

M60/M62/M66 Simister Island Interchange

TR010064

ENVIRONMENTAL STATEMENT APPENDICES

APPENDIX 8.3 BAT SURVEY REPORT

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed
Forms and Procedure) Regulations 2009

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms and
Procedure) Regulations 2009**

**M60/M62/M66 Simister Island Interchange
Development Consent Order 202[]**

**ENVIRONMENTAL STATEMENT APPENDICES
APPENDIX 8.3 BAT SURVEY REPORT**

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Appendix 8.3 Bat survey report

Executive summary

This technical report presents the findings of desk study and bat surveys undertaken between 2021 and 2023 as part of the M60/M62/M66 Simister Island Interchange (the 'Scheme'). The purpose of the surveys was to establish an ecological baseline for bats to form part of the supporting information for Chapter 8: Biodiversity of the Environmental Statement (TR010064/APP/6.1).

The desk study identified a range of bat species in the study area with roosts mainly associated with local residential areas and Philips Park Wood to the south-west of the Scheme.

A programme of bat surveys was undertaken which identified:

- Fifty four trees with bat roosting potential in the survey first defined by the provisional Order Limits
- Eight trees with bat roosting potential within the Order Limits
- No evidence of roosting bats were found
- Four bat species were identified through transect, static detector and vantage point surveys: common pipistrelle; noctule; soprano pipistrelle; and brown long-eared bat
- Hedgerows within the survey area appear to be used by the local bat population, but not on a consistent basis

It is likely a small number of bat roosts are present within the suburban housing that is present in the local area and in Philips Park Wood. The landscape is a mix of neutral, slightly wet grassland, intensively managed grasslands, cropland, with an extensive area of woodland and parkland also present to provide suitable habitats for bats. However, these habitats are all located in close proximity to a network of motorways which reduces connectivity between these areas and therefore are unlikely to support the core sustenance zones of more sensitive species or larger colonies.

Using the Wray *et al.* (2010) approach, the bat assemblage within the study area has been valued as being of **Local importance**.

1 Introduction

1.1 Purpose of the report

- 1.1.1 The report sets out the results of desk-based study and field surveys undertaken between May 2021 and May 2023 as part of the M60/M62/M66 Simister Island Interchange (the 'Scheme'). The aim is to establish an ecological baseline for the local bat population to provide supporting information for Chapter 8: Biodiversity of the Environmental Statement (TR010064/APP/6.1) and to inform any mitigation or licencing requirements.
- 1.1.2 The data were collected in conjunction with the application of the relevant good practice survey guidance (Collins, 2016) and interpretation of planning policies and legislative framework.
- 1.1.3 This report is supported by the following figures in Annex D of this appendix:
- Figure 8.3.1: Bat Roost Potential
 - Figure 8.3.2: Bat Activity Survey Locations
 - Figure 8.3.3: Bat Activity Visualisation

1.2 Definitions

- 1.2.1 The study area relates to the area in which desk study information has been collated via online and third-party sources. This area comprised a 2km buffer around the provisional Order Limits that were available at the time of undertaking and a 30km buffer for Special Areas of Conservation (SACs) that are designated for bats in accordance with DMRB LA 115 (Highways England, 2020).
- 1.2.2 The survey area refers to the area within which surveys were completed. Roost assessments were undertaken within a 100m buffer around the provisional Order Limits which were available at the time of survey (the provisional Order Limits are discussed and presented in detail in the Environmental Scoping Report (TR010064/APP/6.6)). Bat activity surveys were undertaken within the provisional Order Limits. The provisional Order Limits are largely concurrent with the Order Limits for the application for development consent (hereafter just referred to as the Order Limits) and any substantial deviations are included within the wider study area and captured within the overall baseline.

1.3 Legislative, policy and regulatory context

- 1.3.1 An assessment of the legislative and regulatory framework covering bats in the UK has been undertaken. Due consideration has been given to the following statutory instruments and policy frameworks in the preparation of this report:
- Conservation of Habitats and Species Regulations 2017 (as amended)
 - Wildlife and Countryside Act 1981 (as amended)
 - Natural Environment and Rural Communities Act 2006

- 1.3.2 The Greater Manchester Biodiversity Action Plan (BAP) (Greater Manchester Biodiversity Project, 2009) identifies those species and habitats that are most at risk in Greater Manchester and actions required for their conservation. All UK bat species are included in the Greater Manchester BAP, and therefore have a Species Action Plan.
- 1.3.3 Pipistrelle species *Pipistrellus sp.* have been found in all ten districts of Greater Manchester. Daubenton's bat *Myotis daubentonii*, whiskered bat *Myotis mystacinus*, noctule *Nyctalus noctula* and brown long-eared bat *Plecotus auritus* are all mentioned in the Greater Manchester BAP as being present in Bury.
- 1.3.4 Current objectives outlined in the Greater Manchester Species Action Plan are the following:
- Maintain and wherever possible increase the size and number of current colonies, with particular focus on pipistrelle species
 - Prevent further losses of bat populations and reduce habitat fragmentation
 - Consider the needs of all species present in Greater Manchester, especially those that have particular strongholds in the area

2 Methodology

2.1 Desk study

2.1.1 A search was carried out using the Multi-Agency Geographic Information for the Countryside (MAGIC) website (Defra, 2021) to identify the presence of statutory designated sites for bats within 2km of the provisional Order Limits for Sites of Special Scientific Interest (SSSIs), Local Nature Reserves (LNRs) and National Nature Reserves (NNRs). A 30km buffer was used for SACs in accordance with DMRB LA 115 as the relatively high mobility of bat species results in a larger zone of influence for bat SACs. This was reviewed when the Order Limits were confirmed.

2.1.2 Information of Sites of Biological Importance (SBIs) within 2km of the provisional Order Limits were obtained from Greater Manchester Ecology Unit (GMEU) (data received April 2021).

2.1.3 The following data sources were used in order to gather information on bats in the study area:

- Records of bats within 2km of the provisional Order Limits were obtained from GMEU (data received April 2021). Records more than 10 years old (2011 or earlier) were considered historical
- MAGIC (Defra, 2021) was used to search for European Protected Species mitigation licences for bats which had been granted within the 2km study area. This search was completed on 17 February 2022.

2.1.4 Distances given in the results section are based from the Order Limits.

2.2 Field surveys

2.2.1 A suite of field survey was undertaken with reference to the Bat Conservation Trust Good Practice Guidelines (Collins, 2016). These surveys were selected to determine potential roost presence and baseline bat activity within the defined survey area. Surveys that were undertaken are detailed in Table 2.1. Surveys undertaken in 2023 were based on the Order Limits for the application for development consent.

2.2.2 The study area was determined to have low suitability habitat for bats due to the predominance of modified grassland and urbanised areas comprising residential areas, industrial sites and hard standing (see Appendix 8.1: UK Habitat Classification Report of the Environmental Statement Appendices (TR010064/APP/6.3)). Small areas of suitable habitat for bats were present within the survey area in the form of mature trees and woodlands, notably within Philips Park and Heaton Park and three golf courses (Whitefield, Heaton Park and Pike Fold).

2.2.3 Initial ground level tree inspections, and tree climb and inspect surveys occurred in 2021. Access to verge areas, and some areas within the provisional Order Limits was not possible at this time (see Section 2.3). Ground level tree inspections in previously inaccessible areas occurred in November 2022. In May 2023, a final ground based inspection/ tree climbing survey was completed.

Table 2.1 Summary of bat survey programme

Survey	Objective	Survey area and year undertaken
Ground level tree assessment	Ground level assessments of trees were completed to identify any potential roost features (PRFs) on any trees within the survey area.	2021 and 2022: Provisional Order Limits + 100m 2023: Order Limits + 100m
Tree climb and inspect survey	Trees that had any moderate or high PRF identified during ground assessment were climbed and features inspected for suitability for or evidence of roosting bats.	2023: Order Limits + 100m
Emergence surveys	Evening emergence surveys were undertaken on trees with moderate or high potential to support roosting bats, or that could not be climbed safely. To determine whether a PRF was being utilised by roosting bats.	2021: Provisional Order Limits + 100m
Transect surveys	One dusk transect visit per season (three in total) was undertaken as per BCT guidance (Collins, 2016) on surveying low suitability habitat for bats. This was to identify the species assemblage within the survey area and to assess the relative importance of the various habitat types.	2021: Within provisional Order Limits
Static automated detector surveys	Static automated detectors were deployed for five consecutive days during a survey window May – September inclusive. Detectors were deployed three times during this period at three locations. The locations, representative of the various habitat types. This was to understand the species assemblage within the study area.	2021: Within provisional Order Limits
Vantage point surveys	Vantage point surveys were conducted to determine the level of activity along a commuting/foraging feature within the survey area. This was to identify any linear features likely to be impacted by the scheme that are important to commuting and foraging bats.	2021: Linear features which were directedly impacted by the Scheme within provisional Order Limits + 100m

Ground level tree assessments

2.2.4 Trees within the survey area were assessed for their suitability to support roosting bats. The trees were inspected from the ground by a team of two surveyors. Surveyors searched for Potential Roost Features (PRF), examples of which include:

- Hazard beams
- Tear outs
- Lifting bark
- Splits
- Ivy
- Knot holes
- Rot holes

2.2.5 Surveyors searched for signs of bat activity near PRF, including:

- Staining
- Droppings
- Squeaking
- Flies
- Smell
- Smoothing of surfaces around PRF

2.2.6 Surveyors used high powered torches and binoculars to identify and categorise PRF in accordance with their level of suitability to support roosting bats. Each PRF was graded as either a confirmed bat roost, or as having high, moderate or low suitability to support roosting bats (referred to as Bat Roosting Potential (BRP)). Trees with negligible BRP were not recorded. The categorisation of suitability to support roosting bats was completed in line with the Bat Conservation Trust (BCT) Good Practice Guidelines (Collins, 2016).

2.2.7 There would be no direct impacts to structures within the Order Limits and no indirect disturbance impacts to structures due to the distance from the Scheme. Therefore, no surveys of structures were undertaken.

Tree climb and inspect survey

2.2.8 Tree climb and inspect surveys were undertaken in May 2023. PRFs classified as moderate or high during ground level tree assessment were subject to aerial inspection surveys conducted by a suitably licensed bat surveyor who held a level 2 survey licence (Natural England). Climbers were also fully certified with the correct training and certifications.

- 2.2.9 The PRF inspections updated the ground-based assessment and recorded additional characteristics of each feature, including approximate internal cavity dimensions. Trees were 'scoped out' from requiring further survey where close inspection revealed them to provide either low or negligible suitability to support roosting bats.
- 2.2.10 Where a feature could be thoroughly checked through an inspection it was considered that no additional information would be obtained from an emergence / re-entry survey. In that circumstance the repeat PRF aerial inspection was considered to be an appropriate survey method. The total number of surveys completed was in line with the BCT survey guidelines (Collins, 2016).
- 2.2.11 In 2023, only trees that were within 100m of the Order Limits were subject to further survey.

Emergence surveys

- 2.2.12 Emergence surveys consisted of ecologists visiting PRF to listen/record bat activity (using bat detectors EM touch Units, Batbox Duet heterodyne detectors, Magenta Bat 5 detectors, and Anabat Express detectors) and to watch for bats emerging from PRFs in trees. Trees were surveyed if deemed not safe to undergo an aerial inspection after ground roost assessment and within the order limits. These surveys were from half an hour before sunset until two hours after sunset.
- 2.2.13 Surveys recorded if an emergence was recorded, the time, species of bat and number of bats.
- 2.2.14 All emergence surveys were undertaken in September 2021 by professional ecologists and led by ecologists experienced in bat surveys.
- 2.2.15 Each survey was recorded by the bat detectors for subsequent analysis.
- 2.2.16 Evening emergence surveys were completed in suitable weather conditions, generally taken to be:
- Temperature: 10 degrees Celsius or higher
 - Wind: calm or light
 - Rain: dry or intermittently light

Transect surveys

- 2.2.17 Using aerial photography of the survey area, a circular transect route was designed which can be seen in Figure 8.3.2 in Annex D. The route was designed to cover different habitat types within the survey area affected by the Scheme. Areas also included the small woodland patches, hedgerows and watercourses around Pike Fold Golf Course. The transect was walked by a team of two ecologists, walking at a steady pace continuously, who recorded any bat activity along the length of the route. Transects started at sunset and lasted at least two and a half hours. Direction of travel was alternated between each survey visit to survey different habitat types at different times after sunset and avoid bias.

- 2.2.18 At least one of the surveyors was experienced in completing transect surveys. The full length of the route was walked within one night, repeated once per season (spring – April/May, summer – June/July/August, autumn – September/October). This equated to a total of three visits in the period May to September inclusive, as per BCT survey guidance (Collins, 2016) for sites with low suitability for bats.
- 2.2.19 Surveyors used bat detectors to identify and record the number of bat passes along the route to give an indicative record of the bat activity along the transect. If possible, they recorded direction of movement.
- 2.2.20 Bat passes were recorded, and subsequently given references and marked on aerial photography along the transect route. A kernel density function was utilised to generate a visualisation (see Figure 8.3.3 in Annex D) of bat activity to ascertain comparative levels of use of the habitats in the survey area by foraging and commuting bats. The function produces darker areas where there were a higher density of bat passes; and lighter areas where lower density of bat passes. Kernel density has been used as a means to interpret and visualise bat activity, and symbology relevant to bat activity density should be treated as interpretive of collected data.
- 2.2.21 Other information recorded included time of recording, time of first bat pass, behaviour (commuting or foraging) and flight direction. Time of first bat pass can be indicative of a bat roost in the vicinity.

Vantage point surveys

- 2.2.22 A length of hedgerow to be removed by the Scheme was identified for vantage point survey (see Figure 8.3.2 in Annex D), with surveyors positioned to the north (OS grid reference SD 82840 06341) and south (SD 82847 06294) of this area.
- 2.2.23 Vantage point surveys were carried out to determine the level of commuting activity along the feature to be removed.
- 2.2.24 The vantage point surveys were carried out by a team of two ecologists, at least one of whom was experienced in completing vantage point surveys. The vantage point surveys were carried out for two hours after sunset and repeated three times in the period May to September, inclusive.
- 2.2.25 Surveyors used bat detectors to identify and record the number of bat passes along the vantage point.

Static detector surveys

- 2.2.26 Static detector surveys provide quantitative bat activity data to supplement the qualitative data produced by transect surveys (Collins, 2016).
- 2.2.27 Three static Anabat express detector locations, representative of the range of habitats present within the survey area, were surveyed as follows (see Figure 8.3.2 in Annex D):
- Static location A was situated on the edge of an area of scrubby woodland habitat with adjoining hedgerows

- Static location B was situated in a primarily open grassland habitat with some scattered immature trees
- Static location C was situated in continuous woodland habitat, within Philips Park Local Nature Reserve (LNR) to the west of the Scheme

2.2.28 Detectors were deployed three times throughout the survey period May to September inclusive. Detectors were programmed to begin recording 30 minutes prior to sunset and finish 30 minutes after sunrise, adjusted accordingly for each month; for five consecutive days per deployment, as per the bat survey guidelines (Collins, 2016).

Sonogram analysis

2.2.29 Zero-Crossing Archives (ZCA) files from Anabat detectors were converted into Zero-Crossing (ZC) files in Anabat Insight. For the static detector data, the ZC files were then run through Kaleidoscope v4.5.5 using an auto ID process to identify species within data.

2.2.30 Standard parameters in peak frequency, call duration, starting and ending frequencies, and inter-pulse interval (IPI) were used in the auto identification process, with a confidence level of 95%.

2.2.31 Where files received auto ID tags and 10% of files filtered out as noise were manually checked, as per good practice guidance (Russ, 2012).

2.3 Evaluating importance

2.3.1 To evaluate the importance of the bat assemblage present, the specification set out by Wray et al. (2010) will be used. The status of the species, species distribution and the diversity of species recorded during baseline surveys has been considered when determining importance. Details of the methodology for valuing the importance of bat assemblages are presented in Annex C.

2.4 Limitations

2.4.1 One of the three static detectors failed in both July and September (static location B in September and static location C in July). Therefore, it is possible that seasonal peaks in bat activity or rare species transitioning through the area may have not been recorded. However, it is considered that a representative level of bat activity across the survey area was sufficiently recorded as data from at least one detector has been recorded in each month. The transect and vantage point surveys also provide further information to qualify the level of bat activity recorded during the surveys. The occasional static detector failure is therefore not considered to be a significant limitation.

2.4.2 Species identification by sonogram is limited (to a certain extent) by similarities in call structure. In addition, all bats can modulate their calls according to the habitats they are navigating, their behaviour and the information they require at the time. This imposes limitations on reliable analysis of all calls particularly between species of the same genus in the genera: *Plecotus*, *Myotis* and *Nyctalus*.

- 2.4.3 Infra-red / night-vision recording equipment was not utilised for the dusk emergence surveys. As such, there is a possibility that emergencies from surveyed features may have been missed due to low visibility after dark. This is not deemed to be a significant limitation as suitable audio recording equipment was used and would have detected bat passes near the PRF.
- 2.4.4 Due to access constraints, it was not possible to undertake emergence surveys of trees 15 and 23 until September 2021 which resulted in missing data for the early part of the survey season as well as only one of the two required surveys being undertaken. However, this is not considered to be a significant constraint as these trees are now more than 100m from the Order Limits.
- 2.4.5 Heaton Park provides good quality commuting and foraging habitat, however due to the potential risk of encountering antisocial behaviour this area was deemed potentially unsafe to survey. It is worth noting that this area is located adjacent to the Order Limits and has not been subject to survey effort. There may be trees present which are able to support roosting bats in this location that could be subject to disturbance and the area may be utilised by commuting and foraging bats. The lack of surveys at Heaton Park aren't considered a significant constraint because preconstruction surveys would be undertaken and there is good quality commuting and foraging habitat in the direction away from the Order Limits.

3 Results

3.1 Desk study

Designated sites with habitats suitable for bats

- 3.1.1 There were no SACs, NNRs or SSSIs within the study area that were cited as having bat qualifying features.
- 3.1.2 Five LNRs are located within the study area, four of which include woodland habitats suitable for supporting bats, see Table 3.1 below and Figure 8.1.2: Designated Sites in Appendix 8.1: UK Habitat Classification Report of the Environmental Statement Appendices (TR010064/APP/6.3).

Table 3.1 Designated sites with habitats suitable for bats within the study area

Designated site	Approximate Distance from Order Limits
Philips Park LNR	450m west
Mere Clough LNR	420m south
Blackley Forest LNR	1km south
Alkrington Woods LNR	1.9km east

- 3.1.3 Twelve SBIs are located within the study area, six of which cite ancient woodland which is suitable for supporting bats, see Table 3.2 below and Figure 8.1.2: Designated Sites in Appendix 8.1: UK Habitat Classification Report of the Environmental Statement Appendices (TR010064/APP/6.3).

Table 3.2 SBIs with habitat suitable for bats within the study area

SBI name	Approximate Distance from Order Limits
Philips Park and North Wood	200m west
Hollins Plantation	30m north
Hazlitt Wood	3m south-east
Prestwich Clough	1.1km south
Ringley Woods	1.8km west
Boardman Brook	1.9km south-east

- 3.1.4 Three European Protected Species Mitigation (EPSM) licence returns for bats between 2014-2020 were identified within the study area. The closest of these records was adjacent to Philips Park LNR which related to common pipistrelle *Pipistrellus pipistrellus*. The remaining two EPSM licences were located approximately 1.9km south of the Order Limits near to Blackley Forest LNR. Both related to common pipistrelle.

- 3.1.5 The desk study sourced from GMEU (2021) returned over 600 records of seven bat species. Twenty-three records were maternity roosts, two were hibernation roosts, 100 not classified roosts, and 502 were in-flight records, records of mortality, and capture-release sightings.

Bat records

Brown long-eared bat

- 3.1.6 The desk study returned seven records of brown long-eared bat roosts, comprising: two hibernation roosts, the closest of which was approximately 730m south-west of the Order Limits in Philips Park LNR; and five unclassified roosts, the closest of which was located 260m south of the Order Limits. There were four historical (pre-2011) records of passes by brown long-eared bats, the closest of which was approximately 650m south-west of the Order Limits.

Common pipistrelle

- 3.1.7 The desk study returned 60 records of common pipistrelle roosts, comprising: 15 maternity roosts (the closest of which was approximately 210m west of the Order Limits); and 45 unclassified roosts, the closest of which is approximately 290m south-east of the Order Limits. There were nearly 300 other records of common pipistrelle, the closest of which was a historical flight pass record within the Order Limits.

Daubenton's bat

- 3.1.8 The desk study returned seven records of Daubenton's bat roosts, comprising: one maternity roost approximately 2km from the Order Limits in a motorway bridge; and six unclassified roosts, the closest of which is approximately 800m south-west of the Order Limits in Philips Park. There were 40 records of passes by Daubenton's bats, the closest of which was 700m south-west of the Order Limits in Philips Park LNR.

Myotis species

- 3.1.9 The desk study did not return any records of *Myotis* species roosts, though two passes were recorded, the closest of which was approximately 1.72km east of the Order Limits.

Natterer's bat

- 3.1.10 The desk study did not return any records of natterer's bat (*Myotis nattererii*) roosts, though two passes were recorded approximately 750m south-west of the Order Limits in Philips Park LNR.

Noctule

- 3.1.11 The desk study returned one historical record of a noctule bat roost located approximately 2km south-west of the Order Limits. There were 16 records of passes by noctule bats, the closest of which was approximately 500m north of the Order Limits.

Soprano pipistrelle

- 3.1.12 The desk study returned two records of soprano pipistrelle roosts, comprising two unclassified roosts, the closest of which was approximately 540m east of the Order Limits. There were 35 other records of soprano pipistrelle, the closest of which was approximately 165m south-west of the Order Limits in Philips Park LNR.

Unidentified pipistrelle sp.

- 3.1.13 The desk study returned 41 records of unidentified pipistrelle species roosts, seven of which were maternity roosts. The closest maternity roost was located approximately 230m south-east of the Order Limits in the Kirkhams area. The closest unclassified roost was also located in the Kirkhams area, approximately 100m south of the Order Limits. Seventy-six records were returned of other records of unidentified pipistrelle species. The closest of these was adjacent to the Order Limits on Pole Lane and was a bat in flight.

Unidentified bat species

- 3.1.14 Records of unidentified bat species were returned in the desk study. These comprised of six roosts and 27 other bat signs. The closest roost was recorded approximately 230m west of the Order Limits in the Unsworth area.

Whiskered bat / Brandt's bat

- 3.1.15 The desk study returned one record of either a whiskered bat *Myotis mystacinus* or Brandt's *Myotis brandtii* bat roost, comprising an unclassified roost. The exact location of the roost was not confirmed in the data provided but was noted as being within Philips Park LNR. There were five records of passes by whiskered bats, the closest of which was approximately 710m south-west of the Order Limits in Philips Park LNR.

3.2 Field survey

Ground level tree assessment and tree climb and inspect

- 3.2.1 In 2021, ground level tree assessment identified 52 trees with BRP. Thirty-one trees had low BRP and 19 had moderate BRP. Eleven trees with moderate suitability were safe to climb and within the provisional Order Limits and were subject to aerial climb and inspect survey. Eight of these trees were subsequently downgraded to low BRP and were not subject to any further surveys.
- 3.2.2 Surveys did not record any roosts within the survey area. However, these surveys provide only a snapshot in time, and tree-roosting bats move roost regularly and need a large roost resource to support a colony.

- 3.2.3 Follow up ground level roost assessment was carried out in November 2022 for trees within the provisional Order Limits. Fifty-four trees were identified, see Annex A for details and Figure 8.3.1 in Annex D. Twelve trees were subsequently downgraded from low to negligible BRP, five trees with moderate BRP were also downgraded to negligible. Six moderate BRP trees were also downgraded from moderate to low potential. Two trees were upgraded from low to moderate BRP after reassessment.
- 3.2.4 In May 2023 a ground inspection/tree climb took place of trees with outstanding bat survey requirements after the November 2022 reassessment. These trees were all confirmed as having low BRP. Surveys in May 2023 did not record any bat roosts.
- 3.2.5 A summary of results from all trees with BRP can be seen in Annex A. The relation of each tree to the Order Limits is also provided.

Emergence/re-entry surveys

- 3.2.6 Two trees with moderate BRP (BT15 and BT23, see Figure 8.3.1 in Annex D) were subject to an emergence survey on 16 September 2021. Weather conditions were good, with a temperature of 15 degrees Celsius during survey, no precipitation, and a Beaufort wind scale rating of 2.
- 3.2.7 Surveys did not identify the presence of any bat roosts in either of the surveyed trees. No emergences were recorded from either tree. A common pipistrelle was recorded foraging in the area, though overall bat activity was recorded to be very low. B23 was later classified as having low potential for roosting bats in an updated ground roost assessment survey (November 2022).
- 3.2.8 A full breakdown of emergence survey results can be seen in Table 3.3.

Table 3.3 Emergence dusk survey – bat activity recorded

Tree reference	Emergences of bats	Start time of survey	End time of survey	Species – bat activity	Activity observed
BT15	None	19:07	20:52	Common pipistrelle	Heard not seen at 19:52
BT15				Common pipistrelle	Brief foraging pass in the canopy 20:06
BT23	None			Common pipistrelle	Heard not seen 19:41

Transect surveys

- 3.2.9 A summary of transect survey results is provided in Table 3.4 with detailed results provided in Annex B. The transect route can be seen in Figure 8.3.2 in Annex D.

- 3.2.10 Common pipistrelle made up the majority (96.61%) of passes recorded during transect surveys, with the remaining 3.4% made up by noctule bat passes. Noctule were only recorded during the second transect survey (July). Figure 8.3.3 provides a heatmap of common pipistrelle activity recording during these surveys.
- 3.2.11 Conditions during each transect survey were suitable for bat survey with no precipitation on any visit, a minimum temperature of 9°C across all visits and no higher than a three on the Beaufort wind scale recorded.

Table 3.4 Bat passes recorded during transect surveys

Date	Transect visit number	Species	Number of foraging passes recorded	Number of commuting passes recorded	Passes not characterised	Total passes recorded
24/05/21	1	Common pipistrelle	12	2	1	15
08/07/21	2	Common pipistrelle	10	2	18	30
08/07/21	2	Noctule	0	0	2	2
02/09/21	3	Common pipistrelle	6	3	6	15

Visit 1 – May

- 3.2.12 The transect route started from fields to the east of the M66. The first bat was a common pipistrelle, recorded 17 minutes after sunset, foraging along the tree line between Pike Fold Golf Course and the M60 motorway. Further activity from common pipistrelle was recorded across the transect route. Foraging activity from common pipistrelle was recorded along the hedgerows on Pole Lane and adjacent to a hedgerow and woodland scrub east of the M66. A commuting route for common pipistrelle was recorded along a hedgerow at Pole Lane. Low bat activity was recorded along the transect route south-east of Pike Fold Golf Course and Egypt Lane.

Visit 2 – July

- 3.2.13 The transect route was walked in a counter-clockwise direction in July. The first bat recorded was a common pipistrelle recorded 28 minutes after sunset in a scrubby woodland area south of Pike Fold Golf Course. Further activity of common pipistrelle were recorded across the transect route. Foraging activity from common pipistrelle was recorded over scrub on the M60 J18 verge, in the field along hedgerows to the north-east of M60 J18 and along the hedgerows on Egypt Lane. Two noctule passes were recorded on the transect route at Pike Fold Golf Course.

Visit 3 – September

- 3.2.14 The transect route was walked in a counter-clockwise direction in September. The first bat pass was recorded 31 minutes after sunset, recorded adjacent to an area of scrubby woodland east of the M66 between Egypt Lane and Pike Fold Golf Course. Activity from common pipistrelle was recorded across the transect route. Foraging activity from common pipistrelle was recorded along Pike Fold Golf Course and along a hedgerow on Egypt Lane, around a streetlight on Pole Lane and around scattered scrub in a field west of M60 J18.
- 3.2.15 Figure 8.3.3 suggests that common pipistrelle activity was generally highest along the hedgerows of Egypt Lane and Pole Lane and in the scrub habitat south of Pike Fold Golf Course in comparison with other parts of the transect routes across all of the transect surveys.

Vantage point surveys

- 3.2.16 Two bat species were recorded during vantage point surveys: common pipistrelle and noctule. Common pipistrelle made up the majority (97%) of passes recorded, with the remaining 3% (one pass) made up by noctule bat.
- 3.2.17 Noctule bat was only recorded during the last vantage point survey in September 2021.
- 3.2.18 A summary of all bat passes recorded during vantage point surveys can be seen in Table 3.5.

Table 3.5 Bat passes recorded during vantage point surveys

Date	Position	Common pipistrelle	Noctule	Total passes
24/05/2021	North of hedgerow	12	0	12
24/05/2021	South of hedgerow	4	0	4
08/07/2021	North of hedgerow	12	0	12
08/07/2021	South of hedgerow	7	0	7
02/09/2021	North of hedgerow	6	0	6
02/09/2021	South of hedgerow	3	2	5

Visit 1 – May

- 3.2.19 The first bat recorded was a common pipistrelle south of the hedgerow, commuting west to east along a hedgerow 13 minutes after sunset. This pass suggests that there may be a roost present nearby to the west. Common pipistrelle passes were recorded multiple times throughout the survey both north and south of the hedgerow. Commuting activity of common pipistrelle was also recorded throughout the survey flying west to east and east to west along the hedgerow.

Visit 2 – July

- 3.2.20 The first bat recorded was a common pipistrelle commuting along the hedgerow flying east to west at the northern side of the hedgerow recorded 37 minutes after sunset. Further occasional foraging common pipistrelle passes and unobserved bat calls were recorded for the remainder of the survey both north and south of the hedgerow.

Visit 3 – September

- 3.2.21 The first bat recorded was a noctule 13 minutes after sunset but was not seen. No bats were observed during the third survey visit. This first pass would suggest that the bat recorded may have emerged from a roost near to this location. It was recorded on the southern side of the hedgerows. Low numbers of common pipistrelle passes were recorded during the rest of the survey unobserved both north and south of the hedgerow.

Static detector surveys

- 3.2.22 Static detectors (see Figure 8.3.2 in Annex D) recorded 437 passes and four species throughout their period of operation, with static detector location C located in Philips Park LNR recording the highest number of bat passes.
- 3.2.23 Common pipistrelle made up the majority of recorded passes (89.02%), followed by noctule (6.64%), soprano pipistrelle (4.11%), with brown long-eared bat making up the smallest proportion of passes (0.23%) (see Table 3.6).

Table 3.6 Bat passes recorded by static automatic detectors 2021

Bat species	Static detector position									Total
	A			B			C			
	May	July	September	May	July	September	May	July	September	
Common pipistrelle	49	No bats recorded - Noise only (traffic, rain, birds)	0	119	12	Detector malfunction	116	Detector mal- function	93	389
Soprano pipistrelle	0		2	0	0		14		2	18
Noctule	17		0	0	0		6		6	29
Brown long-eared	0		0	0	0		1		0	1
Total	66	0	2	119	12	n/a	137	n/a	101	437

- 3.2.24 At static detector location A, the highest level of activity was recorded in May. Species calls totalled 49 and 17 for common pipistrelle and noctule, respectively.
- 3.2.25 Activity levels at static detector location B were also highest in May. Only one species, common pipistrelle was recorded at this location. Calls for this species totalled 119.
- 3.2.26 Static detector location C recorded both highest species diversity with four bat species recorded: common pipistrelle, noctule, soprano pipistrelle and brown long-eared bat. As with the other locations, the highest level of activity was recorded in May.
- 3.2.27 The bats recorded earliest in the night were all recorded at static detector location C. The earliest bat recorded in relation to sunset was a common pipistrelle recorded 11 minutes after sunset at static detector location C in May. This recording would suggest that the bat recorded may have emerged from a roost near to the static deployment location.
- 3.2.28 At static detector location A, the earliest bat recorded in relation to sunset was recorded 24 minutes after sunset in May. The earliest bat in relation to sunset at static detector location B was recorded 25 minutes after sunset in May.
- 3.2.29 Bats recorded closest to sunrise were recorded at static detector location A in May, with the latest bat recorded 18 minutes before sunrise. The latest bat in relation to sunrise at static detector location B was recorded an hour and 15 minutes before sunrise. The latest bat recorded at static detector location C was recorded 37 minutes before sunrise.

4 Evaluation

- 4.1.1 The desk study identified 124 roosts of up to eight species within 2km of the Order Limits. Of the 54 trees identified with BRP across all surveys, eight are within the Order Limits. However, field surveys did not record any bat roosts within the survey area. It should be noted that surveys only provide a brief window of insight into the roosting activity of bats in an area. Tree-roosting bat species are known to move roost sites frequently, and assemblages of bats require a large roost-resource to support a colony. As such, all mature trees supporting PRFs should be assumed to be part of the roost resource and treated accordingly.
- 4.1.2 Static detectors recorded four bat species within the survey area: common pipistrelle, soprano pipistrelle, noctule, and brown long-eared bat. Of these species, the majority of passes/recordings across all survey methods were of common pipistrelle (89.02%), followed by noctule (6.64%), soprano pipistrelle (4.11%), brown long-eared bat (0.23%). The greatest level of activity was located at static detector location C, situated in Philips Park LNR to the west of the Order Limits but is not within 100m of the Order Limits and is therefore beyond the anticipated Zone of Influence.
- 4.1.3 Bat activity during transects was largely associated with bats foraging along hedgerows, with occasional activity over open grassland areas.
- 4.1.4 Vantage point surveys attempted to determine if the hedgerows along Egypt Lane are an important commuting corridor for bats. Varied levels of activity were recorded throughout the survey window, with a small number of bats recorded commuting along the hedgerows during the survey window. A similar amount of foraging activity was also recorded along the hedgerows.
- 4.1.5 Hedgerows within the survey area appear to be used by the local bat population, but not on a consistent basis, and by a small number of bats. It is determined that there are no key connective linear features within the Order Limits where it intersects linear connective habitat.
- 4.1.6 It is likely a small number of bat roosts are likely to be present within the suburban housing that is present in the local area and in Philips Park Wood. The landscape is a mix of neutral, slightly wet grassland, intensively managed grasslands, cropland, with an extensive area of woodland and parkland also present to provide suitable habitats for bats. However, these habitats are all located in close proximity to a network of motorways which reduces connectivity between these areas and therefore unlikely to support the core sustenance zones of more sensitive species or larger colonies.
- 4.1.7 Using the Wray *et al.* (2010) approach, the bat assemblage within the study area has been valued as being of **Local importance**.

Acronyms and initialisms

Acronym or initialism	Term
BRP	Bat Roost Potential
PRF	Potential Roost Feature
BCT	Bat Conservation Trust
BAP	Biodiversity Action Plan
LNR	Local Nature Reserve
NNR	National Nature Reserve
SAC	Special Area of Conservation
SBI	Site of Biological Importance
SSSI	Site of Special Scientific Interest
HNS	Heard not seen

Glossary

Term	Definition
Static Detector	Automated ultrasonic detector unit that is left in-situ for a pre-determined length of time, programmed to record ultrasonic bat passes in a pre-determined survey period.
Bat Detector	Handheld detector unit capable of converting ultrasonic bat calls beyond the range of human hearing to that which can be heard and analysed by human hearing.

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Annex A Ground and aerial assessment of trees

Table A.1 Ground and aerial assessment of trees for bat roost potential

Tree reference	Species	Description	Initial bat roosting potential (BRP) (2021)	Reviewed BRP after climb (2021)	Updated ground assessment BRP – November 2022 survey	May 2023 inspection – BRP update	Position of tree in landscape	Approximate Distance from Order Limits (m)
BT1	Willow <i>Salix</i> sp.	Tear out at 0-1.75m height. South orientation, tear out, healed over leading to cavity at 1.2m height, south-east orientation.	Low	Not applicable (N/A) – Low	Low	N/A	On the south bank of ditch	60
BT2	Poplar <i>Populus</i> sp.	Broken branch with small cavity entrance, 3.5-4m height. West orientation	Low	N/A – Low	Low	N/A	On south edge of footpath	Within
BT3	Sycamore <i>Acer pseudoplatanus</i>	Tear out, 6m high. South-west orientation	Low	N/A – Low	Low	N/A	On highways banking by motorway	Beyond 100m of Order Limits
BT4	Oak <i>Quercus</i> sp.	Knot hole leading to cavity, 2.5m high. North-west orientation	Moderate	Low	Low	N/A	On woodland banking sloping south	Beyond 100m of Order Limits
BT5	Oak	Knot hole, 2m high. South orientation	Low	N/A – Low	Low	N/A	Within woodland by biking track	Beyond 100m of Order Limits
BT6	Oak	Knot hole, 10m high. South orientation	Low	N/A – Low	Negligible	N/A	Within woodland by biking track	Beyond 100m of Order Limits
BT7	Silver birch <i>Betula pendula</i>	Butt rot, 0.5m high. South orientation	Moderate	Low	Low	N/A	Within woodland by biking track	Beyond 100m of Order Limits
BT8	Oak	Tear out leading to cavity	Moderate	Low	Low	N/A	Within woodland by public footpath	Beyond 100m of Order Limits
BT9	Sycamore	Knot hole 5m high, north-east orientation. Tear out 7m high, south-east orientation	Low	N/A – Low	Low	N/A	Within woodland by public footpath	Beyond 100m of Order Limits
BT10	Alder <i>Alnus glutinosa</i>	Squirrel hole, 4m height, north orientation	Moderate	No climb – outside of survey area	Low	N/A	Within woodland next to watercourse	Beyond 100m of Order Limits
BT11	Oak	Tear out with squirrel drey, 10m height, north orientation. Knot hole, 10m height, north-west orientation	Moderate	No climb – outside of survey area	Moderate	N/A	Within woodland close to footpath	Beyond 100m of Order Limits
BT12	Oak	Knot hole on limb	Low	N/A – Low	Negligible	N/A	Within woodland close to footpath	Beyond 100m of Order Limits
BT13	Sycamore	Cavity within main stem	Low	N/A – Low	Negligible	N/A	Within woodland close to footpath, canopy snapped	Beyond 100m of Order Limits

Tree reference	Species	Description	Initial bat roosting potential (BRP) (2021)	Reviewed BRP after climb (2021)	Updated ground assessment BRP – November 2022 survey	May 2023 inspection – BRP update	Position of tree in landscape	Approximate Distance from Order Limits (m)
BT14	Beech <i>Fagus sylvatica</i>	Butt rot, knot hole on limb 4m high, knot hole on limb 4.5m high, knot hole on main stem 7m high, all north orientation.	Moderate	Low	Low	N/A	On tree line on field boundary	Beyond 100m of Order Limits
BT15	Oak	Knot hole on main stem 5m high, butt rot. North orientation.	Moderate	Moderate	Moderate	N/A	Within woodland by footpath	Beyond 100m of Order Limits
BT16	Sycamore	Butt rot 2.5m high, south-west orientation.	Low	N/A – Low	N/A	Low	Within a horse field	Within
BT17	Sycamore	Butt rot, south-west orientation.	Low	NA – Low	N/A	Low	Within a horse field	Within
BT18	Sycamore	Butt rot, south and west orientation	Moderate	Low	Low	N/A	Within woodland next to stream	Beyond 100m of Order Limits
BT19	Oak	Tear out 10m high, south orientation	Low	N/A – Low	Low	N/A	Within woodland next to stream	Beyond 100m of Order Limits
BT20	Beech	Tear out 13m high, south-west orientation.	Low	Low	Moderate	N/A	On wood edge next to motorway	Beyond 100m of Order Limits
BT21	Sycamore	Lifted bark 5m top of tree. South-west orientation	Low	N/A – Low	Low	N/A	On wood edge next to motorway	Beyond 100m of Order Limits
BT22	Beech	Fluting 1.5m high, knot hole 10m high south orientation	Low	N/A – Low	Negligible	N/A	On wood edge next to motorway	Beyond 100m of Order Limits
BT23	Oak	Split branch 10m high, north orientation	Moderate	Moderate	Low	N/A	Woodland next to path	Beyond 100m of Order Limits
BT24	Oak	Woodpecker hole	Moderate	No climb – outside of survey area	Moderate	N/A	Woodland on small valley side next to stream	Beyond 100m of Order Limits
BT25	Beech	Butt rot 0-1.5m high, south-east orientation	Low	N/A – Low	Low	N/A	Woodland edge	Beyond 100m of Order Limits
BT26	Beech	Butt rot 0-unknown height, south-east orientation	Low	N/A – Low	Low	N/A	Woodland edge	Beyond 100m of Order Limits
BT27	Beech	Fluting 10m high, eastern orientation	Low	N/A – Low	Low	N/A	Woodland edge next to path	Beyond 100m of Order Limits
BT28	Beech	Fluting 6m high, southern orientation	Low	N/A – Low	Low	N/A	Woodland edge next to path	Beyond 100m of Order Limits
BT29	Oak	Knot hole 8m high, southern orientation	Moderate	No climb – outside of survey area	Low	N/A	Woodland next to path	Beyond 100m of Order Limits
BT30	Elm <i>Ulmus</i> sp.	Butt rot 0-1m high, south-eastern orientation	Low	N/A – Low	Low	N/A	Woodland edge next to path	Beyond 100m of Order Limits

Tree reference	Species	Description	Initial bat roosting potential (BRP) (2021)	Reviewed BRP after climb (2021)	Updated ground assessment BRP – November 2022 survey	May 2023 inspection – BRP update	Position of tree in landscape	Approximate Distance from Order Limits (m)
BT31	Dead	Butt rot 0-5m high, south-western orientation	Low	N/A – Low	Low	N/A	Centre of woodland	Beyond 100m of Order Limits
BT32	Dead (willow)	Butt rot and general splits/cracks	Moderate	Low	Low	N/A	Woodland next to path	60
BT33	Dead	Lifted bark 8m high, eastern orientation	Low	N/A – Low	Low	N/A	Woodland edge next to path	Beyond 100m of Order Limits
BT34	Ash <i>Fraxinus excelsior</i>	Butt rot – 0-unknown height. Southern orientation	Moderate	Low	Moderate	N/A	Wooded area of park	Beyond 100m of Order Limits
BT35	Oak	Tear out 3.5m high, western orientation	Low	N/A – Low	Negligible	N/A	Wooded area of golf course	Beyond 100m of Order Limits
BT36	Willow	Knot hole 3m high, southern orientation	Low	N/A – Low	Low	N/A	Wooded area of park	Beyond 100m of Order Limits
BT37	Sycamore	Knot hole 5m high, eastern orientation	Low	N/A – Low	Low	N/A	Edge of wooded area of park next to motorway	Beyond 100m of Order Limits
BT38	Willow	Fluting 5.5m high, south-eastern orientation	Moderate	Low	Negligible	N/A	Tree lined edge of golf course	25
BT39	Ash	Wound, northern orientation	Negligible	N/A	Negligible	N/A	Tree in woodland	Beyond 100m of Order Limits
BT40	Ash	Canker, northern orientation	Low	N/A – Low	Negligible	N/A	Tree in woodland	Beyond 100m of Order Limits
BT41	Oak	Split, northern orientation	Low	N/A – Low	Negligible	N/A	Tree in woodland	Beyond 100m of Order Limits
BT42	Sycamore	Knothole, southern orientation	Negligible	N/A	Negligible	N/A	Tree on steep bank	Beyond 100m of Order Limits
BT43	Sycamore	Split, eastern orientation	Moderate	No climb – outside of survey area	Negligible	N/A	Tree on verge bank	Beyond 100m of Order Limits
BT44	Unknown	Collapsed tree, southern orientation	Low	N/A – Low	Negligible	N/A	Collapsed tree against fencing on verge	Within
BT45	Unknown	Fallen dead tree, Knot hole on limb, southern orientation	Moderate	No climb. Not safe due to tree being dead.	Negligible	N/A	Fallen tree on verge	Within
BT46	Sycamore	Fallen tree, large split, small wound on limb, small knothole, eastern orientation	Moderate	No climb. Fallen tree that does not require arial inspection.	Low	N/A	Fallen tree on verge	18

Tree reference	Species	Description	Initial bat roosting potential (BRP) (2021)	Reviewed BRP after climb (2021)	Updated ground assessment BRP – November 2022 survey	May 2023 inspection – BRP update	Position of tree in landscape	Approximate Distance from Order Limits (m)
BT47	Beech	Wound on limb extending from base, wound on limb, western orientation	Moderate	No climb – no access	Low	N/A	Tree in woodland	15
BT48	Unknown	Decaying tree, split in stem, southern orientation	Low	N/A – Low	Low	N/A	Tree on verge bank	15
BT49	Oak	Snap between limb and stem, northern orientation.	Moderate	No climb – no access.	Negligible	N/A	Tree in woodland by verge	Within
BT50	Silver birch	Split in limb, northern orientation	Low	N/A – Low	Negligible	N/A	Tree on verge bank	Within
BT51	Ash	Lifted bark, north-eastern orientation	Low	N/A – Low	Low	N/A	Verge on motorway	15
BT52	Unknown	Lifted bark, eastern orientation.	Low	N/A – Low	Negligible	N/A	Tree on verge bank	Within
BT 53	Ash	Transverse Snap	N/a	N/a	Moderate	N/A	Tree within small woodland patch within golf course	Beyond 100m of Order Limits
BT 54	Beech	Weld	N/a	N/a	Moderate	N/A	Eastern side of woodland between footpath and metal fence	Beyond 100m of Order Limits

Annex B Transect survey results

Table B.1 Visit 1 – 24/05/2021. Start time 21:18 End time 23:25. Dry, Beaufort wind: 2. Start Temp: 10°C End Temp: 9°C

Time	Grid reference	Habitat	Bat species	Number of bats	Behaviour	Descriptor
21:35	SD 82599 06513	Golf course	Common pipistrelle	1	Foraging	Foraging along tree line to west
21:38	SD 82541 06568	Golf course	Common pipistrelle	1	Foraging	Foraging along tree line to west
21:39	SD 82516 06690	Golf course	Common pipistrelle	1	Foraging	Foraging along tree line to west
21:43	SD 82289 06649	Hedge	Common pipistrelle	1	Commuting	Commuting north – south along hedge
21:49	SD 82327 06521	Hedge	Common pipistrelle	1	Foraging	Foraging along hedge to east
21:51	SD 82430 06416	Hedge	Common pipistrelle	2	Foraging	Foraging up and down the hedge
22:10	SD 82442 06388	Hedge	Common pipistrelle	1	Commuting	Commuting south - north along hedge
22:12	SD 82353 06463	Hedge	Common pipistrelle	1	Foraging	Foraging up and down the hedge
22:19	SD 82283 06569	Hedge	Common pipistrelle	1	Foraging	Foraging up and down the hedge
22:48	SD 82313 06768	Road verge	Common pipistrelle	1	Foraging	Foraging in the hedge to north, travelling east - west
22:53	SD 82746 06449	Not specified	Common pipistrelle	1	HNS	Potential common pip
23:04	SD 82894 06381	Field/hedge	Common pipistrelle	1	Foraging	Foraging along hedge to the west
23:10	SD 82734 06379	Woodland/field	Common pipistrelle	1	Foraging	Foraging south - north
23:11	SD 82731 06470	Field/hedge	Common pipistrelle	1	Foraging	Foraging along hedge to the west

Table B.2 Visit 2 – 08/07/2021. Start time 21:37 End time 00:19. Dry, Beaufort wind: 1. Start Temp: 17°C End Temp: 14°C

Time	Grid reference	Habitat	Bat species	Number of bats	Behaviour	Descriptor
22:05	SD 82707 06365	Woodland	Common pipistrelle	1	*HNS	Heard not seen brief pass
22:06	SD 82771 06373	Woodland	Common pipistrelle	1	HNS	Heard not seen brief pass
22:36	SD 82896 06326	Hedge	Common pipistrelle	1	Commuting	Commuting North - South
22:49	SD 82846 06098	Field/motorway	Common pipistrelle	2	Foraging	Foraging next to motorway over scrub, 5m high, for 1 min
22:56	SD 82952 06173	Field/road/hedge	Common pipistrelle	1	HNS	Heard not seen
22:58	SD 82979 06195	Road/hedge	Common pipistrelle	1	Foraging	North – South next to hedge
23:01	SD 82910 06368	Road	Common pipistrelle	1	Foraging	Over road, west to east, 5m high 3x passes
23:04	SD 82956 06400	Hedge	Common pipistrelle	1	Foraging	7m high foraging over hedge continuously
23:07	SD 82972 06411	Hedge	Common pipistrelle	1	Foraging	Over hedge multiple passes
23:09	SD 82979 06437	Hedge	Common pipistrelle	1	Foraging	Multiple passes
23:09	SD 83009 06443	Hedge	Common pipistrelle	1	HNS	Heard not seen

Time	Grid reference	Habitat	Bat species	Number of bats	Behaviour	Descriptor
23:11	SD 83024 06474	Hedge	Common pipistrelle	1	HNS	Heard not seen
23:15	No reference	Hedge	Common pipistrelle	1	HNS	Heard not seen, multiple passes
23:21	SD 82867 06623	Golf course	Common pipistrelle	2	HNS	Heard not seen
23:23	SD 82840 06633	Golf course	Noctule	1	HNS	Heard not seen
23:24	SD 82821 06639	Golf course	Common pipistrelle	1	HNS	Heard not seen 2x passes
23:27	SD 82657 06673	Golf course	Noctule	1	HNS	Heard not seen
23:28	No reference	Golf course	Common pipistrelle	1	HNS	Heard not seen
23:34	SD 82342 06821	Motorway bridge	Common pipistrelle	1	HNS	Heard not seen
23:36	SD 82289 06748	Road field	Common pipistrelle	1	Commuting	4m commute north-west over field
23:37	No reference	Road field	Common pipistrelle	1	Foraging	4m high north-west over road and into field 3 mins foraging
23:37	No reference	Road field	Common pipistrelle	1	Foraging	Forage over road 3x passes
23:42	SD 82296 06573	Road/hedge field	Common pipistrelle	1	HNS	Heard not seen pass
23:42	SD 82362 06480	Road/hedge field	Common pipistrelle	1	HNS	Heard not seen pass
23:44	SD 82400 06442	Road/hedge field	Common pipistrelle	1	HNS	Heard not seen pass
23:47	SD 82508 06274	Road/hedge field	Common pipistrelle	1	HNS	
23:49	SD 82513 06195	Road/hedge field	Common pipistrelle	1	HNS	
23:50	SD 82371 06448	Road/hedge field	Common pipistrelle	1	HNS	2 nd pass 23:52
00:15	No reference	Road/hedge field	Common pipistrelle	1	Foraging	
00:18	SD 82290 06651	Road/hedge field	Common pipistrelle	1	HNS	

*HNS: bat heard but not seen during the survey

Table B.3 Visit 3 – 02/09/2021. Start time 19:56 End time 22:10. Dry, Beaufort wind 2/3. Start temp: 17°C End temp: 15°C

Time	Grid reference	Habitat	Bat species	Number of bats	Behaviour	Descriptor
20:27	SD 82700 06300	Scrub	Common pipistrelle	1	Commuting	Heard not seen brief pass
20:42	SD 82806 06294	Marsh	Common pipistrelle	1	*HNS	Heard not seen 2x pass
20:44	SD 82781 06294	Marsh	Common pipistrelle	1	HNS	Heard not seen
21:01	SD 82999 06427	Marsh	Common pipistrelle	1	Commuting	Heard not seen
21:04	SD 82950 06547	Pasture	Common pipistrelle	1	Foraging	Foraging up and down hedge
21:14	SD 82863 06623	Golf course	Common pipistrelle	1	Foraging	Heard not seen foraging over golf course
21:16	SD 82833 06630	Golf course	Common pipistrelle	1	Foraging	Heard not seen foraging over golf course

Time	Grid reference	Habitat	Bat species	Number of bats	Behaviour	Descriptor
21:18	SD 82746 06672	Golf course	Common pipistrelle	1	HNS	Heard not seen
21:20	SD 82659 06730	Golf course	Common pipistrelle	1	Foraging	Foraging along trees
21:22	SD 82585 06729	Golf course	Common pipistrelle	1	Commuting	Heard not seen
21:26	SD 82303 06763	Golf course	Common pipistrelle	1	Foraging	Foraging around streetlights
21:37	SD 82291 06595	Hedgerows	Common pipistrelle	1	HNS	Heard not seen
21:46	SD 82633 06048	Pasture	Common pipistrelle	1	HNS	Heard not seen
21:50	SD 82661 05998	Trees/road	Common pipistrelle	1	Foraging	Heard not seen
21:52	SD 82660 0594	Trees/road	Common pipistrelle	1	Foraging	Foraging along tree lines

*HNS: bat heard but not seen during the survey

Annex C Determining the importance of bats

- C.1.1 Determining the importance of bat species has followed the methodology provided by Wray *et al.* (2010). As this approach includes the consideration of features associated with species population (e.g. supporting habitats), the approach sits alongside the biodiversity EclA assessment criteria as discussed in Chapter 8: Biodiversity of the Environmental Statement (TR010064/APP/6.1) rather than being incorporated into it. Wray *et al.* (2010) developed the framework for assigning importance to enable a consistent approach across EclAs and remove the risk of subjectivity which may arise through the use of professional judgement alone. The framework considers the distribution and status of the species concerned, rather than just legal protection, to reflect differences between species in distribution and rarity, and in recognition that not all roosts, commuting routes and foraging areas have the same level of importance for supporting bat populations.
- C.1.2 The framework developed by Wray *et al.* (2010) for valuing bats in EclA was published in 2010. It should be noted that since then CIEEM have published an update to their EclA guidance. Key changes relevant to the application of the Wray *et al.* framework are:
- Reference to 'district and parish level' has been removed and replaced with 'local level'. For clarity these terms will also not be referred to within the assessment of bats for the Scheme; and
 - Assigning a geographic frame of reference now refers to the 'importance' of an ecological feature and the use of the term 'value' is no longer relevant. References to 'value' and 'valuing' of bats within Wray *et al.* (2010) are taken to correspond to the assignment of 'importance'.
- C.1.3 Not all roosts have the same level of importance in supporting a population of bats. The rarity of the species/population within a geographic context has been considered. Survey and desk study results informed the assignment of importance to roost sites, which were then applied to the criteria in Table 4.1 and Table 4.2.

Table C.1 Categorising bats by distribution and rarity

Rarity within range	England bat species
Rarest (population under 10,000)	Greater horseshoe <i>Rhinolophus ferrumequinum</i> , Bechstein's <i>Myotis bechsteinii</i> , Alcathe <i>Myotis alcathoe</i> , greater mouse eared <i>Myotis myotis</i> , barbastelle <i>Barbastella barbastellus</i> , grey long eared <i>Plecotus austriacus</i> .
Rarer (population 10,000-1000,000)	Lesser horseshoe <i>Rhinolophus hipposideros</i> , whiskered, Brandt's, Daubenton's, Natterer's, Leisler's <i>Nyctalus leisleri</i> , noctule, Nathusius' pipistrelle <i>Pipistrellus nathusii</i> , serotine <i>Eptesicus serotinus</i> .
Common (population over 100,000)	Common pipistrelle, soprano pipistrelle, brown long-eared.

Table C.2 Assigning importance to bat roosts

Geographic context	Roost types
Local	Feeding perches (common species) Individual bats (common species) Small number of non-breeding bats (common species)
County	Maternity sites (common species) Small number of hibernating bats (common and rarer species) Feeding perches (rarer/rarest species) Individual bats (rarer/rarest species) Small number of non-breeding bats (rarer/rarest species or all species assemblages)
Regional	Mating sites (rarer/rarest species) including well-used swarming sites Maternity sites (rarer species) Hibernation sites (rarest species)

Geographic context	Roost types
	Significant hibernation sites for rarer/rarest species or all species assemblages
National	Maternity sites (rarest species) Sites meeting SSSI guidelines
International	SAC sites

C.1.4 Survey and desk study results informed the assignment of importance of commuting and foraging habitats and a score was then derived through the systems in Table 4.3, Table 4.4 and Table 4.5 below, which further consider the rarity of the species involved, the approximate numbers of bats using the routes/areas and the nature and complexity of the Scheme.

Table C.3 Scoring system for importance of commuting and foraging bats

Geographic context	Score
Not important	1-10
Local	11-20
County	21-30
Regional	31-40
National / UK	41-50
International	>50

Table C.4 Scoring system for importance of bat commuting routes

Species	Number of bats	Roosts/potential roost nearby	Type and complexity of linear features
Common	Individual bats (5)	None (1)	Absence of (other) linear features (1)
-	-	Small number (3)	Unvegetated fences and large field sizes (2)
Rarer	Small number of bats (10)	Moderate number/Not known (4)	Walls, gappy or flailed hedgerows, isolated well-grown hedgerows and moderate field sizes.
-	-	Large number of roosts, or close to a SSSI for the species (5)	Well-grown and well-connected hedgerows, small field sizes (4)
Rarest	Large number of bats (20)	Close to or within a SAC for the species (20)	Complex network of mature well-established hedgerows, small fields, and rivers/streams

Table C.5 Scoring system for importance of bat foraging areas

Species	Number of bats	Roosts/potential roost nearby	Type and complexity of foraging area
Common	Individual bats (5)	None (1)	Industrial or other site without established vegetation (1)
-	-	Small number (3)	Suburban areas or intensive arable land (2)
Rarer	Small number of bats (10)	Moderate number/Not known (4)	Isolated woodland patches, less intensive arable and/or small towns and villages (3)

Species	Number of bats	Roosts/potential roost nearby	Type and complexity of foraging area
-	-	Large number of roosts, or close to a SSSI for the species (5)	Larger or connected woodland blocks, mixed agriculture and small villages/hamlets (4)
Rarest	Large number of bats (20)	Close to or within a SAC for the species (20)	Mosaic of pasture, woodlands, and wetland areas (5)

Annex D Figures


Figure 8.3.1: Bat Roost Potential

Figure 8.3.2: Bat Activity Survey Locations

Figure 8.3.3: Bat Activity Visualisation


ENVIRONMENTAL STATEMENT APPENDIX 8.3 FIGURE 8.3.1

Legend


 Order Limits

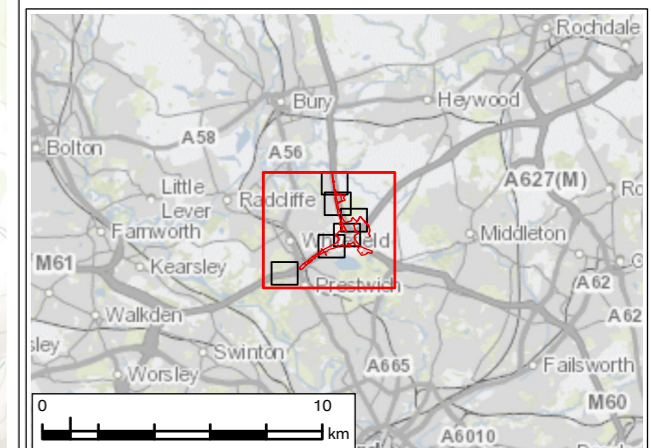
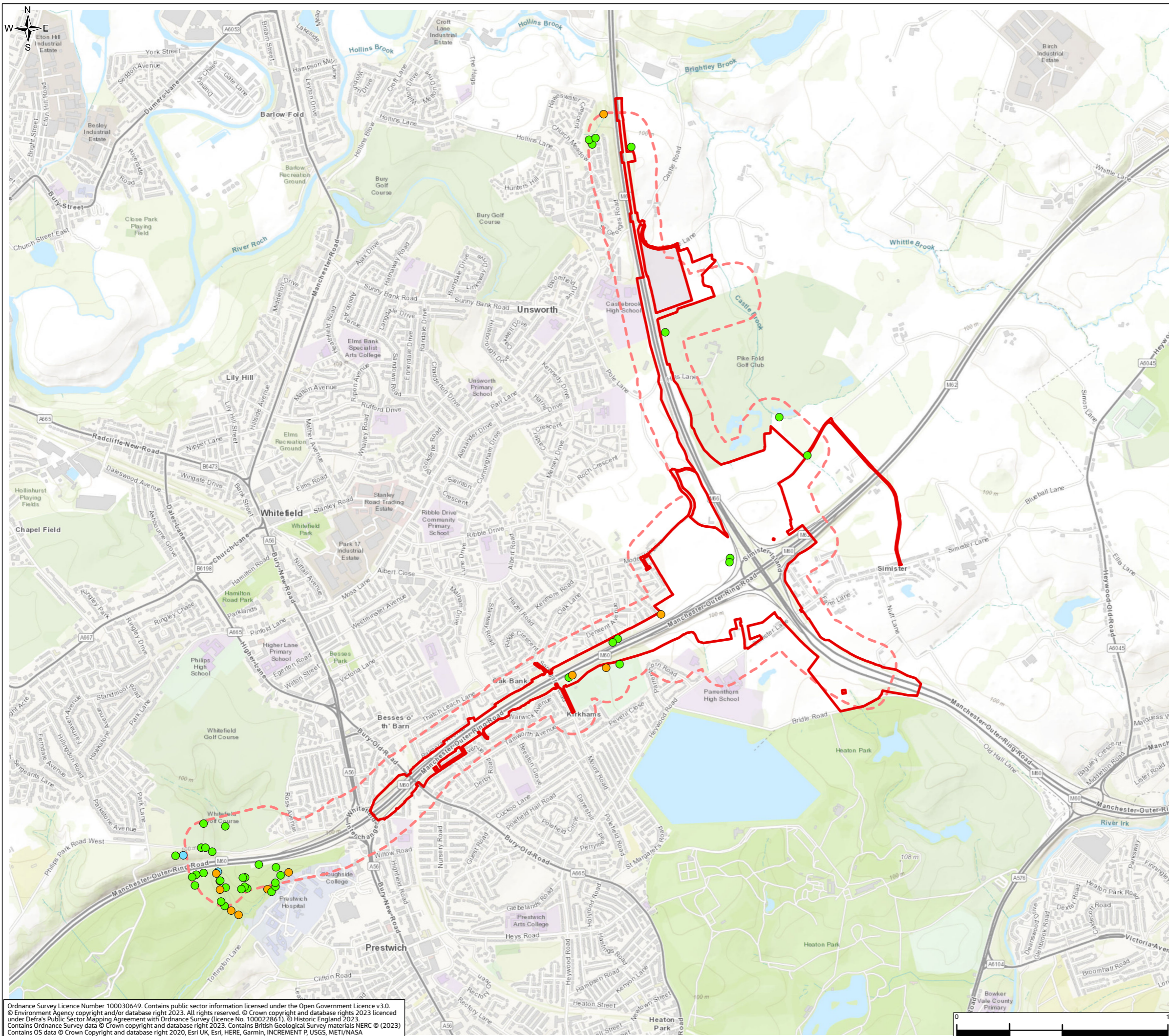
 100m Survey Area

Trees with Bat Roost Potential

 Moderate

 Low

 Negligible



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PAGE 1 OF 7**

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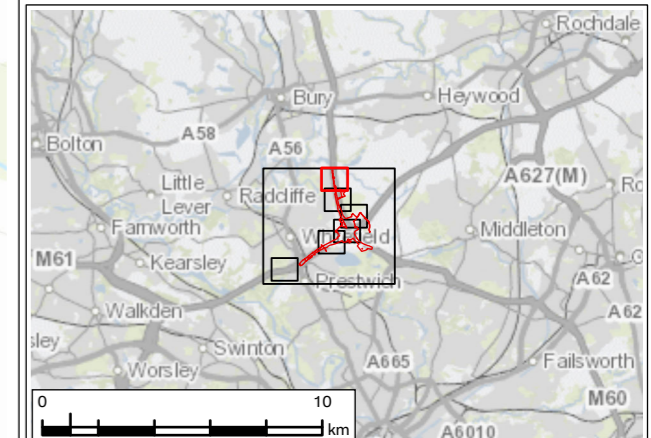
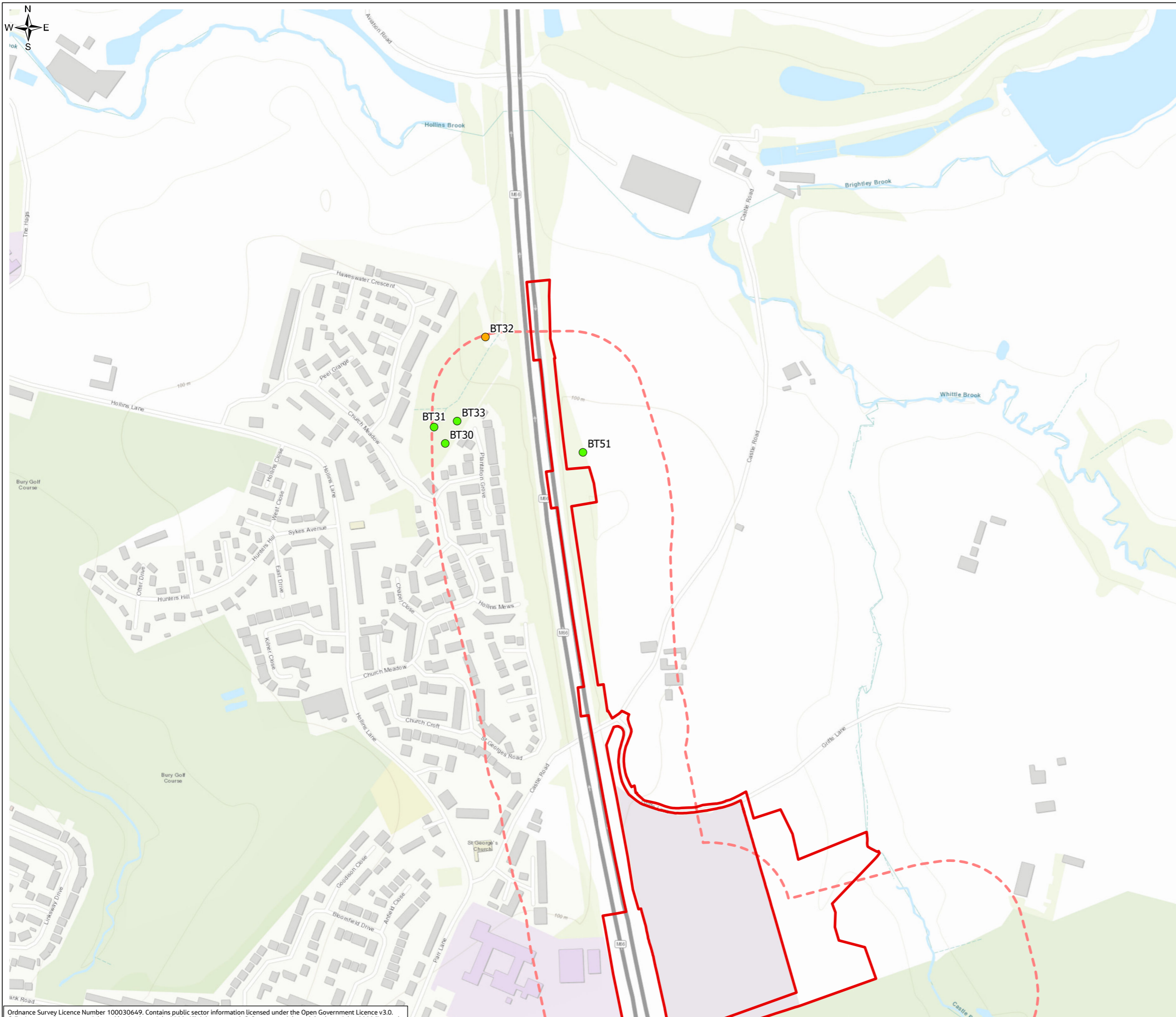
ENVIRONMENTAL STATEMENT APPENDIX 8.3 FIGURE 8.3.1

Legend

- Order Limits
- 100m Survey Area

Trees with Bat Roost Potential

- Moderate
- Low
- Negligible



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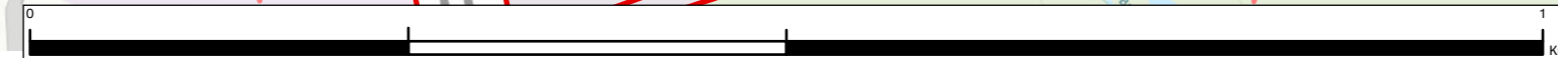
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ENVIRONMENTAL STATEMENT APPENDIX 8.3 FIGURE 8.3.1

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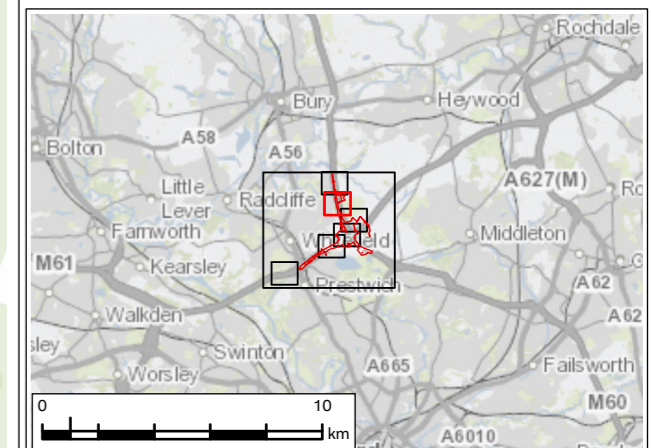
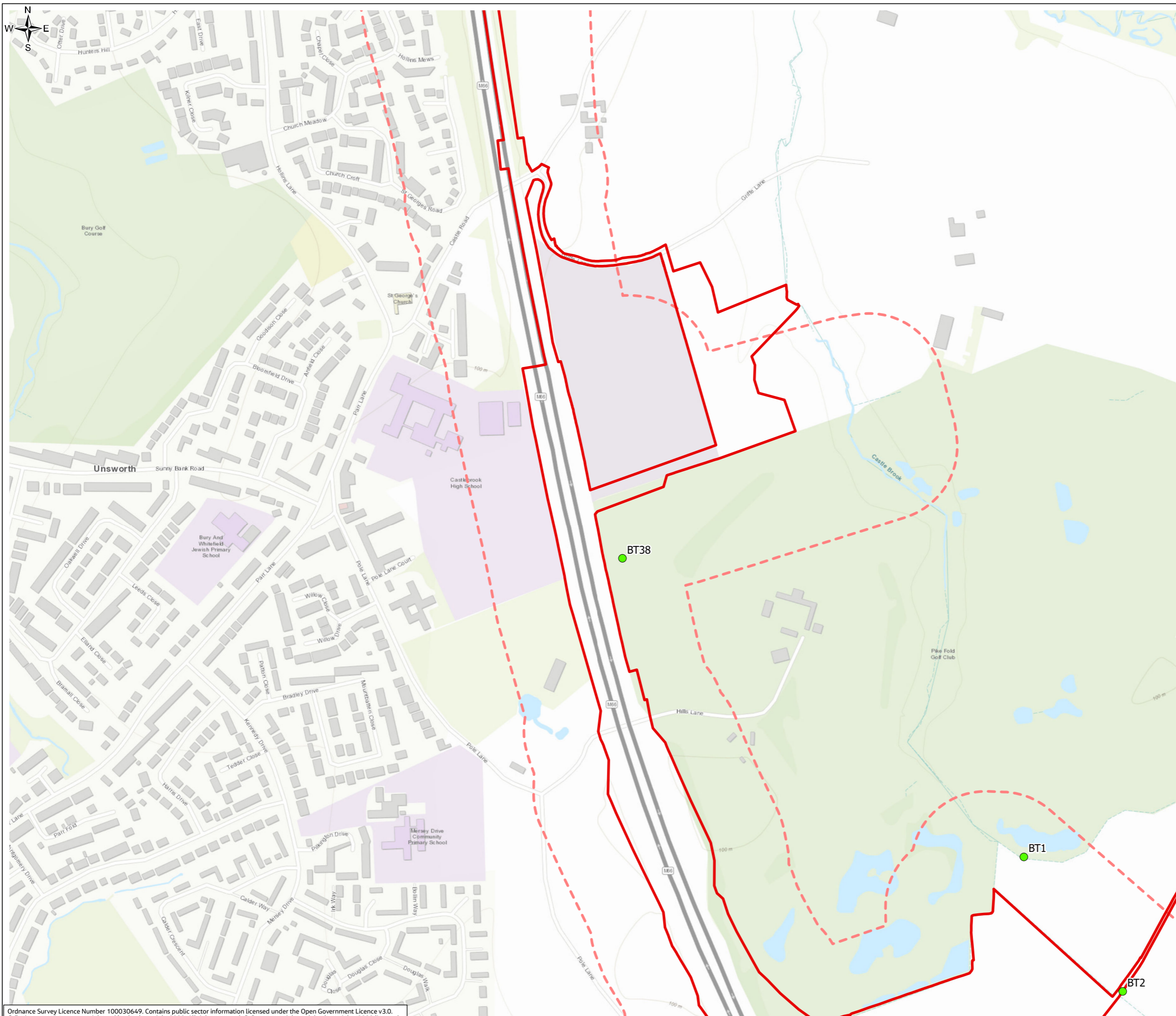
100m Survey Area

Trees with Bat Roost Potential

● Moderate

● Low

● Negligible



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ENVIRONMENTAL STATEMENT APPENDIX 8.3 FIGURE 8.3.1

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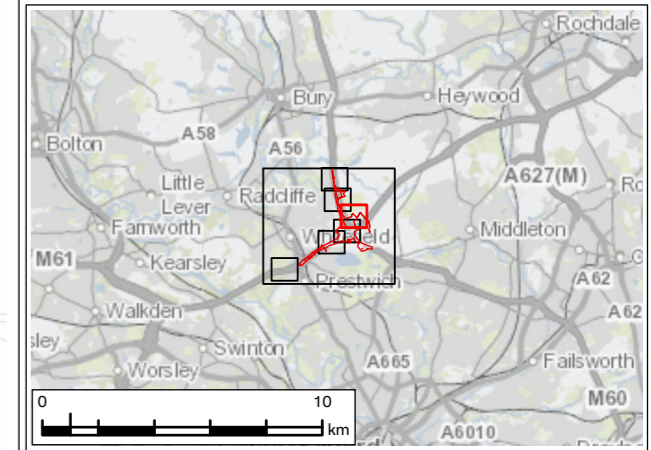
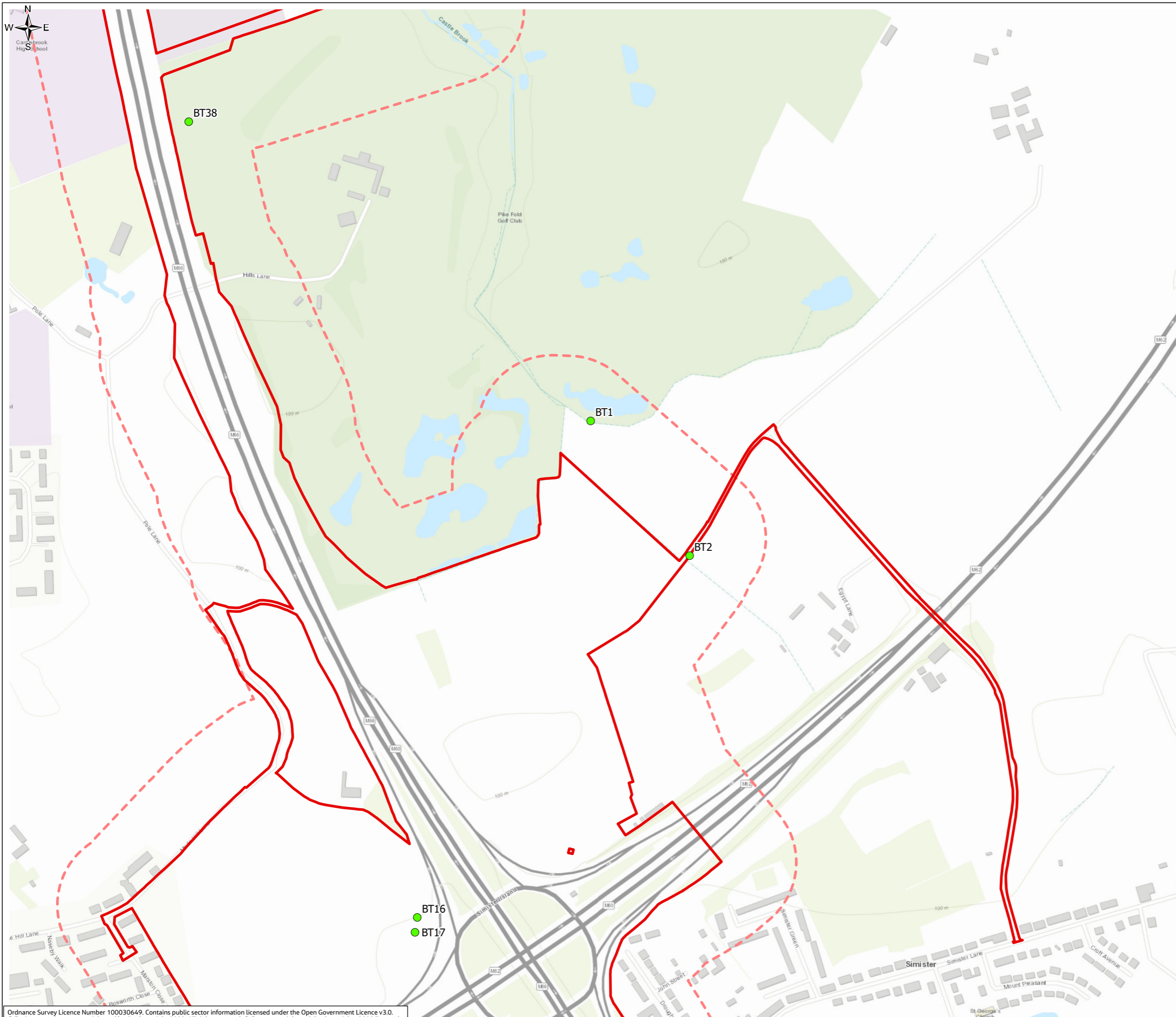
100m Survey Area

Trees with Bat Roost Potential

● Moderate

● Low

● Negligible



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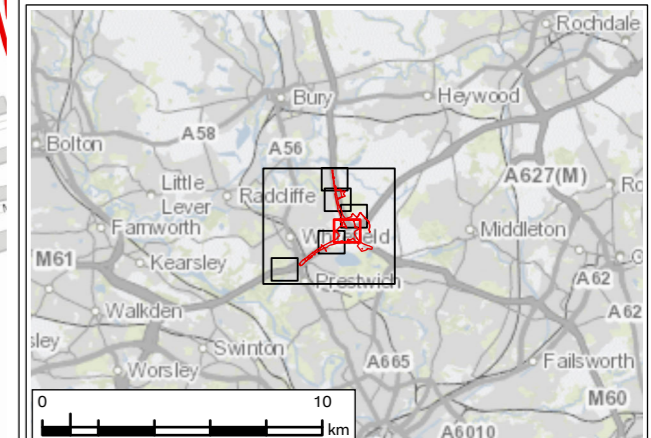
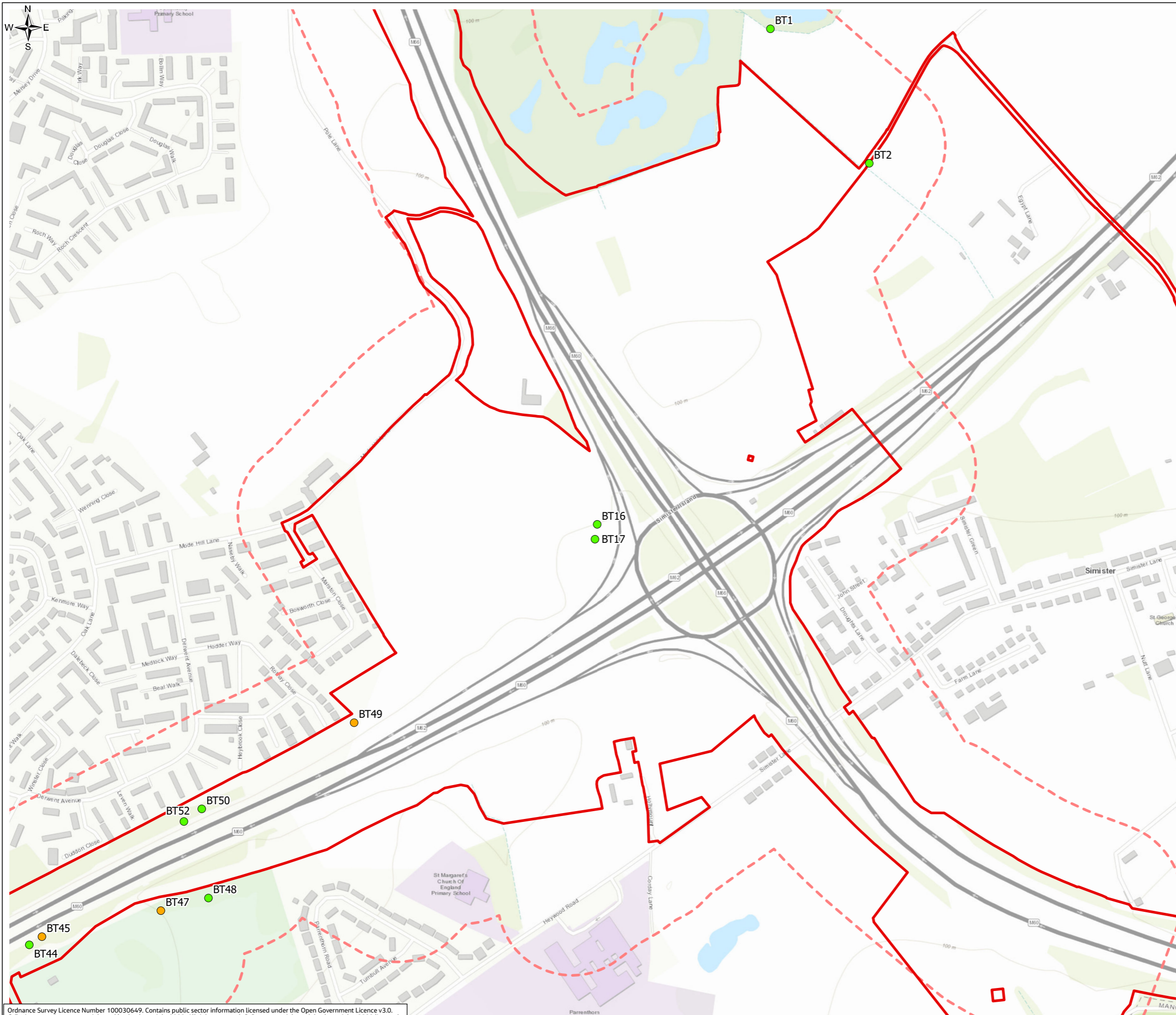
ENVIRONMENTAL STATEMENT APPENDIX 8.3 FIGURE 8.3.1

Legend

- Order Limits
- 100m Survey Area

Trees with Bat Roost Potential

- Moderate
- Low
- Negligible



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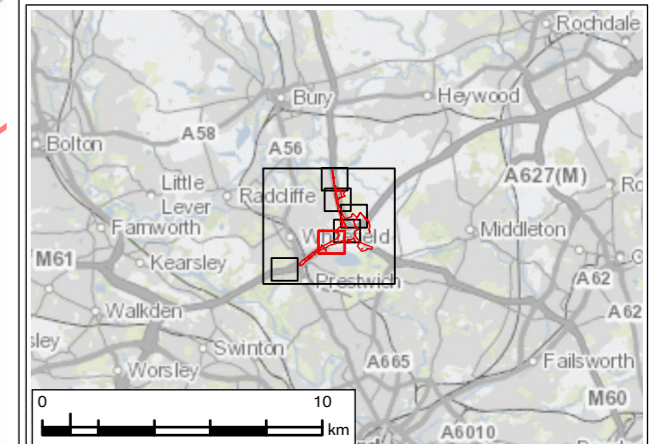
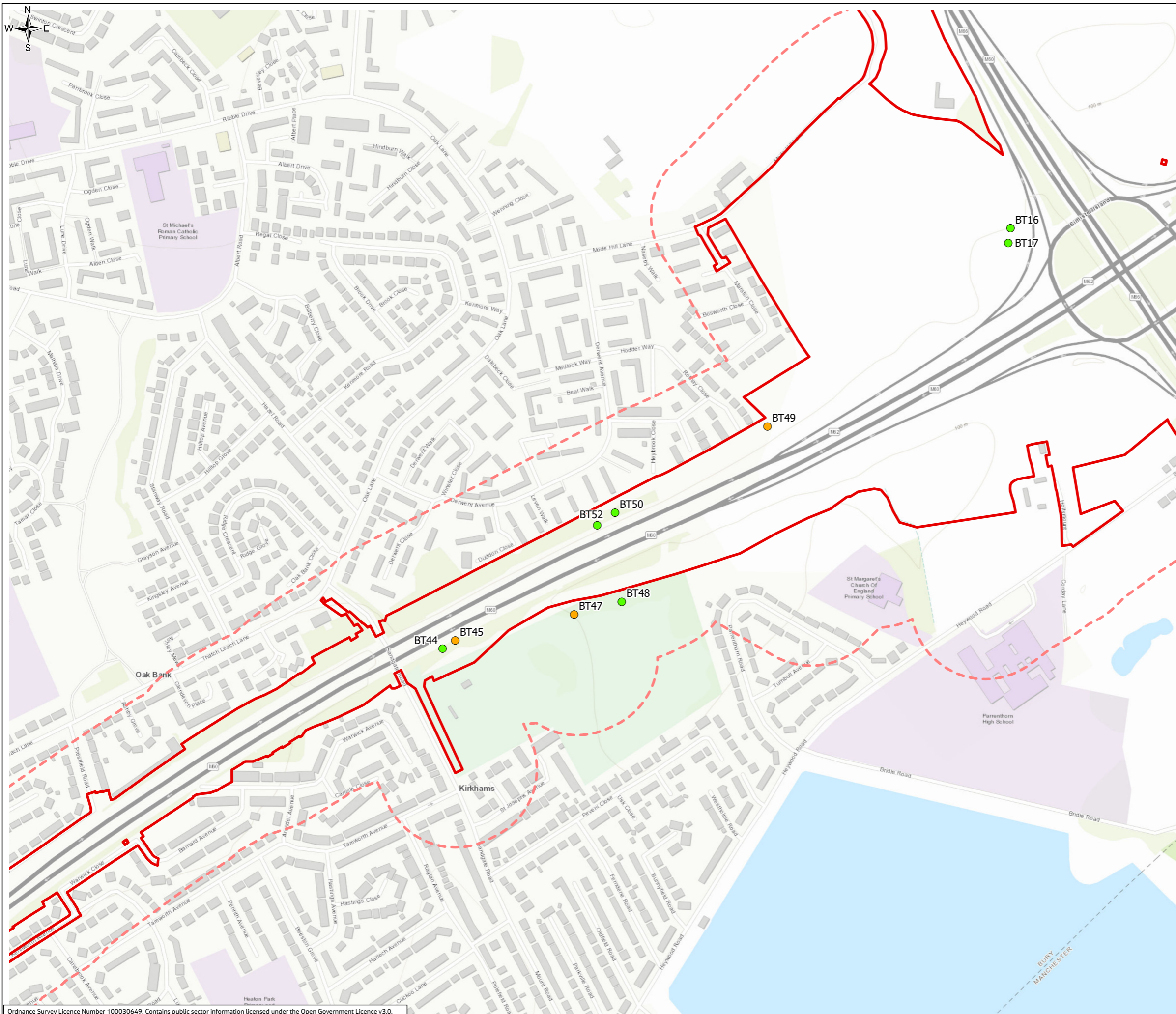
ENVIRONMENTAL STATEMENT APPENDIX 8.3 FIGURE 8.3.1

Legend

- Order Limits
- 100m Survey Area

Trees with Bat Roost Potential

- Moderate
- Low
- Negligible



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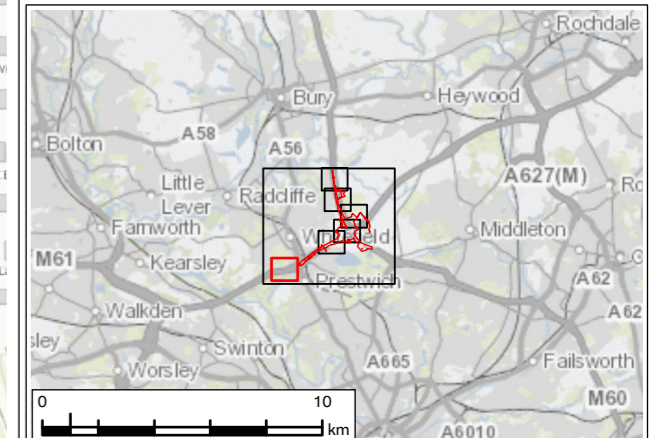
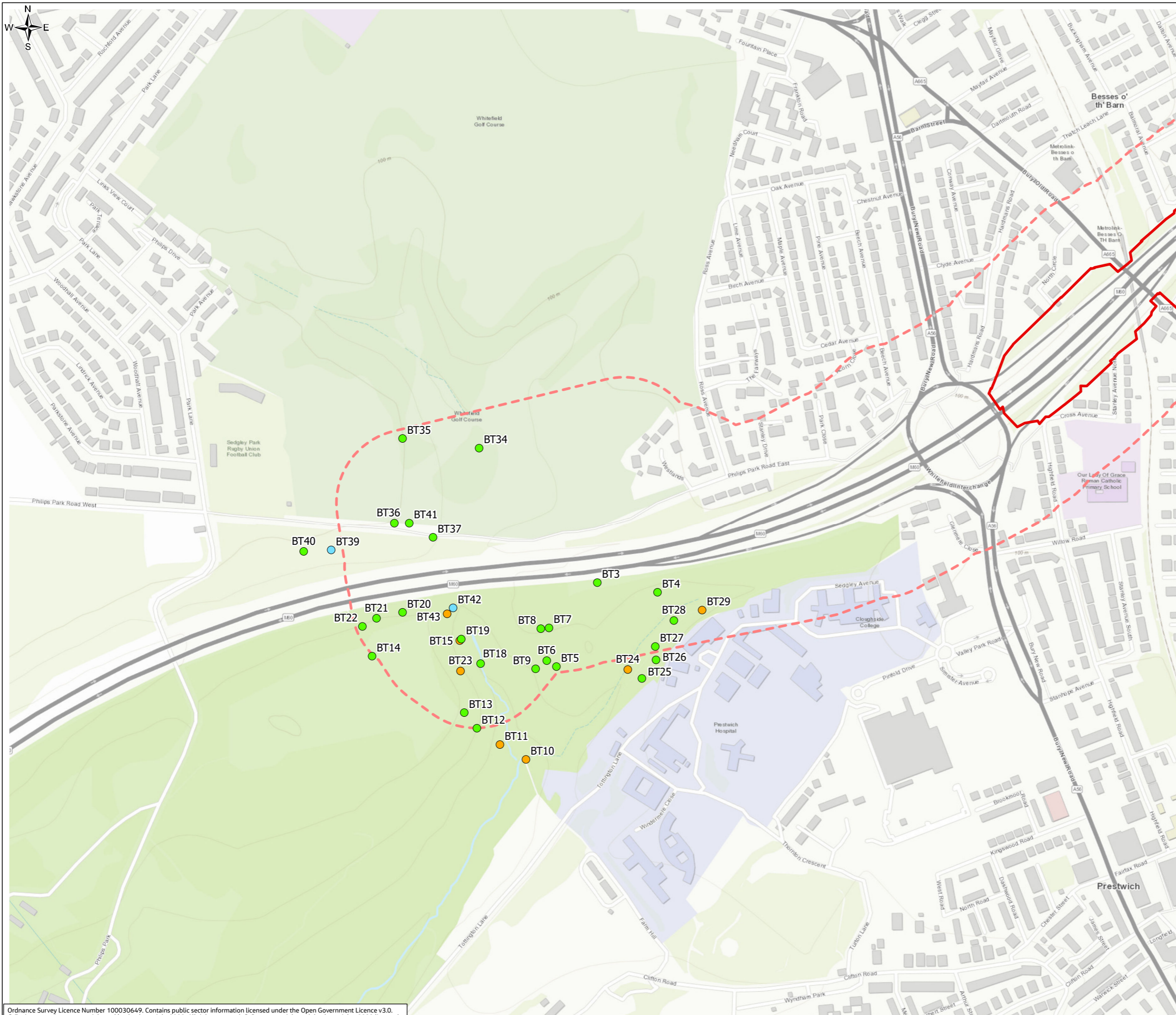
ENVIRONMENTAL STATEMENT APPENDIX 8.3 FIGURE 8.3.1

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- Order Limits
- 100m Survey Area

Trees with Bat Roost Potential

- Moderate
- Low
- Negligible



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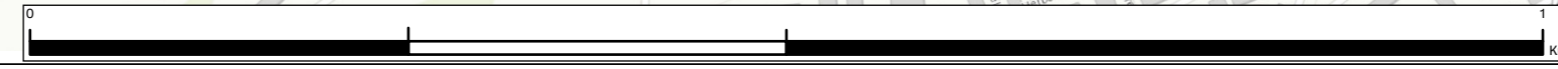


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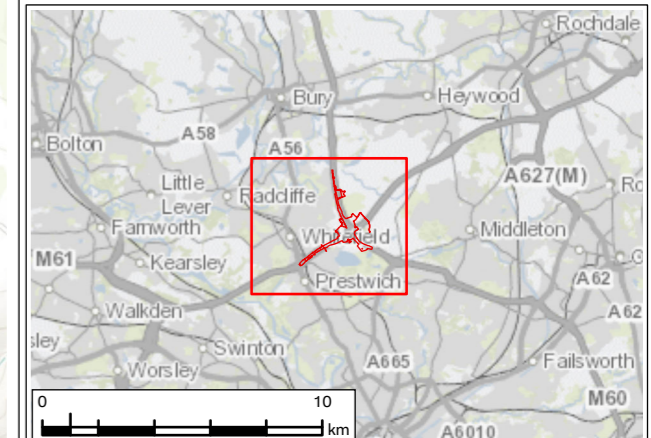
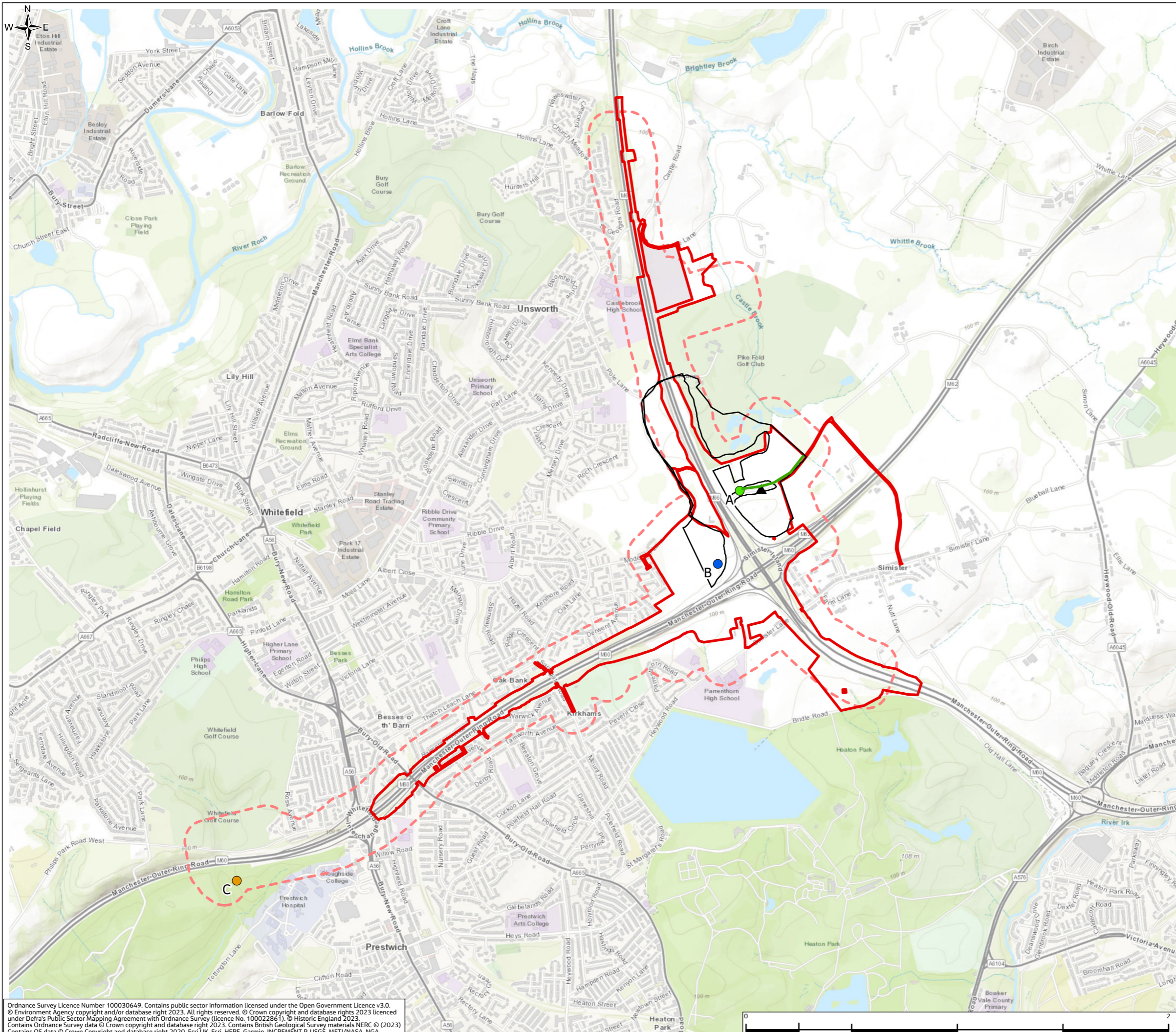


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ENVIRONMENTAL STATEMENT APPENDIX 8.3 FIGURE 8.3.2

Legend

- Order Limits
- 100m Survey Area
- Bat Activity Transect
- Surveyed Hedgerow
- Static detector location A
- Static detector location B
- Static detector location C
- ▲ Vantage point



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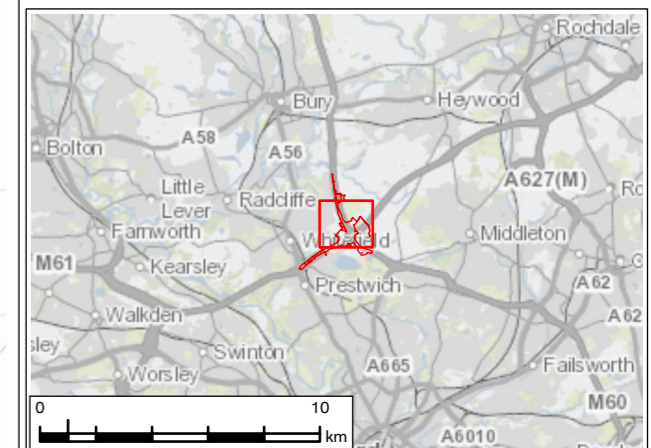
ENVIRONMENTAL STATEMENT APPENDIX 8.3 FIGURE 8.3.3

Legend

- Order Limits
- 100m Survey Area
- Bat Activity Transect
- ▲ Bat Transect Results - Noctule
- Bat Transect Results - Common Pipistrelle

Common Pipistrelle Activity Heatmap

- Low
-
-
- Moderate
-
-
- High



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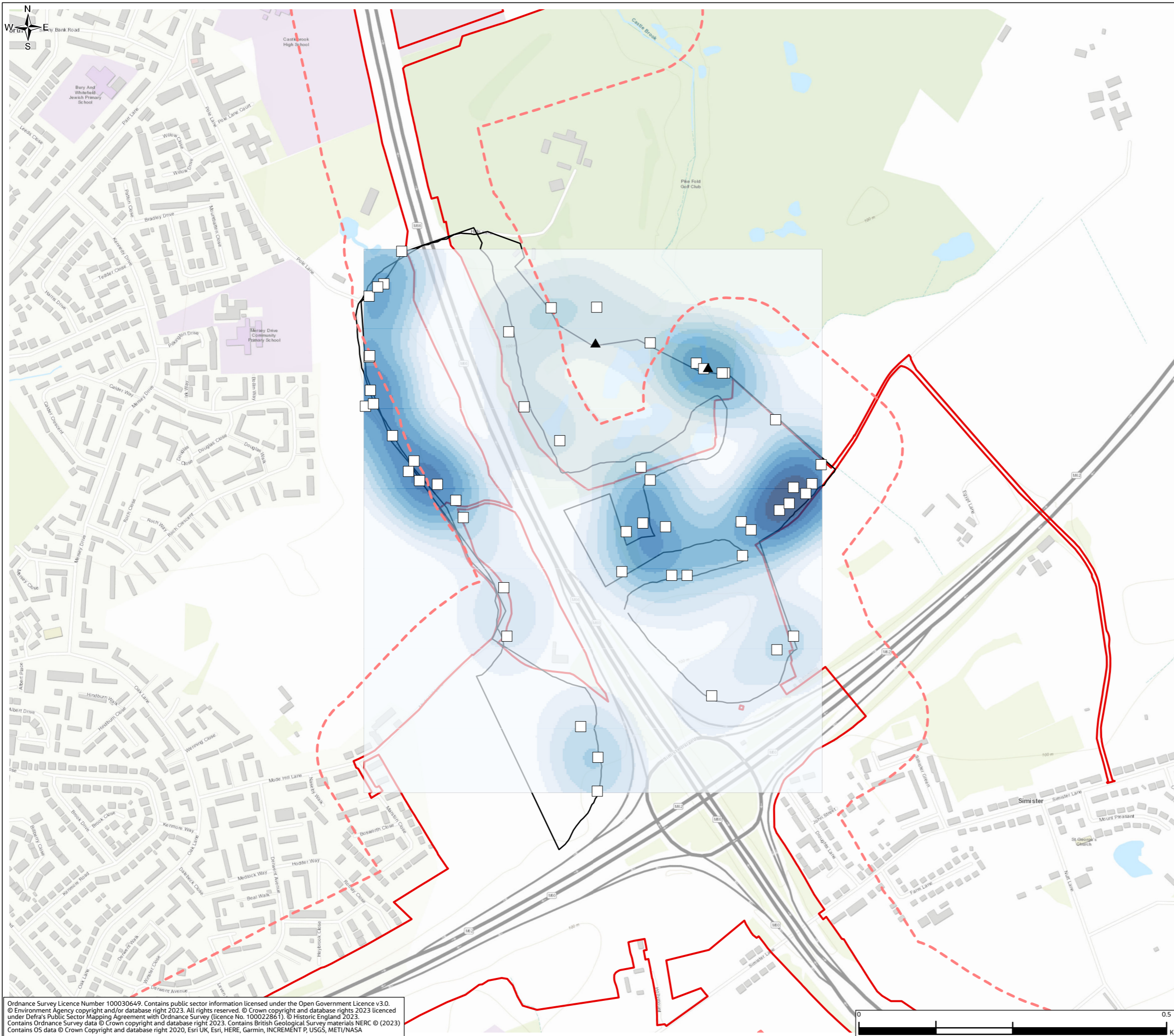
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