/08/18 (V3)	N/A / 20:23	20:11 / 21:53	20	Dry	3
28	08/08/18 (V2)	05:45 / N/A	04:15 / 06:00	16	Dry	0
36	26/06/18 (V1)	N/A / 21:33	21:18 / 23:03	21-26	Dry	1
	26/07/18 (V2)	05:26 / N/A	03:49 / 05:43	15	Dry	1
	28/08/18 (V3)	N/A / 20:08	19:53 / 21:38	18-29	Dry	2
36a	09/08/18 (V2)	05:47 / N/A	04:17 / 06:02	15	Dry	0
	21/08/18 (V1)	N/A / 21:33	21:18 / 23:04	24-26	Dry	1-2
43	14/06/18 (V2)	N/A / 21:30	21:15 / 23:04	16	Dry	2
45	25/06/18 (V2)	N/A / 21:33	21:18 / 23:03	24	Dry	0
	18/07/18 (V3)	05:15 / N/A	03:45 / 05:30	15	Dry	0
56	12/06/18 (V2)	N/A / 21:29	21:14 / 22:59	14-18	Dry	2
	18/07/18 (V3)	05:15 / N/A	03:45 / 05:30	17-20	Dry	0
57	12/06/18 (V2)	N/A / 21:29	21:14 / 22:59	14-18	Dry	2
66	11/06/18 (V2)	N/A / 21:29	21:14 / 22:59	18-23	Dry	1-2
67	11/06/18 (V1)	N/A / 21:29	21:20 / 22:59	18-23	Dry	1-2
	20/07/18 (V4)	05:18 / N/A	03:48 / 05:33	17	Dry	1
125	29/05/18 (V2)	N/A / 21:16	21:01 / 22:46	19	Dry	1
126	29/05/18 (V2)	N/A / 21:16	21:01 / 22:46	19-21	Dry	1
130	30/05/18 (V2)	N/A / 21:17	21:02 / 22:47	19-20	Drizzle	1
139	30/05/18 (V2)	N/A / 21:17	21:00 / 22:47	19-20	Drizzle	1
160	31/05/18 (V2)	N/A / 21:18	20:45 / 22:48	19	Light rain	0
161	31/05/18 (V2)	N/A / 21:18	20:47 / 22:48	19	Light rain	0
184	19/06/18 (V1)	N/A / 21:33	21:17 / 23:15	16-17	Dry	1-4
	10/07/18 (V2)	05:06 / N/A	03:36 / 05:21	17	Dry	1
600	20/06/18 (V1)	N/A / 21:33	21:16 / 23:03	17	Dry	1
	12/07/18 (V2)	05:08 / N/A	03:38 / 05:23	21	Dry	1
	31/07/18 (V3)	N/A / 21:03	20:48 / 22:34	16-19	Dry	1
601	20/06/18 (V1)	N/A / 21:36	21:16 / 23:03	13-16	Dry	3-4
	13/07/18 (V2)	05:09 / N/A	03:39 / 05:24	17	Dry	0-1
	31/07/18 (V3)	N/A / 21:03	20:48 / 22:33	17	Dry	1-2
602	03/09/18 (V3)	N/A / 19:55	19:40 / 21:25	17-18	Dry	2
1545	26/07/18 (V2)	05:26 / N/A	03:56 / 05:41	14	Dry	1
	30/08/18 (V3)	N/A / 20:04	19:49 / 21:34	21-17	Dry	1
1624	24/07/18 (V3)	05:21 / N/A	03:51 / 05:36	20	Dry	1
1629	28/06/18 (V1)	N/A / 21:33	21:17 / 23:03	24	Dry	2-4
	19/07/18 (V2)	05:16 / N/A	03:46 / 05:31	14-16	Dry	0-1
1631	19/06/18 (V1)	N/A / 21:33	21:16 / 23:03	18-19	Dry	0-2

Tree Number	Date	Sunrise / Sunset (BST)	Start / End Time	Temperature (°C)	Precipitation	Wind (Beaufort Scale)
	11/07/18 (V2)	05:07 / N/A	03:37 / 05:22	15-16	Dry	1
	01/08/18 (V3)	N/A / 21:01	20:45 / 22:30	22	Dry	1-2
1633	27/06/18 (V1)	N/A / 21:33	21:18 / 23:03	24	Dry	1-3
	20/07/18 (V2)	05:19 / N/A	03:49 / 05:34	17	Dry	1
1633a	25/07/18 (V1)	N/A / 21:11	20:56 / 22:41	21	Dry	0-1
	10/08/18 (V2)	05:48 / N/A	04:18 / 06:03	18	Moderate rain	1
	24/08/18 (V3)	06:10 / N/A	04:44 / 06:25	11	Dry	1-2
1634	27/06/18 (V2)	N/A / 21:33	21:18 / 22:03	24	Dry	1-3
	20/07/18 (V3)	05:17 / N/A	03:47 / 05:32	16	Dry	1
1640	21/06/18 (V1)	N/A / 21:33	21:19 / 23:03	13	Dry	1
	06/07/18 (V2)	05:01 / N/A	03:30 / 05:16	18-20	Dry	1
1641	21/06/18 (V1)	N/A / 21:53	21:17 / 23:03	13-15	Dry	1
	17/07/18 (V2)	05:14 / N/A	03:44 / 05:29	15	Dry	1
	02/08/18 (V3)	05:36 / N/A	03:36 / 05:51	19	Dry	1-2
1650	25/06/18 (V1)	N/A / 21:34	21:19 / 23:04	21	Dry	1
	17/07/18 (V2)	05:14 / N/A	03:44 / 05:29	16	Dry	1
1651	14/06/18 (V2)	N/A / 21:30	21:17 / 23:30	19	Dry	3
1653	04/06/18 (V2)	N/A / 21:23	21:08 / 22:53	18-21	Dry	3
	08/08/18 (V3)	05:45 / N/A	04:15 / 06:00	18	Dry	1
1654	04/06/18 (V2)	N/A / 21:23	21:08 / 22:53	18	Dry	2
	06/07/18 (V3)	05:01 / N/A	03:30 / 05:16	16-19	Dry	0-1
	23/07/18 (V4)	N/A / 21:14	20:59 / 22:44	23	Dry	1-2
1661	05/06/18 (V1)	N/A / 21:24	21:09 / 22:54	17-19	Dry	1
	19/07/18 (V2)	05:16 / N/A	03:46 / 05:31	15-16	Dry	0
1662	02/08/18 (V2)	N/A / 20:59	20:44 / 22:29	21	Dry	1
	17/08/18 (V3)	05:59 / N/A	04:29 / 06:14	14-15	Dry	1
1667	05/06/18 (V1)	N/A / 21:24	21:09 / 22:54	19	Dry	1
	19/07/18 (V2)	05:16 / N/A	03:46 / 05:31	16	Dry	1
	09/08/18 (V3)	05:47 / N/A	04:17 / 06:02	13-17	Dry	1
1671	14/06/18 (V2)	N/A / 21:31	21:16 / 23:01	17-20	Dry	1-2
	01/08/18 (V3)	05:33 / N/A	03:55 / 05:50	15-19	Dry	1
1677	07/06/18 (V1)	N/A / 21:26	21:11 / 22:56	18	Dry	1
	03/07/18 (V2)	05:00 / N/A	03:30 / 05:15	14-17	Dry	1-2
	05/09/18 (V3)	06:29 / N/A	04:59 / 06:44	15	Dry	1
1678	29/08/18 (V2)	N/A / 20:06	19:51 / 21:36	20	Dry	1
1679	07/06/18 (V2)	N/A / 21:26	21:11 / 22:56	18	Dry	1
	05/07/18 (V3)	05:01 / N/A	03:30 / 05:16	19	Dry	1
1680	06/06/18 (V1)	N/A / 21:25	21:10 / 22:55	19	Dry	1
	05/07/18 (V2)	05:01 / N/A	03:30 / 05:16	19	Dry	0-1
1681	06/06/18 (V2)	N/A / 21:25	21:10 / 22:55	18	Dry	1
	05/09/18 (V3)	06:30 / N/A	04:50 / 06:45	15	Dry	2-3
2000	14/06/18 (V2)	N/A / 21:30	21:15 / 23:01	16-18	Dry	2
AD1	03/07/18 (V1)	05:00 / N/A	03:26 / 05:15	14	Dry	1
	14/08/18 (V2)	N/A / 20:37	20:22 / 22:07	21	Dry	1

Source: Mott Macdonald Ltd. V* = Survey Visit

D. Building Location Plan



Key to Symbols

- Survey area
- Building number



Rev	Date	Drawn	Description	ZCM	CP
P1	24/09/18	GO	For Information	ZCM	CP

M M
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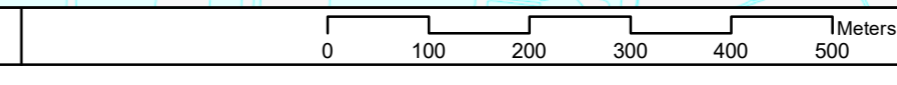
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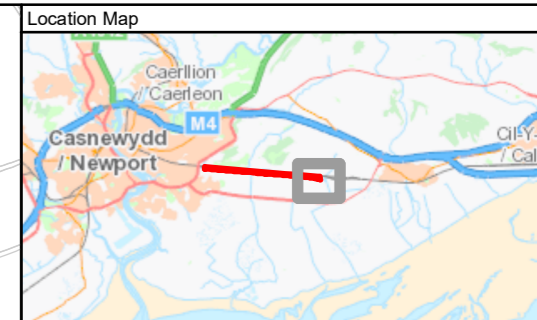
Title

South Wales Metro - Task Order 26
 Llanwnn Bat Survey
 Building Locations

Designed	A Bone	AB	Eng Check	Z Costas	ZCM
Drawn	G O'Donovan	GO	Coordination	L Woolley	LKW
GIS Check	M Hayward	MH	Approved	C Probert	CP
Scale at A3	Status	Rev	Security		
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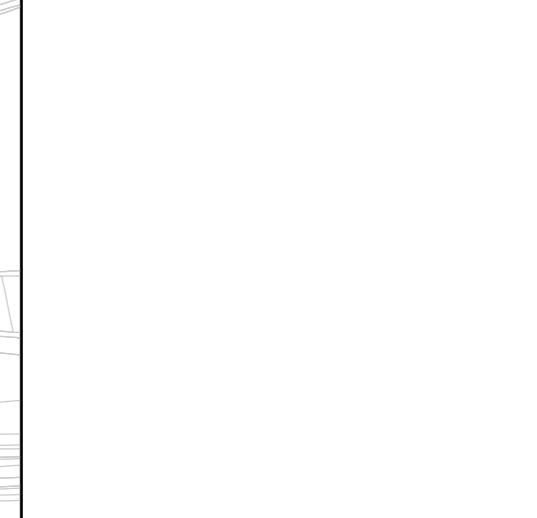


E. Manual Activity Surveys – Transect Routes



Key to Symbols

- Survey area
- - - Transects
- Transect stop points



Transect 1

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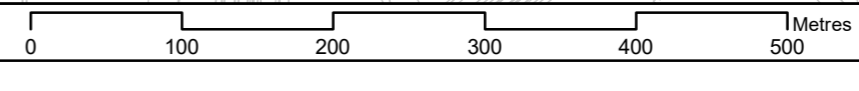
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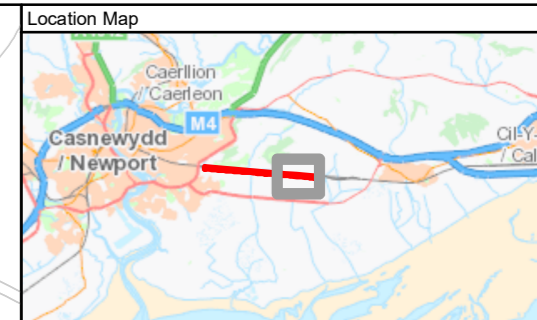
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South Wales Metro - Task Order 026
Llanwern Station - Bat Transect Map
Page 1 of 4

Designed	G Starr	GS	Eng Check	Z Costas	ZCM
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GIS Check	M Hayward	MH	Approved	C Probert	CP
Scale at A3	Status	Rev	Security		
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Key to Symbols

- Survey area
- - - Transects
- - - - Transect 3 adapted route
- Transect stop points

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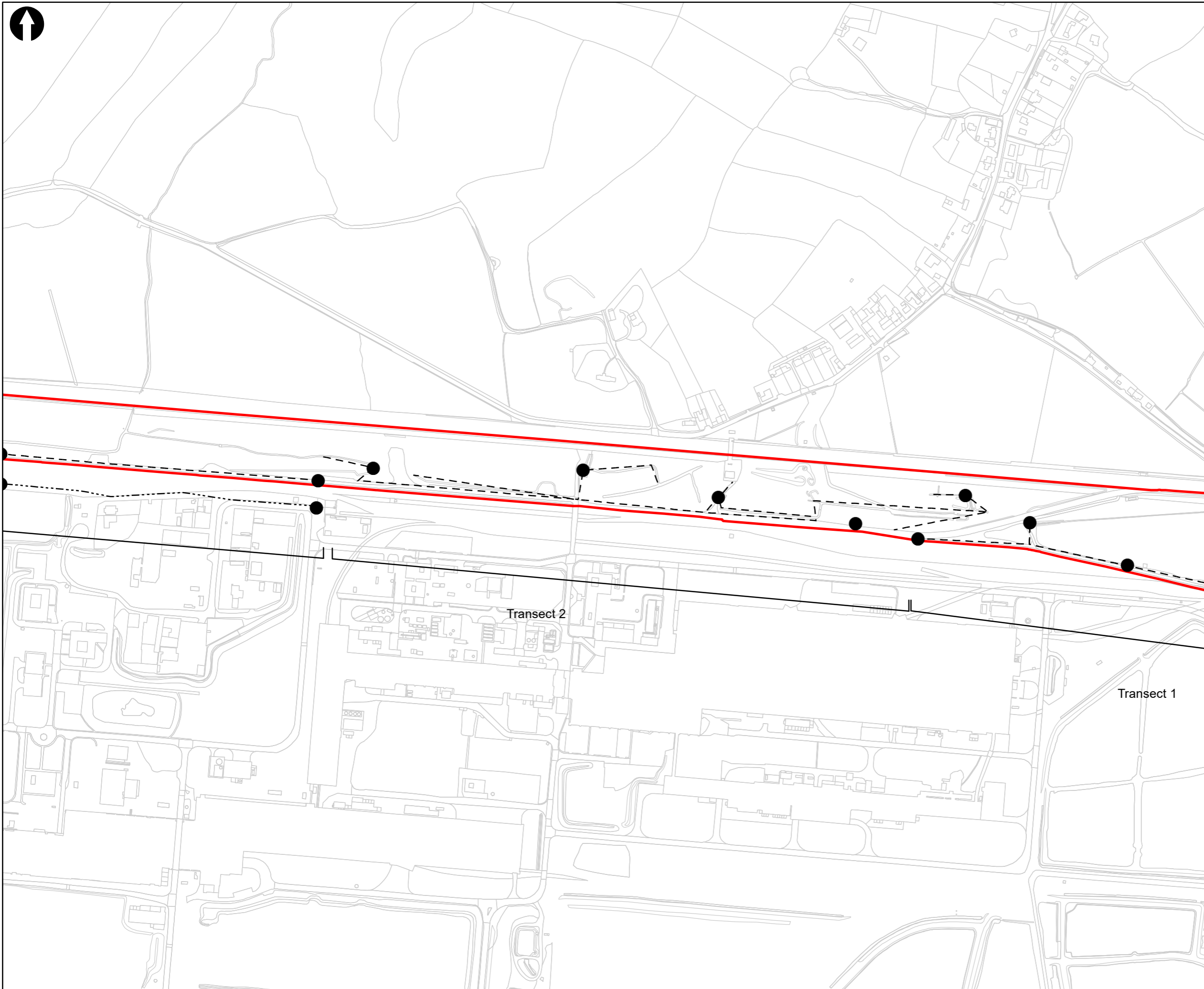
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South Wales Metro - Task Order 026
 Llanwern Station - Bat Transect Map
 Page 2 of 4

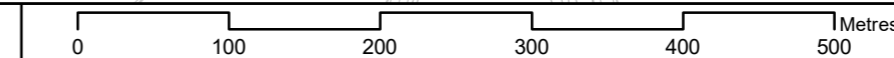
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GIS Check	M Hayward	MH	Approved	C Probert	CP

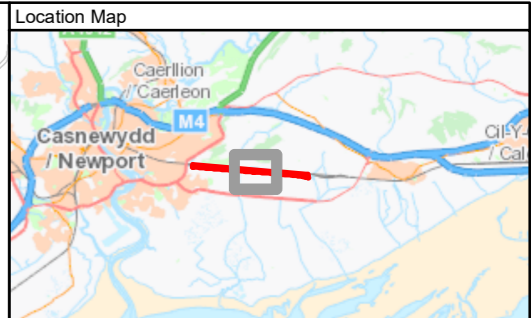
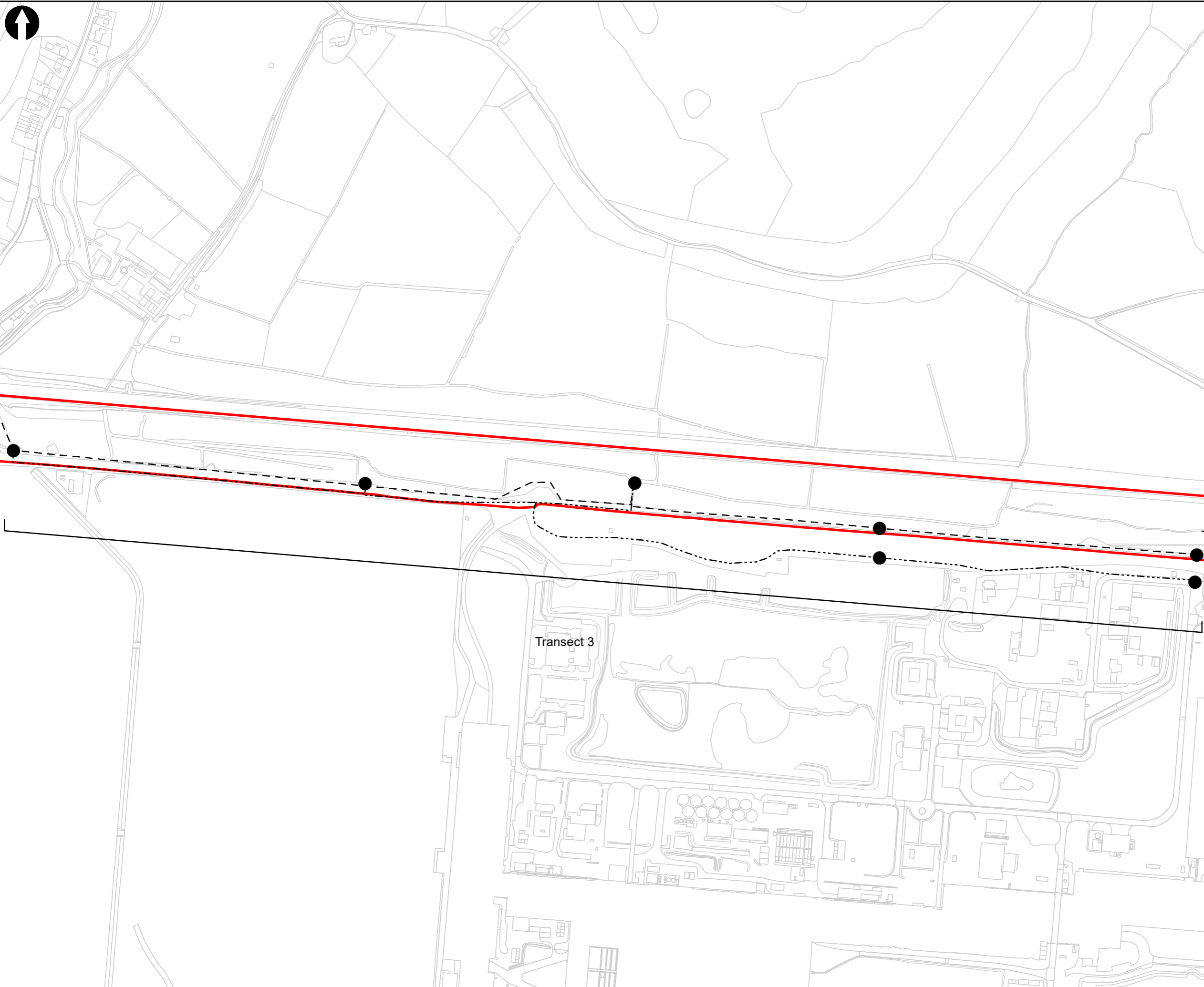
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Key to Symbols

- Survey area
- - - Transects
- - - - Transect 3 adapted route
- Transect stop points

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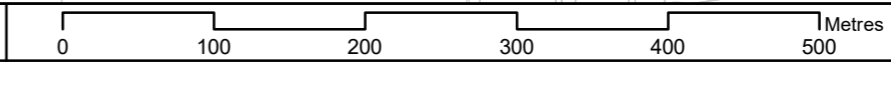
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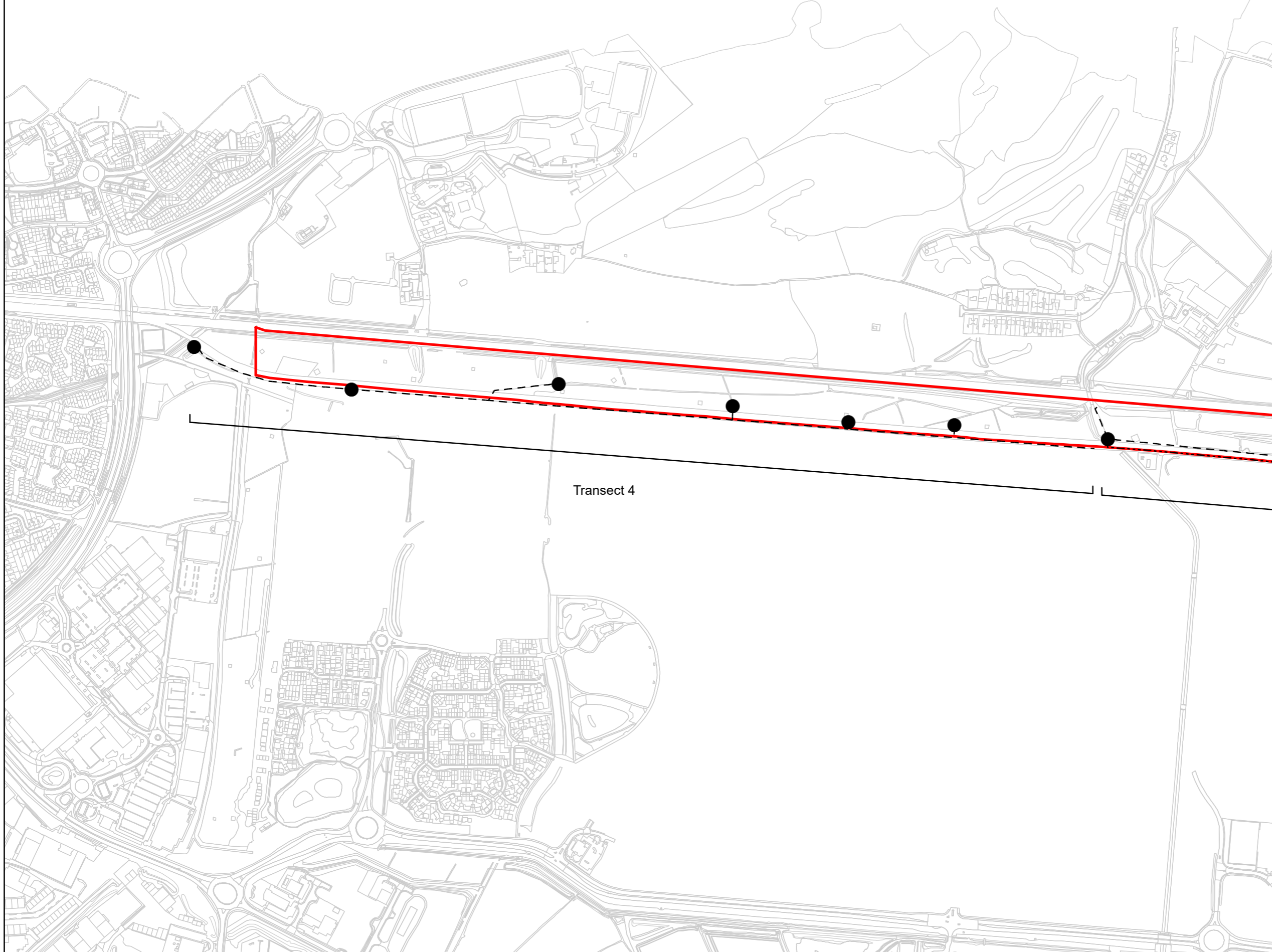
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Title

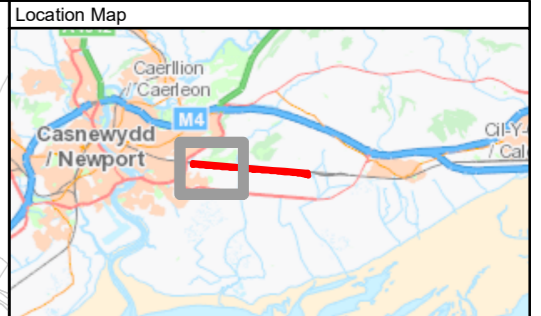
South Wales Metro - Task Order 026
Llanwern Station - Bat Transect Map
Page 3 of 4

Designed	G Starr	GS	Eng Check	Z Costas	ZCM
Drawn	G O'Donovan	GO	Coordination	L Woolley	LKW
GIS Check	M Hayward	MH	Approved	C Probert	CP
Scale at A3	Status	Rev	Security		
1:5,000	INF	P1	STD		





Transect 4



Key to Symbols

- Survey area
- - - Transects
- - - - Transect 3 adapted route
- Transect stop points

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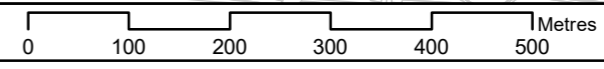
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 United Kingdom

Title

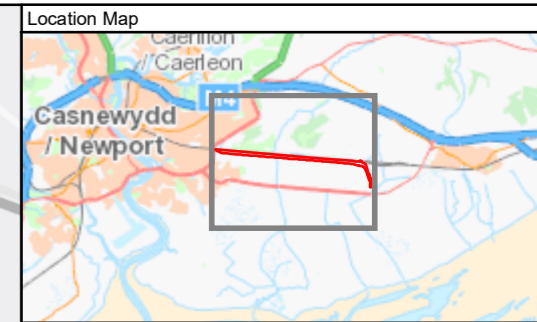
South Wales Metro - Task Order 026
 Llanwern Station - Bat Transect Map
 Page 4 of 4

Designed	G Starr	GS	Eng Check	Z Costas	ZCM
Drawn	G O'Donovan	GO	Coordination	L Woolley	LKW
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Scale at A3	Status	Rev	Security
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Drawing Number			
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F. Automated Activity Survey – Static Detector Locations



Key to Symbols

- Survey area
- Static bat detector locations
- Static bat detector direction

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Title

South Wales Metro - Task Order 026
 Llanwern Station - Static Bat
 Detector Locations

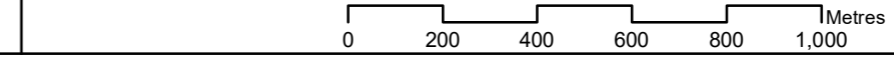
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GIS Check	M Jones	MJ	Approved	C Probert	CP

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G. Automated Activity Survey – Weather Conditions

Table G.1. Automated Activity Survey – Weather Conditions


Date	Location	Sunrise Time	Sunset Time	Sunset/ Sunrise Temperature (°C)	Precipitation	Beaufort Scale	Comments
18/07/18	A - H	05:15	21:19	17 / 23	Light	4	Consistent rain
19/07/18	A - H	05:16	21:18	17 / 17	Light	4	Consistent rain
20/07/18	A - H	05:18	21:17	13 / 16	Heavy	4	Consistent rain, heaviest just before dawn
21/07/18	A - H	05:19	21:15	16 / 13	Light	4	Consistent rain
22/07/18	A - H	05:20	21:14	13 / 14	Dry	2	
25/08/18	A - H	06:13	20:13	14 / 17	Dry	2	
26/08/18	A - H	06:14	20:11	14 / 17	Dry	2	
27/08/18	A - H	06:16	20:08	13 / 19	Dry	2	
28/08/18	A - H	06:17	20:06	14 / 16	Dry	3	
29/08/18	A - H	06:19	20:04	17 / 13	Dry	3	Dry at both dawn and dusk
14/09/18	A - H	06:45	19:28	9 / 10	Light / dry	4	Light rain at dawn but dry at dusk
15/09/18	A - H	06:46	19:25	8 / 12	Light	3	Consistent rain
16/09/18	A - H	06:48	19:23	8 / 11	Light	2	Consistent rain
17/09/18	A - H	06:49	19:21	9 / 16	Dry	3	Dry through the night
18/09/18	A - H	06:51	19:18	9 / 13	Dry	3	Dry at dawn and dusk
19/09/18	A - H	06:53	19:16	8 / 13	Dry	2	
14/10/18	A - H	07:34	18:20	16 / 16	Light / dry	2	Light rain just before dawn but otherwise dry
15/10/18	A - H	07:35	18:17	15 / 15	Dry	3	
16/10/18	A - H	07:37	18:15	17 / 15	Light / dry	4	Light rain during night
17/10/18	A - H	07:39	18:13	13 / 13	Light / dry	4	Light rain just before dusk
18/10/18	A - H	07:41	18:11	11 / 12	Light / dry	3	Light rain at dawn
18/04/18	A - H	06:09	20:13	12 / 16	Dry	4	
19/04/18	A - H	06:07	20:15	10 / 11	Light / dry	3	Light rain just before sunset
20/04/18	A - H	06:05	20:16	10 / 10	Light / dry	3	Dry for both dawn and dusk
21/04/18	A - H	06:03	20:18	10 / 16	Moderate	3	Scattered showers
22/04/18	A - H	06:01	20:20	11 / 9	Dry	4	



Date	Location	Sunrise Time	Sunset Time	Sunset/ Sunrise Temperature (°C)	Precipitation	Beaufort Scale	Comments
22/05/18	A - H	05:10	21:07	12 / 17	Dry	2	
23/05/18	A - H	05:08	21:08	11 / 18	Dry	3	
24/05/18	A - H	05:07	21:10	12 / 13	Light / dry	3	Light rain at dusk but dry at dawn
25/05/18	A - H	05:06	21:11	12 / 13	Dry	2	Dry overnight
26/05/18	A - H	05:05	21:12	13 / 20	Heavy	4	Thundershowers especially at dusk
12/06/18	E, G, H	04:54	21:29	12 / 17	Dry	2	
13/06/18	E, G, H	04:53	21:29	14 / 15	Light / dry	3	Light rain just before sunset
14/06/18	E, G, H	04:53	21:30	15 / 13	Dry	4	
15/06/18	E, G, H	04:53	21:30	12 / 13	Dry	3	
16/06/18	E, G, H	04:53	21:31	13 / 14	Light / dry	4	Dry at dusk but light rain at dawn
18/06/18	A - D, F	04:53	21:32	14 / 16	Light	5	Consistent light rain
19/06/18	A - D, F	04:53	21:32	15 / 17	Light / dry	4	Dry dusk but light rain at dawn
20/06/18	A - D, F	04:53	21:32	15 / 14	Dry	3	Dry at both dawn and dusk
21/06/18	A - D, F	04:53	21:33	8 / 14	Dry	3	
22/06/18	A - D, F	04:54	21:33	7 / 14	Dry	3	



Source: Mott Macdonald Ltd.



H. Tree Assessments Surveys Results



Table H.1 Tree Assessment Survey Results



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1	Crack willow (<i>Salix fragilis</i>)	01/08/2017	High	Low	Vertical cracks; Broken stems; Lifted bark; and Tree of substantial size/age/structure which may contain PRFs.	<p>A vertical split is present at ground level which faces north and leads 1m up into the trunk of the tree. The PRF is smooth and clean inside but is open and does not lead to any cavities.</p> <p>The tree was downgraded to low potential following endoscopic surveys.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
2	Willow sp. (<i>Salix</i> sp.)	01/08/2017	Moderate	High	Woodpecker holes; Rot holes; Lifted bark; Callus Roll and Tree of substantial size/age/structure which may contain PRFs.	<p>Multiple woodpecker holes are present facing west at around 3m off the ground as well as a callus roll which is 5m off the ground facing north. Higher up the trunk at 15m on the south facing side the bark is loose. The above PRFs were found to be damp or containing rotten organic material and are unsuitable for bats. However, a rot hole exists on the west facing side where a branch has broken off creating a cavity that leads upwards into the trunk. The cavity is very dry, sheltered and dark; so has high suitability.</p> <p>The tree was upgraded to high potential following tree climbing surveys.</p>	
3	Willow sp.	01/08/2017	Low	N/A	Rot holes; Broken stems; and Lifted bark.	<p>Most of the features present on the dead willow tree contain damp and rotten organic material. The tree has transitional potential only.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
4	Willow sp.	01/08/2017	Low	Moderate	Vertical cracks; Rot holes; and Lifted bark.	<p>Two rot holes are present, one is at 11m high which faces south, while the other is 10m off the ground and faces in various directions. Woodpecker holes are also present 12m off the ground facing both east and north-west, which create a large cavity linked by multiple holes. However, the cavity is open and exposed. A callus roll is also present at 7m high facing west. The cavity is dry but does not lead anywhere and is too small to be suitable for a bat to roost in. The lower PRFs are damp and contain rotten organic material whilst the features higher up the tree may provide limited suitability.</p> <p>The tree was upgraded to moderate potential following tree climbing surveys.</p>	
5	Willow sp.	01/08/2017	Low	N/A	Lifted bark; and Tree of substantial size/age/structure which may contain PRFs.	<p>There are areas of lifted bark high up the trunk of the tree, which may provide limited transitional suitability.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
6	Poplar sp. (<i>Populus</i> sp.)	01/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	There are small areas of dense ivy cover at the top of the tree which could be hiding PRF's.	
7	Poplar sp.	01/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
8	Poplar sp.	01/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
9	Poplar sp.	01/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
10	Poplar sp.	01/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
11	Poplar sp.	01/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
12	Poplar sp.	01/08/2017	Low	N/A	Thicker ivy vines (>50mm); and Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
13	Poplar sp.	01/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
14	Aspen (<i>Populus tremula</i>)	01/08/2017	Moderate	Low	Thicker ivy vines (>50mm); Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats. The trunk of the tree is in good condition with no cracks or splits present. The tree was downgraded to low potential following a tree climbing survey.	
15	Aspen	01/08/2017	Moderate	Low	Thicker ivy vines (>50mm); Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats. The trunk of the tree is in good condition with no cracks or splits present. The tree was downgraded to low potential following a tree climbing survey.	


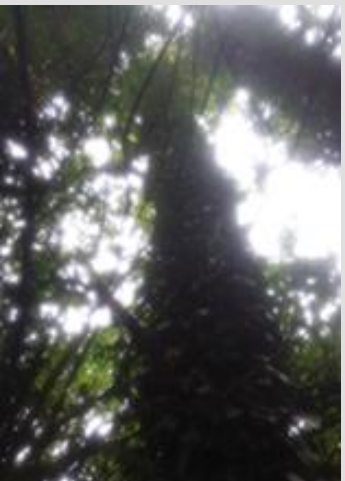
Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
16	Poplar sp.	01/08/2017	Low	N/A	Thicker ivy vines (>50mm); Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
17	Common hawthorn (<i>Crataegus monogyna</i>)	01/08/2017	Moderate	Negligible	Thicker ivy vines (>50mm); Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats. The trunk of the tree is in good condition with no cracks or splits present. The tree was downgraded to negligible potential following a tree climbing survey.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
18	Aspen	01/08/2017	Low	N/A	Thicker ivy vines (>50mm); Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
19	Crack willow	01/08/2017	Moderate	Low	Rot holes; Lifted bark; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	There is dense ivy covering the trunk of the tree in places, creating crevices which are open and exposed making them unsuitable for bats. Cracks are also present within the bark of the tree. These, however, do not lead anywhere or create cavities that could be used by bats. The tree was downgraded to low potential following a tree climbing survey.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
20	Poplar sp.	01/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
21	Poplar sp.	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
22	Willow sp.	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
23	Aspen	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
24	Poplar sp.	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
25	Poplar sp.	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
26	Mountain pine (<i>Pinus mugo</i>)	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
27	Willow sp.	02/08/2017	Moderate	High	Knot holes; Vertical cracks; Horizontal cracks; Lifted bark; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	The tree has multiple trunks with woodpecker holes within the northern stem that are 9m off the ground, face east and are 5cm in diameter. Two cavities are also present within the trunk at 4m and 4.3m high which face west, as well as a split at 10m high where the stem has broken off. All the PRF's are dry and sheltered. They are highly likely to be used by bats. The tree was upgraded to high potential following a tree climbing survey.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
28	Willow sp.	02/08/2017	High	Moderate	Rot holes; Knot holes; Vertical cracks; Lifted bark; and Tree of substantial size/age/structure which may contain PRFs.	<p>A small open cavity is present within the trunk of the tree, 2m off the ground facing north-west, which would be suitable for one bat to use as a roost. Higher up the tree there is a woodpecker hole which is 5cm in diameter and leads upwards into the trunk which also has good suitability for bats.</p> <p>The tree was downgraded to moderate potential following a tree climbing survey.</p>	
29	Aspen	02/08/2017	Low	N/A	<p>Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs</p>	<p>Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
30	Aspen	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
31	Aspen	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
32	Aspen	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
33	Aspen	02/08/2017	Low	N/A	Rot holes; Hazard beams; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	The PRF's towards the base of the tree were found to be damp, shallow and contained rotten organic material. Ivy vines also cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
34	Aspen	02/08/2017	Moderate	Low	Rot holes; Vertical cracks; and Tree of substantial size/age/structure which may contain PRFs.	<p>There is a small cavity within a branch that is 5cm in diameter and 10m off the ground, facing south. The cavity is too open and exposed and is unsuitable for bats.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
35	Wych elm (<i>Ulmus glabra</i>)	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	<p>Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
36	Aspen	02/08/2017	Moderate	Confirmed	Thicker ivy vines (>50mm); Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Substantial ivy covers the trunk creating crevices behind the thick stems all around tree, particularly on the bottom of the north-facing side of the trunk. This tree was confirmed as a roost, see Appendix K for details.	
36a	Poplar sp.	11/05/18	Moderate	N/A	Ivy cover – may be obscuring other features	Substantial ivy cover with thick stems covering the trunk in all directions, creating crevices suitable for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
36b	Unknown Dead	11/05/18	Low	N/A	Vertical Crack	A dead fallen tree which is lying horizontally with a 40cm long crack running along the trunk, facing north. The crack is large and dry inside but is open and airy from the south side making it too exposed for bats to use as a roost.	
37	Aspen	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
38	Birch sp. (Betula sp.)	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
39	Aspen	02/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
40	Aspen	02/08/2017	Low	N/A	Rot holes; Knot holes; Vertical cracks; Lifted bark; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Cavities exist in the lower part of the trunk which point downwards so are unlikely to support bats. Ivy vines also cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
41	Aspen	03/08/2017	Low	N/A	Vertical cracks; and Tree of substantial size/age/structure which may contain PRFs.	There are vertical cracks within the trunk of the tree which leading downward facing cavities which are unlikely to support bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
42	Aspen	03/08/2017	Low	N/A	Rot holes; Knot holes; and Tree of substantial size/age/structure which may contain PRFs.	A branch wound is present 5m off the ground facing north-west, alongside rot holes within the lower part of the trunk. Features lower down the trunk were found to be shallow and to contain rotten organic material following endoscopy. It is unlikely that the PRF's would be used by bats.	
43	Aspen	03/08/2017	Moderate	Negligible	Rot holes; and Tree of substantial size/age/structure which may contain PRFs.	<p>There is a closed wound within the trunk which is approximately 6m high and is south facing. On the same side of the trunk a rot hole is also present which is 5.5m off the ground and is 5cm in diameter. The rot hole leads upwards into the trunk forming a dry and sheltered cavity that has moderate suitability for bats.</p> <p>The tree was downgraded to negligible potential following a tree climbing survey.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
44	Aspen	03/08/2017	Moderate	Low	Rot holes; and Tree of substantial size/age/structure which may contain PRFs.	<p>A wound exists within the trunk of the tree which is approximately 8m high on the north-facing side of the tree, which is 80cm by 10cm in size. Woodpecker holes are also present on the north facing side. The cavities are exposed and are not deep enough to be suitable for use by bats.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
45	Willow sp.	03/08/2017	High	N/A	Rot holes; Hazard beams; Horizontal cracks; Vertical cracks; Lifted bark; Butt rot/root rot; and Tree of substantial size/age/structure which may contain PRFs.	<p>The tree contains several PRF's which start at ground level and finish at approximately 8m high. A basal rot cavity is present at ground level which faces north-east, is dry and extends over 1m vertically into the trunk. A wound is also present within a branch 5m off the ground facing south, which is 3cm in diameter. The cavity is smooth and dry on the inside but is very narrow. Both PRF's are highly suitable for bats and likely to be used as a roost. There is an additional PRF at 8m high which does not lead anywhere so unsuitable.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
46	Willow sp.	03/08/2017	Moderate	N/A	Rot holes.	A rot hole is present 1.7m off the ground, which extends 0.5m into the trunk. The feature is smooth on the inside and is free from organic material.	
47	Willow sp.	03/08/2017	Low	N/A	Butt rot / root rot.	Root rot has created a cavity in the base of the trunk which extends 0.4m inwards. There is evidence to suggest the cavity is being used by birds.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
48	Willow sp.	03/08/2017	Low	N/A	Vertical cracks; and Horizontal cracks.	Narrow hazard beams and vertical splits are present within the trunk of the tree however, they do not lead to suitable cavities for bats.	
49	Sycamore (<i>Acer pseudoplatanus</i>)	03/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
50	Turkey oak (<i>Quercus cerris</i>)	03/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
51	Sycamore	03/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
52	Sycamore	03/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
53	Sycamore	03/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
54	Sycamore	03/08/2017	Low	N/A	Rot holes; and Double leaders.	Rot holes are present within the trunk of the tree, 30cm from the ground. The features were endoscoped upon initial assessment and found to be deep but contain rotten organic material.	
55	Willow sp.	03/08/2017	Low	N/A	Butt rot/root rot; Vertical cracks; and Tree of substantial size/age/structure which may contain PRFs.	Root rot in the base of the tree forms a vertical crack that leads 30cm up into the trunk. The feature contains damp, rotten organic material and is unlikely to be suitable for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
56	Willow sp.	03/08/2017	Moderate	High	Rot holes; Hazard beams; Vertical cracks; Horizontal cracks; and Tree of substantial size/age/structure which may contain PRFs.	<p>A large split is present within the trunk of the tree at 4m high, alongside multiple smaller cavities and crevices. None of which lead to a suitable cavity, as they are all too shallow or exposed to have any potential for bats. A cavity within the trunk at 0.5m high facing south, extends upwards into the trunk which is dry and sheltered. There are smaller cavities leading off the main cavity, which has high suitability for bats to use as a roost.</p> <p>The tree was upgraded to high potential following a tree climbing survey.</p>	
57	Willow sp.	03/08/2017	Moderate	N/A	Woodpecker holes; Rot holes; Lifted bark; and Tree of substantial size/age/structure which may contain PRFs.	<p>The willow tree contains several PRF's which start at 2m off the ground, where a trunk cavity in the form of a round hole is present on the south facing side. This leads to a sheltered, narrow cavity that extends downwards into a branch. A branch cavity also exists on the westward facing side of the tree at 3.5m high, which extends horizontally each way from the opening, it is dry but also exposed. Another cavity is also present on the South facing side of the trunk at 9m high, however it is shallow and does not lead to a suitable cavity or crevice.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
58	Willow sp.	04/08/2017	Moderate	Low	Rot holes; Broken stems; and Tree of substantial size/age/structure which may contain PRFs.	<p>A fallen tree laying horizontally, with a trunk cavity present at 0.4m off the ground. The cavity appears to be smooth inside and free from organic material, however, it is semi exposed to the weather due to a gap in the top, which limits its suitability.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
59	Douglas Fir (<i>Pseudotsuga menziesii</i>)	04/08/2017	Low	N/A	Rot holes; Vertical cracks; Broken stems; Lifted bark; and Tree of substantial size/age/structure which may contain PRFs.	<p>There are vertical cracks and rot holes within the trunk of the tree, which all appear to be too shallow to be suitable for bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
60	Willow sp.	04/08/2017	Confirmed	N/A	Vertical cracks; and Tree of substantial size/age/structure which may contain PRFs.	Bat droppings were found within the vertical split in the trunk during the initial assessment. The droppings are likely to be pipistrelle sp., for details see Appendix K. the PRF's are smooth on the inside and free from organic material.	
61	Willow sp.	04/08/2017	High	N/A	Rot holes; and Vertical cracks.	A branch wound is present 3m high on the north east facing side of the trunk. The features are smooth on the inside and free from organic material.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
61b	Crack willow	23/07/18	Confirmed	N/A	Vertical Crack; and Brocken Stems.	A vertical crack is present within the base of the trunk, it is 1.5m in length and 0.5m off the ground. A broken branch also exists further up the tree. Bat droppings were found during the first survey and were sent off for DNA analysis, see Appendix K for details.	
62	Willow sp.	04/08/2017	High	Confirmed	Hazard beams; Vertical cracks; Horizontal cracks; and Tree of substantial size/age/structure which may contain PRFs.	There is a deep vertical crack from ground level to 1.5m high, which forms multiple apexes. There is a cavity at the top of the crack which leads up into the trunk. The sides of the crack are smooth and the cavity is free from organic material, which makes the feature highly suitable for bats. Large amounts of bat droppings were found inside the cavity during the first survey. During the second survey fresh droppings were observed, with older droppings observed during the third survey. The droppings were sent off to Swift ecology for DNA analysis, for details see Appendix K.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
63	Willow sp.	04/08/2017	Low	N/A	Hazard beams; and Tree of substantial size/age/structure which may contain PRFs.	A hazard beam is present within a branch of the tree, it is shallow, open and exposed so considered to have negligible potential for bats.	
64	Sycamore	04/08/2017	Moderate	Low	Rot holes; and Vertical cracks.	<p>A 2m long vertical crack runs up the trunk of the tree, this crack extends 200mm upwards into the tree trunk. The PRF is smooth inside but contains lots organic damp material inside. A very small hole was also found which is large enough for one bat to use, but it is unlikely as it is damp and the entrance is cluttered.</p> <p>The tree was downgraded to low potential following endoscopy.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
65	Aspen	04/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
66	Aspen	04/08/2017	Moderate	N/A	Rot holes; Woodpecker holes; and Broken stems.	Trunk cavity 5m off the ground facing west and 4cm in length. The cavity is shallow and dry but full of cobwebs, which cover the entrance, suggesting low potential for bats. Woodpecker holes 5m off the ground facing north and 5cm in diameter. One dry and sheltered cavity from a rotted woodpecker hole is used by small birds for nesting, active with 10 eggs. There are multiple rot holes and woodpecker holes at the top of the tree which are exposed and rotten with negligible potential.	




Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
67	Willow sp.	04/08/2017	Moderate	High	Rot holes; Broken stems; and Tree of substantial size/age/structure which may contain PRFs.	Lower features were shallow or contained damp or rotten organic material. Rot holes and hazard beams higher up could not be reached and may have potential. Potential bat droppings were found on the inside of cavity during the second survey, however these were confirmed to be pygmy shrew (<i>Sorex minutus</i>).	
68	Sycamore	09/08/2017	Low	N/A	Ivy cover- may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
69	White willow (<i>Salix alba</i>)	09/08/2017	High	Moderate	Horizontal cracks; Other hollows; and Ivy cover - may be obscuring other features	<p>This tree is multi-stemmed. A rot hole is located at the base of the trunk which leads to small cavities and crevices facing north and 60cm in size. Tree was endoscoped and found to be free from rotten organic material. Ivy covers the tree in all directions, thick stems creating crevices underneath which are suitable for bats. A split within the tree trunk, 1m off the ground facing west and 1m in length, has some suitability for transitional roosting in crevice at the top where it is more sheltered.</p> <p>The tree was downgraded to Moderate potential following endoscopic surveys.</p>	
70	Crack willow	09/08/2017	Low	N/A	Ivy cover - may be obscuring other features	<p>Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
71	Willow sp.	09/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
72	Turkey oak	09/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
73	Crack willow	09/08/2017	Low	N/A	Lifted barks; and Ivy cover – may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats. There are also small areas of lifted bark, but do not create suitable crevices for bats.	
75	Willow sp.	09/08/2017	Moderate	Low	Horizontal cracks; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Vertical split in branch goes at least 400mm into the trunk. Very dense ivy cover and complicated tree structure likely to be hiding features. The tree was downgraded to low potential following a tree climbing survey.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
76	Willow sp.	09/08/2017	Low	N/A	Ivy cover – may be obscuring other features; Thicker ivy vines (>50mm); and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
77	Common hawthorn	09/08/2017	Low	N/A	Ivy cover – may be obscuring other features; Thicker ivy vines (>50mm); and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines do not create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
78	Common hawthorn	09/08/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
79	Common hawthorn	09/08/2017	Low	N/A	Ivy cover- may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
80	Common elder (<i>Sambucus nigra</i>)	09/08/2017	Low	N/A	Ivy cover- may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
81	Unknown Dead	09/08/2018	Moderate	Low	Rot Holes	<p>Rot hole in dead tree, in dense woodland, that extends approximately 0.5m up into the trunk. Slight odour of bat near feature.</p> <p>The tree was downgraded to low potential following endoscopy.</p>	
83	Aspen	09/08/2017	Low	N/A	Broken stems.	<p>One snapped limb identified approximately 8m from ground.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
84	Poplar sp.	09/08/2017	Low	N/A	Vertical cracks; and Lifted bark.	Cankers and lifted bark identified on tree trunk.	
85	Poplar sp.	09/08/2017	Low	N/A	Vertical cracks; and Lifted bark.	Cankers and lifted bark identified on tree trunk.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
86	Poplar sp.	09/08/2017	Low	N/A	Vertical cracks.	Double leader.	
86a	Poplar sp.	09/08/2017	Low	N/A	Vertical cracks; and Lifted bark.	Tree behind 86, could not be accessed/tagged due to dense vegetation. Tree contained a canker and lifted bark.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
87	Poplar sp.	09/08/2017	Low	N/A	Horizontal cracks; and Lifted bark.	Lifted bark and canker approximately 12m up trunk of tree.	
88	Unknown Dead	09/08/2017	Low	N/A	Vertical cracks; Horizontal cracks; and Tree of substantial size/age/structure which may contain PRFs.	Features endoscoped, contained damp organic material.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
91	Poplar sp.	10/08/2017	Low	N/A	Vertical cracks.	Canker.	
92	Poplar sp.	10/08/2017	Low	N/A	Vertical cracks; and Broken stems.	Branch wound on north-east side of the trunk.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
93	Crack willow	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
94	Willow sp.	10/08/2017	Moderate	Low	Rot holes; Vertical cracks; Broken stems; Lifted bark; and Ivy cover - may be obscuring other features.	Limbs have rot holes and lifted bark. The tree was downgraded to low potential following a tree climbing survey.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
95	Willow sp.	10/08/2017	Low	N/A	Rot holes; Hazard beams; Vertical cracks; Horizontal cracks; Double leaders; and Tree of substantial size/age/structure which may contain PRFs.	PRFs generally damp and shallow. If these were drier they could be used transitionally.	
96	Willow sp.	10/08/2017	Moderate	Low	Rot holes; Lifted bark; and Ivy cover - may be obscuring other features.	Lifted bark around a rotten branch leads to a complex cavity, however, quite exposed. Branch cavity 3m off ground facing north very small quite exposed, light through ivy covering top of cavity. Trunk cavity 0.5m off ground facing north-west. Small cavity with birds' nest in bottom extending slightly downwards. Ivy cover on secondary trunk could be obscuring further features. The tree was downgraded to low potential following a tree climbing survey.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
97	Sycamore	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
98	Sycamore	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
99	Sycamore	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
100	Crack willow	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
101	Willow sp.	10/08/2017	Low	N/A	Rot holes; and Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats. Small cankers.	
102	Crack willow	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
103	Crack willow	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
104	Pine sp. (<i>Pinus</i> sp.)	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
105	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
106	Unknown	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	




Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
107	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
108	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
109	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
110	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
111	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
113	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	


Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
114	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
115	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	


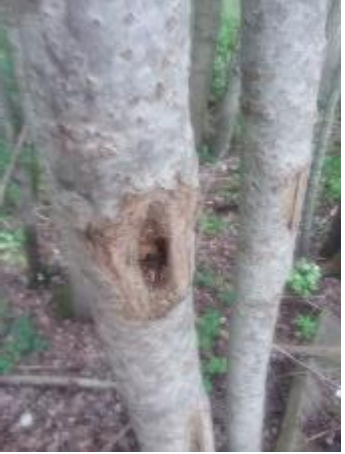
Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
116	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
117	Pine sp.	10/08/2017	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
118	Willow sp.	10/08/2017	Moderate	Low	Rot holes	<p>Two rot holes on the lower portion of the tree trunk. Both features extend approximately 400mm into the trunk. One rot hole is free from damp and organic material; the other is not.</p> <p>The tree was downgraded to low potential following endoscopy.</p>	
119	Crack willow	10/08/2017	Moderate	Negligible	Hazard beams; and Broken stems	<p>Large open split 10m off ground facing in all directions around the tree. All crevices exposed with no cavities.</p> <p>The tree was downgraded to negligible potential following a tree climbing survey.</p>	
120	Willow sp.	10/08/2017	High	N/A	Rot holes; Hazard beams; Vertical cracks; Horizontal cracks; Broken stems; and Other hollows and cavities	<p>Multiple complex cavities are present within the trunk of the tree, which are deep and are free from damp and organic material.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
121	Unknown	10/08/2017	Moderate	Low	Vertical cracks; and Broken stems	<p>The trunk of this tree has snapped and blown over. Trunk cavity 6m high facing south. It is quite open, partly sheltered and dry but evidence of bird nesting on ledge 15cm deep. There is a split 12m high at top of the trunk facing upwards. This makes it very exposed with no cavities or crevices so not suitable.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
122	Willow sp.	10/08/2017	High	Low	Woodpecker holes; and Broken stems	<p>This tree's trunk has snapped leading to a potential cavity from the split. The split is 12m high facing south, 4cm long 8cm deep large and mostly open. There is one small cavity within that is semi exposed so low potential. Woodpecker hole 10m high facing north 3cm diameter at top of trunk. This hole goes all the way through to other side of trunk so very exposed and not suitable.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
123	Crack willow	10/08/2017	Low	N/A	Vertical cracks; and Tree of substantial size/age/structure which may contain PRFs.	Vertical split appears sealed. Rot present further up the trunk of the tree.	
124	Crack willow	10/08/2017	High	Low	Vertical cracks.	Large fallen trunks have created a split. This split is 10m off ground facing upwards 12cm long and quite exposed to the weather. Knot hole is 8m high facing south, 5cm diameter and 4cm deep. This faces slightly upwards and filled with water so weather exposure makes it unsuitable for bats. The tree was downgraded to low potential following a tree survey.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
125	Crack willow	10/08/2017	High	N/A	Rot holes; Knot holes; and Vertical cracks.	<p>Features at a lower height were endoscoped and found to contain damp and rotten organic material. There were more features located higher up the tree that could not be endoscoped. There are two rot holes where a branch has fallen, 10m off ground facing north. These were very shallow and exposed but dry, however, don't lead back very far. A split 10m high facing south-west was 7cm deep in trunk with a cavity hole at the top leading upwards into the tree. This was very sheltered and enclosed, and although containing some organic material it is still moderately suitable for a small number of bats. There is a 20m high split at the top of the tree but too small and exposed to be suitable. There was a hole 9m high going back into the tree where a branch split. This feature was open and exposed with evidence of birds nesting. A callus roll 5m off the ground facing south-east, 2cm deep, didn't lead anywhere and was not suitable. A cavity 1m off ground facing east, 50cm by 30cm, and 40cm deep into the trunk, was dry inside and leads upwards into a further narrow cavity with high potential for bats. Another cavity in the trunk was 1m high facing north with some crevices. These were rotting and small so mostly unsuitable.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
126	Crack willow	11/08/2017	Moderate	Low	Vertical cracks.	<p>Rot holes form vertical splits. These are located too high to endoscope but appear to be free from organic material.</p> <p>The tree was downgraded to low potential following a tree climbing survey and emergence / re-entry survey.</p>	
127	Common elder	11/08/2017	Moderate	Low	Rot holes; and Vertical cracks.	<p>Canker in small tree. Narrow cavity was free from organic material when endoscoped.</p> <p>The tree was downgraded to low potential following endoscopy.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
128	Unknown Dead	11/08/2017	Low	N/A	Tree of substantial size/age/structure which may contain PRFs.	Hazard beam is too open to have significant potential but there may be other features obscured by dense vegetation.	
129	Aspen	11/08/2017	Low	N/A	Ivy cover- may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
130	Crack willow	11/08/2017	Low	Moderate	Rot holes.	<p>A branch cavity 15m off ground facing west was 6cm in diameter, shallow and exposed. A trunk cavity 6m off the ground facing west was 1m long by 3cm wide and 20cm deep. This long narrow crack in the trunk had crevices behind bark and is suitable for one bat. This is a likely transitional roost.</p> <p>The tree was upgraded to moderate potential following a tree climbing survey.</p>	
131	Common elder	11/08/2017	Low	N/A	Lifted bark.	<p>Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
132	Oak sp. (<i>Quercus</i> sp.)	11/08/2017	Low	N/A	Butt rot/root rot; and Other hollows and cavities.	PRFs identified at ground level contained rotten organic material and tree sap.	
133	Willow sp.	16/11/17	Confirmed	N/A	Vertical cracks; Horizontal cracks; and Lifted bark.	Old droppings were found in vertical split. Splits were endoscoped and found to be a maximum of 150mm deep but were dry and free from organic material. Likely to be a transitional roost – no hibernation potential as too shallow. Bat droppings found during the initial assessment of the tree were sent off to Swift ecology for DNA analysis, which came back as a soprano pipistrelle.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
134	Willow sp.	16/11/2017	Moderate	Low	Horizontal cracks.	<p>Two hazard beams present on tree. One could be reached from ground level and was endoscoped. This was found to be dry, free from organic material, deep and enclosed enough to have potential to support a single bat / a small number of roosting bats.</p> <p>The tree was downgraded to low potential following endoscopy.</p>	
135	Willow sp.	16/11/2017	Confirmed	N/A	Hazard beams.	<p>Hazard beam endoscoped and found to be shallow but free from organic material. Bat droppings were found during the initial assessment of this tree. It is considered that the droppings identified are likely to indicate a transitional roost. The droppings were sent off to Swift ecology for DNA analysis and were confirmed as serotine droppings. Historic bat droppings were found during the first survey. Whilst a single fresh dropping was found on the final survey.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
136	Willow sp.	16/11/2017	Low	N/A	Vertical cracks.	Roll in trunk forms apex 200mm in depth. A small amount of rotten organic material was found inside cavity when endoscoped.	
137	Polar sp.	04/12/2017	Low	N/A	Vertical cracks.	There is a small vertical split into the trunk, which is approximately 10cm deep and is free from damp and rotten organic material. However, the feature is too shallow for bats to use as a roost.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
138	Sycamore	06/12/2017	Low	N/A	Ivy cover- may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
139	Poplar sp.	04/12/2017	Moderate	N/A	Vertical cracks.	There is a vertical split in trunk 5m above the ground facing north and south which is 1.2m by 3cm and 30cm deep. The split forms a trunk cavity after ending on one side at the top.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
140	Poplar sp.	04/12/2017	High	Low	Vertical cracks.	<p>There are two splits on the trunk. A split on the left-hand side is substantial and leads into the hollow trunk. This split is 6m off the ground facing east and west which is 1m in length and goes through middle of trunk straight through to the other side. This means it's quite exposed so not suitable as a crevice for bats. Another split in trunk is healed and does not lead anywhere. There is a feature approximately 6m above ground which cannot be reached and was thought to have hibernation potential but upon closer inspection it was later downgraded to low.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
141	Poplar sp.	04/12/2017	Confirmed	N/A	Other hollows and cavities	<p>Bat droppings were found during the initial assessment of the tree. The droppings were sent off to Swift ecology for DNA analysis and confirmed as serotine droppings. Pipistrelle droppings were found in small gaps going into a historic wound. This is likely to be a transitional roost but without hibernation potential.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
142	Sycamore	05/12/2017	Low	N/A	Rot holes; and Other hollows and cavities	Small rot holes and roll back located 10m from ground.	
143	Poplar sp.	11/08/2017	Low	N/A	Ivy cover- may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
144	Aspen	11/08/2017	Low	N/A	Ivy cover- may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
145	Turkey oak	11/08/2017	Low	N/A	Ivy cover- may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	Lower PRFs are deemed to have negligible potential following endoscopy. Features further up the tree may be hidden by ivy cover.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
146	Unknown Dead	11/08/2017	Low	N/A	Rot holes; Vertical cracks; Lifted bark; and Tree of substantial size/age/structure which may contain PRFs	Lower PRFs are deemed to have negligible potential following endoscopy. There may be some unseen features from the ground.	
147	Poplar sp.	11/08/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
148	Poplar sp.	11/08/2017	Low	N/A	Ivy cover- may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
151	Poplar sp.	04/12/2017	Low	N/A	Ivy cover – may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
152	Poplar sp.	04/12/2017	Low	N/A	Ivy cover – may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
153	Poplar sp.	04/12/2017	Low	N/A	Other hollows and cavities	Several roll backs and cankers were too high up the trunk of the tree to see if they lead anywhere.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
154	Poplar sp.	04/12/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
155	Pedunculate oak (<i>Quercus robur</i>)	05/12/2017	Moderate	Negligible	Knot holes; Horizontal cracks; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	There is a crack and rot hole 5m off ground facing west. Neither features lead anywhere. Knot hole and horizontal crack are located approximately 4m from the ground. No other features, tree was in good condition. The tree was downgraded to negligible potential following a tree climbing survey.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
156	Willow sp.	05/12/2017	Low	N/A	Ivy cover- may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
157	Pedunculate oak	05/12/2017	Low	N/A	Rot holes; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Dense ivy may be hiding features. Roll backs located higher up the tree and do not appear to go anywhere.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
158	Sycamore	06/12/2017	Low	N/A	Other hollows and cavities; Lifted bark; and Ivy cover – may be obscuring other features	Lifted bark leads into a small cavity approximately 5m high on the trunk of the tree.	
159	Common alder (<i>Alnus glutinosa</i>)	05/12/2017	Low	N/A	Rot holes	Roll back located approximately 10m above ground.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
160	Pedunculate oak	05/12/2017	High	Moderate	<p>Knot holes; Vertical cracks; Other hollows and cavities; Lifted bark; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs</p>	<p>There is a branch cavity 7m off ground facing north, 3cm deep and quite exposed and dry. Other crevices in branch are very exposed and wet so unsuitable for bats. Multiple knot holes at various heights and directions don't lead anywhere and are unsuitable for bats. Very thick ivy stems create crevices near to the top but still quite small and only suitable for transitional roosting.</p> <p>The tree was downgraded to moderate potential following a tree climbing survey.</p>	
161	Sycamore	05/12/2017	Moderate	High	<p>Rot holes; Other hollows and cavities; and Ivy cover – may be obscuring other features</p>	<p>There is a trunk cavity 8m off the ground facing east, 4cm long 18cm deep. This cavity leads upwards into trunk and is very dry and sheltered. It was created where a branch broke off.</p> <p>The tree was upgraded to high potential following tree climbing and emergence / re-entry surveys.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
162	Sycamore	05/12/2017	Moderate	Low	Vertical cracks; and Lifted bark	<p>A trunk cavity is present, that is 6m off the ground facing west. The cavity is 1m long and 5cm wide. The long and narrow cavity is also deep but is open and too exposed for bats to use the feature as a roost.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
163	Sycamore	05/12/2017	Low	N/A	Other hollows and cavities	<p>There are several roll backs within the trunk of the tree at 6m high, that do not appear to lead to a cavity. Therefore, they are unsuitable for use by bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
164	Poplar sp.	05/12/2017	Low	N/A	Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
165	Sycamore	06/12/2017	Low	N/A	Other hollows and cavities; and Ivy cover – may be obscuring other features	Roll back located 7m off the ground within the trunk of the tree, however, it does not appear to lead to a suitable cavity. There are also ivy vines covering the trunk in all directions which could be hiding PRF's. The vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
166	Sycamore	05/12/2017	High	Low	Rot holes	<p>The tree contains brown rot with multiple rot holes leading into the trunk of the tree and has bat odour near the feature.</p> <p>The tree was downgraded to low potential following endoscopying.</p>	
167	Sycamore	06/12/2017	Moderate	Low	Knot holes; Hazard beams; Vertical cracks; and Ivy cover – may be obscuring other features	<p>A split is present 10m off the ground, facing both north and south. The split is open and exposed. There is a rot hole within the branch which creates a small crevice but does not lead to a cavity. The PRF could potentially be used as a transitional roost but it is unlikely. There is also light ivy cover along the trunk of the tree which could be hiding PRF's, however the vines are not dense enough to create suitable crevices.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
168	Turkey oak	06/12/2017	Low	N/A	Ivy cover – may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
169	Poplar sp.	06/12/2017	Low	N/A	Horizontal cracks; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	A fallen tree lying over a reed with multiple splits along the trunk. The splits contain organic material so are unlikely to be used by bats. There are also ivy vines covering the trunk in all directions which could be hiding PRF's. However, the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
170	Sycamore	06/12/2017	Low	N/A	Knot holes; and Ivy cover – may be obscuring other features	Small knot holes are present at the top of the tree that are likely too small for bats and do not appear to lead to a cavity.	
171	Sycamore	06/12/2017	Moderate	Negligible	Rot holes; and Vertical cracks.	<p>There is a rot hole that leads to a roll back where a scar is present on the trunk. This is open and doesn't lead anywhere so unsuitable for bats. There is a rot hole that leads into a roll back, located approximately 10m above ground. It appears the roll back is deep.</p> <p>The tree was downgraded to negligible potential following a tree climbing survey.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
172	Sycamore	06/12/2017	Low	N/A	Other hollows and cavities	There is a roll back 10m off the ground within the trunk of the tree, that does not appear to lead to a cavity.	
173	Willows sp.	06/12/2017	Low	N/A	Ivy cover – may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
174	Sycamore	06/12/2017	Moderate	Negligible	Rot holes; and Hazard beams.	<p>There is a rot hole 6m off the ground facing east, 5cm long and 3cm wide 0.5cm deep. It is open and doesn't lead anywhere so unsuitable. The hazard beam is large in comparison to the trunk size and located approximately 5m above ground. There is a rot hole at the same height on the trunk.</p> <p>The tree was downgraded to negligible potential following a tree climbing survey.</p>	
175	Sycamore	06/12/2017	Low	N/A	Ivy over – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs.	<p>Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
176	Sycamore	06/12/2017	Moderate	Low	Rot holes; Other hollows and cavities; and Ivy cover – may be obscuring other features.	<p>There is a branch cavity 10m off ground facing north, 30cm long and 20cm deep. The cavity in the dead part of tree is open both sides and too small / exposed at the top. A roll back is located approximately 7m up the tree facing north. There are also several rot holes on the southern facing side of the trunk.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
177	Sycamore	06/12/2017	Low	N/A	Ivy cover- may be obscuring other features.	<p>Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
178	Sycamore	06/12/2017	Low	N/A	Ivy cover- may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	
179	Sycamore	06/12/2017	Low	N/A	Ivy cover- may be obscuring other features.	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
180	Sycamore	06/12/2017	Low	N/A	Rot holes		
181	Sycamore	06/12/2017	Moderate	Low	Rot holes; Vertical cracks; and Horizontal cracks.	<p>There is a rotten branch wound 2.5m off the ground which leads to a cavity which is open at both ends, exposed and damp therefore has low suitability for bats. Another cavity is present within a dead branch at 4m high which is also open and unsuitable for bats. There are rot holes in roll backs further up the tree.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
182	Pedunculate oak	06/12/2017	Low	N/A	Vertical cracks; Other hollows and cavities; and Ivy cover – may be obscuring other features	The trunk contains multiple splits which were found to be shallow, following endoscopy. There are also branch wounds higher up the tree which also appear to be shallow so have limited potential for bats.	
183	Willow sp.	06/12/2017	Low	N/A	Horizontal cracks; Other hollows and cavities; and Lifted bark	There are multiple vertical splits, roll backs and areas of lifted bark. The lower features contain damp and rotten organic material making them unsuitable for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
184	Birch sp.	06/12/2017	Moderate	N/A	Double leaders between overlap stems branches; and Ivy cover – may be obscuring other features	Double leaders form hollows between the trunks, which are covered in a lattice of thicker ivy vines that could potentially form crevices suitable for bats.	
185	Sycamore	06/12/2017	Low	N/A	Rot holes; Vertical cracks; Other hollows and cavities; and Lifted bark	A roll back is present within the trunk of the tree as well as a vertical split and rot holes higher up the trunk. All of which do not lead to suitable cavities and have low potential to support bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
186	Sycamore	06/12/2017	Low	N/A	Rot holes	A rot hole is present within the trunk of the tree, which is 6m off the ground. The hole appears to be shallow and has limited suitability for bats.	
187	Sycamore	06/12/2017	Low	N/A	Rot holes; Vertical cracks; and Ivy cover – may be obscuring other features	The ivy is possibly hiding a vertical crack into a rot hole approximately 8m above ground.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
188	Pedunculate oak	06/12/2017	Low	N/A	Rot holes; and Lifted bark	This tree has brown rot. Several rot holes appear shallow and there is a lot of peeling bark present.	
190	Willow sp.	16/01/2018	Low	N/A	Vertical cracks and splits		



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
191	Willow sp.	16/01/2018	Low	N/A	Double leaders		
192	Alder	16/01/2018	Low	N/A	Hazard beam	<p>A hazard beam is present within a branch, 2m off the ground. The cavity is shallow and so has limited potential to support bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
193	Willow sp.	16/01/2018	Low	N/A	Lifted bark		
194	Unknown	16/01/2018	Low	Negligible	Hazard beam	<p>A hazard beam exists within a branch of the tree which is 1m off the ground, the crack is shallow and does not lead to a suitable cavity.</p> <p>The tree was downgraded to negligible potential following endoscopy.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
195	Willow sp.	16/01/2018	High	Low	Vertical splits; and Butt rot/root rot.	<p>A narrow pipe-like cavity is present within a branch of the tree, 2m off the ground facing west. The cavity extends for 60cm into the branch but does not lead into anything else.</p> <p>The tree was downgraded to low potential following endoscopy.</p>	
196	Willow sp.	16/01/2018	Moderate	Low	Trunk wound	<p>A large cavity exists in the base of the tree but there is also a large crack in the trunk which exposes the cavity. It is damp inside and exposed to light. Because of this the cavity has limited suitability for bats.</p> <p>The tree was downgraded to low potential following endoscopy.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
197	Willow sp.	16/01/2018	Moderate	N/A	Rot holes	Rot hole at the base of the tree extends 500mm into the tree trunk.	
198	Willow sp.	16/01/2018	Moderate	N/A	Butt rot/root rot	Butt rot in the base of the tree forms two apices which both extend over 400mm into the trunk of the tree. The cavities are free from damp and inorganic material.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
199	Willow sp.	16/01/2018	Moderate	Negligible	Hazard beams	<p>There are hazard beams in this small tree, approximately 500mm off the ground.</p> <p>The tree was downgraded to negligible following endoscopying.</p>	
201	Sycamore	16/01/2018	Low	N/A	Rot holes; and Vertical cracks and splits	Roll backs on the tree trunks generally shallow.	


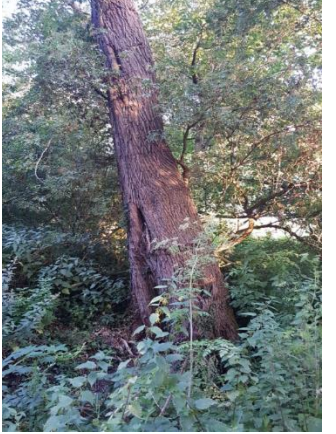
Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
202	Willow sp.	16/01/2018	Moderate	Low	Vertical cracks and splits	<p>There is a rot hole into a slanted trunk about 500mm in depth. Clean on the inside.</p> <p>The tree was downgraded to low potential following endoscopying.</p>	
203	Ash (<i>Fraxinus excelsior</i>)	16/01/2018	Low	N/A	Thicker ivy vines (>50mm); and ivy cover – may be obscuring other features	<p>Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
204	Poplar sp.	19/01/2018	Moderate	N/A	Callus roll	There is a callous roll 1m off the ground facing east and a scar on the bottom of the tree. A small hole at top of this leads upwards in the trunk to a narrow cavity which extends 600mm into trunk.	
204a	Poplar sp.	02/05/2018	Low	N/A	Vertical Cavity	There is a trunk cavity 3m off the ground facing south, 5cm in diameter. A large scar and callus roll with excluded bark extends upwards into cavity. At 1.5m the cavity is quite exposed due to crack and large woodpecker hole at the top. This makes it quite light inside. The cavity extends upwards past a woodpecker hole just little bit.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
205	Pedunculate oak	19/01/2018	High	Low	Rot holes; Knot holes; Vertical cracks; Horizontal cracks; Broken stems; Butt rot/root rot; Other hollows and cavities; and Tree of substantial size/age/structure which may contain PRFs	<p>This tree has multiple branch wounds and tears, rot holes and splits at various heights. There is basal rot leading upwards into a cavity, 0.3m high 40cm wide facing east, but it's very wet inside and not suitable for bats. Split branches on the tree have small cracks but no suitability for bats because they do not create cavities or crevices. There are knot holes facing various directions and different sizes all over the tree. These are all very shallow and not suitable. Loose bark all over trunk but the underneath is too exposed for bats. Butt rot also extends into the base of the tree.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
206	Poplar sp.	19/01/2018	Low	N/A	Other hollows and cavities	<p>Canker approximately 10m up the trunk of the tree.</p>	


Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
207	Willow sp.	19/01/2018	Moderate	N/A	Rot holes	Rot holes extends 200mm into the trunk of the tree and are free from damp and organic material.	
209	Willow sp.	19/01/2018	Low	N/A	Rot holes; Vertical cracks; Horizontal cracks; and Lifted bark	Some lifted bark and rot at the base of the tree. Likely transitional potential only.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
210	Poplar sp.		Low	N/A	Horizontal cracks; and Other hollows and cavities	Cankers do not lead anywhere, however, visibility was impaired by a train. It is likely it points downwards therefore letting water in.	
211	Willow sp.		Low	N/A	Rot holes	There are several small rot holes, some of which extend into the tree but are dirty and damp.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
600		15/5/18	High	N/A	Trunk Cavity	<p>Fallen tree which is adjacent to a ree, with a split and rot creating cavities, found to be complex, with smaller crevice's and cavities inside after endoscopy. Main cavity is 1m off the ground and facing east, with potential smaller cavities facing west. Emergence surveys were therefore required.</p>	
601	Crack Willow	15/5/18	High	Confirmed	Trunk Cavity	<p>This tree's cavities were found to be complex after endoscopy, and emergence surveys were required.</p> <p>This tree was confirmed as a roost, see Appendix K for details.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
602	Crack Willow	06/08/18	Confirmed	N/A		<p>Fallen tree adjacent to the ree, with a large vertical split running from the base of the tree up the trunk. Feature faces south-east. Bat droppings were found during the first survey which was carried out on the 06/08/2018.</p>	
1545	Poplar sp.	26/06/2018	Moderate	Confirmed	Rot Hole	<p>A semi mature poplar tree with a rot hole 5m off the ground facing south.</p> <p>This tree was confirmed as a roost, see Appendix K for details.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1622	Crack Willow	16/05/2018	Low	N/A	Broken Stems	Tree is climbable however access is restricted due to dense scrub. Snapped branch with potential cavity, facing north-west. Restricted access limits visibility.	
1623	Crack Willow	16/05/2018	Low	N/A	Vertical Hollows or Cracks	Tree is climbable; however, access is restricted due to dense scrub and bramble. There is a vertical crack facing south, 3m off the ground. Hard to tell whether the feature goes into the trunk.	


Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1624	Crack Willow	16/05/2018	Moderate	Confirmed	Woodpecker Holes	<p>There is a woodpecker hole 5m high facing south-east. The entrance is very open with a small cavity that goes downwards so is full of water with no potential for bats.</p> <p>There is a rot hole 5m high facing south-east which is 10cm in diameter and 20cm deep making a cavity that extends upwards very dry and sheltered. A ripped branch created a rot hole 4m high facing south and doesn't lead anywhere. There are three woodpecker holes facing south, 3m off the ground. One is a very large hole, the other two are half formed. Bat droppings were found at the back of the cavity during the second survey.</p>	
1625	Crack Willow	16/05/2018	Moderate	N/A	Vertical Hollows or Cracks	<p>There is a large vertical crack facing south, 15m off the ground. Could not be endoscoped from the ground and would require climbing. There is a trunk cavity 10m high facing east and crack forms crevice on both sides of a branch which leads slightly upwards.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1626	Unknown Dead	16/05/2018	Low	N/A	Lifted Bark	Standing dead wood, cannot be climbed. There is lifted bark all around the trunk.	
1627	Unknown Dead	16/05/2018	Low	N/A	Lifted Bark	Standing dead wood tree and lifted bark all around the trunk. Cannot be climbed.	


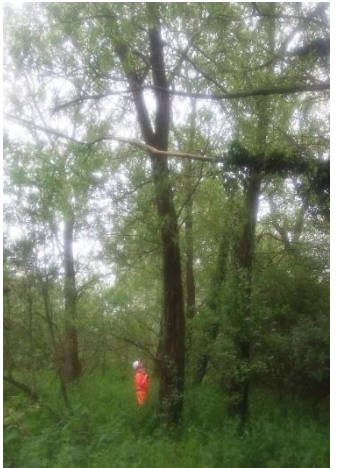
Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1628	Crack Willow	16/05/2018	Low	N/A	Broken Stems; and Vertical Hollows or Cracks	Could not be endoscoped from the ground, would require climbing. There is a very large crack where a branch has snapped off the trunk, around 20m off the ground, with a potential cavity. Second broken branch with a horizontal split at ground level but does not lead anywhere.	
1629	Unknown Dead	16/05/2018	Moderate	N/A	Woodpecker Holes; Vertical Hollows or Cracks; and Broken Stems	Standing partially dead tree, unsuitable for climbing. Large cavity facing north-west roughly 3m off the ground. There is a woodpecker hole facing south and 4m off the ground.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1630	Silver Birch (<i>Betula pendula</i>)	16/05/2018	Low	N/A	Woodpecker Holes	Healed crack with a woodpecker hole inside the crack facing north-west, 6m off the ground. Could not be endoscoped from the ground.	
1631	Unknown Dead	16/05/2018	High	N/A	Rot holes; Broken Stems; and Lifted Bark	Could not be endoscoped from the ground. There is standing deadwood with lifted bark in places and a snapped trunk. Two very large holes face south-west, 2m off the ground. This tree has potential for owls.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1632	Silver Birch	16/05/2018	Moderate	N/A	Woodpecker Holes	Woodpecker hole facing south-east roughly 20m off the ground.	
1633	Silver Birch	16/05/2018	Moderate	N/A	Broken Stems; Lifted Bark; Vertical Hollows or Cracks; and Horizontal Hollows or Cracks	Fallen tree that is not be able to be climbed. A large snap in the trunk with limited visibility to be able to see if it leads anywhere. There is lifted bark around the crack.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1633a	Silver Birch	28/06/2018	High	Confirmed	Woodpecker Hole	<p>There is a woodpecker hole facing south-east, 18m high. There is another woodpecker hole 15m high facing south with 5cm diameter, going back 10cm creating a very dry and sheltered cavity.</p> <p>This tree was confirmed as a roost, see Appendix K for details.</p>	
1633b	Willow sp.	18/06/2018	Moderate	N/A	Vertical Cavity	<p>A cavity in willow tree was endoscoped from the ground. This cavity extends upwards 10cm and creates a good, narrow crevice suitable for very small numbers of bats. The crevice was full of cobwebs and pollen restricting access and suggesting not in use.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1634	Silver Birch	16/05/2018	Moderate	Confirmed	Woodpecker Holes	<p>There is a large woodpecker hole facing west roughly 10m off the ground. There is a second woodpecker hole facing South which extends into a 25/35cm cavity that goes upwards and downwards respectively. The cavity was very dry inside. Staining was noted underneath the feature during the first survey which was carried out on the 04/06/2018.</p> <p>This tree was confirmed as a roost, see Appendix K for details.</p>	
1634a	Willow sp.	04/05/2018	Moderate	N/A	Trunk Cavity	<p>There is a basal trunk rot cavity approximately 1m off the ground facing north-west. This extends back 10-15cm and extends upwards approximately 45cm. The crevice is dry inside with moos around the outside.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1635	Crack Willow	04/05/2018	Moderate	Low	Lifted Bark; Broken Stems; Woodpecker Holes; and Vertical Hollows or Cracks	<p>There is a healed vertical crack facing east and two woodpecker holes within the healed crack. The crack is roughly 7m in length and the woodpecker holes are 4m of the ground. Lifted bark is also present at the top of the crack. Crack does not lead anywhere. Woodpecker holes are 4cm diameter and don't lead anywhere. Loose bark at top of scar in trunk very open and exposed not suitable.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
1636	Crack Willow	16/05/2018	Moderate	Low	Woodpecker Holes	<p>Two woodpecker holes are present at 8m and 7m off the ground, facing south. The higher one is 4cm diameter and the lower one is 10cm in diameter. The higher one creates a small cavity but is very exposed and has a second hold through the bottom of the branch. The lower has a cavity which is extends downwards from a branch split containing an empty birds nest.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	

Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1637	Crack Willow	16/05/2018	Low	N/A	Substantial Ivy Cover; and Broken Stems	There are two broken branches snapped off on the north side of the tree, but substantial ivy cover is limiting visibility. Lifted bark also visible on the west side of the tree and on the broken branches.	
1638	Crack Willow	16/05/2018	Moderate	Low	Woodpecker Holes	<p>There is a woodpecker hole which faces south-east about 7m off the ground located next to a cracked limb. This feature is 5cm in diameter and extends upwards and downwards. The woodpecker hole was found to be full of mould and therefore downgraded to low potential.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	


Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1639	Crack Willow	16/05/2018	Low	N/A	Vertical Hollow or Crack	There is a vertical crack facing west, which is 6m off the ground. The crack has mostly healed except for a small section on the side. There is a second vertical crack facing east, 3m in length which has mostly healed with a small gap at the top.	
1640	Crack Willow	16/05/2018	Moderate	N/A	Vertical Hollow or Crack	Long vertical crack roughly 1m in length facing north and 3m off the ground.	


Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1641	Unknown Dead	16/05/2018	High	N/A	Vertical Hollow or Crack; Woodpecker Holes; Lifted Bark; and Rot Holes	There is lifted bark on all sides. There is a woodpecker hole facing south-east 5m off the ground. There are rot holes facing north roughly 2.5m off the ground.	
1642	Wych Elm	16/05/2018	Moderate	Low	Horizontal Hollow or Crack	Two horizontal hollows, one facing east the other north-west. One leads to a cavity. The tree was downgraded to low potential following endoscopy.	


Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1643	Willow sp.	16/05/2018	Low	N/A	Rot Holes	There is a rot hole 5m high facing south. Hard to tell whether the feature goes in from ground level.	
1644	Crack Willow	16/05/2018	Moderate	Confirmed	Horizontal Hollow or Crack	Two horizontal splits, one facing north the other facing south. These are 1.5m off the ground. Droppings were found during the second survey on the 23/07/2018. The droppings were sent off to Swift ecology for DNA analysis, which came back as a soprano.	

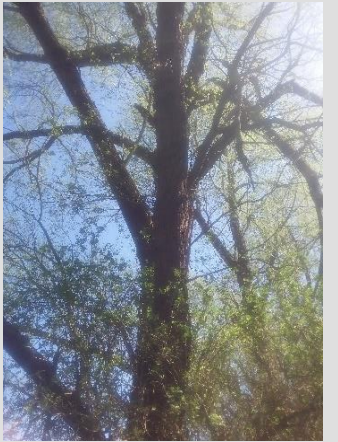

Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1645	Crack Willow	15/05/2018	Moderate	N/A	Horizontal Hollow or Crack	There is a horizontal crack 2m from the ground facing north.	
1646	Field Maple (<i>Acer campestre</i>)	15/05/2018	Moderate	Low	Broken Stems	<p>There is a tear out, 2.5m from the ground facing east.</p> <p>The tree was downgraded to low potential following endoscopy.</p>	


Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1647	Sycamore	15/05/2018	Low	N/A	Rot Holes	A rot hole is present 4m off the ground facing south. The feature does not appear to lead to a suitable cavity.	 A vertical photograph showing a sycamore tree trunk in a forest. The tree has a prominent rot hole in its trunk, which is the subject of the survey entry. The surrounding forest is lush with green foliage.

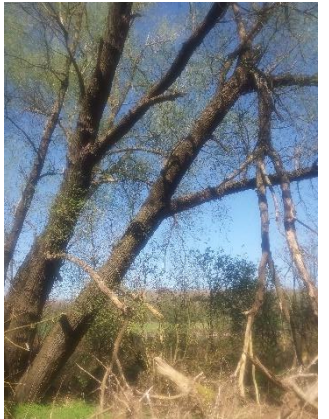
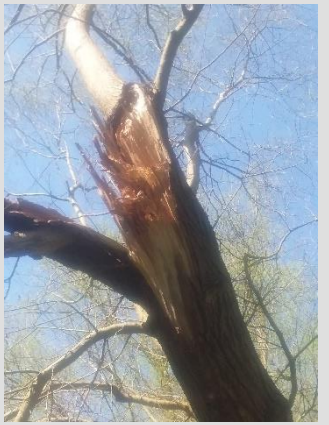
Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1648	Sycamore	15/05/2018	Low	N/A	Rot Holes; and Vertical Hollow or Crack	A vertical crack is present within a broken branch, which is facing skywards, letting rain water into the crack. The crack is 10m high facing south-west. A rot hole is also present at 8m high facing north-west. However, this PRF does not appear to lead to a suitable cavity or crevice.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1649	Common Alder (<i>Alnus glutinosa</i>)	15/05/2018	Low	N/A	Ivy Cover	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1650	Cherry sp. (<i>Prunus</i> sp.)	15/05/2018	Moderate	N/A	Lifted Bark; and Horizontal Hollows or Cracks	The bark is lifted on both the south-west and south-east facing sides of the trunk. A cavity is also present facing south-east at 4m high.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1651	Crack willow	19/04/18	Low	High	Broken stems	<p>Four separate branch cavities exist at 2m, 4m, 12m and 15m off the ground facing various directions. Two lack suitable crevices or cavities. The one at 15m has a hollow branch cavity linked by multi entrance, moderate potential small crack but allows a small amount of sun and rain in. The one at 12m faces south and has a cavity which leads up the branch from the entrance. This is very dry and sheltered with high bat potential. A basal cavity at ground level facing north is 30cm in diameter deep dry and well sheltered. There is a knot hole 15m off the ground facing south which is very sheltered and suitable for small number of bats (likely one due to small opening).</p> <p>The tree was upgraded to high potential following a tree climbing survey.</p>	
1652	Crack willow	19/04/18	High	Confirmed	Vertical cracks; and Lifted bark	<p>Fallen tree over a wet area, with a large split at the base of the trunk. A large cavity is present 1m off the ground and facing south-west. Lifted bark is also present 1.5m off the ground and facing skywards. During the second survey a single dropping was found inside the hollow on 12/06/2018. The droppings were sent off to Swift ecology for DNA analysis and confirmed as serotine droppings.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1653	Crack willow	19/04/18	Moderate	High	Woodpecker holes; and Broken stems	<p>The tree has multiple PRF's. There is a woodpecker hole facing south, 18m from the ground and 6cm in diameter. It is 5cm deep dry and sheltered, suitable for 1 bat but has grass growing out of it showing its unlikely to be used. There is a knot hole 17m off the ground facing east. It is 8cm in diameter and creates a cavity that goes into tree and upwards. It is sheltered and contained dry bird droppings. There is a callus roll 17m off the ground facing east, 6cm in diameter and goes back into the tree creating a sheltered area with high potential for one bat. Branches are also split where they have broken off the trunk, 4m and 6m off the ground and facing east. These have negligible potential because they don't lead anywhere and are too exposed. A trunk cavity is also present, 6m high and facing east. The large cavity in trunk contained a large honey bee nest making it unsuitable but worth noting it would be suitable when bees aren't present.</p>	
						<p>The tree was upgraded to high potential following a tree climbing survey.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1654	Crack willow	19/04/18	Moderate	Confirmed	Broken stems; Lifted bark; and Tree of substantial size/age/structure which may contain PRFs	<p>One old dropping was found on the bark underneath the entrance to the cavity during the first survey which was carried out on the 30/04/2018.</p> <p>This tree was confirmed as a roost, see Appendix K for details.</p>	
1655	Crack willow	19/04/18	Low	Negligible	Vertical cracks; and Tree of substantial size/age/structure which may contain PRFs	<p>There is a fresh split present where the trunk has broken off at 10m high, the opening of which faces upwards potentially allowing rain water to enter and does not lead anywhere.</p> <p>The tree was downgraded to negligible potential following a tree climbing survey.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1656	Crack willow	19/04/18	Moderate	Low	Vertical cracks	<p>Splits are present within a broken branch which is 10m off the ground and facing West, however the cracks are small and exposed. There is also lifted bark along the trunk which is 8m off the ground facing south.</p> <p>The tree was downgraded to low potential following a tree climbing survey.</p>	
1657	Unknown	19/04/18	Low	N/A	Vertical cracks; and Lifted bark	Fallen tree with splits and lifted bark up the trunk.	


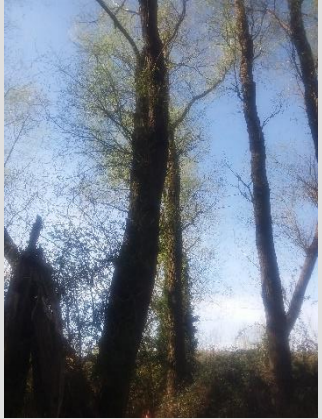
Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1658	Common elder	19/04/18	Low	Negligible	Vertical cracks	<p>There are splits in a thin branch off the main trunk which is 3cm wide and leads to a rotted cavity.</p> <p>The tree was downgraded to negligible potential following endoscopy.</p>	
1659	Crack willow	19/04/18	Moderate	Low	Horizontal cracks; Broken stems; and Lifted bark	<p>Fallen tree with a split right through the trunk, horizontal to the ground 3m high and facing north. One limb has a split with lifted bark, 1m off the ground and facing south-east.</p> <p>The tree was downgraded to low potential following endoscopy.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1660	Crack willow	19/04/18	Low	Negligible	Broken stems	<p>Two branches have broken off the main trunk leaving splits, one is 4m off the ground facing east, the second is 10m high and faced west. Neither form cavities so the tree has limited suitability for bats.</p> <p>The tree was downgraded to negligible potential following a tree climbing survey.</p>	
1661	Crack willow	18/04/18	Moderate	N/A	Woodpecker holes	<p>Woodpecker hole 20 to 25m off the ground on a branch facing towards the ground on the north-east of the tree.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1662	Crack willow	18/04/18	High	N/A	Woodpecker holes; Vertical cracks; Broken stems; Lifted bark; and Tree of substantial size/age/structure which may contain PRFs	A large woodpecker hole with a cavity is present, however it is more likely to be a bird or squirrels nest. Claw or beak marks surround the hole and twigs are present. Large sections of the bark are lifted, and one branch tear exists 12m off the ground.	
1663	Crack willow	18/04/18	Low	N/A	Ivy cover - may be obscuring other features	Ivy vines cover the trunk in all directions which could be hiding PRF's, however the vines are not thick enough to create suitable crevices for bats.	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1664	Crack willow	18/04/18	Low	N/A	Vertical cracks	There is a long vertical split 3m off the ground, however the feature is masked by bramble blocking the entrance so low suitability for bats.	
1665	Crack willow	18/04/18	Moderate	Low	Broken stems; Ivy cover – may be obscuring other features; and Tree of substantial size/age/structure which may contain PRFs	Dense ivy cover could potentially cover PRFs. There is a broken branch and potential cavity that is 20m off the ground and facing west. Ivy is dense with some thick stems but doesn't appear to form a crevice suitable for bats. There is a split 15m high facing west. The feature is completely open and unlikely to lead to a cavity. The tree was downgraded to low potential following a tree climbing survey.	


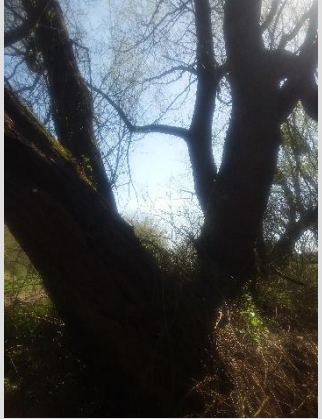
Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1666	Crack willow	18/04/18	Low	N/A	Knot holes	The knot hole is 15m high and faces south. Unable to see if there is a cavity leading further into the trunk.	
1667	Crack willow	18/04/18	High	Confirmed	Vertical cracks; Tree of substantial size/age/structure which may contain PRFs	<p>Massive split in trunk creating small cavities near bottom and large cavity at 5m leading up into trunk facing east. The feature is mostly hollow and leans making loud creaking noises in wind which may reduce suitability. A large vertical split is present alongside multiple smaller splits where the tree is starting to fall. Unable to see where any of the splits lead to.</p> <p>This tree was confirmed as a roost, see Appendix K for details.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1668	Crack willow	18/04/18	Low	N/A	Rot holes	A rot hole is located 5m off the ground facing west, unsure if a cavity is present.	
1669	Crack willow	18/04/18	Moderate	Low	Rot holes	<p>Two rot holes are present within the trunk. The first of which is 8m off the ground and faces south-east. It is rounded with a smooth edge which is very open but dry with bird feathers present inside. This is considered to have low potential as a transitional roost.</p> <p>The second is 9m off the ground facing east and is 5cm in diameter. It is a rounded smooth hole that doesn't lead to other cavities.</p> <p>The roosting potential was downgraded from moderate to low following the endoscopic survey.</p>	



Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1670	Unknown	18/04/18	Low	N/A	Vertical cracks; and Lifted bark	Fallen tree with splits in the trunk and lifted bark. The splits are open to external weather conditions leading to low potential for bats.	
1671	Crack willow	18/04/18	Low	Confirmed	Rot holes	<p>There is a trunk cavity 5m off the ground facing east. The cavity has a deep hole 30cm deep that leads upwards into a narrow cavity which is dry and sheltered. A fallen branch has exposed a hole within the trunk, while carrying out initial inspection from the ground it was unclear whether the hole leads to a cavity. The further endoscopic surveys found it to be 10cm in length, 4m off the ground and faces east.</p> <p>Bat droppings were found on the bottom of the entrance on the 03/05/2018. The dropping was small and smooth and likely belonged to a pipistrelle. The dust of the dropping was collected but it was not enough for DNA analysis to be carried out</p>	

Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1672	Crack willow	18/04/18	Moderate	Negligible	Horizontal cracks	<p>There is a collapsed trunk with a split right the way through with a potential cavity. However, it does not appear to lead anywhere</p> <p>The roosting potential was downgraded from moderate to negligible following the endoscopic survey.</p>	
1674	Crack willow	18/04/18	High	Low	Woodpecker holes; and Rot holes	<p>There are three woodpecker holes on the underside of the leaning willow tree, which are 10m off the ground facing east, all of which are rounded and smooth fairly exposed. Just below the woodpecker holes there is a rot hole at 8m high which is 5cm in diameter. Rotted knot hole is exposed and shallow.</p> <p>The roosting potential was downgraded from high to low following the endoscopic survey.</p>	

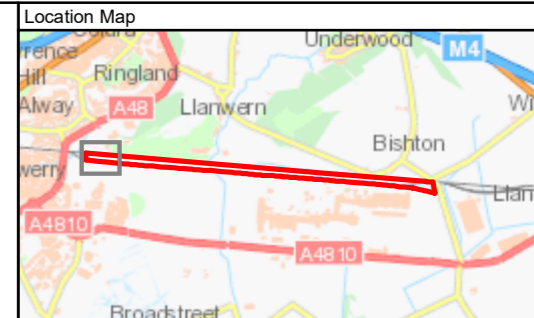
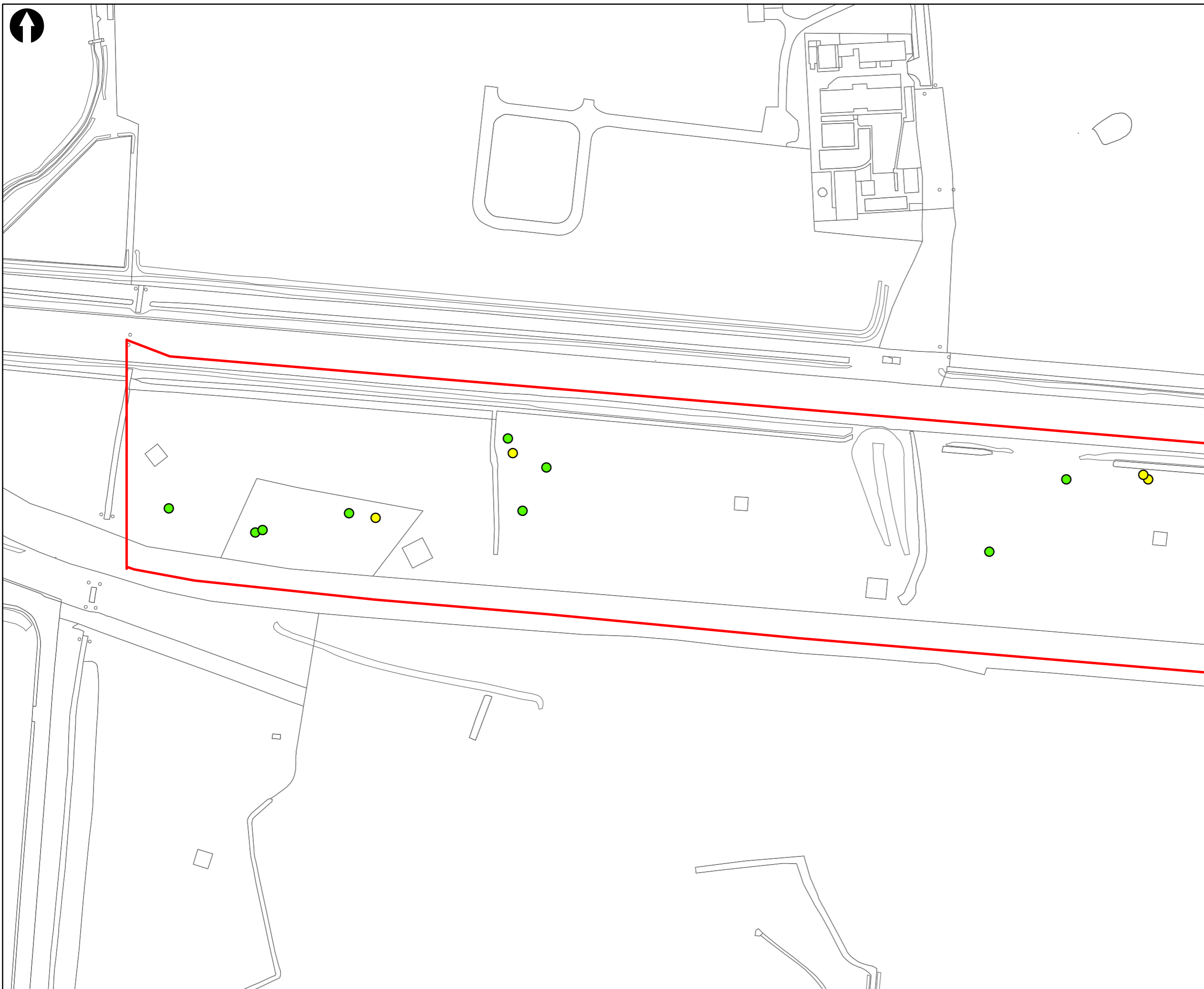
Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1673	Crack willow	18/04/18	Low	N/A	Broken stems	Broken stems are present with a hazard beam 5m off the ground, however they are facing the sky and are likely to let rain in.	
1675	Crack willow	18/04/18	Low	N/A	Rot holes	Rot hole is present 8m off the ground and facing south-west.	

Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1676	Crack willow	18/04/18	High	Moderate	Vertical cracks	<p>A split is present which runs straight through the trunk. Unable to see how far up the trunk the split runs due to limited visibility.</p> <p>The roosting potential was downgraded from high to moderate following the endoscopic survey.</p>	
1677	Crack willow	18/04/18	Moderate	Confirmed	<p>Woodpecker holes; Vertical cracks; and Tree of substantial size/age/structure which may contain PRFs</p>	<p>Multiple trunks are present, one of which has two woodpecker holes that are 8 and 9m off the ground facing north-east. Another trunk has a 15cm long split 1m off the ground which leads into a cavity. The cavity is clean in one section however a second section has cobwebs and is obscured by bramble.</p> <p>This tree was confirmed as a roost, see Appendix K for details.</p>	

Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1678	Goat willow (<i>Salix caprea</i>)	18/04/18	Low	Moderate	Callus roll; Rot holes; and Broken stems	<p>The tree has two main trunks, one of which is hollow all the way through but has snapped and fallen over creating small crevices. However, the exposed end of the split is facing skywards potentially allowing rain water to enter, therefore it has limited potential to be used by bats as a roost. A knot hole is present within the other trunk of the tree which is still standing upright, the entrance of the knot hole is cluttered due to adjacent branches so has low potential as feature.</p> <p>The roosting potential was upgraded from low to moderate following the endoscopic survey.</p>	
1679	Crack willow	18/04/18	Low	Confirmed	Rot holes; Tree of substantial size/age/structure which may contain PRFs	<p>Two cavities are present within the trunk of the willow tree facing north-west, they are 5m and 4.5m off the ground respectively. The higher one is dry and sheltered - suitable as transitional roost for one bat. The lower is a cylindrical hole that goes back into tree however it is very wet and full of slugs meaning low potential for bats. A rot hole is also present 5m off the ground that does not appear to lead anywhere.</p> <p>This tree was confirmed as a roost, see Appendix K for details.</p>	

Tree Number	Species	Date of Initial Survey	Assessed Roosting Potential	Revised Potential	PRFs	Comments	Photos
1680	Willow sp.	18/04/18	Moderate	Moderate	Rot holes; Broken stems; Tree of substantial size/age/structure which may contain PRFs	Two rot holes are present, one is 5m off the ground and facing east while the other is 25m off the ground and facing north. There is potentially a third hole where a branch has fallen off the tree, 5m above the ground and facing south which could not be seen during initial ground-based assessment.	
1681	Willow sp.	18/04/18	High	Confirmed	Vertical cracks; Broken stems; Between overlapping stems and branches; and Tree of substantial size/age/structure which may contain PRFs	<p>One section of the trunk has fallen onto the floor, whilst another has been caught by a neighbouring tree.</p> <p>There is a large split through the twisted trunk, that is 4m off the ground and 3m in length. The cavity doesn't go up far and it is quite sheltered and not enclosed. A section is quite wet and mossy inside as it is very open and exposed. The middle goes down into a sheltered cavity below the split but open at very bottom. There are lots of access points into same cavity.</p> <p>This tree was confirmed as a roost, see Appendix K for details.</p>	

I. Bat Trees Location Plan



Key to Symbols

Survey area

Bat potential

- Confirmed roost
- High
- Moderate
- Low

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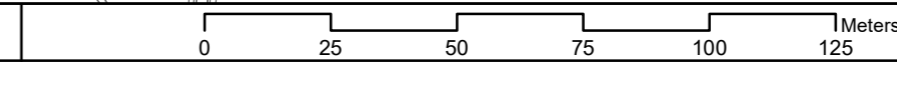
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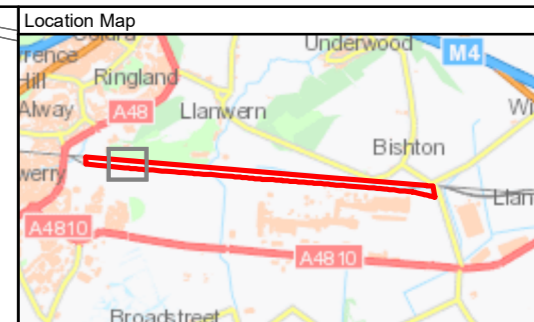
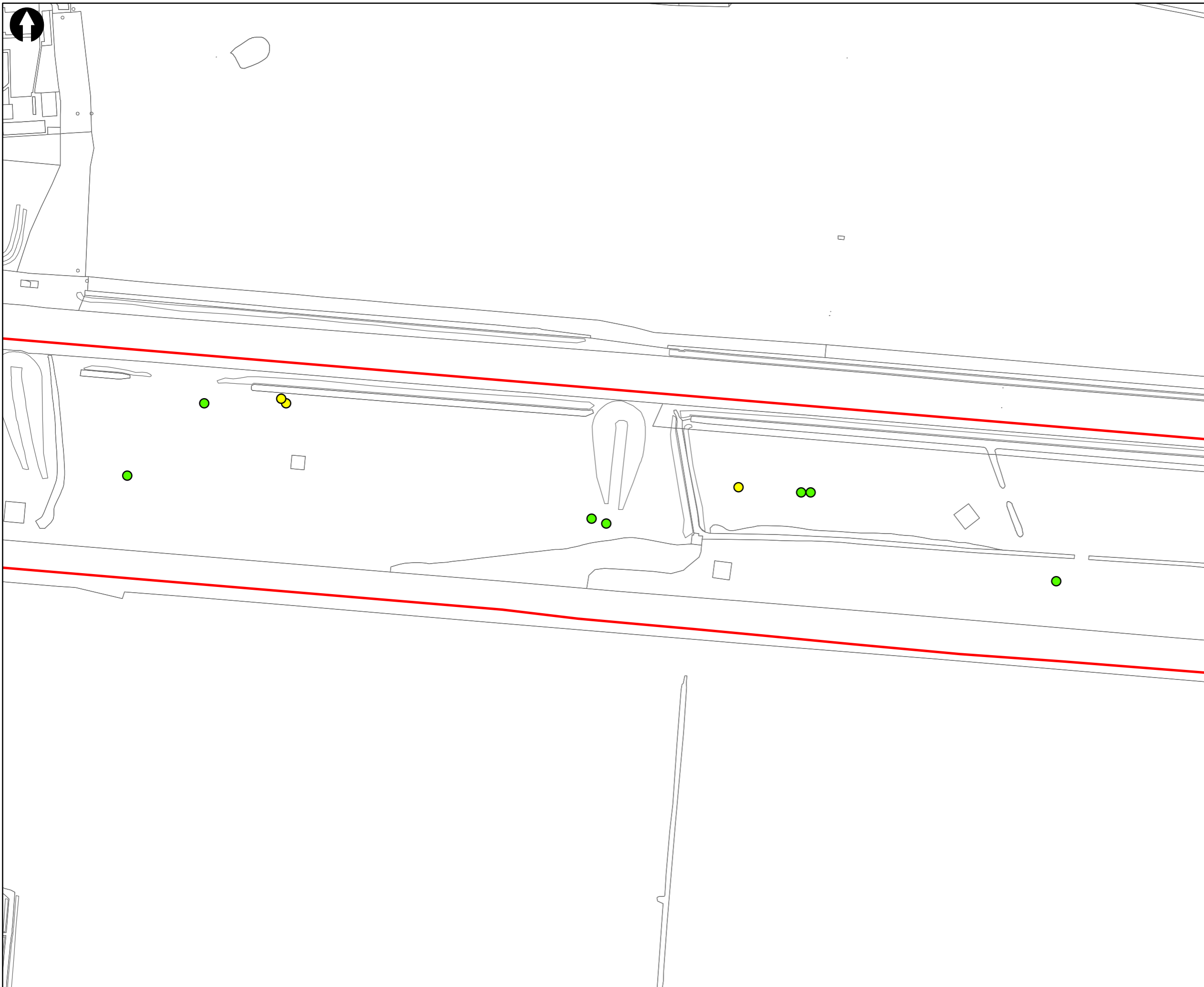
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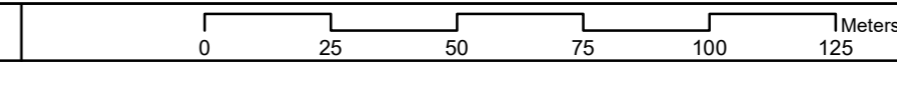
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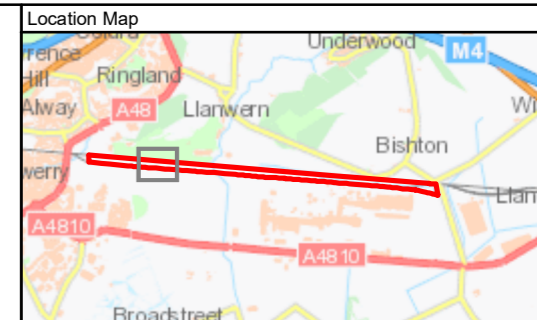
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- Bat potential**
- Confirmed roost
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- Moderate
- Low

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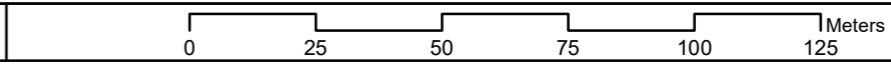
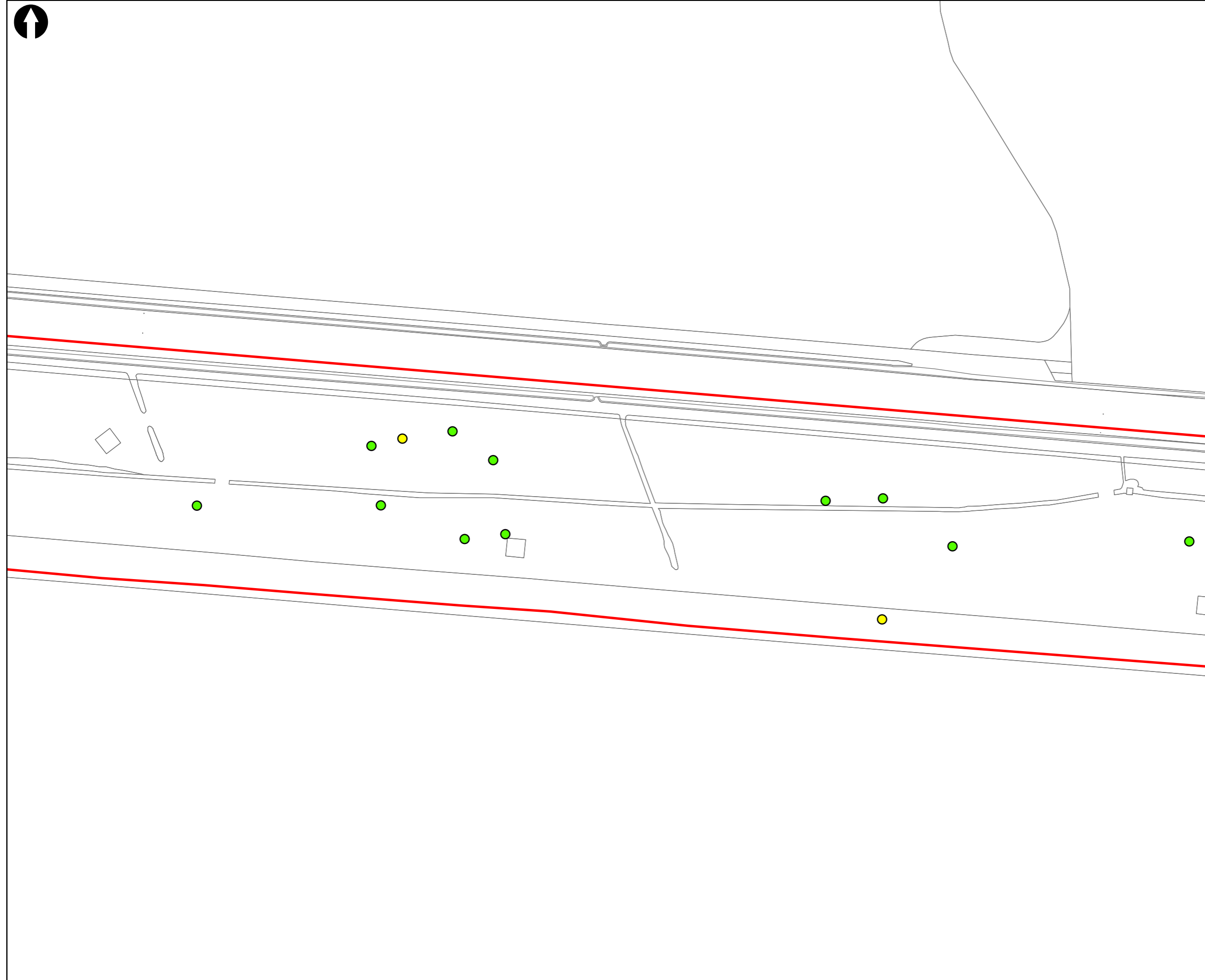
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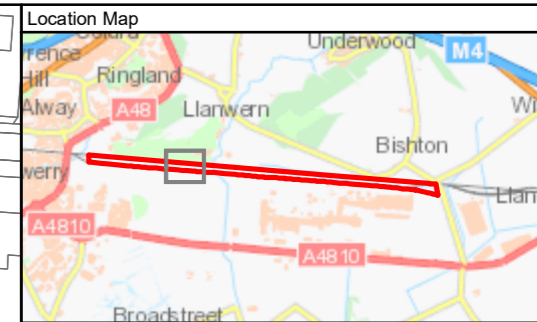
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Key to Symbols

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- Low

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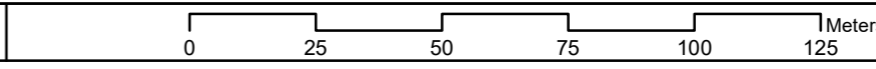
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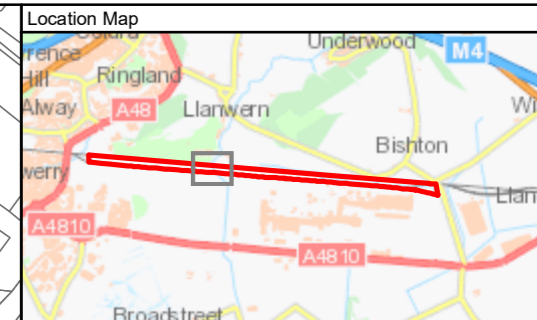
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Bat potential

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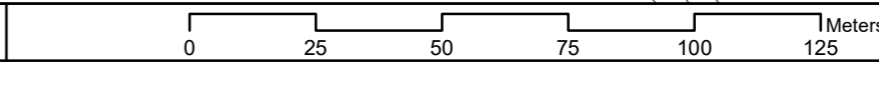
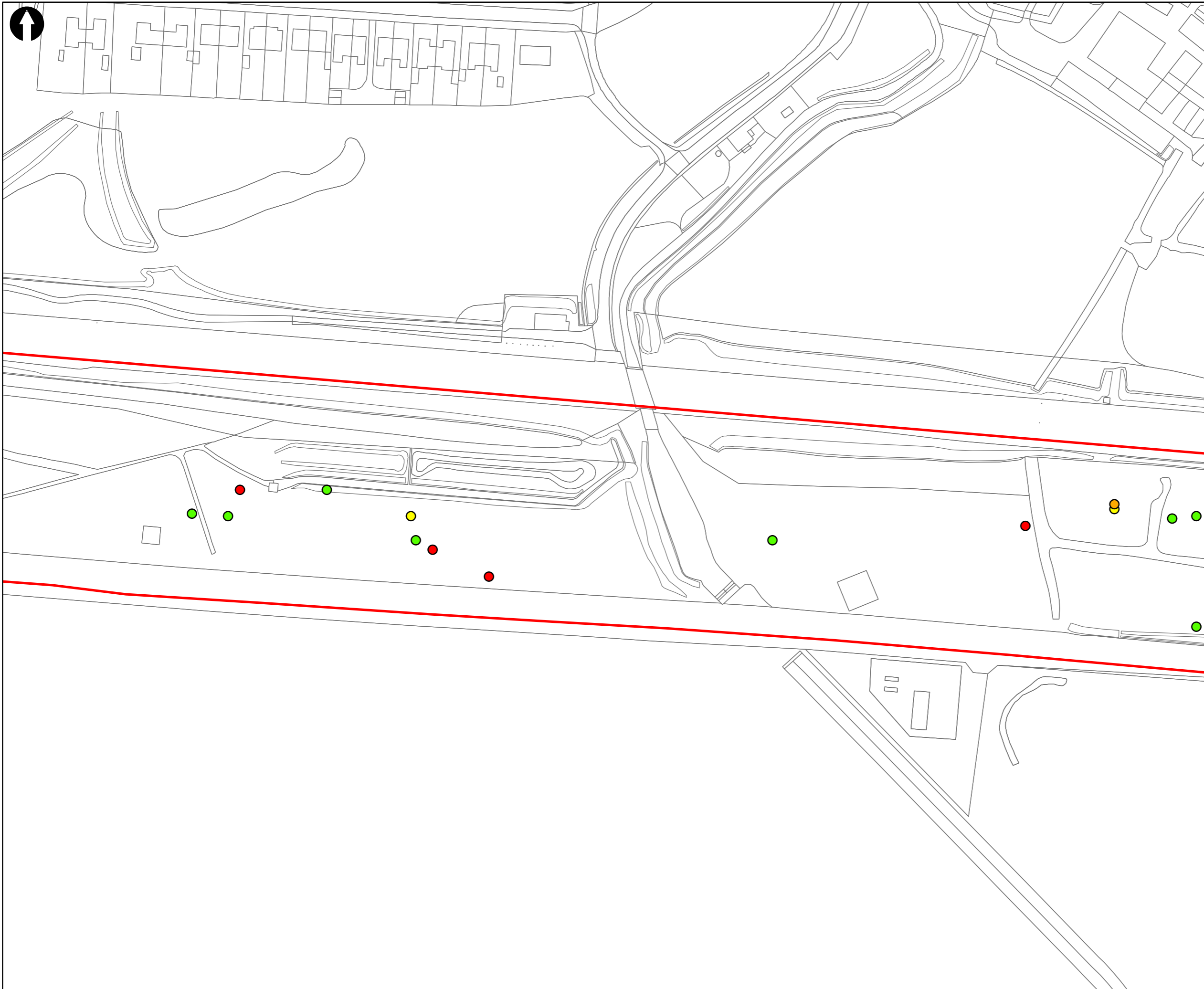
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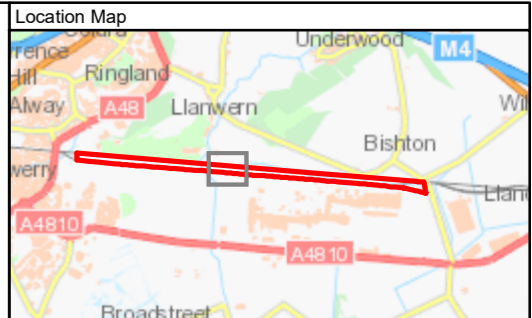
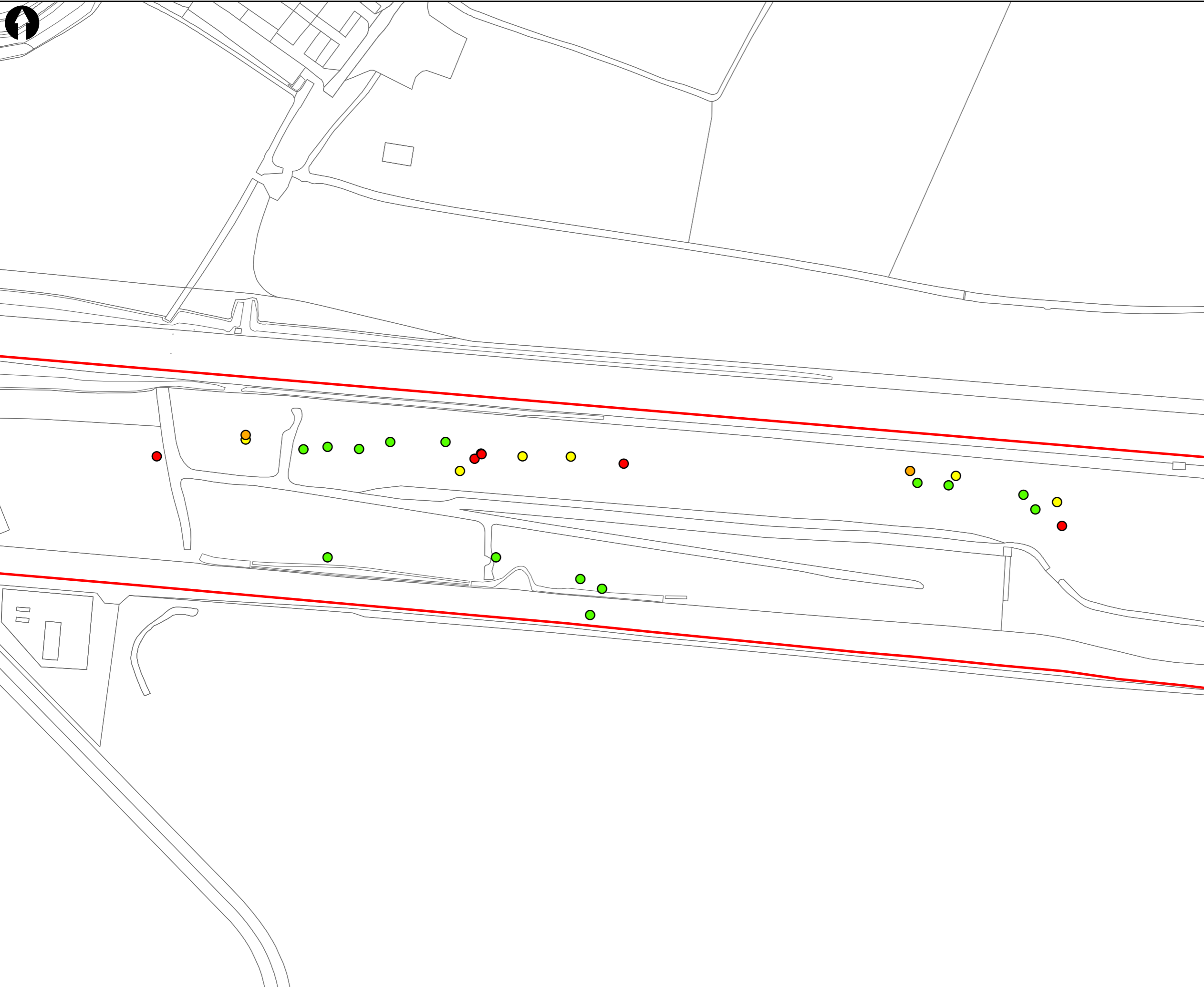
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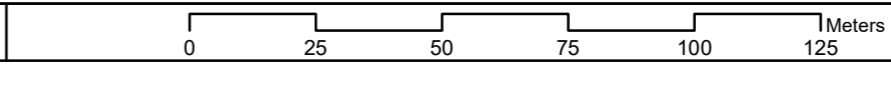
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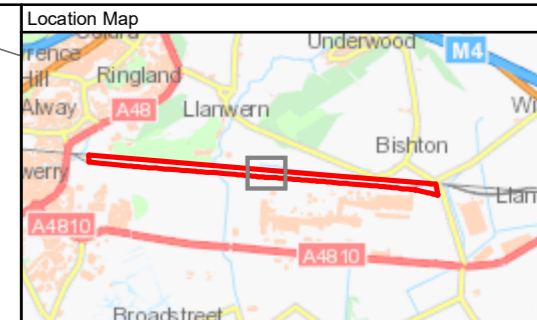
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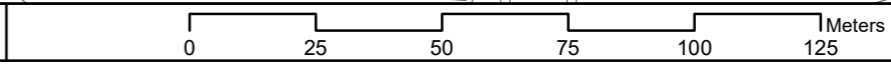
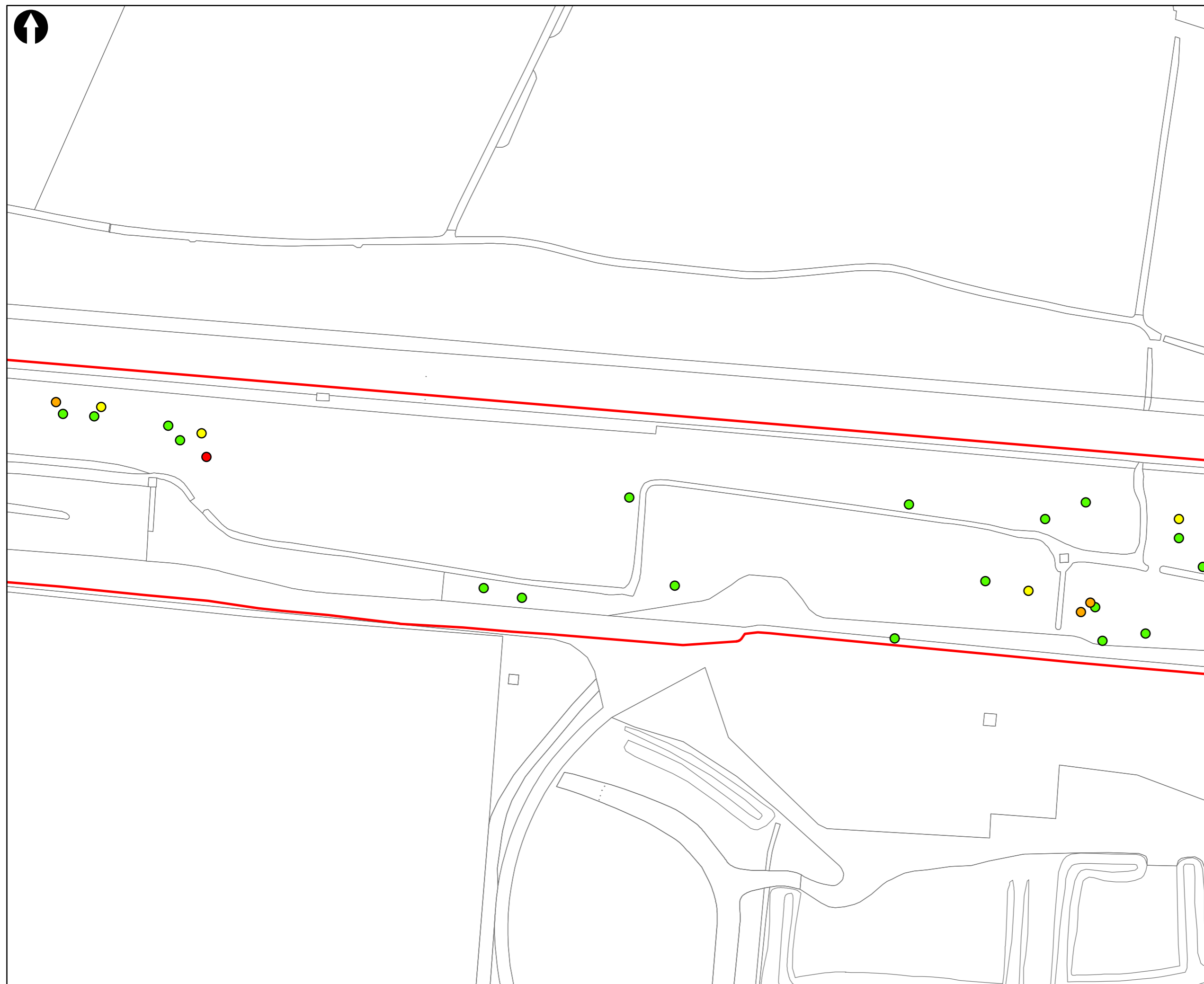
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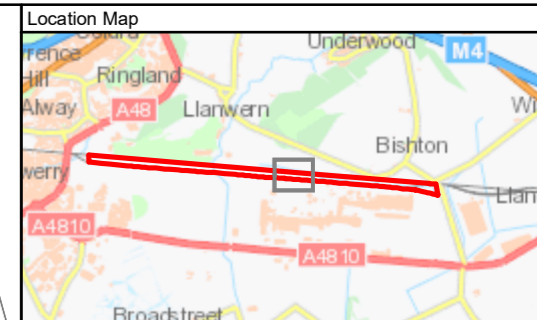
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Key to Symbols

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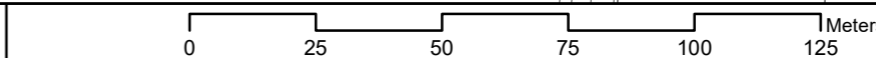
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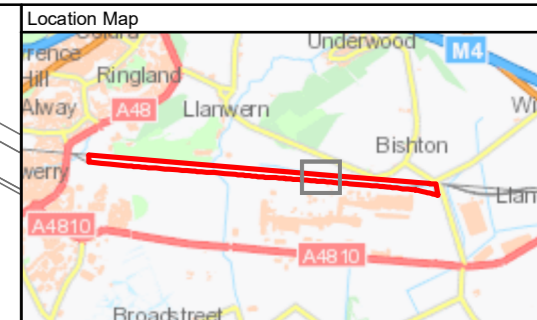
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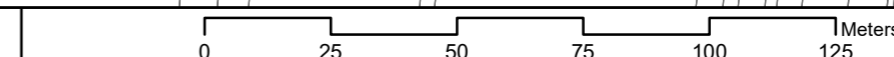
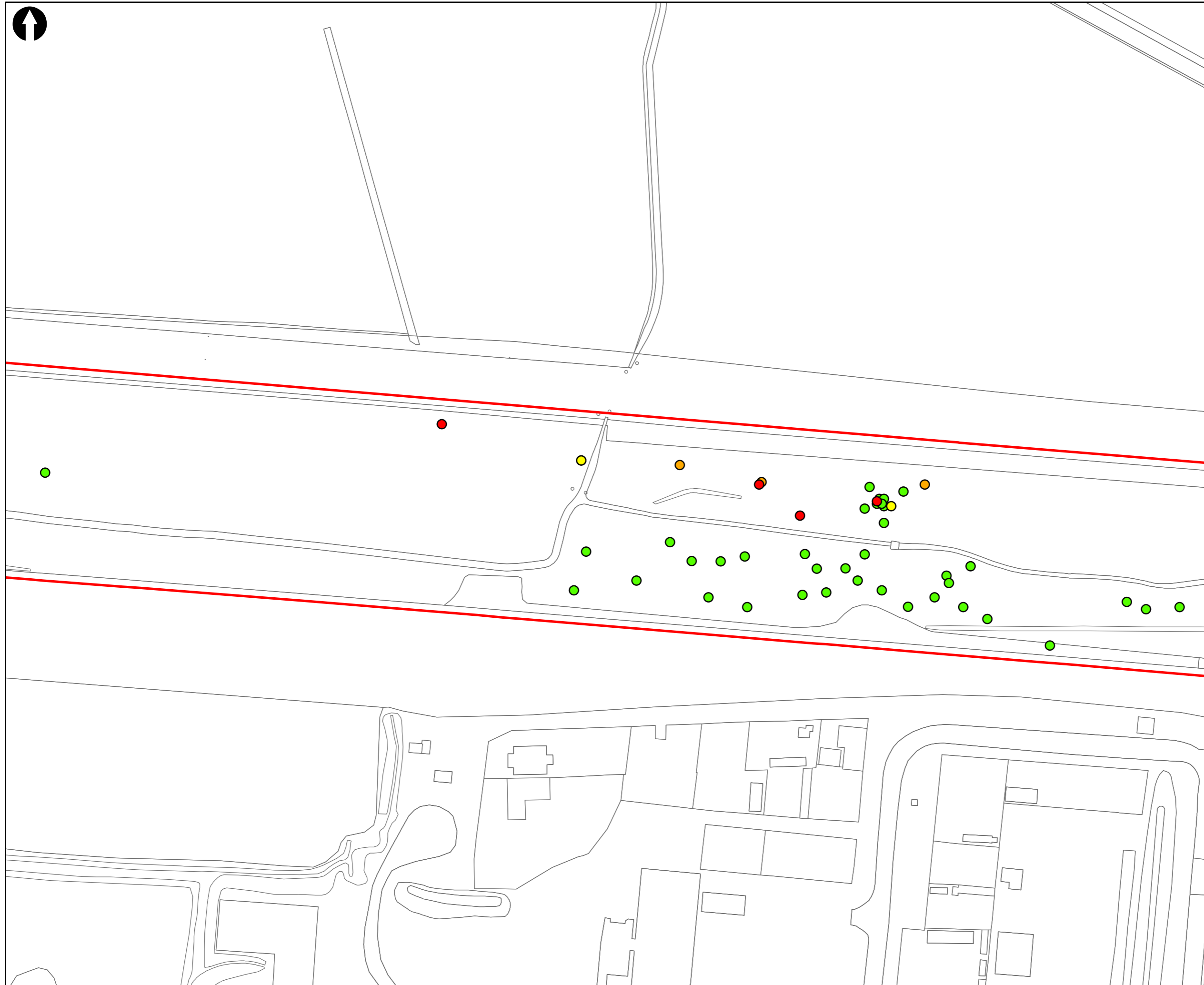
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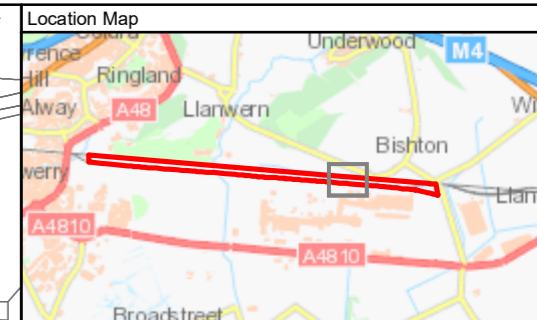
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 South Wales Metro - Task Order 26
 Bat Tree Survey Results 2018

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Drawn	T Ruff	TR	Coordination	J Bates	JB
GIS Check	G O'Donovan	GO	Approved	C Probert	CP

Scale at A3	Status	Rev	Security
1:1,500	INF	P2	STD

Drawing Number
 367590-MMD-26-XX-DR-C-0422





Key to Symbols

- Survey area
- Bat potential**
- Confirmed roost
- High
- Moderate
- Low

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Rev	Date	Drawn	Description	Ch'k'd	App'd

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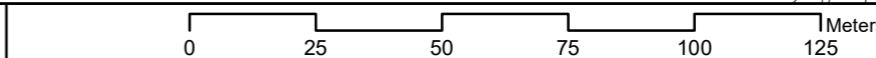
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Bat Tree Survey Results 2018

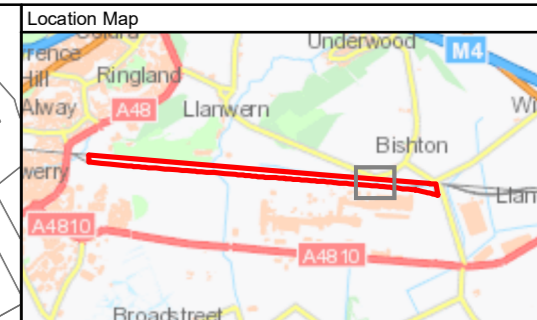
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Drawing Number
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Key to Symbols

- Survey area
- Bat potential**
- Confirmed roost
- High
- Moderate
- Low

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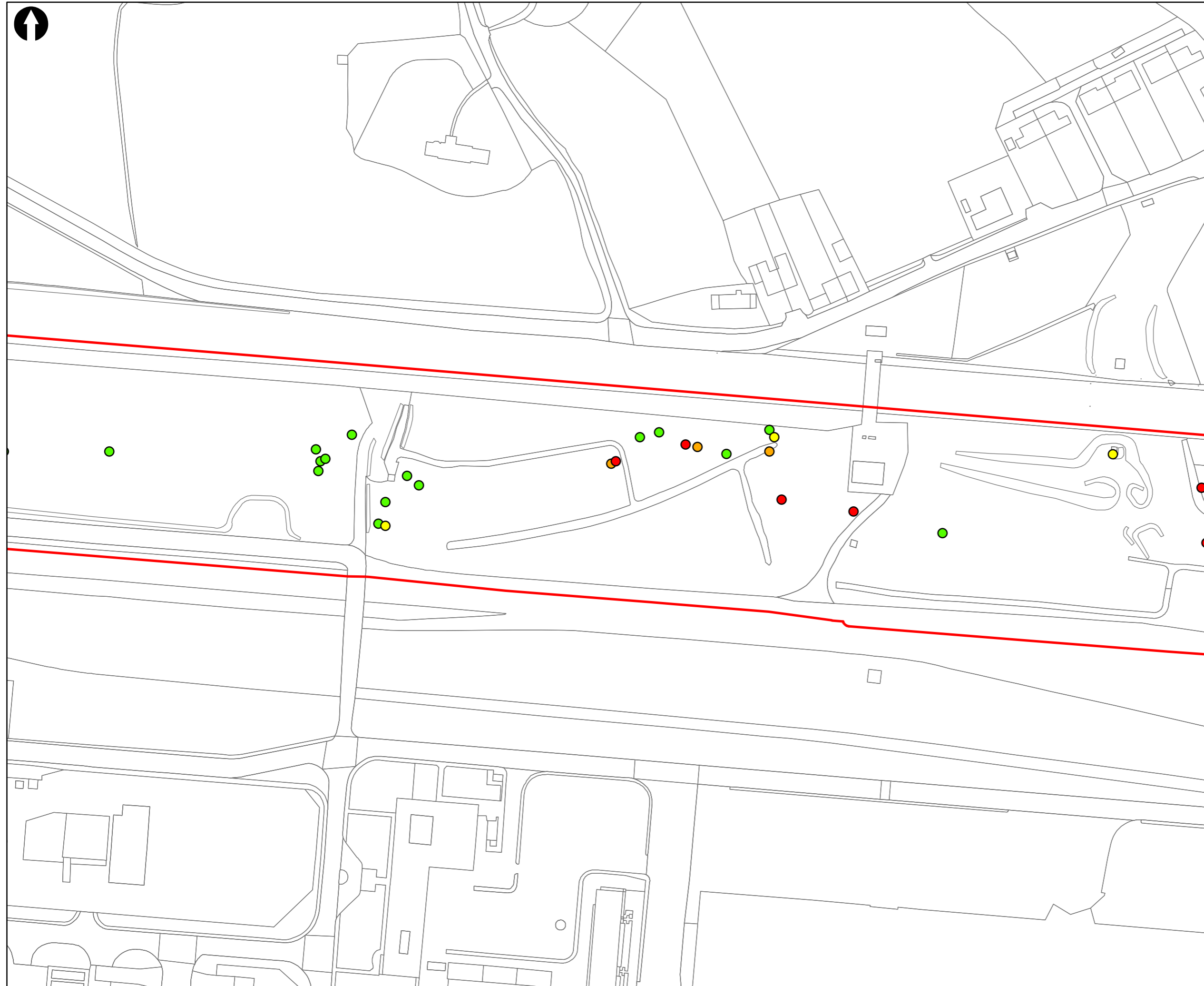
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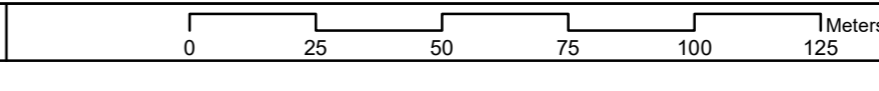
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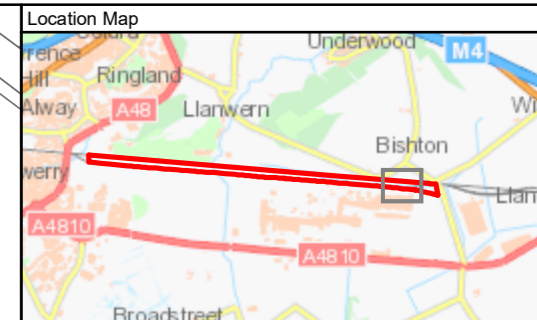
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Key to Symbols

- Survey area
- Bat potential**
- Confirmed roost
- High
- Moderate
- Low

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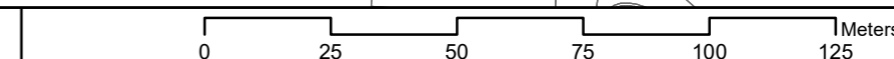
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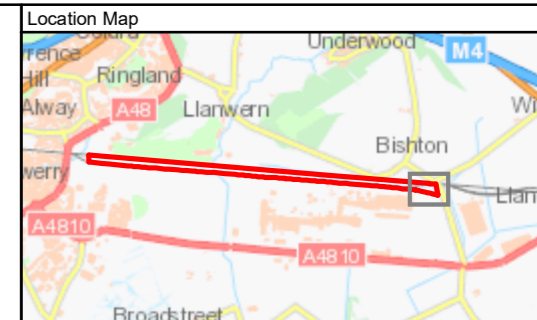
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Scale at A3	Status	Rev	Security
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Drawing Number
 367590-MMD-26-XX-DR-C-0425





Key to Symbols

Survey area

Bat potential

● Confirmed roost

● High

● Moderate

● Low

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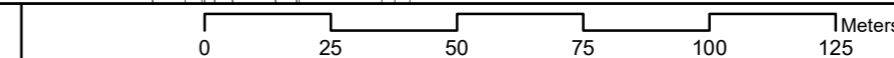
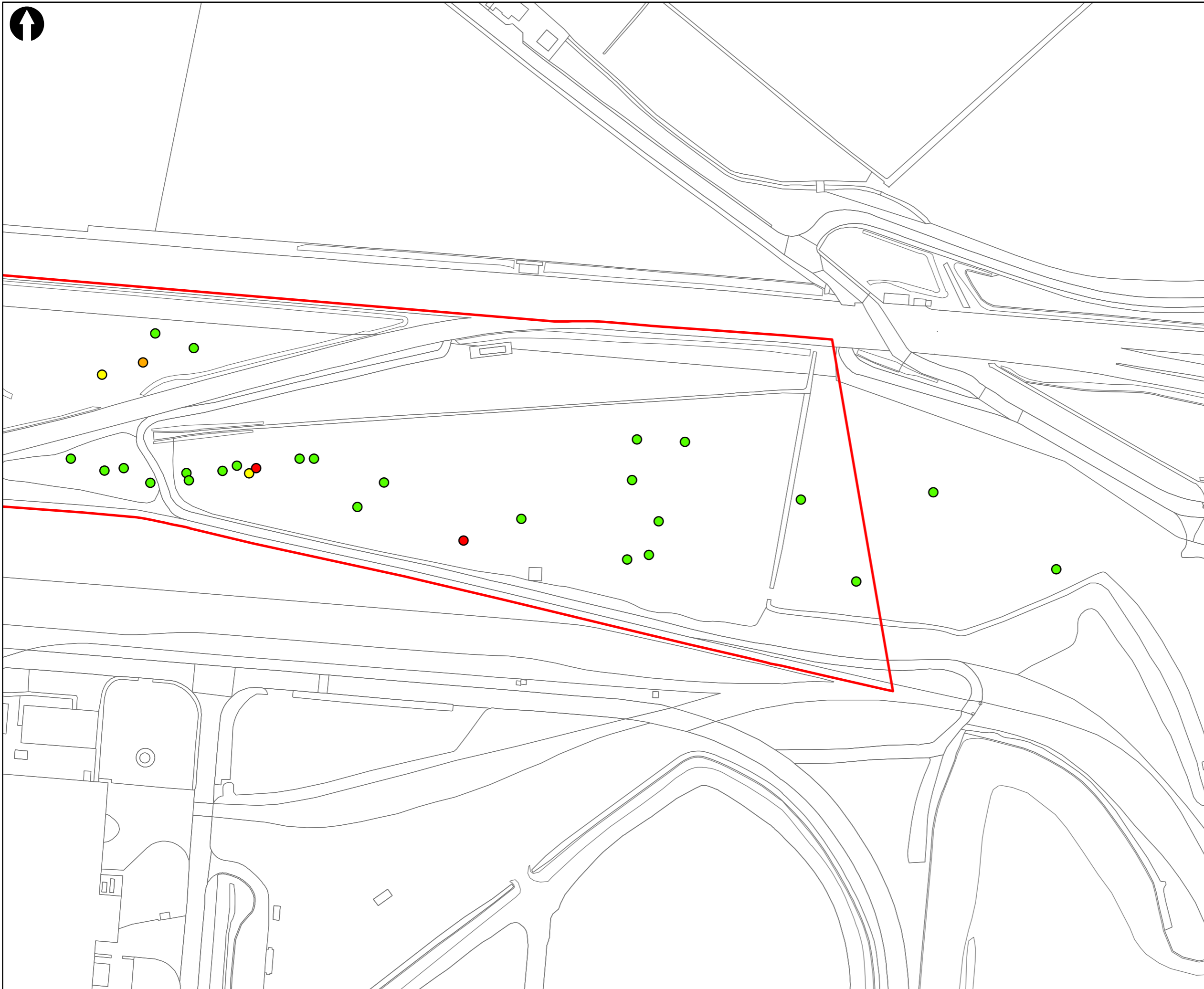
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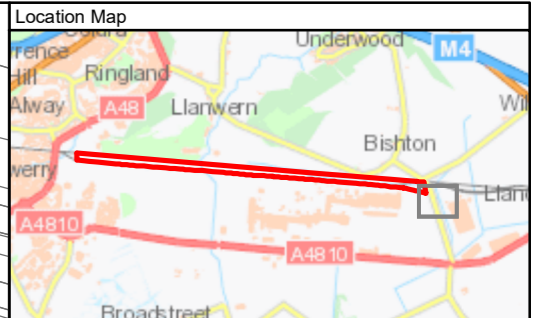
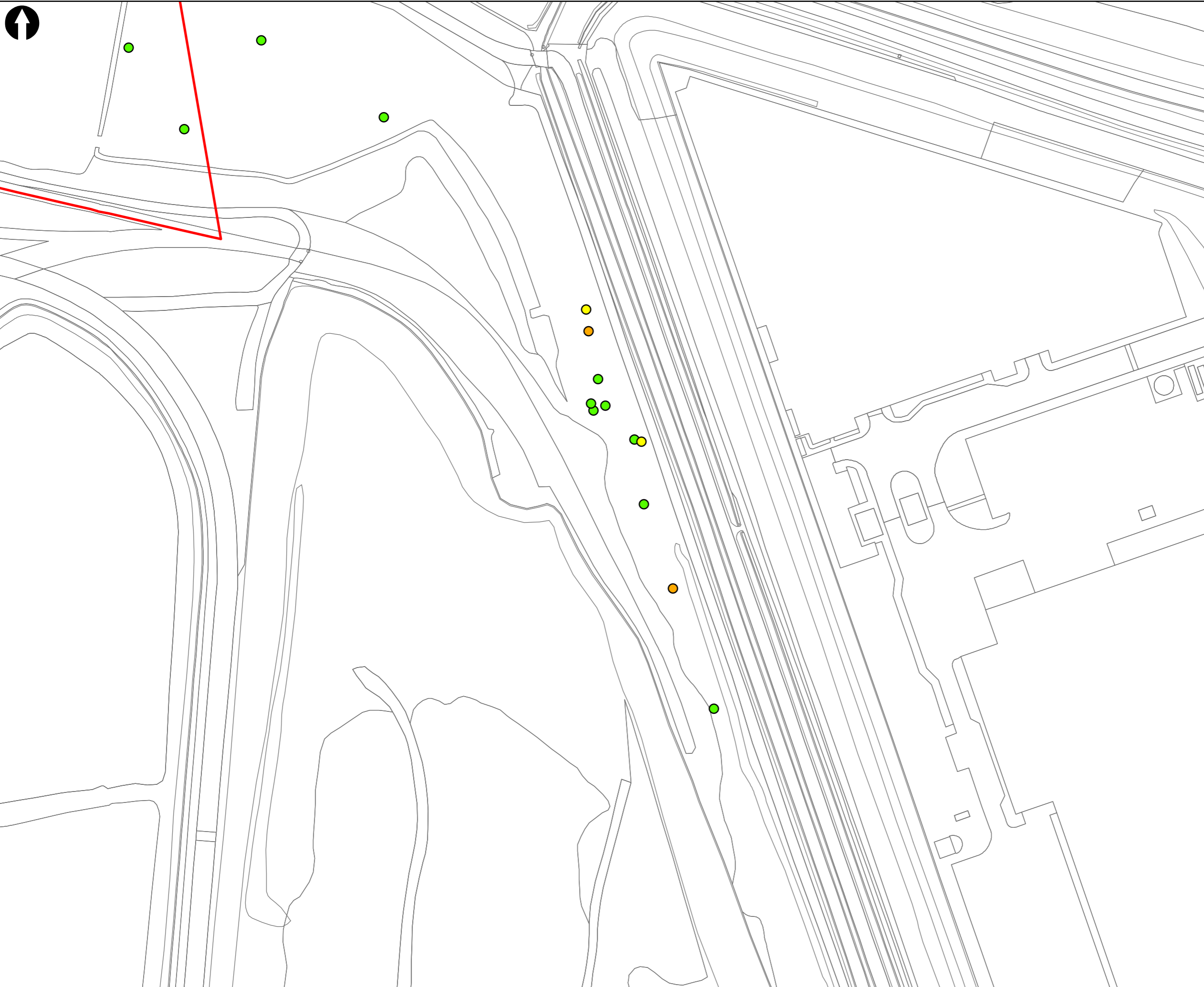
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1:1,500	INF	P2	STD

Drawing Number
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Key to Symbols

Survey area

Bat potential

- Confirmed roost
- High
- Moderate
- Low

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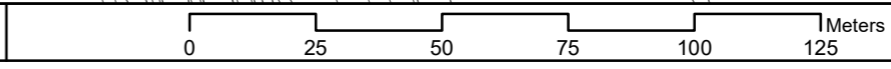
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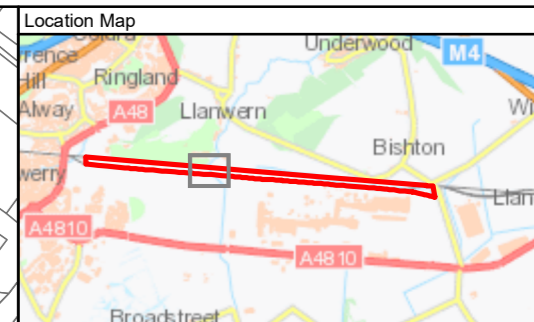
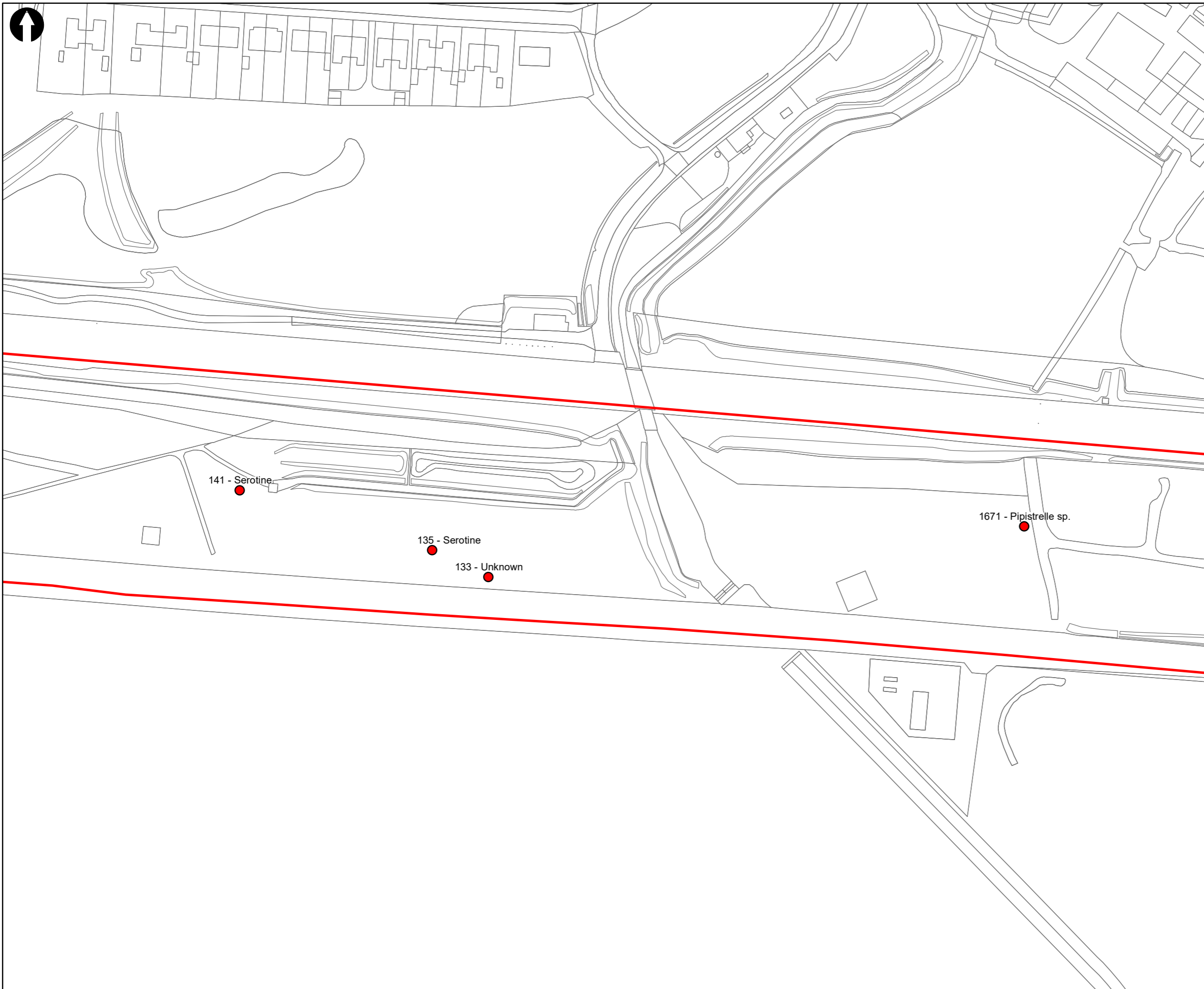
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Scale at A3	Status	Rev	Security
1:1,500	INF	P2	STD

Drawing Number
367590-MMD-26-XX-DR-C-0427



J. Confirmed Roosts Location Plan – Trees



Key to Symbols

Survey area

Bat potential

● Confirmed roost
(Tree number - bat species)

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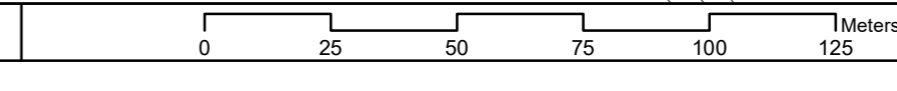
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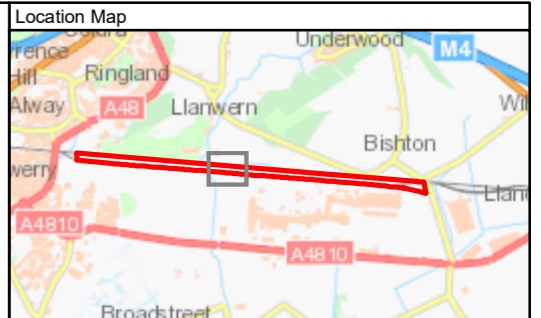
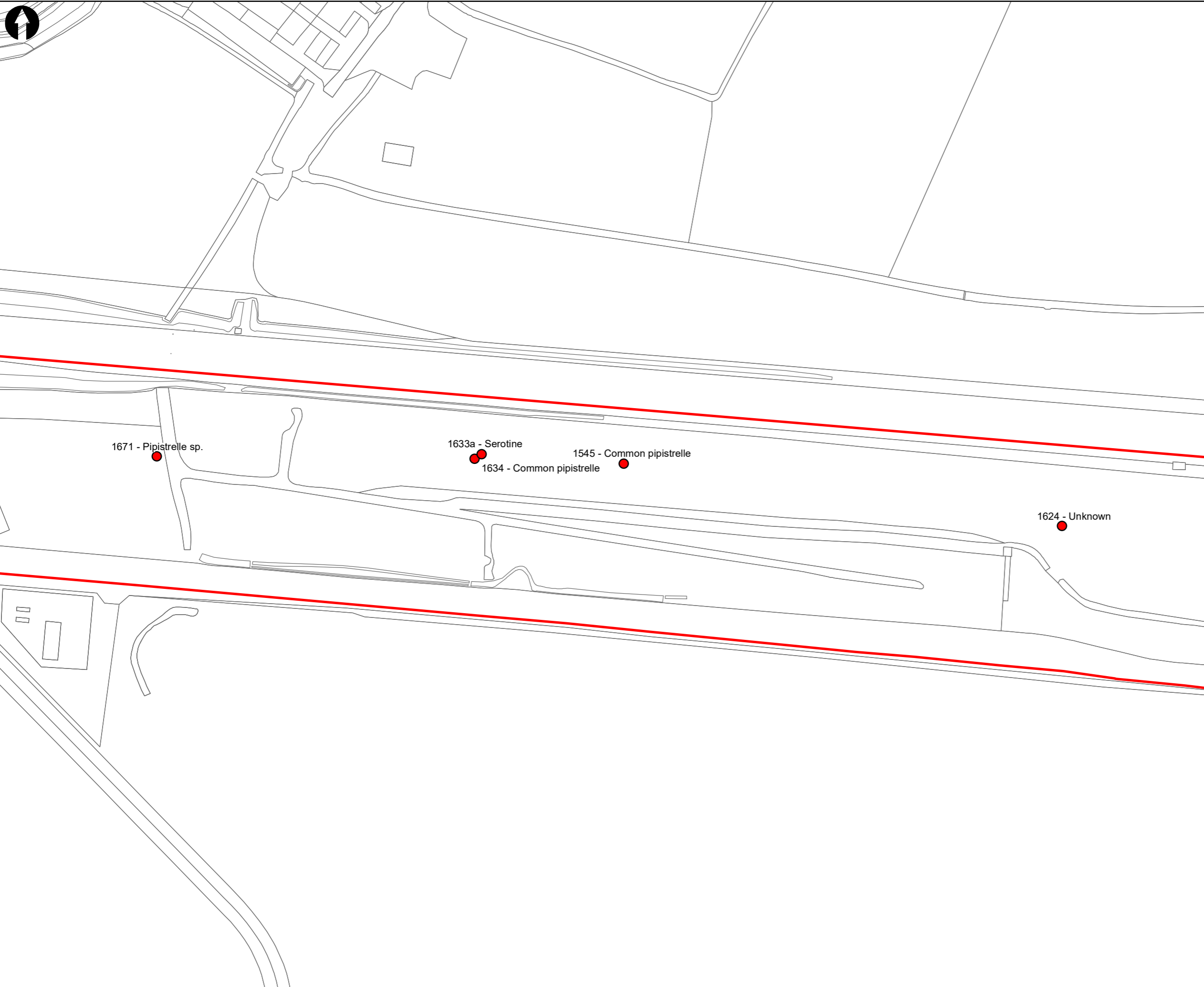
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 Bat Tree Survey Results 2018
 Confirmed Roosts

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GIS Check	G O'Donovan	GO	Approved	C Probert	CP
Scale at A3	Status	Rev	Security		
1:1,500	INF	P1	STD		



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367590-MMD-26-XX-DR-C-0431



Key to Symbols

Survey area

Bat potential

● Confirmed roost
(Tree number - bat species)

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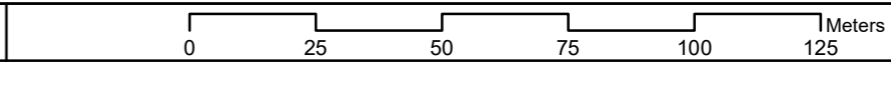
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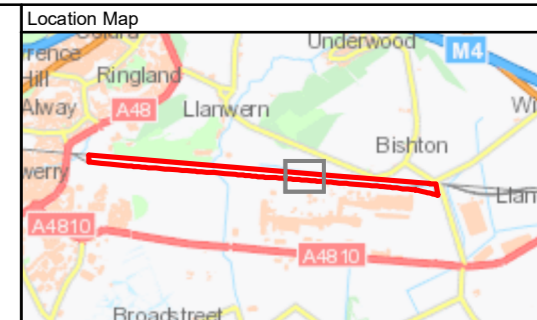
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 Bat Tree Survey Results 2018
 Confirmed Roosts

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Drawn	T Ruff	TR	Coordination	J Bates	JB
GIS Check	G O'Donovan	GO	Approved	C Probert	CP
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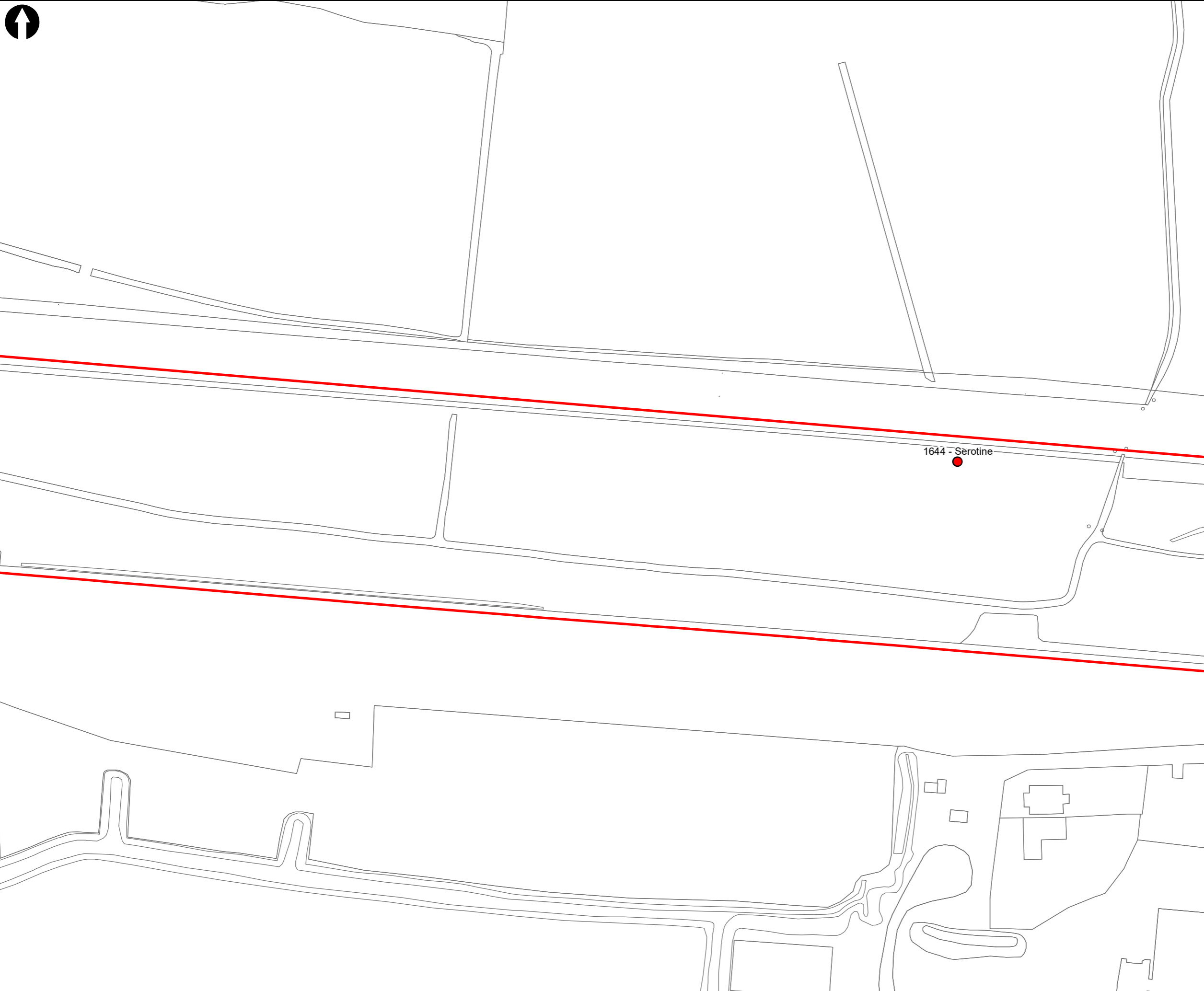


Key to Symbols

Survey area

Bat potential

● Confirmed roost
(Tree number - bat species)



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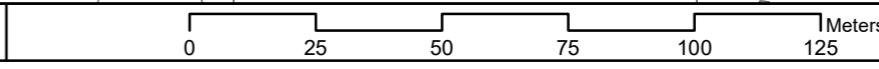
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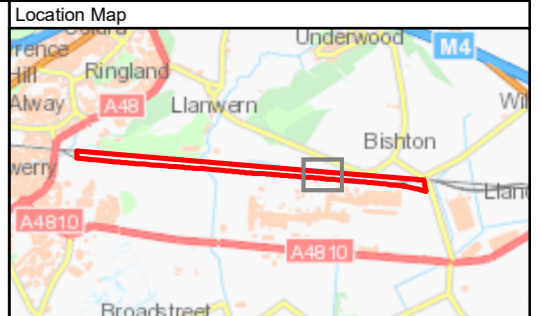
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Scale at A3	Status	Rev	Security		
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- Key to Symbols
- Survey area
 - Bat potential
 - Confirmed roost
 - (Tree number - bat species)

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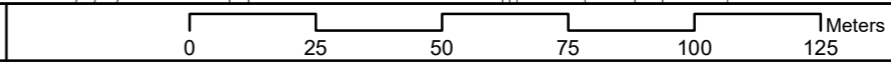
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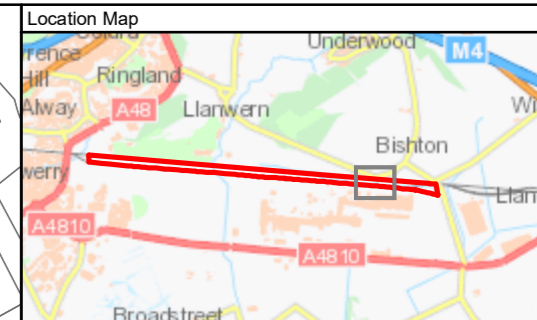
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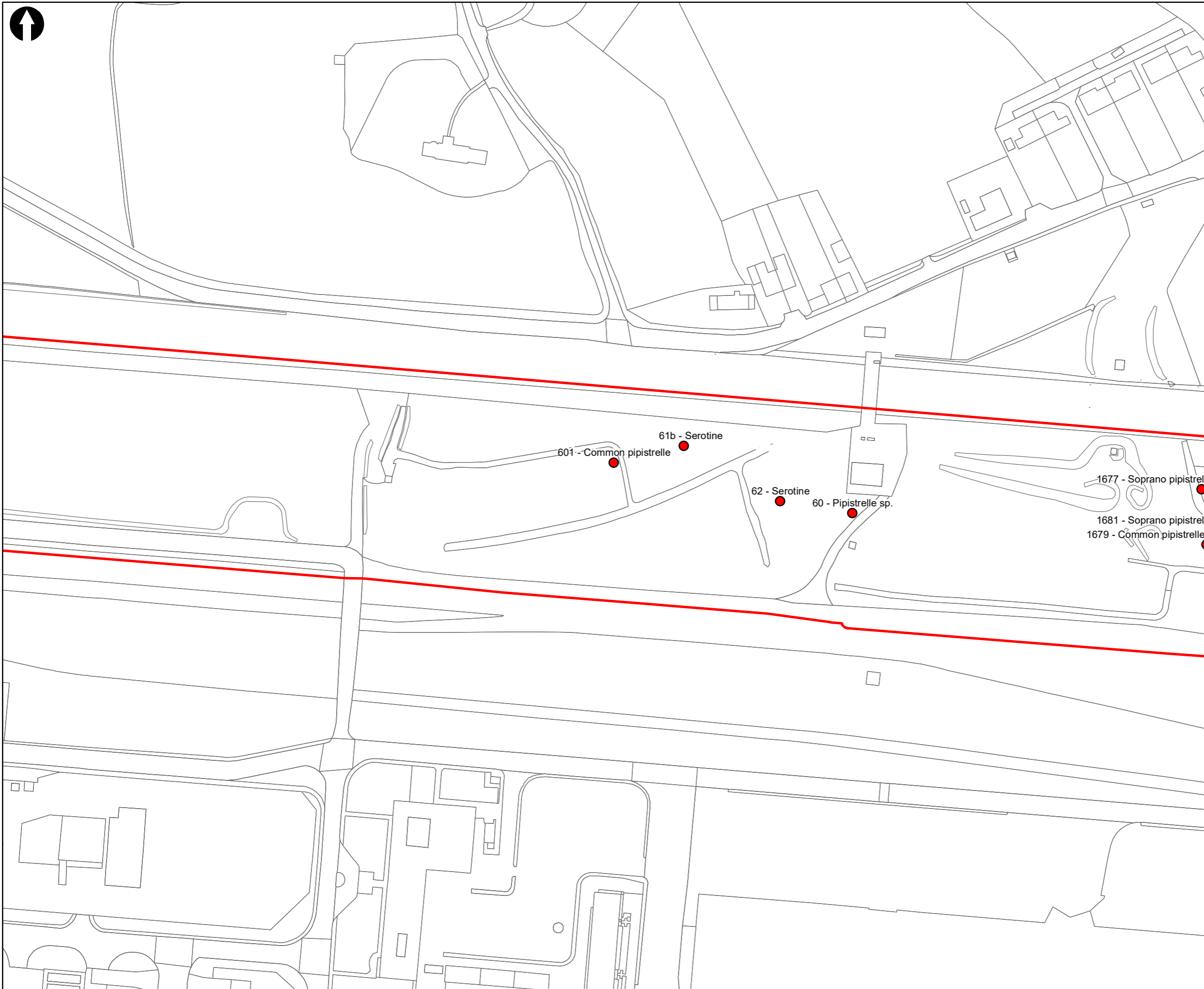
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Key to Symbols

- Survey area
- Bat potential
 - Confirmed roost
 - (Tree number - bat species)



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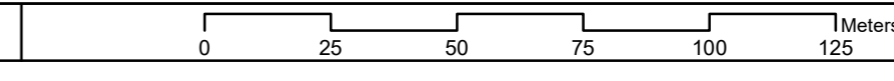
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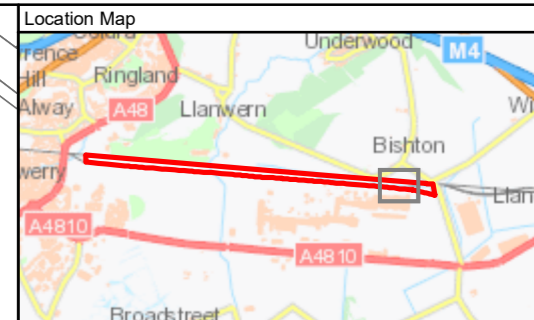
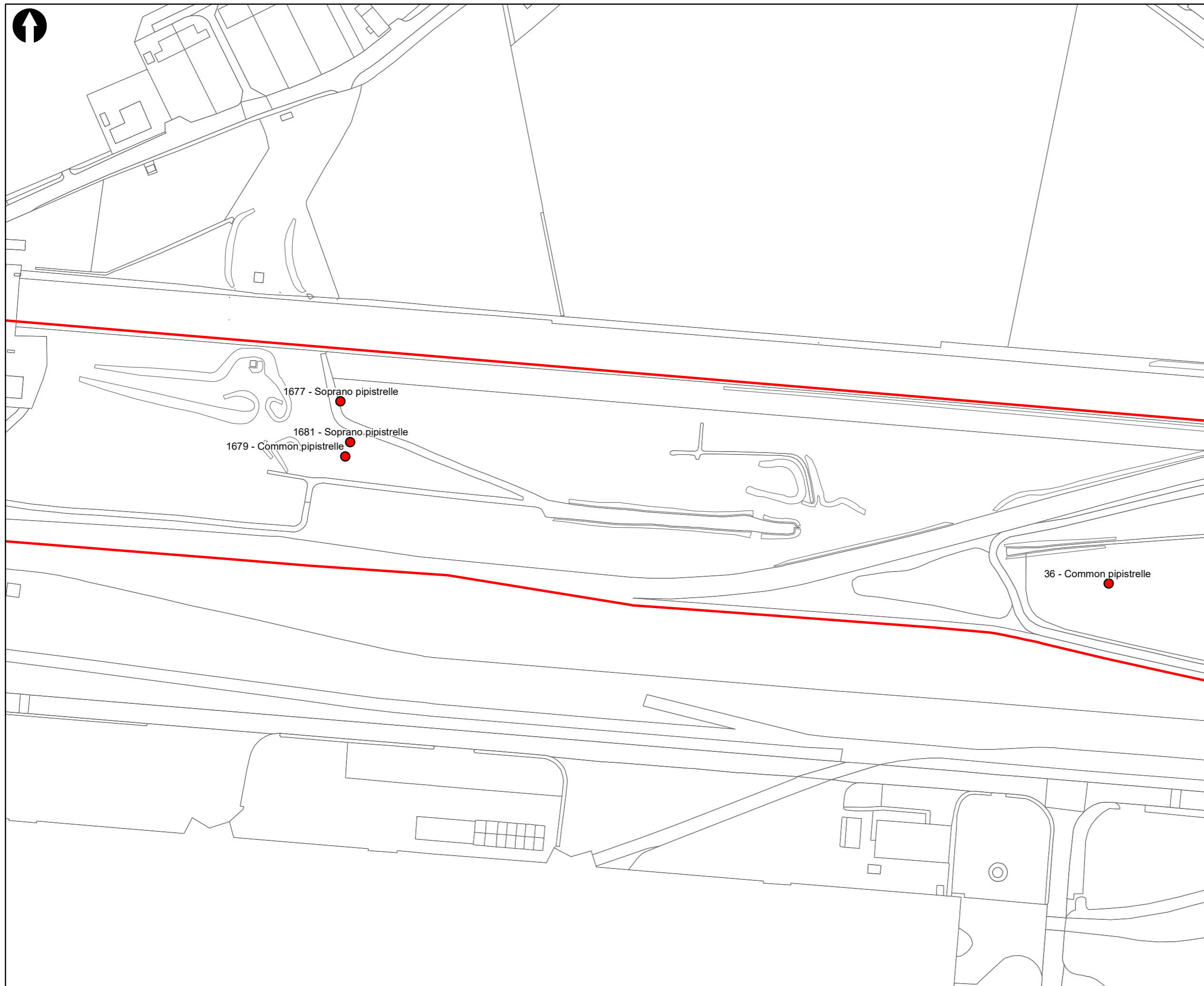
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Confirmed Roosts

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GIS Check	G O'Donovan	GO	Approved	C Probert	CP
Scale at A3	Status	Rev	Security		
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Key to Symbols

Survey area

Bat potential

● Confirmed roost
(Tree number - bat species)

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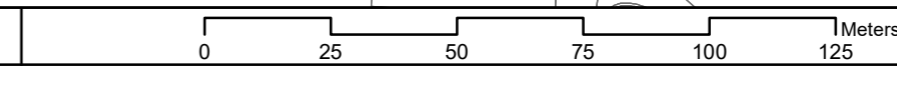
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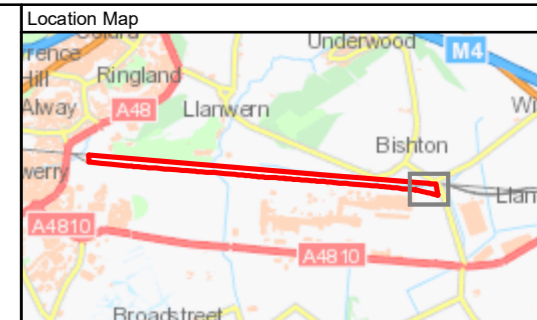
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 Bat Tree Survey Results 2018
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GIS Check	G O'Donovan	GO	Approved	C Probert	CP
Scale at A3	Status	Rev	Security		
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Key to Symbols

Survey area

Bat potential

- Confirmed roost
- (Tree number - bat species)

36 - Common pipistrelle



2000 - Noctule



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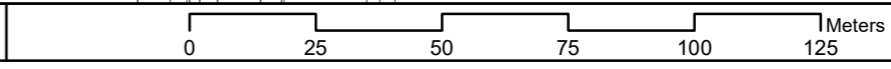
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Designed	A Bone	AB	Eng Check	Z Costas	ZCM
Drawn	T Ruff	TR	Coordination	J Bates	JB
GIS Check	G O'Donovan	GO	Approved	C Probert	CP

Scale at A3	Status	Rev	Security
1:1,500	INF	P1	STD

Drawing Number
367590-MMD-26-XX-DR-C-0437



K. Roost Status Survey Results – Trees

Table K.1: Bat Tree Survey Results

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4	Roost (Y / N)	Summary
1	High	Low	E – Gr	E - Gr	-	-	N	No evidence of bats was found during the surveys.
2	Moderate	High	E - TC	E - TC	E - TC	-	N	No evidence of bats was found during the surveys.
4	Low	Moderate	E - TC	E - TC	-	-	N	No evidence of bats was found during the surveys.
14	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
15	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
17	Moderate	Negligible	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
19	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
27	Moderate	High	E - TC	E / R	E / R	-	N	Bird droppings were found within the trunk cavity at 4m high during the first survey on 17/7/18. However, no evidence of bats was found during the surveys.
28	High	Moderate	E - TC	E / R	-	-	N	During the first survey bird droppings were found within the woodpecker hole. However, no evidence of bats was found during the surveys.
34	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
36	Moderate	Confirmed	E / R	E / R	E / R	-	Y	On the first survey on 26/06/18 a common pipistrelle was recorded emerging from the tree at 21:04.
36a	Moderate	Moderate	E / R	E / R	-	-	N	No evidence of bats was found during the surveys.
43	Moderate	Negligible	E - TC	E / R	-	-	N	No evidence of bats was found during the surveys.
44	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
45	High	High	E - TC	E / R	E / R	-	N	No evidence of bats was found during the surveys.
46	Moderate	Moderate	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys. The cavity appeared to be in used by dormice during the first survey on the 14/05/2018. When a ball of leaves could be seen at the top of the cavity when endoscoped.

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4	Roost (Y / N)	Summary
56	Moderate	High	E - TC	E / R	E / R	-	N	No evidence of bats was found during the surveys.
57	Moderate	Moderate	E - TC	E / R	-	-	N	No evidence of bats was found during the surveys.
58	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
60	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	-	Y	Bat droppings were found during the initial assessment of the tree Droppings (crushed to confirm bat; no others available for DNA analysis). No droppings were subsequently found during the three 2018. Droppings were recorded were identified as likely being from a pipistrelle species bat due to the shape and size.
61	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	-	Y	
61b	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	-	Y	Bat droppings were found during the first survey which was carried out on the 23/07/2018. The droppings were sent off to Swift Ecology for DNA analysis and determined to be serotine droppings.
62	High	Confirmed	E – Gr	E – Gr	E – Gr	-	Y	A large amount of bat droppings were found inside the cavity during the first survey carried out on the 12/06/2018. However, they could not be reached to collect a sample. During the second survey fresh droppings were observed and collected, whilst historic droppings were found during the third survey. The droppings collected during the second survey were sent off to Swift Ecology for DNA analysis which determined them to be serotine droppings.
64	Moderate	Low	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
66	Moderate	Moderate	E – TC	E / R	-	-	N	No evidence of bats was found during the surveys. The trunk cavity was found to be full of cobwebs and an active birds nest with ten eggs inside was also present.
67	Moderate	High	E / R	E - Gr	E - Gr	E / R	Y	Bat droppings were found on the inside of cavity during the second survey which was carried out on the 02/07/2018. These were sent for DNA analysis to Ecowarwicker Ecological Forensics which determined them to be pygmy shew (<i>Sorex minutus</i>) droppings
69	High	Moderate	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
75	Moderate	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
81	Moderate	Low	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
94	Moderate	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
96	Moderate	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys. A birds nest was present within a cavity 0.5m off the ground.
118	Moderate	Low	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4	Roost (Y / N)	Summary
119	Moderate	Negligible	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
120	High	High	E – Gr	E – Gr	E – Gr	-	N	No evidence of bats was found during the surveys. The horizontal crack was also found to be full of cobwebs during the second survey carried out on 11/06/2018.
121	Moderate	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
122	High	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
124	High	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
125	High	High	E – TC	E / R	E – TC	-	N	No evidence of bats was found during the surveys.
126	Moderate	Low	E - Gr	E / R	-	-	N	No evidence of bats was found during the surveys.
127	Moderate	Low	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
130	Low	Moderate	E – TC	E / R	-	-	N	No evidence of bats was found during the surveys.
133	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	-	Y	Bat droppings were found during the initial assessment of the tree (crushed to confirm bat; no others available for DNA analysis). No droppings were subsequently found during the three 2018 visits.
134	Moderate	Low	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
135	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	-	Y	Bat droppings were found during the initial assessment of this tree. Historic bat droppings were found then found during the first check survey and a single fresh dropping was found on the final survey. The droppings were sent off to Swift Ecology for DNA analysis and were determined to be serotine droppings.
139	Moderate	Moderate	E – TC	E / R	-	-	N	No evidence of bats was found during the surveys.
140	High	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
141	Confirmed	Confirmed	E – Gr	E – Gr	E – Gr	-	Y	Bat droppings were found during the initial assessment of the tree. The droppings were sent off to Swift Ecology for DNA analysis and determined to be serotine droppings.
155	Moderate	Negligible	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
160	High	Moderate	E – TC	E / R	-	-	N	No evidence of bats was found during the surveys.
161	Moderate	High	E – TC	E / R	E – TC	-	N	No evidence of bats was found during the surveys.
162	Moderate	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
166	High	Low	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
167	Moderate	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
171	Moderate	Negligible	E – TC	-	-	-	N	No evidence of bats was found during the surveys.

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4	Roost (Y / N)	Summary
174	Moderate	Negligible	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
176	Moderate	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
181	Moderate	Low	E – TC	-	-	-	N	No evidence of bats was found during the surveys.
184	Moderate	Moderate	E / R	E / R	-	-	N	No evidence of bats was found during the surveys.
194	Low	Negligible	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
195	High	Low	E – Gr	E – Gr	E – Gr	-	N	No evidence of bats was found during the surveys.
196	Moderate	Low	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
197	Moderate	Moderate	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
198	Moderate	Moderate	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
199	Moderate	Negligible	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
202	Moderate	Low	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
204	Moderate	Moderate	E – Gr	E - Gr	-	-	N	No evidence of bats was found during the surveys.
204a	Moderate	Low	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
205	High	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
207	Moderate	Moderate	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
600	High	High	E / R	E / R	E / R	-	N	No evidence of bats was found during the surveys.
601	High	Confirmed	E / R	E / R	E / R	-	Y	During the third surveys two common pipistrelles emerged from a split in the trunk of the tree at 7m high, which was carried out on 31/07/2018. The first bat emerged at 21:34 and the second at 21:38.
602	Confirmed	Confirmed	E – Gr	E – Gr	E / R	-	Y	Bat droppings were found during the first survey which was carried out on the 06/08/2018. These were sent for DNA analysis to Ecowarwicker Ecological Forensics. The droppings collected failed the DNA analysis process and therefore could not be identified to species level.
1545	Moderate	Confirmed	E - TC	E / R	E / R	-	Y	On the second survey on 26/07/18 a single common pipistrelle was observed re-entering the tree at 04:46.
1624	Moderate	Confirmed	E - TC	E - TC	E / R	-	Y	Bat droppings were found at the back of the cavity during the second survey (crushed to confirm bat; no others available for DNA analysis).
1625	Moderate	Moderate	E - TC	E - TC	-	-	N	No evidence of bats was found during the surveys.
1629	Moderate	Moderate	E / R	E / R	-	-	N	No evidence of bats was found during the surveys.
1631	High	Moderate	E / R	E / R	E / R	-	N	No evidence of bats was found during the surveys.
1632	Moderate	Moderate	E - TC	E - TC	-	-	N	No evidence of bats was found during the surveys.

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4	Roost (Y / N)	Summary
1633	Moderate	Moderate	E / R	E / R	-	-	N	No evidence of bats was found during the surveys.
1633a	High	Confirmed	E / R	E / R	E / R	-	Y	During the second survey on 27/05/18 a single serotine bat (identified from sound analysis) was recorded emerging from a woodpecker hole at 21:25. On the third survey visit on 10/08/2018 a single big bat was recorded re-entering the same feature at 05:29, this bat could not be identified to species level.
1633b	Moderate	Moderate	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
1634	Moderate	Confirmed	E - TC	E / R	E / R	-	Y	Staining was noted underneath the feature during the first survey which was carried out on the 04/06/2018. On the third survey visit on 20/07/18 a single common pipistrelle was recorded re-entering a woodpecker hole on the south-west side of the tree at 04:46.
1634a	Moderate	Moderate	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
1635	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
1636	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys. One of the woodpecker holes contains an empty birds nest
1638	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
1640	Moderate	Moderate	E / R	E / R	-	-	N	No evidence of bats was found during the surveys.
1641	High	High	E / R	E / R	E / R	-	N	No evidence of bats was found during the surveys.
1642	Moderate	Low	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
1644	Moderate	Confirmed	E – Gr	E – Gr	E – Gr	-	Y	Droppings were found during the second survey on the 23/07/2018. The droppings were sent off to Swift Ecology for DNA analysis and were determined to be serotine droppings
1645	Moderate	Moderate	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
1646	Moderate	Low	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
1650	Moderate	Moderate	E / R	E / R	-	-	N	No evidence of bats was found during the surveys.
1651	Low	High	E - TC	E / R	E – Gr	-	N	No evidence of bats was found during the surveys.
1652	High	Confirmed	E – Gr	E – Gr	E – Gr	-	Y	During the second survey a single dropping was found inside the hollow on 12/06/2018. The droppings were sent off to Swift Ecology for DNA analysis and determined to be serotine droppings.
1653	Moderate	High	E - TC	E / R	E / R	-	N	No evidence of bats was found during the surveys. One of the PRF's contains a honey bees nest.
1654	Moderate	Confirmed	E – Gr	E / R	E / R	E / R	Y	One historic dropping was found on the bark underneath entrance to the cavity during the first survey which was carried out on the 30/04/2018.

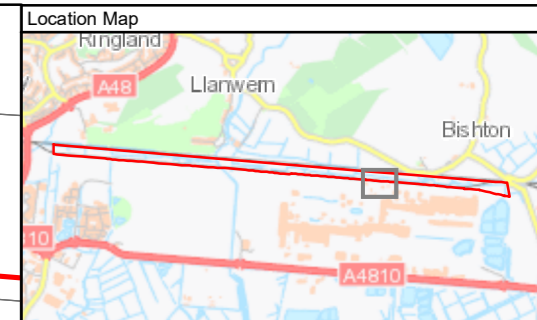
Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4	Roost (Y / N)	Summary
								No emerging or re-entering bats were recorded. Given the characteristics of the dropping and PRF, this is considered likely to be a pipistrelle sp. roost.
1655	Low	Negligible	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
1656	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
1658	Low	Negligible	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
1659	Moderate	Low	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
1660	Low	Negligible	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
1661	Moderate	Moderate	E / R	E / R	-	-	N	No evidence of bats was found during the surveys.
1662	High	High	E – Gr	E / R	E / R	-	N	No evidence of bats was found during the surveys.
1665	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
1667	High	Confirmed	E / R	E / R	E / R	-	Y	On the first survey visit on 05/06/18 a single soprano pipistrelle was recorded emerging from the base of the tree at 21:49.
1669	Moderate	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
1671	Low	Confirmed	E - TC	E / R	E / R	-	Y	Bat droppings were found on the bottom of the entrance on the 03/05/2018. The dropping was small and had a fine texture, indicating that it likely belonged to a pipistrelle. More droppings were collected on a later survey and sent for DNA analysis to Ecowarwicker Ecological Forensics, results were not returned. The original assessment of the droppings has therefore been used and this has been assessed as a pipistrelle sp. roost.
1672	Moderate	Negligible	E – Gr	-	-	-	N	No evidence of bats was found during the surveys.
1674	High	Low	E - TC	-	-	-	N	No evidence of bats was found during the surveys.
1676	High	Moderate	E – Gr	E – Gr	-	-	N	No evidence of bats was found during the surveys.
1677	Moderate	Confirmed	E / R	E / R	E / R	-	Y	On the first survey visit on 07/06/18, a single common pipistrelle was observed emerging from this tree at 21:43.
1678	Low	Moderate	E - TC	E / R	-	-	N	No evidence of bats was found during the surveys.
1679	Low	Confirmed	E - TC	E / R	E / R	-	Y	On the second survey visit on 07/06/18 a single common pipistrelle was recorded emerging from a rot hole at 21:44.
1680	Moderate	Moderate	E / R	E / R	-	-	N	No evidence of bats was found during the surveys.
1681	High	Confirmed	E - TC	E / R	E / R	-	Y	On the second survey on 06/06/2018, a single soprano pipistrelle was observed emerging from the tree at 22:18.

Tree Number	Assessed Roosting Potential	Revised Potential	Survey 1	Survey 2	Survey 3	Survey 4	Roost (Y / N)	Summary
2000	High	Confirmed	E - TC	E / R	E - TC	-	Y	Staining was observed below the entrance of a woodpecker hole on the 15/05/2018. During the final survey on the 16/07/2018 a noctule was observed within the tree. The bat was high in the cavity facing downwards.
AD1	Moderate	Moderate	E / R	E / R	-	-	N	No evidence of bats was found during the surveys.

Source: Mott MacDonald Ltd.

E / R = Emergence / Re-entry, E – TC = Endoscopy by Tree Climbing, E – Gr = Endoscopy from the ground.

L. Building Survey Results – Location Plan



Key to Symbols

Site boundary

Bat roosting potential

Confirmed

Moderate

Negligible

B1 Building number

Notes

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P1	24/09/18	TR	For Information	ZCM	CP
Rev	Date	Drawn	Description	Ch'k'd	App'd

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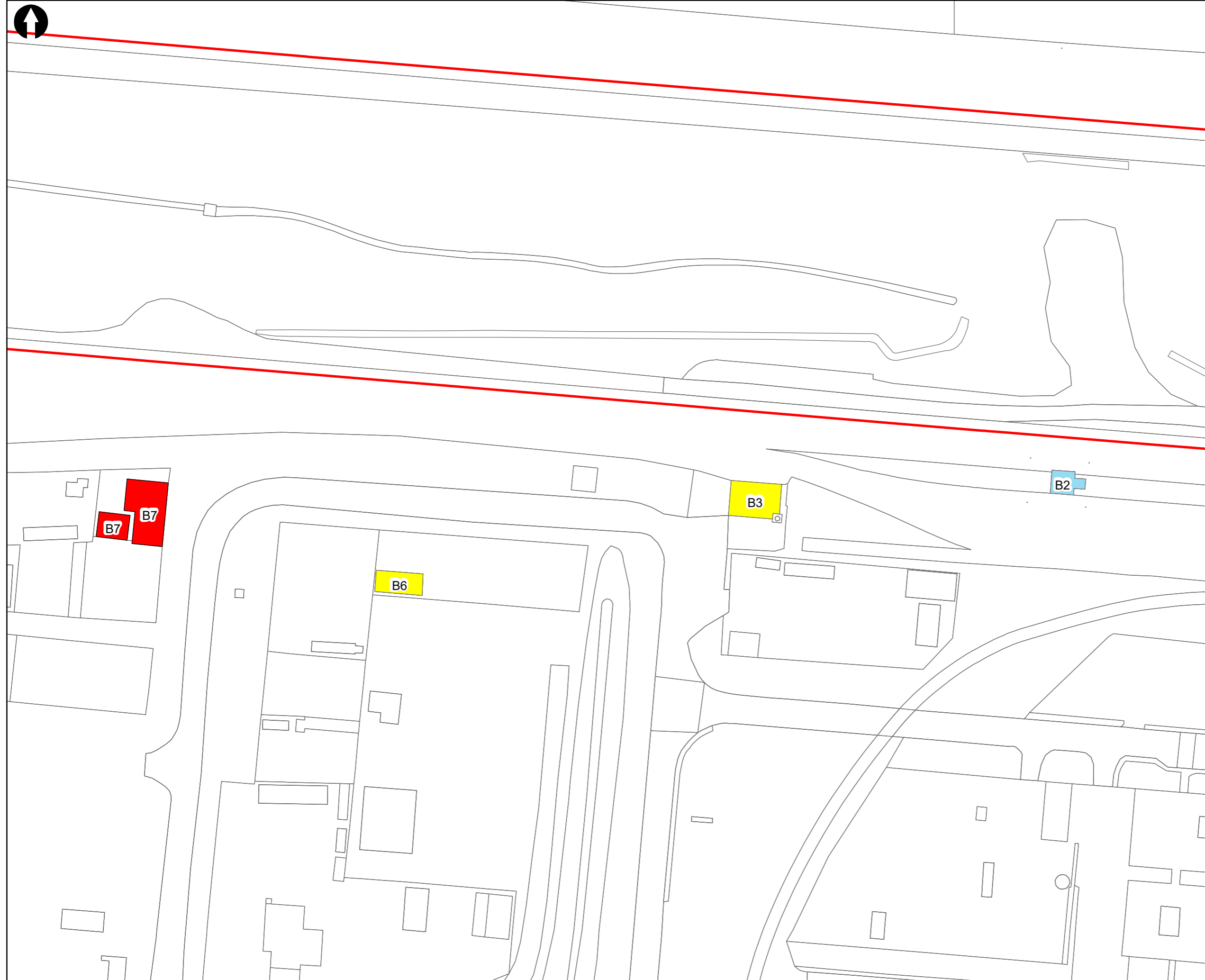
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South Wales Metro - Task Order 26
 Llanwern Buildings
 Bat Survey Results

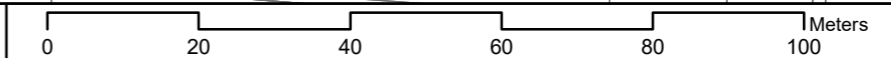
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Drawn	T Ruff	TR	Coordination	J Bates	JB
GIS Check	G O'Donovan	GO	Approved	C Probert	CP

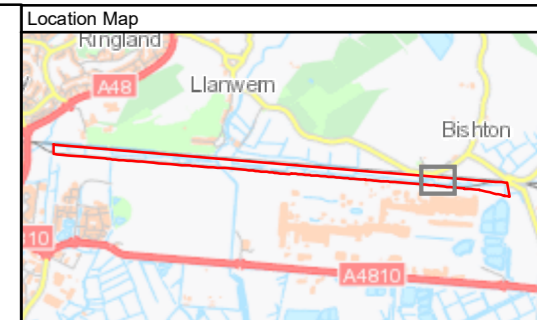
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1:1,000	INF	P1	STD

Drawing Number
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Key to Symbols

Survey area

Bat roosting potential

Negligible

Notes

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Rev	Date	Drawn	Description	Ch'k'd	App'd

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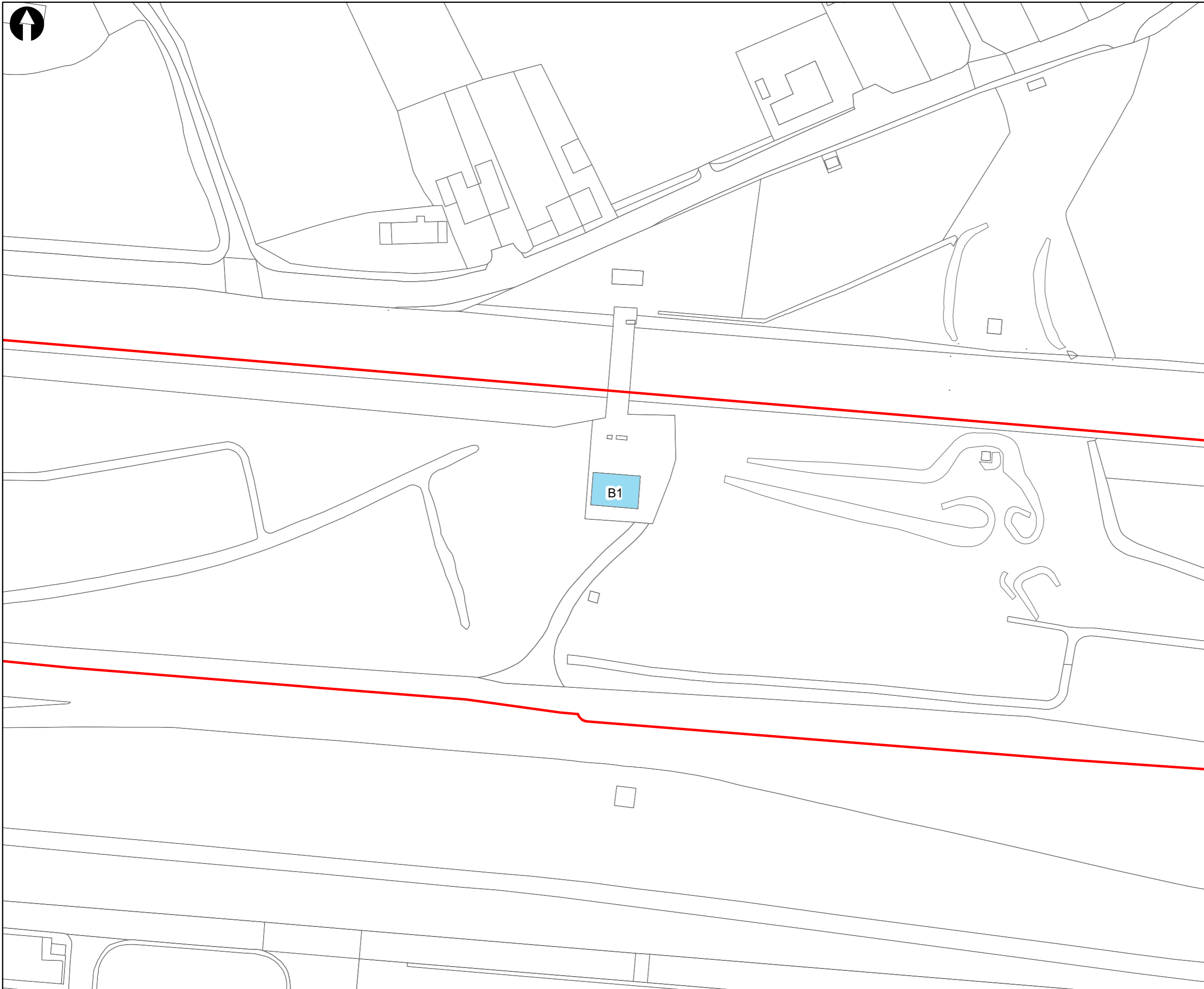
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South Wales Metro - Task Order 26
 Llanwern Buildings
 Bat Survey Results

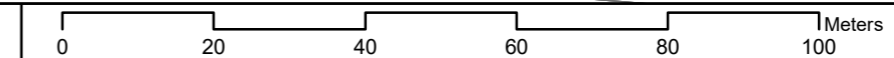
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Drawn	G O'Donovan	GO	Coordination	J Bates	JB
GIS Check	M Hayward	MH	Approved	C Probert	CP

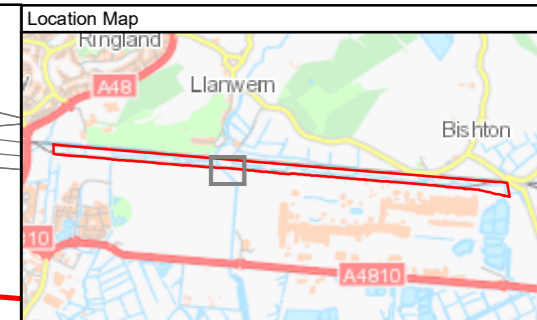
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Key to Symbols

Survey area

Bat roosting potential

Negligible

Notes

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Rev	Date	Drawn	Description	Ch'k'd	App'd

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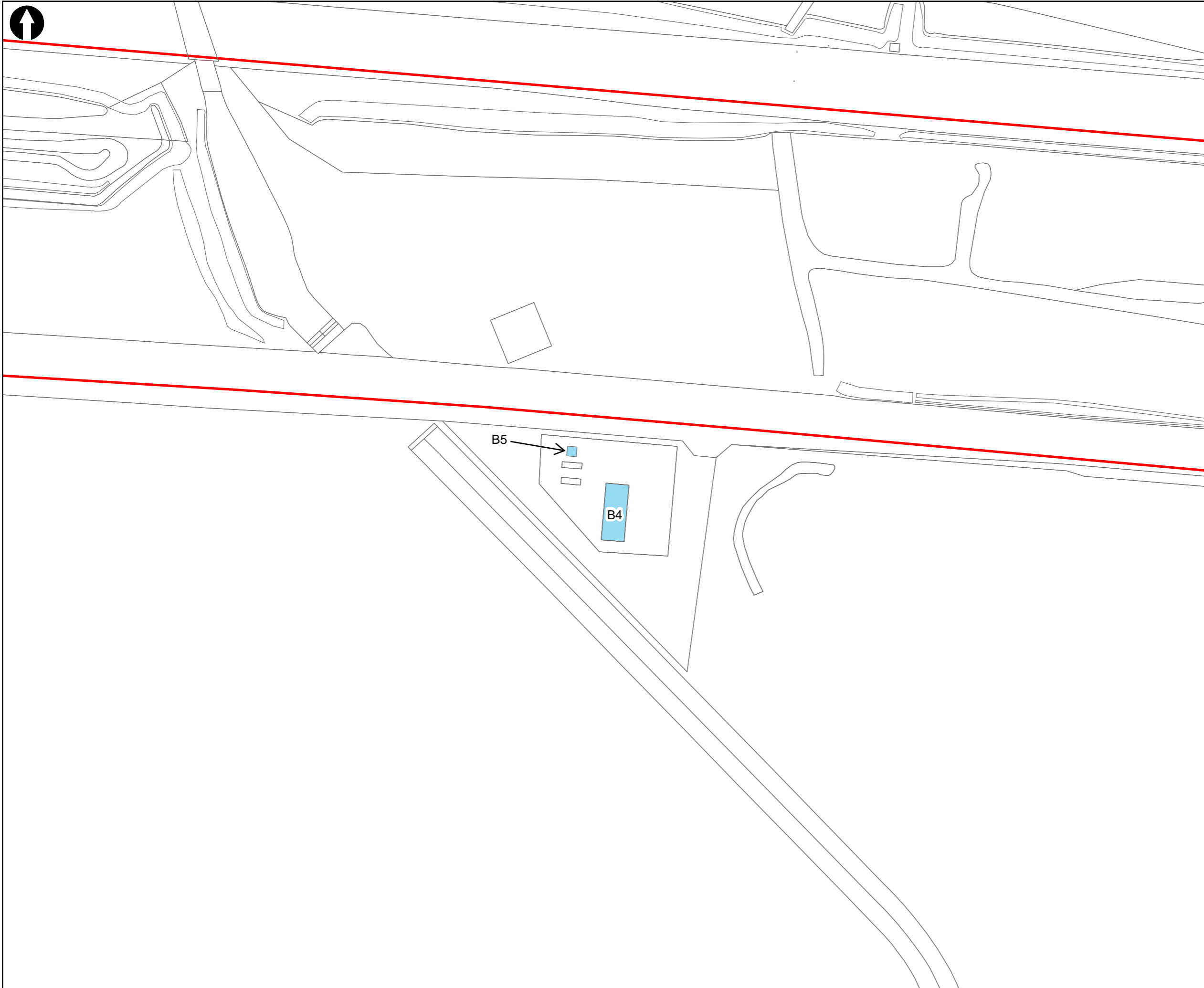
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South Wales Metro - Task Order 26
 Llanwern Buildings
 Bat Survey Results

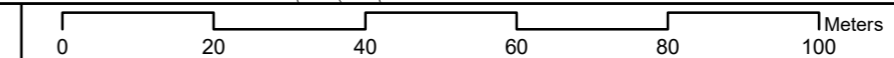
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GIS Check	M Hayward	MH	Approved	C Probert	CP

Scale at A3	Status	Rev	Security
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M. Building Photographs

Figure M.1: Building B1 (Pumphouse)



Source: Mott MacDonald Ltd.

Figure M.2: Building B2 (Rail Control)



Source: Mott MacDonald Ltd.

Figure M.3: Building B3 (DB Cargo)



Source: Mott MacDonald Ltd.

Figure M.4: Building B4 (Gas Station)



Source: Mott MacDonald Ltd.

Figure M.5: Building B5 (Gas Station Associated)



Source: Mott MacDonald Ltd.

Figure M.6: Building B6 (Derelict 1)



Source: Mott MacDonald Ltd.

Figure M.7: Building B2 (Derelict 2)



Source: Mott MacDonald Ltd.

Figure M.8: Building B8 (LHS Building)



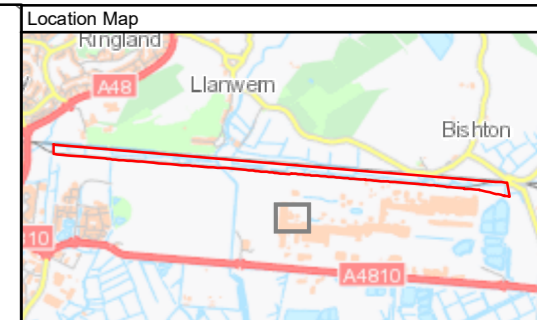
Source: Mott MacDonald Ltd.

Figure M.9: Building B9



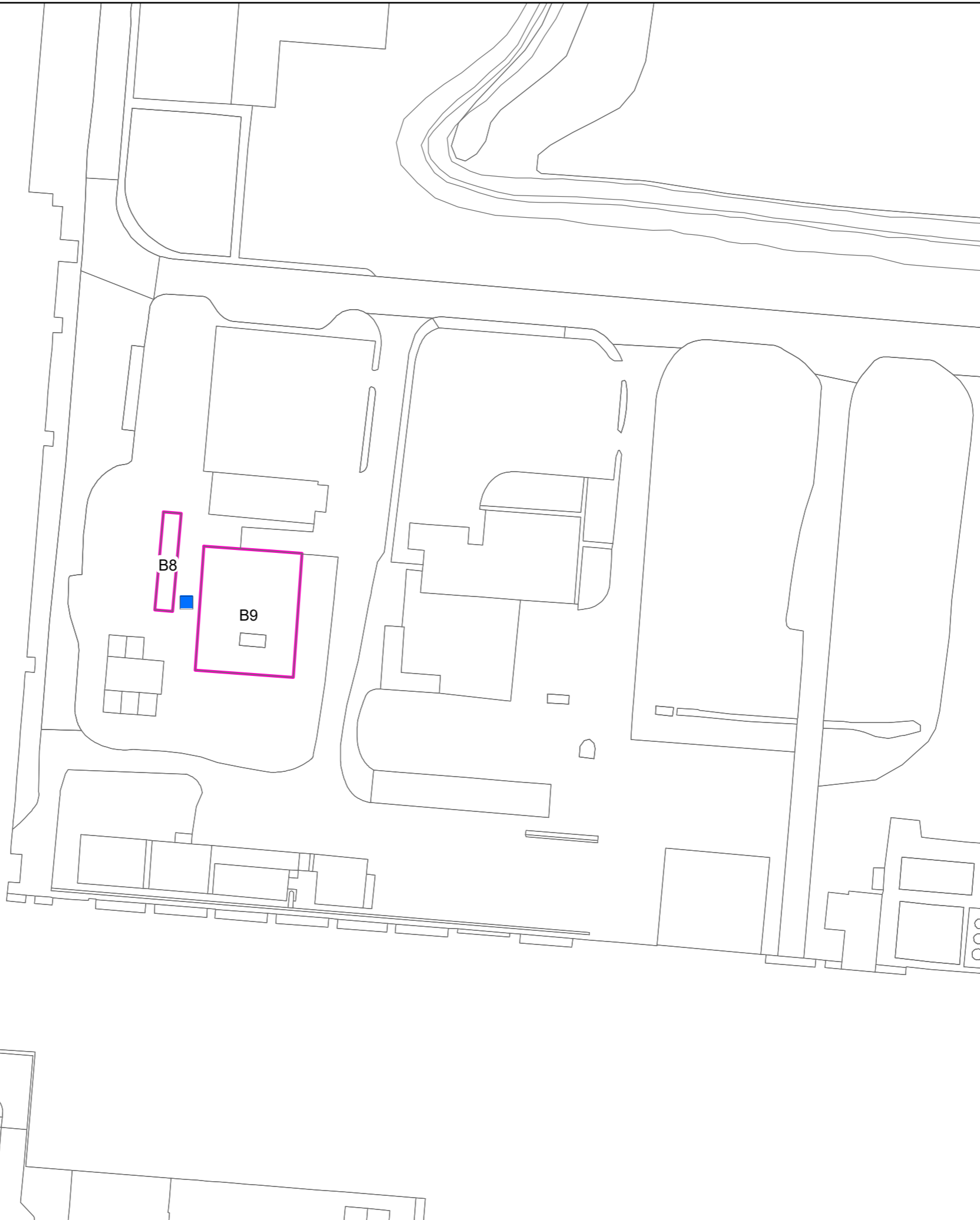
Source: Mott MacDonald Ltd.

N. LHS Building – Location Plan



Key to Symbols

	Building location
	Static bat detector
B8	Building number



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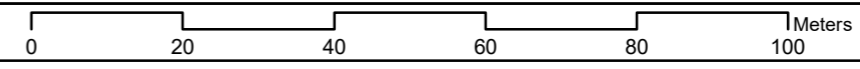
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South Wales Metro - Task Order 26
Llanwern Building
Lesser Horseshoe Bat Survey
Static Detector Location

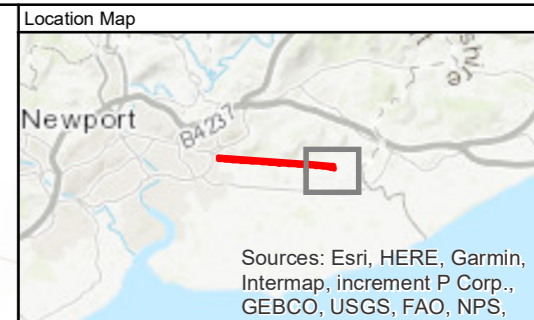
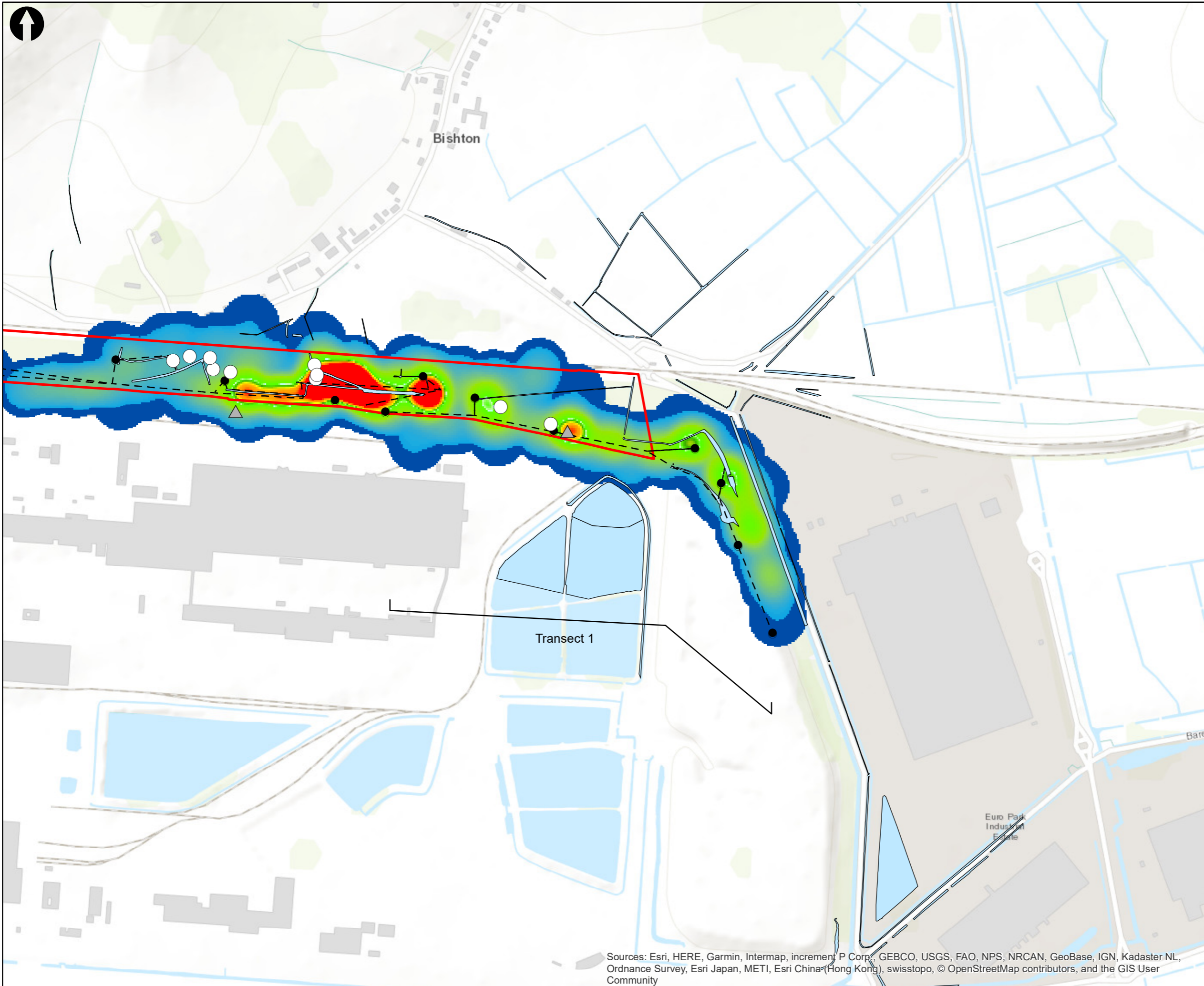
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367590-MMD-26-XX-DR-C-0428



O. Manual Activity Surveys – Heat Maps



Key to Symbols

- Survey area
- - - Transects
- - - - Transect 3 adapted route
- Transect stop points
- ▲ Lighting towers
- Reens

Bat roosting potential

- Confirmed

Bat activity

- High bat activity
- Moderate bat activity
- Low bat activity

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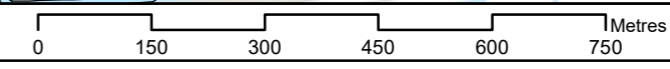
Transport for Wales
Southgate House
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Title

South Wales Metro - Task Order 26
Llanwern Bat Activity Heat Map
All Species & Confirmed Roosts
Transect 1

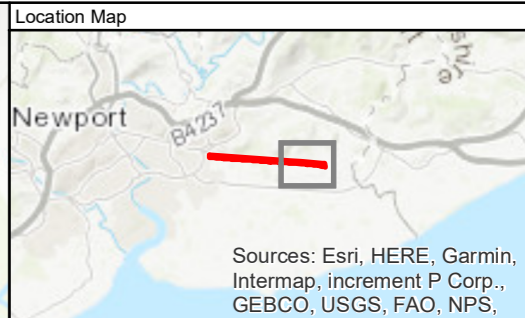
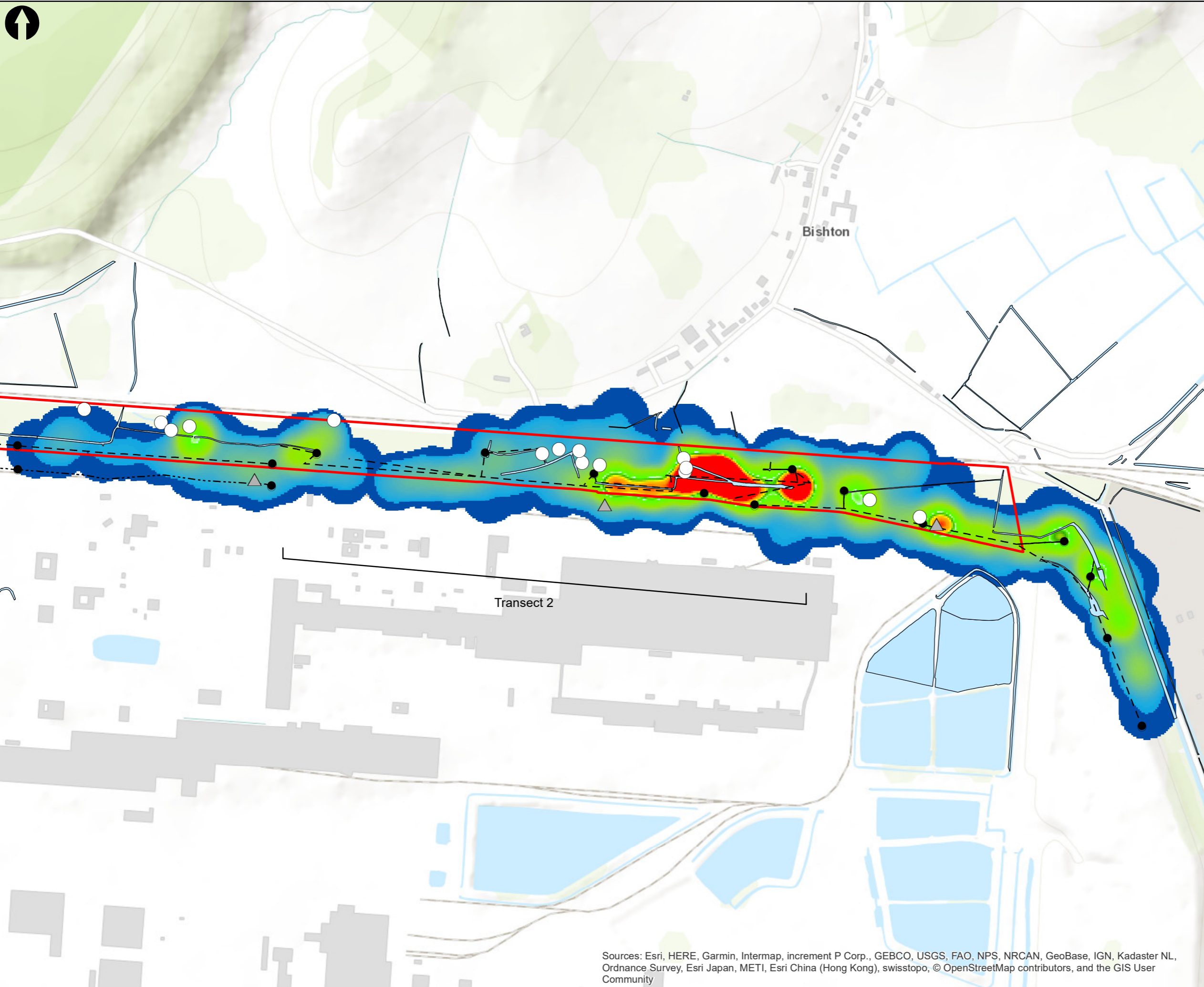
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Key to Symbols

- Survey area
- - - Transects
- - - - Transect 3 adapted route
- Transect stop points
- ▲ Lighting towers
- Reens

Bat roosting potential

- Confirmed

Bat activity

- High bat activity
- Moderate bat activity
- Low bat activity

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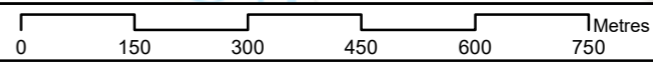
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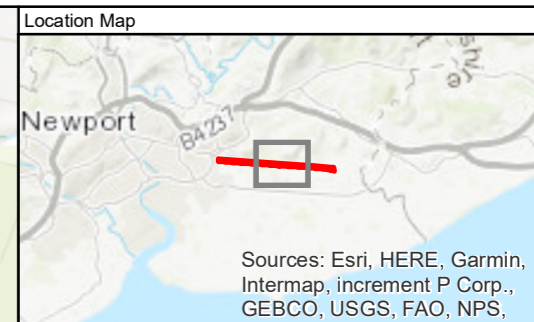
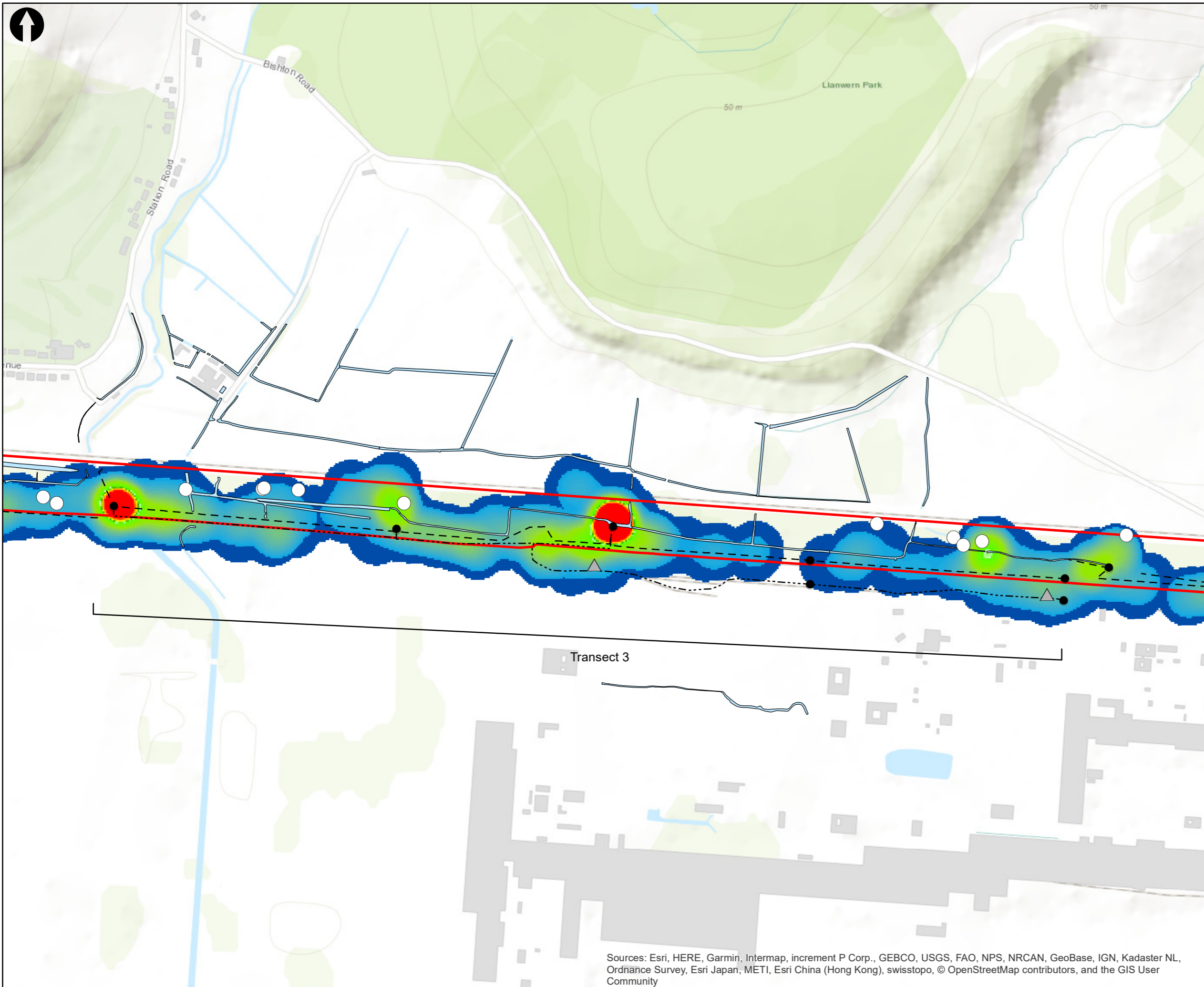
Title

South Wales Metro - Task Order 26
 Llanwern Bat Activity Heat Map
 All Species & Confirmed Roosts
 Transect 2

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Key to Symbols

- Survey area
- - - Transects
- · - · - Transect 3 adapted route
- Transect stop points
- ▲ Lighting towers
- Reens

Bat roosting potential

- Confirmed

Bat activity

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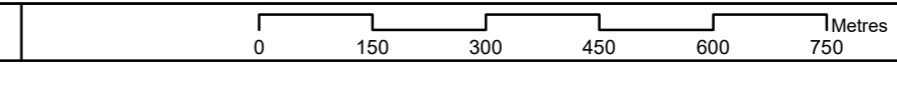
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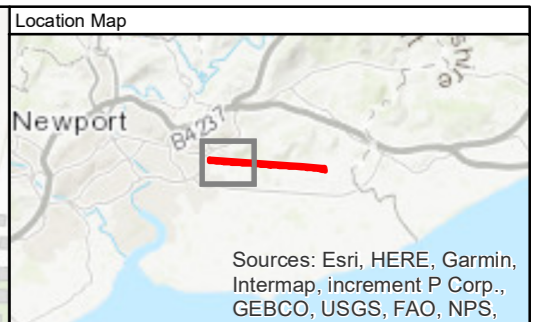
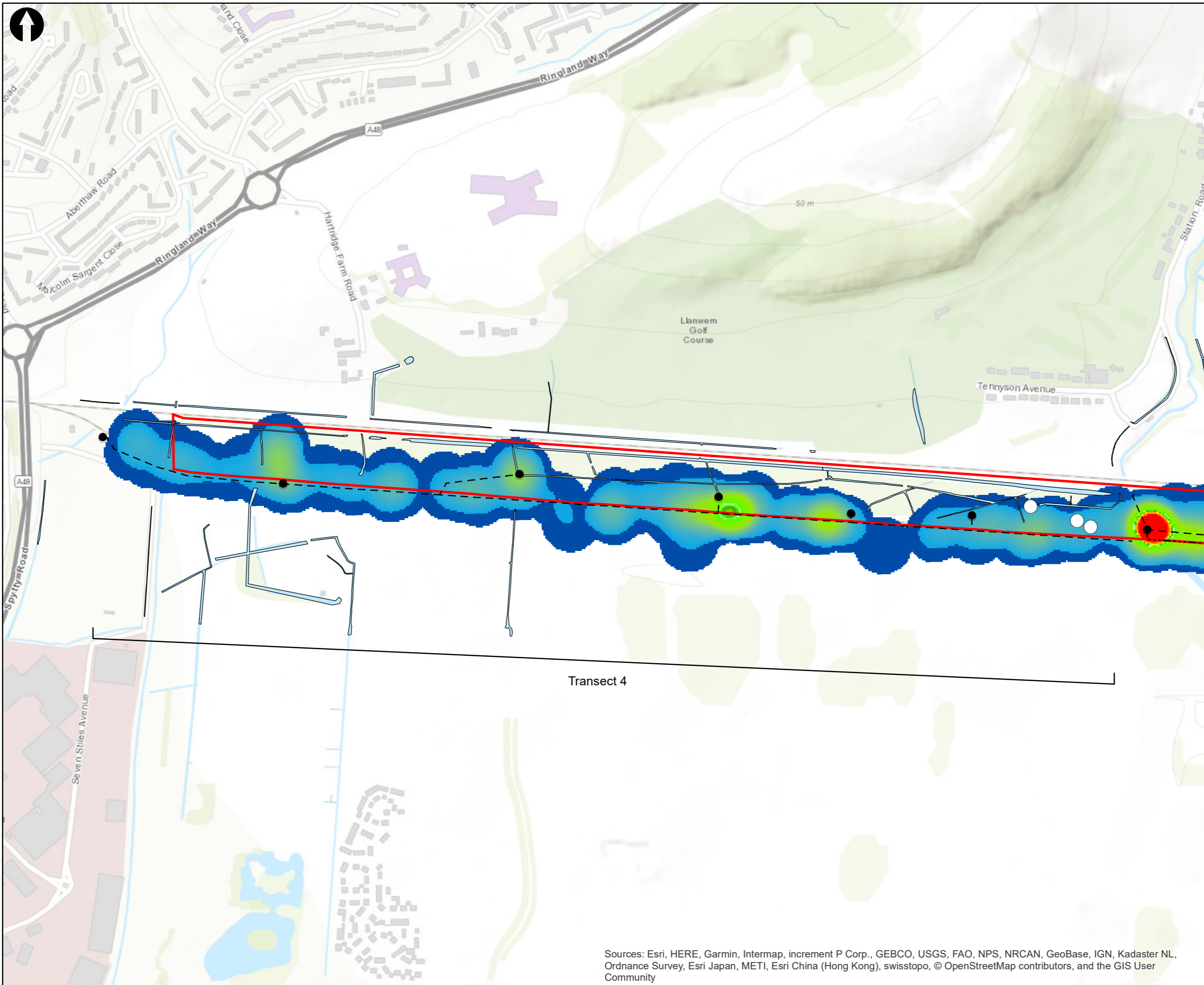
South Wales Metro - Task Order 26
 Llanwern Bat Activity Heat Map
 All Species & Confirmed Roosts
 Transect 3

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Key to Symbols

- Survey area
- - - Transects
- - - - Transect 3 adapted route
- Transect stop points
- Reens

Bat roosting potential

- Confirmed

Bat activity

- High bat activity
- Moderate bat activity
- Low bat activity

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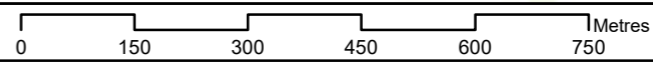
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Title

South Wales Metro - Task Order 26
 Llanwern Bat Activity Heat Map
 All Species & Confirmed Roosts
 Transect 4

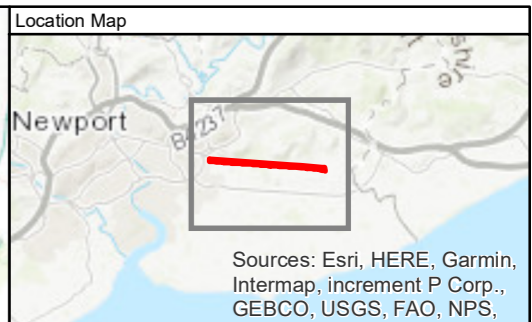
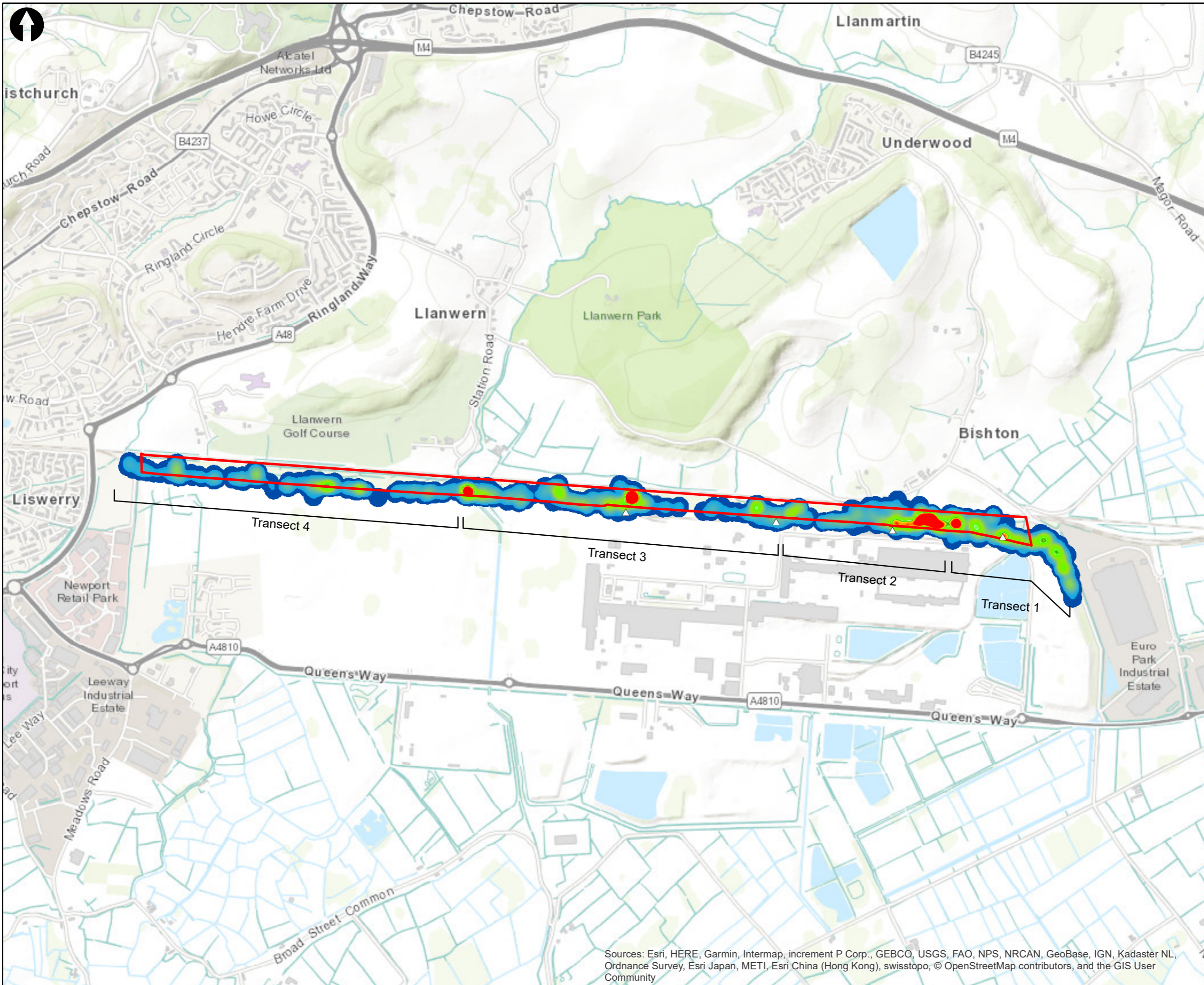
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Key to Symbols

- Survey area
- Lighting towers

Bat activity

- High bat activity
- Moderate bat activity
- Low bat activity

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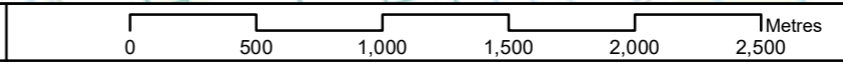
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Title

South Wales Metro - Task Order 26
Llanwern Bat Activity Heat Map
(Manual Surveys)
All Species

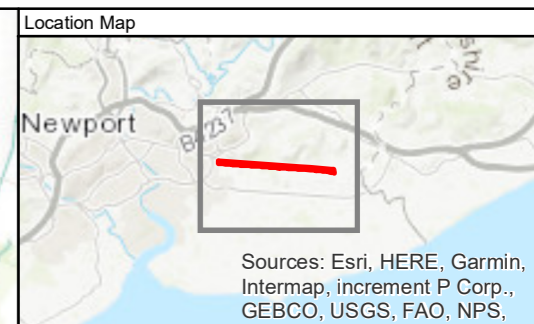
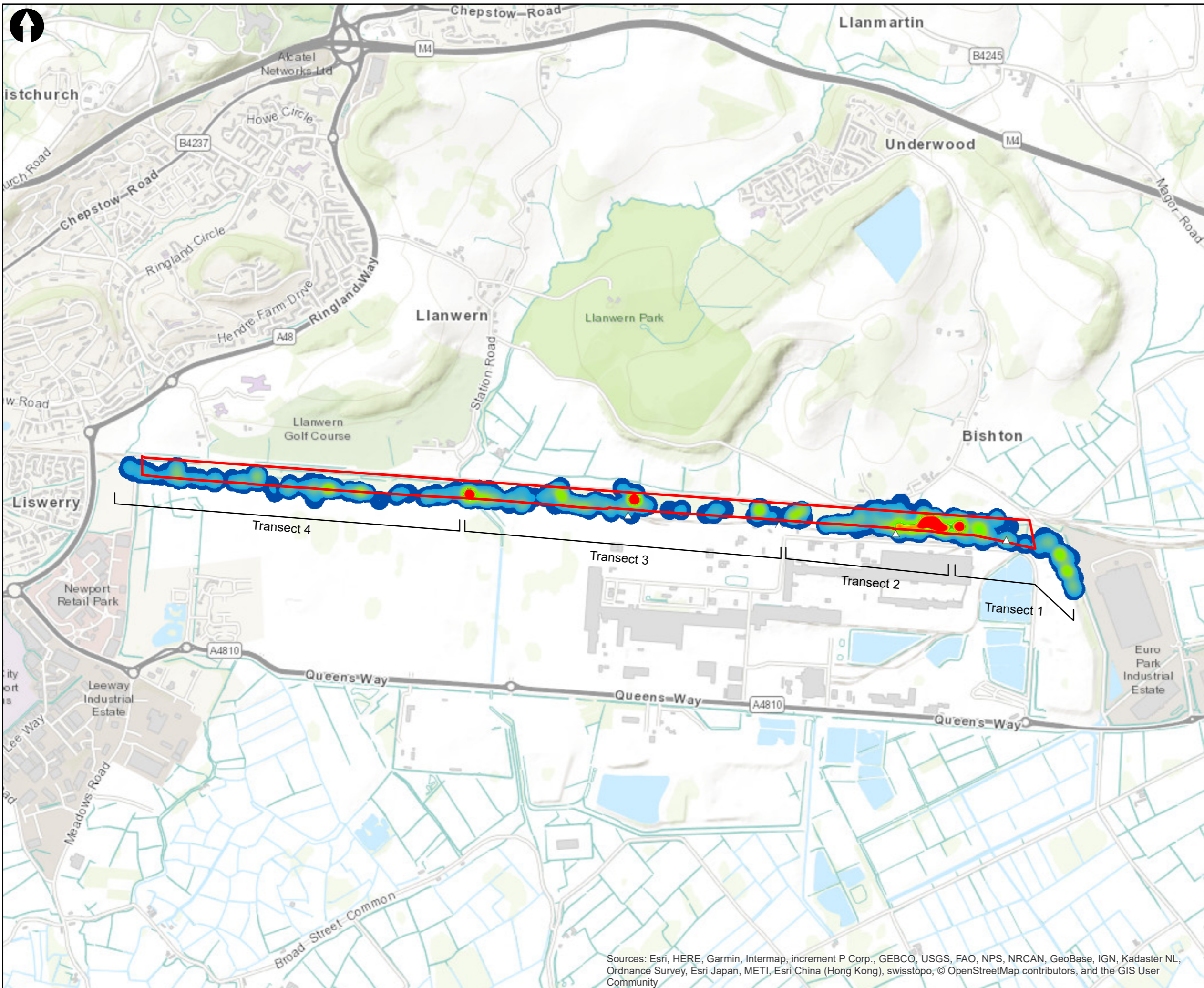
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Key to Symbols

- Survey area
- Lighting towers

Bat activity

- High bat activity
- Moderate bat activity
- Low bat activity

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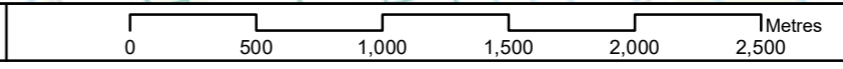
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Cardiff, CF10 1EW
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Title

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Llanwern Bat Activity Heat Map
(Manual Surveys)
Pipistrelle Species

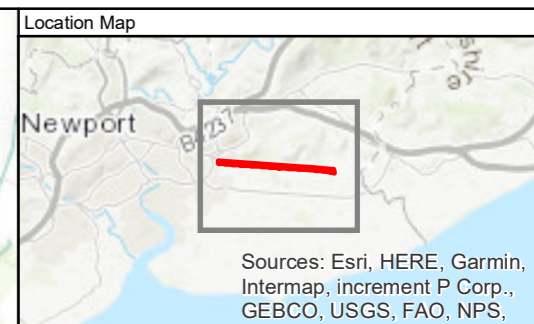
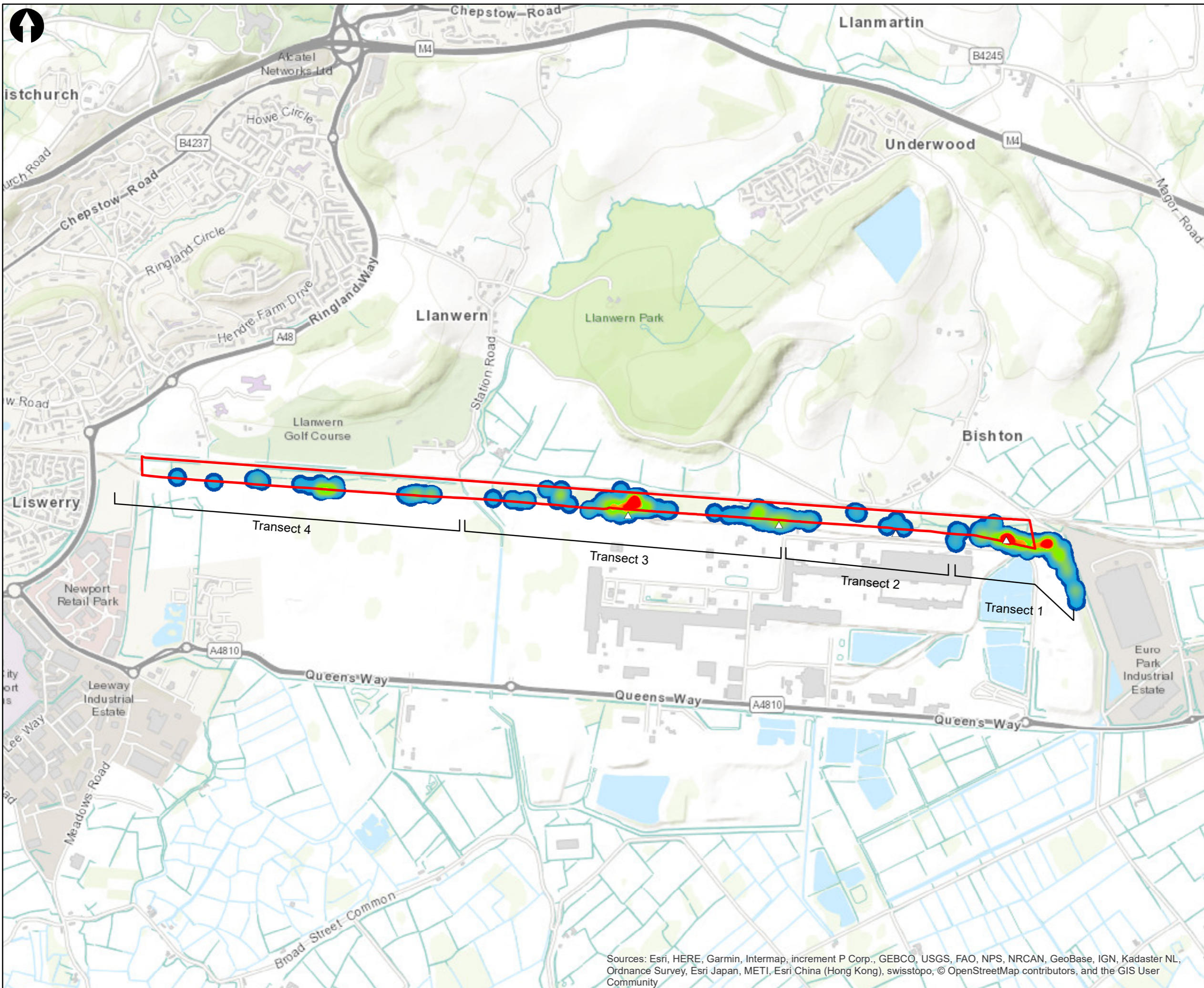
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GIS Check	M Hayward	MH	Approved	C Probert	CP
Scale at A3	Status	Rev	Security		
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Key to Symbols

- Survey area
- Lighting towers

Bat activity

- High bat activity
- Moderate bat activity
- Low bat activity

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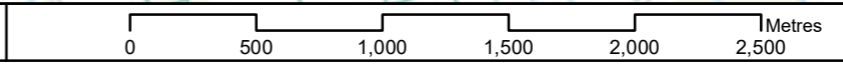
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Title

South Wales Metro - Task Order 26
Llanwern Bat Activity Heat Map
(Manual Surveys)
Nyctalus Species

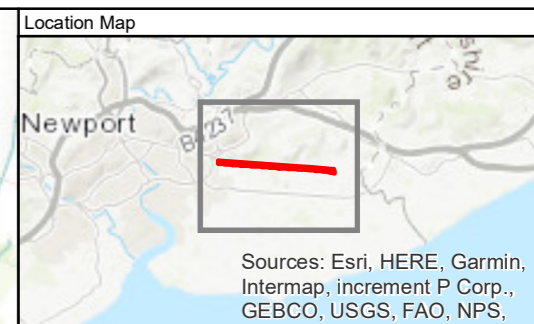
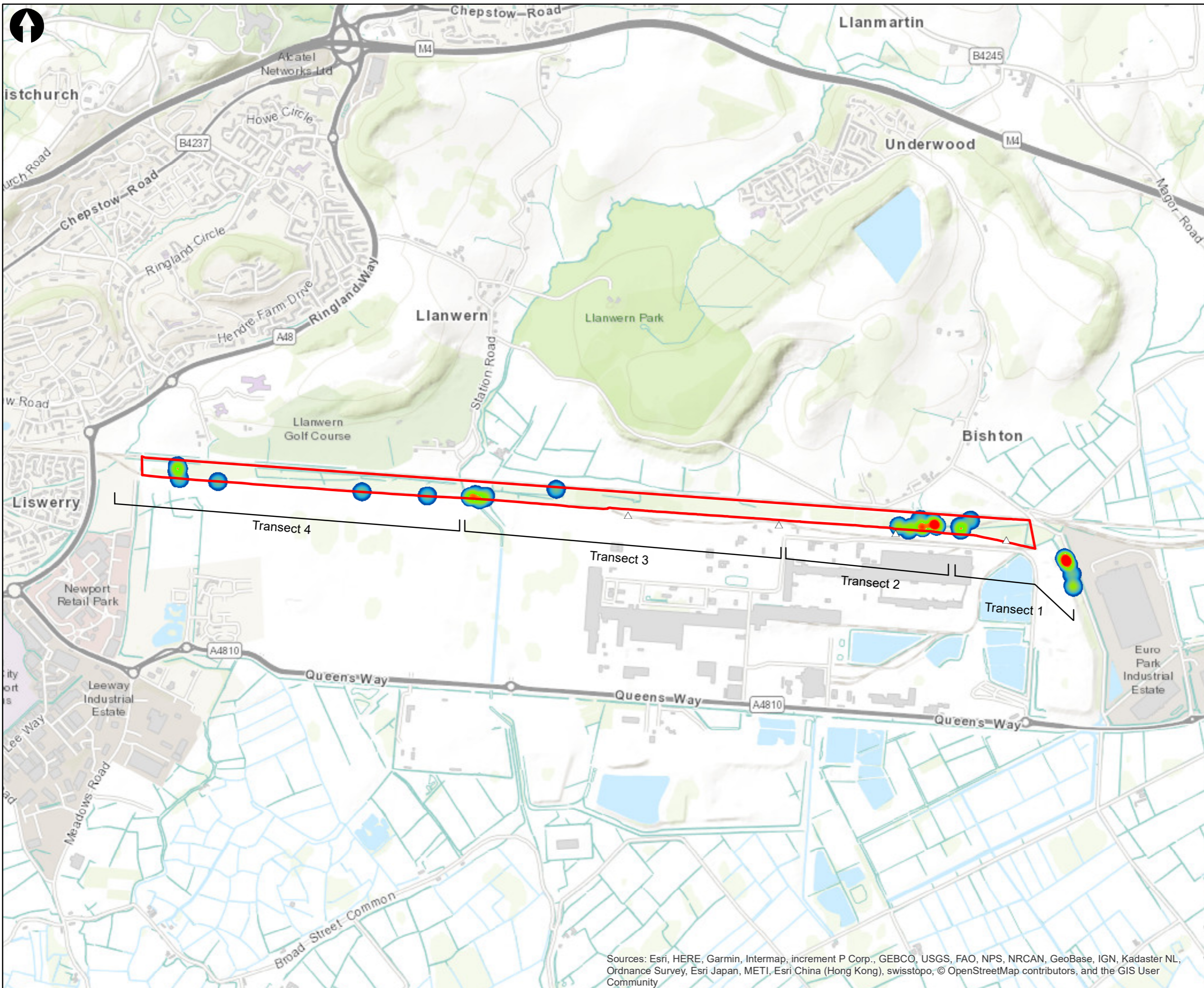
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GIS Check	M Hayward	MH	Approved	C Probert	CP
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Key to Symbols

- Survey area
- Lighting towers

Bat activity

- High bat activity
- Moderate bat activity
- Low bat activity

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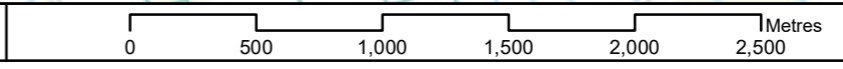
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United Kingdom

Title

South Wales Metro - Task Order 26
Llanwern Bat Activity Heat Map
(Manual Surveys)
Myotis Species

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P. Bat Activity Per Night and Per Hour Comparison

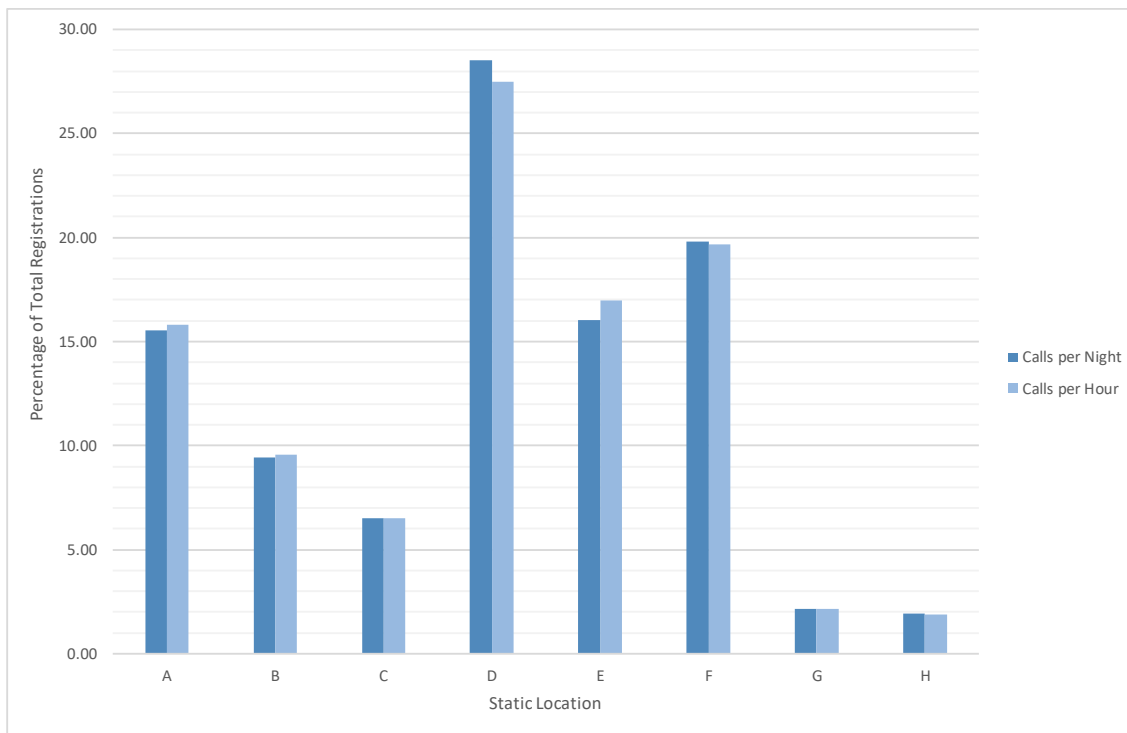
Table P.1: Average Bat Call Registrations per Hour Across Static Detector Locations and Species

Transect	1		2		3		4	
Static Location	A	B	C	D	E	F	G	H
Big Bat	0.031	0.201	0.003	0	0.012	0	0.005	0
Serotine	0.046	0.059	0	0.024	0	0	0.003	0
<i>Myotis</i> species	5.446	0.893	0.130	0.036	0.040	0	0.025	0.011
Noctule	7.450	9.048	1.014	42.048	20.432	0.382	0.157	0.044
<i>Nyctalus</i> species	9.231	8.728	3.083	15.509	24.568	0.323	0.074	0.095
Pipistrelle species	22.073	7.766	13.983	19.339	2.472	53.639	4.992	4.356
<i>Plecotus</i> Species	0.058	0.096	0.006	0.036	0.004	0	0.025	0.011
Lesser horseshoe bat	0	0	0.003	0	0	0.010	0	0
Grand Total	44.335	26.791	18.222	76.994	47.528	55.118	5.984	5.229
Percentage of total	15.82%	9.56%	6.50%	27.48%	16.96%	19.67%	2.14%	1.87%

Table P.2: Average Bat Call Registrations per Night Across Static Detector Locations and Species

Transect	1		2		3		4	
Static Location	A	B	C	D	E	F	G	H
Big Bat	0.320	2.103	0.029	0	0.120	0	0.059	0
Serotine	0.480	0.621	0	0.267	0	0	0.029	0
<i>Myotis</i> species	56.640	9.345	1.382	0.400	0.400	8.148	7.794	7.960
Noctule	77.480	94.690	10.765	462.533	204.320	4.074	1.676	0.480
<i>Nyctalus</i> species	96.000	91.345	32.735	170.600	245.680	3.444	0.794	1.040
Pipistrelle species	229.560	81.276	148.471	212.733	24.720	572.148	53.441	47.920
<i>Plecotus</i> Species	0.600	1.000	0.059	0.400	0.040	0	0.265	0.120
Lesser horseshoe bat	0	0	0.029	0	0	0.111	0	0
Grand Total	461.080	280.379	193.471	846.933	475.280	587.926	64.059	57.520
Percentage of total	15.54%	9.45%	6.52%	28.54%	16.02%	19.81%	2.16%	1.93%

Figure P.2: Average Bat Call Registrations per Hour and per Night by Static Detector Location



Source: Mott MacDonald Ltd.

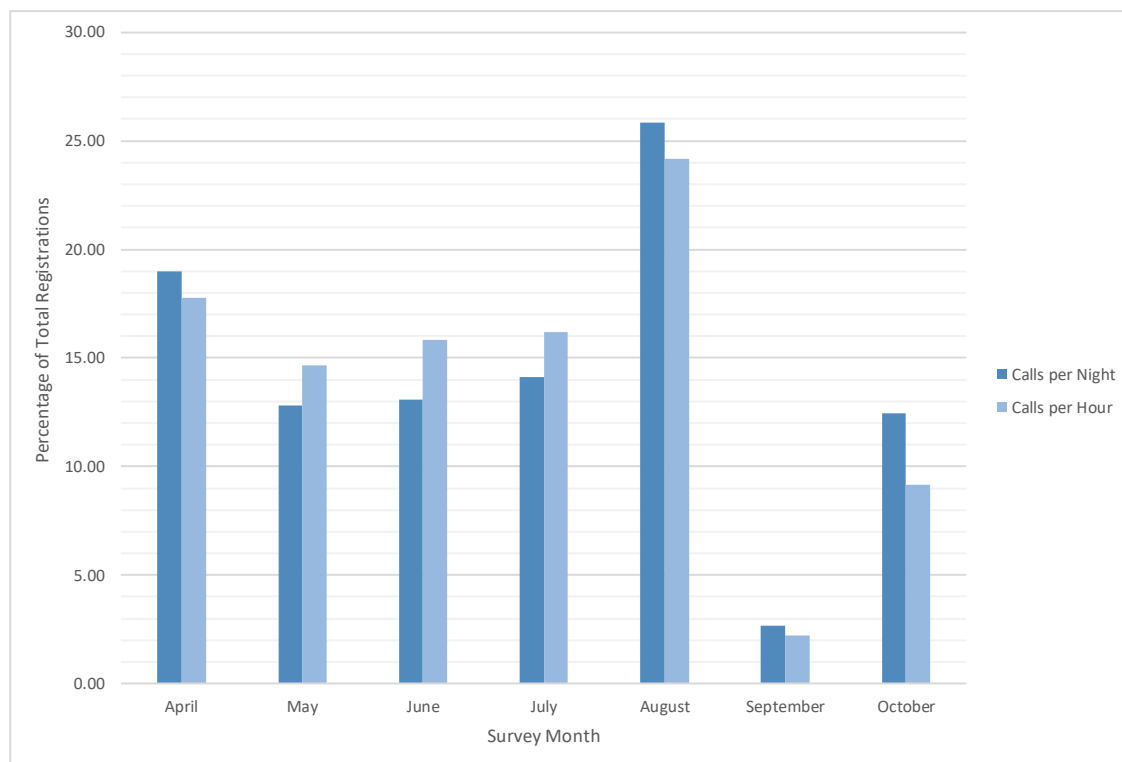
Table P.3: Average Bat Call Registrations per Hour Across Survey Months and Species

Species	April	May	June	July	August	September	October
Big Bat	0	0.271	0.020	0.010	0.011	0.003	0
Serotine	0.009	0.093	0.030	0.006	0	0	0
<i>Myotis</i> species	1.070	0.182	1.338	2.152	1.495	0.560	0.557
Noctule	7.655	10.618	8.760	0.990	22.540	0.216	2.657
<i>Nyctalus</i> species	8.242	5.591	3.815	16.095	3.992	0.136	9.377
Pipistrelle species	22.048	15.271	20.756	16.190	24.973	3.941	7.460
<i>Plecotus</i> Species	0.003	0.129	0.020	0.048	0.027	0	0.011
Lesser horseshoe bat	0.009	0.004	0	0	0	0	0
Grand Total	39.036	32.160	34.739	35.492	53.037	4.856	20.063
Percentage of Total	17.79%	14.66%	15.83%	16.18%	24.18%	2.21%	9.15%

Table P.4: Average Bat Call Registrations per Night Across Survey Months and Species

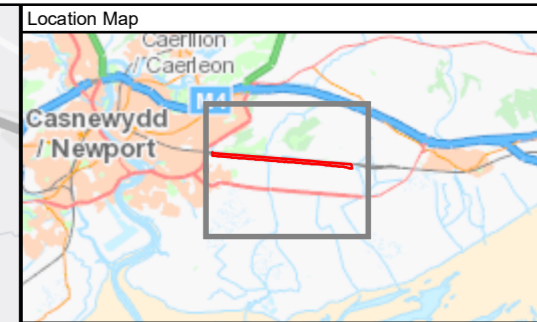
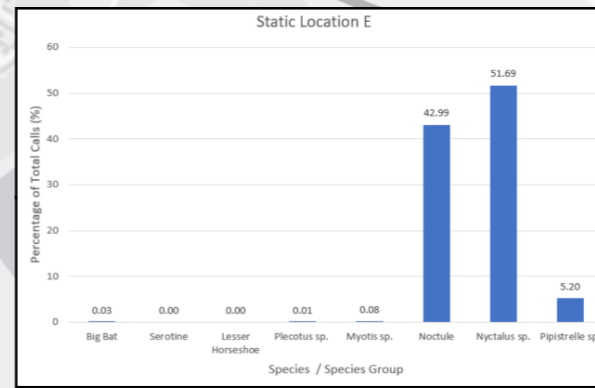
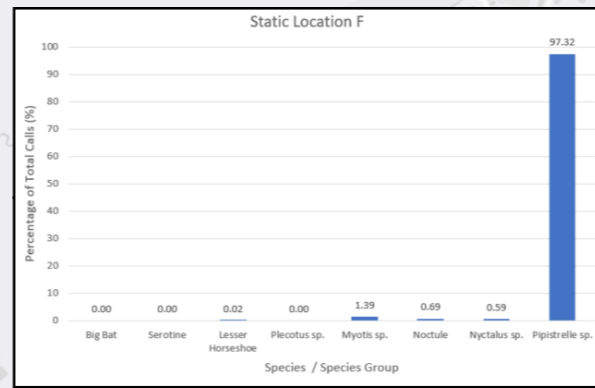
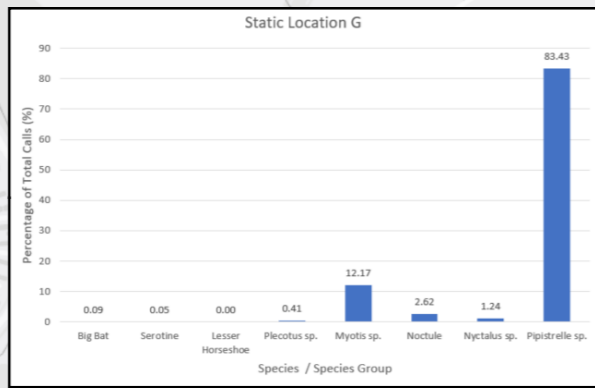
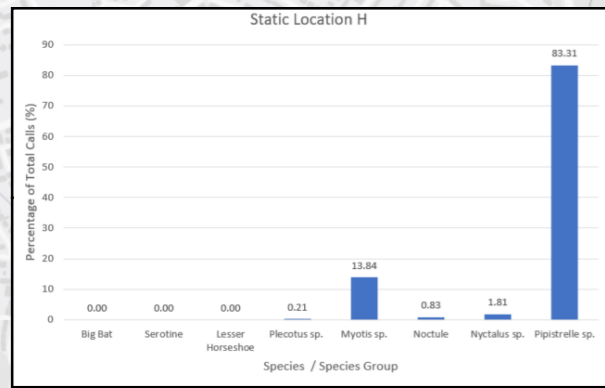
Species	April	May	June	July	August	September	October
Big Bat	0	2.440	0.171	0.086	0.118	0.033	0
Serotine	0.100	0.840	0.257	0.057	0	0	0
<i>Myotis</i> species	11.767	1.640	11.371	19.371	16.441	7.000	7.800
Noctule	84.200	95.560	74.457	8.914	247.941	2.700	37.200
<i>Nyctalus</i> species	90.667	50.320	32.429	144.857	43.912	1.700	131.280
Pipistrelle species	242.533	137.440	176.429	145.714	274.706	49.267	104.440
<i>Plecotus</i> Species	0.033	1.160	0.171	0.429	0.294	0	0.160
Lesser horseshoe bat	0.100	0.040	0	0	0	0	0
Grand Total	429.400	289.440	295.286	319.429	583.412	60.700	280.880
Percentage of Total	19.01%	12.81%	13.07%	14.14%	25.83%	2.69%	12.44%

Figure P.2: Average Bat Call Registrations per Hour and per Night by Month



Source: Mott MacDonald Ltd.

Q. Automated Activity Surveys – Results Plan



Key to Symbols

Survey area

Static detector locations (average bat registrations per hour)

77 Static detector



Notes

- For information only, not for construction.
- Contains public sector information licensed under the Open Government Licence v3.0: (<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>)
- Contains Ordnance Survey data © Crown copyright and database right 2018 Ordnance Survey. All rights reserved. Mott MacDonald Ltd 0100026791
- Symbol size is relative to bat registrations per hour at each location.

P1	24/09/18	GO	For Information	ZCM	CP
Rev	Date	Drawn	Description	Ch'k'd	App'd

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Client
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 United Kingdom

Title
 South Wales Metro - Task Order 026
 Llanwern Station - Static Bat
 Detector Survey Results

Designed	A Bone	AB	Eng Check	Z Costas	ZCM
Drawn	G O'Donovan	GO	Coordination	L Woolley	LKW
GIS Check	M Hayward	MH	Approved	C Probert	CP

Scale at A3	Status	Rev	Security
1:16,000	INF	P1	STD

Drawing Number
 367590-MMD-26-XX-DR-C-0455

