



High Speed Two Phase 2a (West Midlands - Crewe)

Background Information and Data

Ecology and biodiversity

Ecological baseline data - bats (BID-EC-012-000)



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Department
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A report prepared for High Speed Two (HS2) Limited:

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Contents

1	Introduction	1
2	Bats	3
2.1	Methodology	3
2.2	Deviations, constraints and limitations	3
2.3	Baseline	7
3	References	94

List of tables

Table 1:	Confirmed tree roosts within CA1	9
Table 2:	Confirmed roosts in buildings and structures within CA1	12
Table 3:	Confirmed building roosts beyond 100m buffer in CA1	15
Table 4:	Bat activity surveys conducted within CA1	16
Table 5:	Bat activity transect survey results for Transect 3 (replacement for transect 4)	17
Table 6:	Bat activity transect survey results for Transect 4	18
Table 7:	Bat activity transect survey results for Transect 5	19
Table 8:	Bat activity transect surveys results for Transect 6	20
Table 9:	Bat activity transect surveys results for Transect 7	21
Table 10:	Summary of static detector monitoring results for Transect 3	22
Table 11:	Summary of static detector monitoring results for Transect 4	23
Table 12:	Summary of static detector monitoring results for Transect 5	24
Table 13:	Summary of static detector monitoring results for Transect 6	25
Table 14:	Summary of static detector monitoring results for Transect 7	26
Table 15:	Confirmed tree roosts within CA2	33
Table 16:	Confirmed tree roosts beyond 100m buffer in CA2	36
Table 17:	Confirmed roosts in buildings and structures within CA2	38
Table 18:	Bat activity surveys conducted within CA2	41
Table 19:	Bat activity transect survey results for Transect 8	42
Table 20:	Bat activity transect survey results for Transect 9	43
Table 21:	Summary of static detector monitoring results for Transect 8	44
Table 22:	Summary of static detector monitoring results for Transect 9	45
Table 23:	Confirmed tree roosts within CA3	50
Table 24:	Confirmed tree roosts beyond 100m buffer in CA3	51

Table 25: Confirmed roosts in buildings and structures within CA ₃	53
Table 26: Bat activity surveys conducted within CA ₃	55
Table 27: Bat activity transect survey results for Transect 20	56
Table 28: Bat activity transect survey results for Transect 15	57
Table 29: Bat activity transect survey results Transect 13	58
Table 30: Bat activity transect survey results for Transect 11	59
Table 31: Summary of static detector monitoring results for Transect 20	60
Table 32: Summary of static detector monitoring results for Transect 15	61
Table 33: Summary of static detector monitoring results for Transect 13	62
Table 34: Summary of static detector monitoring results for Transect 11	63
Table 35: Confirmed tree roosts within CA ₄	68
Table 36: Confirmed tree roosts beyond 100m buffer in CA ₄	69
Table 37: Confirmed roosts in buildings and structures within CA ₄	71
Table 38: Confirmed roosts in buildings and structures beyond 100m buffer in CA ₄	72
Table 39: Bat activity surveys conducted within CA ₄	73
Table 40: Bat activity transect survey results for Transect 16	74
Table 41: Summary of static detector monitoring results for Transect 16	75
Table 42: Confirmed tree roosts within CA ₅	79
Table 43: Confirmed tree roosts beyond 100m buffer in CA ₅	80
Table 44: Confirmed roosts in buildings and structures within CA ₅	82
Table 45: Confirmed roosts in buildings and structures beyond 100m buffer in CA ₅	84
Table 46: Bat activity surveys conducted within CA ₅	85
Table 47: Bat activity transect survey results for Transect 17	86
Table 48: Bat activity transect survey results for Transect 19	87
Table 49: Bat activity transect survey results for Transect 21 (to replace transect 17)	88
Table 50: Summary of static detector monitoring results for Transect 17	89
Table 51: Summary of static detector monitoring results for Transect 19	90
Table 52: Summary of static detector monitoring results for Transect 21	91

1 Introduction

1.1.1 This report presents a summary of the ecological baseline data relating to bats.

1.1.2 Ecological baseline data has been collected for the assessment of High Speed Rail (West Midlands - Crewe). The Proposed Scheme will pass through the following community areas (CA):

- CA1: Fradley to Colton;
- CA2: Colwich to Yarlet;
- CA3: Stone and Swynnerton;
- CA4: Whitmore Heath to Madeley; and
- CA5: South Cheshire.

1.1.3 This report should be read in conjunction with Map Series EC-05 to EC-06 in the Background Information and Data, Ecology Map Books.

1.1.4 The following baseline ecology reports can also be referred to:

- Ecological baseline data - phase 1 habitat survey (Background Information and Data: BID-EC-002-000);
- Ecological baseline data - protected and or notable flora (Background Information and Data: BID-EC-003-000);
- Ecological baseline data - national vegetation classification and ancient woodland (Background Information and Data: BID-EC-004-000);
- Ecological baseline data - hedgerows (Background Information and Data: BID-EC-005-000);
- Ecological baseline data - river habitat, river corridor, and ditch surveys, (Background Information and Data: BID-EC-006-000);
- Ecological baseline data - amphibian and pond surveys (Background Information and Data: BID-EC-007-000);
- Ecological baseline data - reptiles (Background Information and Data: BID-EC-008-000);
- Ecological baseline data - breeding and wintering birds (Background Information and Data: BID-EC-009-000);
- Ecological baseline data - otter and water vole (Background Information and Data: BID-EC-010-000);
- Ecological baseline data - hazel dormouse (Background Information and Data: BID-EC-011-000);
- Ecological baseline data - white clawed crayfish and other invertebrate (Background Information and Data: BID-EC-013-000); and

- Ecological baseline data - fish (Background Information and Data: BID-EC-014-000).

1.1.5 Note that baseline data for badger is not made publically available due to the historic persecution of this species

1.1.6 The ecological assessment is detailed in the High Speed Rail (West Midlands - Crewe) Environmental Statement (ES)¹.

- Volume 2, Community area reports;
- Volume 3, Route-wide effects;
- Volume 4, Off-route effects; and
- Volume 5, Appendices.

¹ HS2 Ltd (2017), *High Speed Rail (West Midlands - Crewe) Environmental Statement (ES)*, www.gov.uk/HS2

2 Bats

2.1 Methodology

2.1.1 Details of the standard methodology utilised for bat surveys are provided in the Technical Note HS2 Ecological Surveys: Field Survey Methods and Standards (FSMS) included in the Scope and Methodology Report (SMR) Addendum (see ES Volume 5: Appendix CT-001-002).

2.1.2 A desk study search was undertaken to identify bat records within 5km of the land required for construction of the Proposed Scheme. Records dated prior to 1 October 2006 were excluded from the desk study review. Desk study records relating to bats were obtained from the following sources:

- Staffordshire Ecological Record²; and
- rECOrd³, Local Biological Records Centre for the Cheshire region.

2.2 Deviations, constraints and limitations

2.2.1 Survey efforts have been limited to land where access permission has become available throughout the survey period. Due to access restrictions, a full survey season has not been completed on a range of sites along the route.

Trees

Constraints and limitations

2.2.2 Surveys of trees with regard to bats included ground level inspections, climbed inspections and emergence/re-entry surveys over the survey season of 2016.

2.2.3 A constraint when undertaking these types of tree surveys was adverse weather which included high winds, rain and cold temperatures. Adverse weather affected ground-level surveys by reducing visibility of features and impeded climbed inspections owing to health and safety concerns. These conditions are also unsuitable to conduct bat emergence surveys in and therefore scheduled surveys were necessarily cancelled when conditions were adverse. This impeded completion of emergence surveys at sites across the land required for construction of the Proposed Scheme.

2.2.4 Surveys were also constrained by health and safety issues when trees were assessed as being unsafe to climb. To address this, ground assessments and emergence surveys were carried out to assess the potential of these trees to support roosting bats.

2.2.5 Some of the surveys were constrained by equipment failure and malfunction and loss of recordings.

2.2.6 Approximately 336 trees were climbed in November and December 2016. Whilst there was a reduced likelihood of encountering bats in accessible cavities, during those

² Staffordshire Ecological Record, *The Ecological Database for Staffordshire*, http://www.staffs-ecology.org.uk/html2015/index.php?title=Main_Page

³ rECOrd, *Local Biological Records Centre serving Cheshire*, <http://www.record-lrc.co.uk/>

months this approach was taken to rule out, or downgrade, a proportion of the trees from high/medium to lower roost potential at an early date. Droppings could also be collected from accessible cavities confirming roost presence.

- 2.2.7 Access was not possible to all sites and accessibility was also intermittent (e.g. as a result of restrictions arising from game shooting). This resulted in inconsistent and incomplete survey sets of some features which required emergence surveys.
- 2.2.8 A large proportion of trees were assessed through climbed inspections, emergence and back-tracking surveys, and activity transect. As a result, the majority of roosts are likely to have been recorded where survey access was granted.
- 2.2.9 Where surveys could not be fully completed owing to the above constraints, this limitation was addressed by ensuring that assessments based on incomplete survey data were conservative to account for gaps in information.

Deviations

- 2.2.10 Refinements to the methodology for surveying woodland blocks were made with a view to identifying key dispersal and foraging corridors within, and originating from, woodland parcels within the vicinity of the land required for the construction of the Proposed Scheme as well as key foraging habitats. These deviations were:
 - an initial roost potential assessment of each woodland area was carried out, following the ground level tree assessment. These assessments subsequently informed the requirement for additional surveys; and
 - an appropriate suite of back-tracking surveys were undertaken to identify woodland roosting sites, key dispersal corridors within and originating from woodland parcels, important foraging habitats, and specific roost locations.
- 2.2.11 The use of back-tracking as a method deviation was permitted by HS2 in order to provide greatest understanding of the bats using and roosting in an area with many suitable potential roosting sites. Further information on back-tracking surveys can be found in sections 2.2.13 to 2.2.16.
- 2.2.12 Due to the sheer number of trees requiring ground-level tree assessment, trees with negligible potential were not mapped.

Trees: back-tracking surveys

Constraints and limitations

- 2.2.13 High winds, rain and cold temperatures are unsuitable for conducting back-tracking surveys in and therefore scheduled surveys were necessarily cancelled when conditions were adverse. This impeded completion of back-tracking surveys at sites across the land required for construction of the Proposed Scheme.
- 2.2.14 Access was not possible to all sites and accessibility was also intermittent. This resulted in inconsistent and incomplete survey sets of some features.
- 2.2.15 Access changes to land parcels also resulted in incomplete surveys, such as seasonal restricted access to Clifford's Wood shoot land, and Checkley Wood shoot land located in CA3 and CA5 respectively.

Deviations

- 2.2.16 Sites where this deviation to the methodology was conducted are:
- CA₁, woodland near Shaw Lane, Spencer's Plantation;
 - CA₂, Hoo Mill, woodland west of Ingestre Golf Club, Ingestre Golf Club, woodland embankment adjacent to Hopton Lane, land near Sunny Hill Farm;
 - CA₃, land adjacent to the A51;
 - CA₄, Whitmore Wood; and
 - CA₅, Checkley Brook, land south of Checkley Lane.

Buildings and structures

Constraints and limitations

- 2.2.17 The main constraints to external and internal building inspections comprised access to the site and/or declined access to building interiors and roof voids.
- 2.2.18 Access permission was not granted for the majority of buildings and other structures on private land. In some instances an initial assessment of potential to support roosting bats was undertaken based on external survey only.
- 2.2.19 Where internal access was granted, surveys of several sites was constrained by health and safety concerns. These included sites with hazards, including structural safety and the potential presence of asbestos, or where access was not physically possible. In these situations, interior inspections were not undertaken. A building in CA₅ had access permissions retracted part way through the season, and consequently some buildings do not have a complete set of emergence survey data.
- 2.2.20 Adverse weather conditions such as high winds, rain and cold temperatures, encountered over the survey season of 2016 made it unsuitable to conduct bat emergence surveys and therefore scheduled surveys were necessarily cancelled. This impeded completion of emergence surveys at sites across the land required for construction of the Proposed Scheme.
- 2.2.21 Where surveys could not be fully completed owing to the above constraints, this limitation was addressed by ensuring assessments based on incomplete survey data were conservative to account for the gaps in information.

Deviations

- 2.2.22 Due to difficulties internally accessing buildings on private land, some surveys omitted the internal inspection and comprised of the external assessment followed by emergence/re-entry surveys.

Activity surveys

Constraints and limitations

- 2.2.23 The main constraint was access withdrawals on land used for game shooting in CA₃ and CA₅ which meant that activity surveys in September and October 2016 could not

occur. Other health and safety concerns prevented the complete number of visits being undertaken in CA1, CA2, CA3 and CA5.

- 2.2.24 Access issues with land owners in CA3 meant that access was withdrawn and only one survey could be undertaken in June 2016 on one of the pre-determined transects.
- 2.2.25 As with other bat surveys, adverse weather conditions caused surveys to be cancelled and interfered with the detection rate of the detectors for surveys. However, the less-intensive volume of these surveys compared with the survey regime for emergence surveys allowed more flexibility in re-scheduling activity surveys when conditions were suitable. The constraint of adverse conditions on activity surveys was therefore relatively low.
- 2.2.26 Where surveys could not be fully completed owing to the above constraints, this limitation was addressed by ensuring that assessments based on incomplete survey data were conservative to account for gaps in information.

Deviations

- 2.2.27 Deviation from the survey methodology occurred when access was retracted and surveys could not be completed, other transects were walked to cover months where data would not be gathered. To maintain the 3km per 10km of route survey ratio alternative transects were walked to cover months when access was withdrawn for the original transect route.

Static detector surveys

Constraints and limitations

- 2.2.28 Static ultrasonic bat recorders (Batlogger C) were used for the majority of static detector surveys. Due to access constraints and inability to retrieve some detectors an Anabat Express was used for one survey.
- 2.2.29 The main constraint of these surveys was equipment failure and malfunction whereby the recording devices failed to record, some of these failings were due to livestock and adverse weather. The incidence was more evident on static detectors where 38% of the surveys scheduled had no survey results due to failed statics.
- 2.2.30 The limitations when surveying for bats using ultrasonic detectors is acknowledged due to the variable properties in bat echolocation calls. Some bats, including brown long-eared bat, have very directional and quiet calls and are only easily detectable when the bat detector is in close range and facing in the direction of the bat. Data analysis has allowed for identification of the majority of the calls to species level with the exception of *Myotis* species. However the lower amplitude of some calls of some species, such as brown long-eared bats, is more difficult to detect. As such their presence and subsequent abundance is likely to be underestimated.
- 2.2.31 Due to land access constraints and equipment failure, it was not possible to successfully deploy static recorders at all locations each survey month. Some survey months did not gather data for five nights due to equipment failure.

Deviations

- 2.2.32 Where transects had to be moved during the survey season due to revoked access permission, static detectors were also redeployed to these alternative transect locations.

2.3 Baseline

Fradley to Colton (CA1)

- 2.3.1 Tables 1 to 3 provide summaries of bat roosts identified in CA1 from field surveys. These tables should be read in conjunction with map series EC-05, (Volume 5, Ecology map book). Survey information collected has been allocated an ecology survey code to provide a unique identified for use on project mapping.

Overview of bat species status in the vicinity of CA1

- 2.3.2 There are no statutory designated sites (within 10km) or non-statutory designated sites (within 5km) of CA1 which support bats as features for their designations.
- 2.3.3 Habitats within CA1 suitable to support roosting, foraging and commuting bats include several woodland blocks including broad-leaved woodland, four main watercourses (Pyford Brood, Bourne Brook, the River Trent, and Moreton Brook) and several smaller watercourses, water bodies, marshy grassland (Trentside Meadows Local Wildlife Site (LWS)), species-rich grassland (Lount Farm LWS), lowland hay meadow (Habitat of Principal Importance), and farmland supporting hedgerows, some of which are considered to be 'important'. The majority of these habitats are located within and adjacent to the land required for the construction of the Proposed Scheme.
- 2.3.4 Field surveys and desk study records recorded at least ten species of bats in CA1. Seven species were identified from field surveys. The desk study further identified Natterer's bat, Daubenton's bat and whiskered bats in the local area. The total bat assemblage is as follows:
- Common pipistrelle (*Pipistrellus pipistrellus*);
 - Soprano pipistrelle (*Pipistrellus pygmaeus*);
 - Brown long-eared bat (*Plecotus auritus*);
 - Nathusius' pipistrelle (*Pipistrellus nathusii*);
 - Noctule (*Nyctalus noctula*);
 - Serotine (*Eptesicus serotinus*);
 - Brandt's bat (*Myotis brandtii*);
 - Daubenton's bat (*Myotis daubentonii*);
 - Whiskered bat (*Myotis mystacinus*); and
 - Natterer's bat (*Myotis nattereri*).

Roosting (trees)

- 2.3.5 A total of 1852 trees were subject to an initial ground based assessment and subsequent further detailed climbed surveys where appropriate in line with the methods described in the FSMS document.
- 2.3.6 Of the 1852 trees that were initially assessed, the following results were obtained:
- 191 trees identified as having high potential to support roosting bats;
 - 340 trees identified as having moderate potential to support roosting bats; and
 - the remaining 1321 trees were classified as having low or negligible potential to support roosting bats. These trees were subsequently scoped out of further survey.
- 2.3.7 Of the 531 trees assessed as having moderate or high potential to support roosting bats:
- a total of 406 were subject to further surveys in the form of a tree climbing inspection during which seven roosts were identified;
 - 204 were reassessed as having low to negligible potential to support roosting bats and were scoped out of further surveys; and
 - 84 trees were subject to emergence surveys during which a further five roosts were recorded. Forty-three trees were subject to back-tracking surveys.
- 2.3.8 Four back-tracking surveys were undertaken in the area at three sites. A high incidence of trees with high and moderate potential were identified at these sites, therefore this methodological deviation was undertaken in order to gain an understanding of the bat assemblage at this site.
- 2.3.9 Details of confirmed tree roosts in this area of the route are provided in Table 1.

Table 1: Confirmed tree roosts within CA1

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT2-191040	North-east of Shaw Lane.	SK113159	Common ash.	Unknown, droppings not viable.	11 September 2016, tree climbing inspection.	Day/summer.	Droppings found in upward facing ledge from a west facing tear out 6m high.	1	Within.
000-BT2-191172	North-west of Shaw Lane.	SK112162	Pedunculate oak.	Noctule bat (visual confirmation) (1).	13 December 2016, tree climbing inspection.	Day/summer.	Long helical split in deadwood.	1	Within.
000-BT3-201194	South-east of Lount Farm.	SK036223	Pedunculate oak.	Unknown bat (1), bat did not echolocate.	9 September 2016, tree climbing inspection.	Day/summer.	Bat seen entering roost but not echo-locating.	1	Within.
000-BT3-201197	North-east of Lount Farm.	SK035224	Common alder.	<i>Myotis</i> sp. (1).	19 July 2016, tree climbing inspection.	Day/summer.	Bat seen entering roost in rot hole in branch (180mm diameter) overhanging field to the north west.	1	Within.
000-BT2-201199	North-east of Lount Farm.	SK035224	Common alder.	Unknown, droppings not viable.	1 August 2016, tree climbing inspection.	Summer/ maternity/ hibernation.	Branch fissure with cavity, bat droppings present in fissure.	1	Within.
000-BT3-201215	South-east of Lount Farm.	SK034227	Crack willow.	Noctule (1).	20 July 2016, tree emergence.	Day/summer.	Bat seen entering tree.	1	Within.
000-BT3-201249	North-east of Lount Farm.	SK032226	Crack willow.	Soprano pipistrelle (1).	7 September 2016, tree emergence.	Day/summer/ transitional.	Emerged from tree.	1	Within.
000-BT2-201255	South-east of Lount Farm.	SK033227	Crack willow.	Unknown (1).	26 July 2016, tree climbing inspection. 19 July 2016, tree emergence.	Day/ transitional.	Entrance 7x10cm opens to a 10cm downward facing cavity Unidentified bat, not echo-locating, emerged from tree.	1	Within.

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-192157	North-east of Trentside Meadows.	SK102168	Pedunculate oak.	Soprano pipistrelle (1).	18 August 2016, tree climbing inspection. 24 August 2016, tree emergence.	Day/summer.	Dead branch stub with old droppings. Emergence, from west side of tree.	1	11 north-east.
000-BT3-196500	South-east of Uttoxeter Road.	SK112162	Pedunculate oak.	Noctule (5).	3 August 2016, tree climbing inspection. 6 September 2016, tree emergence.	Maternity/summer.	Interconnecting wounds, adequate size to support colony. Would be susceptible to temp change. Single noctule bat found. Emergence from south side of tree.	1	14 south-east.
000-BT2-199005	South-east of Newlands Lane.	SK057215	Crack willow.	Unknown.	12 October 2016, tree climbing inspection.	Day/summer.	Dropping found in cavity at the top of the split.	1	80 north-east.
000-BT3-197248	South-west of Blithbury Road.	SK064202	Pedunculate oak.	Unknown.	31 August 2016, tree climbing inspection.	Day/summer.	Unidentified bat seen flying out of tree but not echo-locating.	1	99 north-west.

Roosting (buildings and structures)

- 2.3.10 A total of 65 buildings in this area were subject to initial inspections, resulting in the following:
- 23 buildings were confirmed to support 27 roosts;
 - 23 roosts were confirmed via internal inspections and four roosts were identified from emergence surveys;
 - seven buildings had high potential to support bats; and
 - 35 buildings had moderate potential to support bats.
- 2.3.11 Of the 62 buildings confirmed as having roosts, or assessed as having high or moderate potential to support bats:
- 44 buildings were subject to internal inspections resulting in identification of 23 bat roosts;
 - 24 buildings were subject to a total of 35 emergence surveys identifying a further four roosts; and
 - species have not been confirmed at seven buildings but evidence of roosting bats was identified.
- 2.3.12 Details of confirmed roosts in buildings/structures in this area of the route are provided in Table 2, details of roosts over 100m from the Proposed Scheme are provided in Table 3.

Table 2: Confirmed roosts in buildings and structures within CA1

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-188001	Cranberry, building north-east of Fradley Wood BAS.	SK132138	Barn.	Unknown species (3), droppings found outside the building. DNA not viable.	25 August 2016, building emergence.	Day/summer.	Three unknown bats emerged. Two story derelict brick barn. Open structure with missing doors and windows.	1	Within.
000-BS1-197004	Building north-west of Blithbury Road.	SK072203	Residential.	Unknown due to limited access. Roost inspection had limited access and could not confirm presence. Anecdotal evidence from landowner who has seen bats fly out of the building in the evening.	12 August 2016, internal inspection.	Unknown.	Brick house with pebble-dash coating over most of the walls (except lower 1m). Approx. age - 1920's.	1	Within.
000-BS1-191006	Building south-west of Echills.	SK108163	Barn.	Brown long-eared (DNA) and one bat in-situ.	15 November 2016, internal inspection.	Maternity.	Three storey brick built barn with a single storey extension used as a garage to the north.	1	2 south-east.
00-BS1-191001	Building within Shawlane Farm.	SK113161	Garage.	Brown long-eared (DNA), low numbers of droppings found.	19 August 2016, internal inspection.	Day/summer.	Red brick garage with timber roof construction, droppings found at gable end.	1	4 south-east.
000-BS1-194001	Residential property south-east of Pipe Wood Lane.	SK092180	Residential.	Unknown, small accumulation of droppings found near chimney stack.	13 July 2016, internal inspection.	Occasional/transitional.	Large house with multiple annexe and hipped roof sections but limited access/egress points.	1	8 south-west.
000-BS1-190006	Building south-east of A515.	SK118152	Residential.	Unknown, small number of droppings (10-20). DNA not viable.	25 July 2016, internal inspection.	Day/feeding.	Single story building with breeze block walls and a corrugated tin roof.	1	9 north-east.

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-199013	Building north-east of Hamley House Farm.	SK050215	Barn.	Brown long-eared bat (visual dropping ID), <i>Pipistrellus</i> sp. (visual, dropping ID). Low numbers of brown long-eared bat and pipistrelle droppings found.	21 July 2016, internal inspection.	Day/summer.	L-shaped, red brick barn, with extensions. Most potential roost features are internal, such as gaps between beams and walls, or in wall cavities.	1	9 north-west.
000-BS1-191007	Building south-west of Echills.	SK108163	Residential.	Brown long-eared (DNA), low numbers of droppings in the building.	15 November 2016, internal inspection.	Feeding.	A two storey brick built building with a separate single storey section to the north east.	1	11 south-west.
000-BS1-201001	Building north-east of Jongham's Cottage.	SK039221	Residential.	Brandt's bat (DNA), 30+ droppings in the one roof that was accessible.	4 October 2016, internal inspection.	Day/summer.	Large brick built building with a multiple pitched tiled roof.	1	16 south-west.
000-BS1-197002	Building north-west of Blithbury Road.	SK072204	Residential.	Brown long-eared (DNA and 6), common pipistrelle (5).	8 September 2016, building emergence.	Day/summer/transitional.	Single storey barn of unknown age, beginning to deteriorate. Tile roosting opportunities.	1	13 south-east.
000-BS1-192002	Building north-east of Trentside Meadows LWS.	SK101170	Barn.	Unknown, bat droppings found underneath box located at front of the building. DNA not viable.	14 July 2016, internal inspection.	Occasional/feeding.	Open front barn structure with thin wooden panels forming the side and rear walls.	1	13 north-east.
000-BS1-201002	Building south-west of Jongham's Cottage.	SK039221	Garage.	Brown long-eared (DNA). Low numbers of bat droppings found.	4 October 2016, internal inspection.	Feeding.	Brick garage.	1	16 south-west.
000-BS1-199006	Building north-west of Narrow Lane.	SK055213	Residential.	Soprano pipistrelle (2).	26 September 2016, building emergence.	Day/summer/transitional.	Single story building with breeze block walls and a corrugated tin roof.	1	17 south-west.

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-197001	Building south-east of Blithbury Road.	SK070202	Residential.	Brown long-eared (DNA), 40+ droppings near a hole in roof membrane.	7 December 2016, internal inspection.	Day/summer.	A two storey rendered and multi pitched building with a lean-to on the south elevation.	1	20 south-east.
000-BS1-199011	Building north-west of Stockwell Heath (pond).	SK056216	Residential.	Unknown due to lack of access	26 July 2016, internal inspection.	Unknown.	House with a loft space split into two sections but limited access.	1	24 south-east.
000-BS1-199001	South-east of Newlands Lane.	SK056215	Residential.	Common pipistrelle (DNA), low amount (approx. 10) of droppings found.	3 August 2016, internal inspection.	Transitional	There were some rips in the underfelt of the roof void. Light ingress from above the wall plate in some places.	1	28 north-east.
000-BS1-193002	Building at Littleton House Farm, south-west of Pipe Ridware.	SK095177	Residential.	Common pipistrelle (DNA), soprano pipistrelle (DNA).	2 August 2016, internal inspection.	Day/summer.	Two story brick building with multiple gable ends and hipped roof structures.	1	38 south-west.
000-BS1-191004	Building south-west of A513.	SK114162	Residential.	Brown long-eared (6). Hundreds of droppings in one loft space with five bats, 30+ droppings with one bat in second loft. Confirmed by visual and DNA.	5 October 2016, internal inspection.	Maternity/ transitional/ day.	Two story red brick residential property in fairly good condition, and there were multiple loft spaces present.	1	39 south-west.
000-BS1-199005	Building north-west of Narrow Lane.	SK056216	Kennels.	Unidentifiable bat droppings found outside the building but not viable for DNA analysis.	2 August 2016, external inspection.	Transitional	Single story building with breeze block walls and a corrugated tin roof. Potentially build post year 2000.	1	47 south-west.
000-BS1-199003	Building north-west of Narrow Lane.	SK055212	Residential.	Soprano pipistrelle (two emerged).	26 September 2016, building emergence.	Day/summer/ transitional.	Large house with large dormer windows on the northern and southern elevations Well sealed	1	57 south-west.

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
							with insulation between the joists.		
000-BS1-195002	Building south-east of Bentley Farm.	SK084189	Barn.	Common pipistrelle (2), brown long-eared bat (visual dropping ID).	28 September 2016, building emergence.	Transitional.	Single storey barn with multiple extensions and separate rooms.	1	62 north-west.
000-BS1-194005	Building north-east of Pipe Wood Lane.	SK090187	Barn.	<i>Pipistrellus</i> sp. (visual dropping ID). Scattered droppings found throughout barn.	26 October 2016, internal inspection.	Day/summer.	Brick built barns with frequent cavities in brickwork inside.	1	73 north-east.

Table 3: Confirmed building roosts beyond 100m buffer in CA1

Ecology Survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-195004	Building at Bentley Farm, south-west of Pipe Wood Lane.	SK084189	Residential.	Brown long-eared bat (visual dropping ID), 200+ droppings.	22 June 2016, internal inspection.	Maternity.	Three storey farmhouse with droppings under ridge beams in roof void.	1	116 north-west.

Bat activity surveys

2.3.13 The following seven species have been recorded during the range of bat activity surveys conducted in the survey area:

- Common pipistrelle;
- Soprano pipistrelle;
- Brown long-eared bat;
- Nathusius' pipistrelle;
- Noctule;
- Serotine;
- *Myotis* species; and
- *Nyctalus/Eptesicus* species.

Table 4: Bat activity surveys conducted within CA1

Ecology survey code	Transect location	Numbers of surveys conducted	First survey date	Final survey date	CA	Map reference
000-BA1-192001, 000-BA1-193003	3 (replacement for Transect 4)	3	17 August 2016	24 October 2016	1	EC-06-304,EC-06-305, EC-06-305-L1
000-BA1-193001, 000-BA1-193002	4	2	26 May 2016	1 June 2016	1	EC-06-304,EC-06-305, EC-06-305-L1
000-BA1-195001	5	5	24 May 2016	10 September 2016	1	EC-06-306, EC-06-307
000-BA1-199001, 000-BA1-200001	6	3	25 May 2016	16 August 2016	1	EC-06-309, EC-06-310a,EC-06-310b
000-BA1-201001	7 (crosses over with CA2)	5	30 June 2016	13 October 2016	1/2	EC-06-310a,EC-06-310b, EC-06-311

Table 5: Bat activity transect survey results for Transect 3 (replacement for transect 4)

Ecology survey code	Transect location				Description of habitats covered by transect																
	South of the River Trent near Pipe Ridware.				Trentside Meadows, floodplain adjacent to the River Trent with a small woodland copse and tree lined hedgerows.																
Visit number and date	Weather conditions				Total species passes during transect survey																
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
Visit 1: Dusk: 15 August 2016	18	2	1	0	32	82									2	5		3		1	
Visit 2: Dusk: 19 September 2016	16	1	0	1	41	53		15							4			7			1
Visit 3: Dusk: 20 October 2016	16	7	0	0	57	32		10							2			4			2

Pp - common pipistrelle, P py - soprano pipistrelle, Pn - Nathusius' pipistrelle, P sp. - Pipistrelle bat species, Mb - Bechstein's bat, Md - Daubenton's bat, Mn - Natterer's bat, Mm - whiskered bat, Mbr - Brandt's bat, Mm/Mb -whiskered/ Brandt's bat, M sp - *Myotis* bat species, Rh – lesser horseshoe bat Pa -brown long-eared bat, Bb - barbastelle bat, Nn - noctule bat, NI - Leisler's bat, Es - serotine bat, Ny/Ep -*Nyctalus/Eptesicus* bat.

Cloud cover on a scale of 0-8 where 0 = Sky completely clear, 4 = Sky half cloudy, 8 = Sky completely cloudy.

Precipitation intensity on scale of 0-5 where 0 = Dry, 1 = Light drizzle, 2 = Light rain, 3 = Moderate rain, 4 = Heavy rain, 5 = Torrential rain.

Wind speed score of 0-12 against Beaufort scale where 0 = calm, 2 = light breeze, 4 = Moderate breeze, 6 = strong breeze, 7 = High wind, 9 = Strong gale, 12 = Hurricane

2.3.14 Low to medium levels of common and soprano pipistrelles were recorded at this location with peaks of 57 and 82 passes per night (ppn), respectively. Very low numbers of *Myotis* species, brown long-eared bats, noctules and *Nyctalus/Eptesicus* passes were also recorded with a maximum count for noctules of 7ppn. A single serotine bat was recorded during August 2016.

Table 6: Bat activity transect survey results for Transect 4

Ecology survey code	Transect location				Description of habitats covered by transect																	
	North bank of River Trent.				River Trent, mature bankside vegetation with some trees.																	
Visit number and date	Weather conditions				Total species passes during transect survey																	
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es	
Visit 1: Dusk: 26 May 2016	11	1	0	0	121	43		3							5							
Visit 2: Dusk: 4 July 2016	13	8	0	2	88	1		3							3			2				
Visit 3: Dusk: 11 July 2016	15	6	0	2	39	14		7										2				

2.3.15 Moderate levels of common pipistrelle activity were recorded at this location in May 2016 with a peak of 121ppn and low levels of soprano pipistrelles with a peak of 43ppm at the same time of year. There were also low numbers of non-defined pipistrelle bat species in the area with a peak of 7ppn in mid-July 2016. Very low numbers of noctule passes were noted on both July 2016 sampling dates and very low counts of *Myotis* species and brown long-eared bats were present in May and July 2016 respectively.

Table 7: Bat activity transect survey results for Transect 5

Ecology survey code	Transect location				Description of habitats covered by transect																	
	Land west of Pipe Wood.				Arable fields bounded with hedgerows/tree lines and a tree-lined wet ditch, connectivity links to Pipe Wood.																	
Visit number and date	Weather conditions				Total species passes during transect survey																	
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es	
Visit 1: Dusk: 26 May 2016	13	4	0	2	124	37									11							
Visit 2: Dusk: 23 June 2016	17	2	0	2	55	38		1							5	32						1
Visit 3: Dusk: 6 July 2016	17	8	0	1	16	2		3							2	12		3				
Visit 4: Dusk: 2 August 2016	20	4	0	2	47	20		1							3			35				4
Visit 5: Dusk: 6 September 2016	24	8	0	1	33	6									3			9				2

2.3.16 Low to moderate levels of activity of common pipistrelles were recorded at this location with a peak of 124ppn during May 2016 and low levels of soprano pipistrelles with a peak of 38ppn also in May 2016. There were also very low numbers of *Myotis* species, *Nyctalus/Eptesicus* species and non-defined pipistrelle species with maxima of 14ppn, 4ppn and 3ppn respectively. There were moderate activity peaks in brown long-eared bat in June 2016 at 32ppn and noctules in August 2016 at 35ppn.

Table 8: Bat activity transect surveys results for Transect 6

Ecology survey code	Transect location				Description of habitats covered by transect																	
	West of Abbots Bromley, North East of Rugeley.				Well vegetated ditch, ponds in the area and connectivity via hedgerows to Spencer's Plantation. A few small plantations to the north and Colton village to the south.																	
Visit number and date	Weather conditions				Total species passes during transect survey																	
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	Nl	Es	Ny/Es	
Visit 1: Dusk: 25 May 2016	15	8	1	1	1																	
Visit 2: Dusk: 12 July 2016	13	8	0	2	6	10		2							2	1		6				
Visit 3: Dusk: 9 August 2016	14	4	1	2	25	12		1								1		6				2

2.3.17 There were low levels of bat activity at this location. The most common were the common pipistrelle with a peak of 25ppn, soprano pipistrelle with a peak of 12ppn and noctule with a peak of 8ppn. Very low levels of *Myotis* species and non-defined pipistrelle calls were detected at this site, with only 1 to 3ppn recorded in July and August 2016 for *Myotis* species, and 1 to 2ppn in those same months for pipistrelles. *Nyctalus/Eptesicus* species were recorded in August 2016 at 2ppn and solitary passes of brown long-eared bats in July and August 2016.

Table 9: Bat activity transect surveys results for Transect 7

Ecology survey code	Transect location				Description of habitats covered by transect																
	Land around Moreton Brook.				Morton Brook (well vegetated) and Lount Farm, with a couple of ponds and lowland meadow habitat. The site also supports hedgerows with trees connecting to the surrounding landscape.																
Visit number and date	Weather conditions				Total species passes during transect survey																
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
Visit 1: Dusk: 30 June 2016	15	8	1	2	1	20		1										3			
Visit 2: Dusk: 13 July 2016	15	7	2	2	12	4		7							1			3		3	
Visit 3: Dusk: 11 August 2016	19	4	0	4	8	3		1							1					1	3
Visit 4: Dusk: 29 September 2016	17	2	0	1	13	16		1						2	1			1			2
Visit 5: Dusk: 13 October 2016	10	5	0	1	37	50		14													

2.3.18 Low levels of soprano pipistrelle activity was recorded at this location with a peak of 50ppn during October 2016 and low levels of common pipistrelles with a peak of 37ppn also in October 2016. There were also very low numbers of passes of non-defined pipistrelle species with a maximum in October 2016 of 14ppn. A few brown long-eared bats, *Myotis* species, *Nyctalus/Eptesicus* species and noctules were recorded with maxima of 3ppn, 3ppn and 5ppn respectively. There were also very low counts of serotine passes in July and August 2016.

Table 10: Summary of static detector monitoring results for Transect 3

Ecology survey code	Static Location	OS Grid	Description of habitats															
000-BA2-192001	Trentside Meadows.	SK103173	Hedgerow south of River Trent.															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
17 August 2016 to 21 August 2016	4	85	3		7							2						
19 September 2016 to 24 September 2016	5	81	85	1								4						1
20 October 2016 to 24 October 2016	4	318	423		20								2			1		1

2.3.19 High levels of common and soprano pipistrelle activity were recorded at Trentside Meadows with peaks of 318ppn and 423ppn during October 2016. There were also low numbers of passes of non-defined pipistrelle species with a maximum in October 2016 of 20ppn. Very low numbers of brown long-eared bats, *Myotis* species and *Nyctalus/Eptesicus* species were recorded with maxima of 2ppn, 4ppn and 1ppn respectively. There was also a solo pass of a Nathusius' pipistrelle and a noctule in September and October 2016 respectively.

Table 11: Summary of static detector monitoring results for Transect 4

Ecology survey code	Location	OS Grid	Description of habitats															
000-BA2-193001	North bank of River Trent.	SK102174	North bank of the River Trent.															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																
		Pp	Ppy	Pn	P.sp.	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp.	Pa	Bb	Nn	NI	Es	Ny/Es
26 May 2016 to 1 June 2016	5	121	43		3							5						
5 July 2016 to 10 July 2016	5	14	6		2										6		1	16

2.3.20 Moderate levels of common pipistrelle activity were recorded on the North bank of the River Trent in May 2016 at 121ppn with lower levels in July 2016 of 14ppn. Low levels of soprano pipistrelles were present with a peak in May 2016 of 43ppn. Low numbers of *Nyctalus/Eptesicus* species were present in July 2016 with 16 passes. Also present in low numbers were non-defined pipistrelle species, *Myotis* species, and noctules. Additionally, a solo serotine pass was detected in July 2016.

Table 12: Summary of static detector monitoring results for Transect 5

Ecology survey code	Location	OS Grid	Description of habitats															
000-BA2-196001	Land west of Pipe Wood.	SK081195	Adjacent to the pond west of Pipe Wood.															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
24 May 2016 to 31 May 2016	6	124	37									11						
23 June 2016 to 27 June 2016	4	37	38		1							18	39					22
6 July 2016 to 11 July 2016	5	338	256	67	20							10					3	7
2 August 2016 to 8 August 2016	6	222	239		10							166	12		15		2	5
6 September 2016 to 10 September 2016	4	106	68		1							16	4		1			3

2.3.21 In this location, the land west of Pipe Wood, moderate to high levels of both common and soprano pipistrelle activity were recorded. A peak of 338ppn was detected for common pipistrelle passes in July 2016 while the highest number of soprano pipistrelle passes was also detected in July 2016 at 256ppn. The lowest values of both species were detected in June 2016. Additionally while no passes were detected in other months a moderate number of Nathusius' pipistrelle passes were detected in July 2016 showing a peak at 67ppn. High numbers of *Myotis* species were recorded in August 2016 with a peak of 166ppn. Low numbers of non-defined pipistrelle species, brown long-eared bats, noctules and *Nyctalus/Eptesicus* species were detected at this location with maxima of 20ppn, 12ppn, 15ppn and 22ppn respectively. Very low numbers of serotine passes were detected in July and August 2016.

Table 13: Summary of static detector monitoring results for Transect 6

Ecology survey code	Location	OS Grid	Description of habitats															
000-BA2-201001	West of Abbots Bromley, north-east of Rugeley.	SK039222	South-west corner of Spencer's Plantation.															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
24 May 2016 to 31 May 2016	7	1																
12 July 2016 to 17 July 2016	5	590	376	1	78							74			10		2	4

2.3.22 A very high number of common and soprano pipistrelles were detected in July 2016 at this location with maxima of 590ppn and 376ppn respectively. Additionally, moderate maxima of 78ppn and 74ppn were detected for non-defined pipistrelle species and *Myotis* species respectively, also in July 2016. At 10ppn, a low number of noctule passes were detected and very low levels of serotine and *Nyctalus/Eptesicus* species were also detected with maxima of 2ppn and 4ppn respectively. Solitary passes of Nathusius' pipistrelle were detected in July 2016. Only one common pipistrelle was detected in May 2016 implying that there may have been detector failure at this time.

Table 14: Summary of static detector monitoring results for Transect 7

Ecology survey code	Location	OS Grid	Description of habitats																
000-BA2-201002	Land around Moreton Brook.	SK033225	Along a tree lined section of Moreton Brook.																
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																	
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es	
1 July 2016 to 5 July 2016	4				18														
11 August 2016 to 12 August 2016	2	34	6		1							1							2
30 September 2016 to 1 October 2016	2	16	6		3							5							

2.3.23 At the land around Moreton Brook low levels of bat passes were detected between July 2016 and October 2016. Out of the bats detected the common pipistrelle and non-defined pipistrelle species showed the highest maxima of 34ppn in August 2016 and 27ppn in July 2016 respectively. Very low numbers of soprano pipistrelles, *Myotis* species and *Nyctalus/Eptesicus* species were also detected with maxima of 6ppn, 5ppn and 2ppn respectively.

Discussion

Bat assemblage

- 2.3.24 Three additional bat species to those recorded during field survey were identified from desk study records. These were Daubenton's bat, whiskered bat, and Natterer's bat.
- 2.3.25 Field surveys carried out in 2016 confirmed the presence of eight bat species along the route, including rarer species; noctule, serotine, Brandt's bat, and Nathusius' pipistrelle.
- 2.3.26 Common and widespread species including common pipistrelle and soprano pipistrelle were the most recorded but moderate levels of activity were mostly noted with a few months of higher activity recorded on static detectors.
- 2.3.27 Common and soprano pipistrelle was the most frequently recorded species during activity surveys in CA1 with peak counts of 275ppn of common pipistrelle and 103ppn of soprano pipistrelle both recorded on the walked transect 5 in July.
- 2.3.28 Brown long-eared bats were recorded in relatively high numbers near Pipe Wood in June and July 2016. The majority of confirmed species roosts were of brown long-eared bats, four of which were maternity roosts, suggesting that they are widespread in the area.
- 2.3.29 Noctule, a rarer bat species, was recorded in low numbers on the majority of transects. A few passes of serotine bat were recorded near the River Trent and around Moreton Brook. A single pass of a lesser horseshoe bat (*Rhinolophus hipposideros*) was recorded in CA2 along the River Trent so this species could utilise the river as a commuting route in CA1 in low numbers.
- 2.3.30 *Myotis* species were recorded on all the transects and a Brandt's bat maternity roost was identified in a building near Spencer's Plantation.
- 2.3.31 Noctule and brown long-eared bats were encountered on all of the transects suggesting that they are widespread in the area. Nathusius' pipistrelle were recorded in low numbers on only a few of the transects (River Trent near Trentside Meadows, land west of Pipe Wood and Moreton Brook).
- 2.3.32 Serotine was recorded on every transect but only in July and August 2016.
- 2.3.33 The lack of access may have resulted in some roosts going unrecorded; the key areas where access was not available during the summer survey season included land between Admaston and Moreton where access was retracted in late summer.
- 2.3.34 The land around King's Bromley and Rileyhill supported habitats that could be important to foraging and commuting bats. Woodlands which could support roosts and provide foraging and commuting habitats that were not accessible included woodland east of Woodend Common Barn, Rice's Spinney, Shaw Gap Wood, Westfield Covert and Cawarden Springs Wood and small woodlands near to Cawarden.
- 2.3.35 The static detectors recorded similar levels of activity to that recorded on the walked transects, however static detectors recorded the whole night of activity rather than

the sunset period. Species assemblages and abundance were consistent with walked transects.

Roosts

- 2.3.36 The desk-study records identified two soprano pipistrelle maternity roosts approximately 500m to the south-west of the Proposed Scheme near Fradley. Roosts of brown long-eared bat, common and soprano pipistrelle, Daubenton's bat, whiskered bat, Natterer's bat and noctule were also identified in the records. The nearest roost was a common pipistrelle roost located 25m to the north-west of the Proposed Scheme in a building in Stockwell Heath.
- 2.3.37 Roosts of soprano pipistrelle, noctule, and *Myotis* species were identified in trees. The soprano pipistrelle roost was located north of King's Bromley Lane. Two noctule roosts were identified, one to the north-west of Spencer's Plantation and the other, a maternity roost, was found in a tree to the west of Pipe Wood.
- 2.3.38 A *Myotis* species roost and three unconfirmed roosts were found in land near Spencer's Plantation. Land at Shawlane Farm, land near Tomlinson's Spinney, land near Valley Barn Farm, and land east of Newlands Lane all supported bat roosts with unconfirmed species.
- 2.3.39 One tree was found to support a maternity roost supporting noctule bats located south-east of Uttoxeter Road near Tomlinson's Spinney.
- 2.3.40 A total of 27 building roosts were identified in 23 buildings and structures in the area. DNA analyses identified 11 buildings supporting roosting bats. Seven maternity roosts were identified four of which were brown long-eared bats.
- 2.3.41 Ten buildings supported brown long-eared roosts. A brown long-eared maternity roost was identified in a building at Bentley Farm. Further brown long-eared roosts were identified in two buildings near Shawlane Farm, one of which was a maternity roost, two buildings west of Tomlinson's Spinney, one of which was a maternity roost, a building near Rosewood Farm, a building south of Spencer's Plantation, and a building north east of Rosewood Farm. This latter building recorded six brown long-eared and five common pipistrelle bats during emergence surveys. A residential building at Hamley House Farm, west of Stockwell Heath supported a day roost of brown long-eared bats and a *Pipistrellus* species. Another building at Bentley Farm supported a transitional brown long-eared and common pipistrelle roost.
- 2.3.42 A residential building in Pipe Ridware supported a common and soprano pipistrelle roost, but access was restricted and numbers and roost type are unknown. A building south of Spencer's Plantation supported a small non-breeding Brandt's bat roost with approximately 30 droppings.
- 2.3.43 A common pipistrelle roost was identified in a building north of Colton. Emergence surveys identified two buildings south-west of Stockwell Heath with soprano pipistrelle roosts.
- 2.3.44 The other seven roosts were identified from evidence of roosting but samples were not viable for DNA analyses and emergence surveys did not identify a species.

- 2.3.45 Data from the HS2 Phase One Environmental Impact Assessment⁴ recorded roosting Daubenton's bat, Natterer's bat, soprano pipistrelle, noctule and brown long-eared bat in Ravenshaw Wood, Black Slough and the Slaish.

Foraging habitat

- 2.3.46 The landscape in this area comprises largely agricultural fields, improved grasslands, semi-improved grassland, broadleaved woodlands, with intact species-rich hedgerows and tree lined roads. Watercourses and waterbodies, providing foraging habitat, are present throughout the area.
- 2.3.47 Land north-east of Riley Hill from Blithfield Reservoir south to the Trent and Mersey Canal was also considered to provide suitable foraging habitat and assumed a key site.
- 2.3.48 The walked transects noted low to moderate foraging activity near Trentside Meadows adjacent to the River Trent. Moderate levels of common and soprano pipistrelle were noted foraging alongside the River Trent, with occasional brown long-eared, noctule, Leisler's bat (*Nyctalus leisleri*) and serotine due to the assemblage and habitats present it is an assumed key foraging area.
- 2.3.49 The walked transect near to Pipe Wood was used infrequently by foraging bats with occasional feeding activity in and around the small pond bounded by trees involving common pipistrelles, brown long-eared bat, noctule and *Myotis* species.
- 2.3.50 The walked transect around the hedgerows connected to Spencer's Plantation frequently encountered foraging common and soprano pipistrelles. The pond to the east of Spencer's Plantation also provided foraging habitat for these species and the Plantation itself supported low levels of foraging brown long-eared bat, *Myotis* species, noctule, and soprano pipistrelle, due to the assemblage present Spencer's Plantation is an assumed key foraging area.
- 2.3.51 Land around Moreton Brook and Lount Farm recorded low levels of foraging behaviour but it supported a good species assemblage containing rarer species including serotine and a few foraging *Myotis* species due to the assemblage present land around Moreton Brook is an assumed key foraging area.
- 2.3.52 The woodland adjacent to Shaw Lane provided notable activity identified from the back-tracking surveys. The survey found high levels of activity from common and soprano pipistrelles with low *Myotis* species activity with a maximum count of two bat passes and occasional noctule passes.
- 2.3.53 Data from the HS2 Phase One Environmental Impact Assessment⁴ identified core foraging habitat in Ravenshaw Wood, Black Slough and the Slaish and occasional foraging areas south of Cranberry, this area is assumed to be a key foraging area as the data has not been updated recently.

⁴ SES and AP2 Vol 5 for CFA 22,

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/444120/Volume_5_Ecology_CFAs_16-22

Commuting habitat

- 2.3.54 The hedgerow network throughout this area is well established with good connections to some of the larger woodlands such as Pipe Wood. There are also tree-lined fields, watercourses and roads which in total creates an extensive network for commuting bats. The overall commuting activity was relatively low and no extensive commuting routes were identified.
- 2.3.55 Commuting bats used hedgerows and the bankside vegetation along the Trent and Mersey Canal and Coventry Canal to navigate to foraging habitats, due to a lack of access and limited data for this area and considering the suitable habitats it is an assumed key commuting route.
- 2.3.56 The hedgerows with connectivity to Pipe Wood recorded commuting bats heading towards and away from Pipe Wood.
- 2.3.57 Low levels of commuting bats were recorded on the transect south, and east of Spencer's Plantation suggesting that the bats are commuting from the north-west to forage in the woodland.
- 2.3.58 Land around Moreton Brook and Lount Farm supports agricultural fields with tree-lined hedgerows which were used by commuting bats including common and soprano pipistrelle, serotine, noctule and brown long-eared bat in low numbers. Due to the suitable habitats present Moreton Brook is an assumed key commuting route.
- 2.3.59 A lesser horseshoe bat was recorded in CA2 on a static detector adjacent to the Hoo Mill near the River Trent in September. This rare bat could utilise the River Trent as a commuting corridor from maternity sites to hibernation sites in low numbers therefore it is considered to be an assumed key commuting route.
- 2.3.60 The HS2 Phase One Environmental Impact Assessment⁴ identified commuting routes along the Trent and Mersey Canal and was identified an important commuting corridor for several species, in particular Daubenton's bat and soprano pipistrelle.

Colwich to Yarlet (CA2)

- 2.3.61 Tables 15 to 17 provide summaries of bat roosts identified in CA2 from field surveys. These tables should be read in conjunction with map series EC-05, (Volume 5, Ecology map book). Survey information collected has been allocated an ecology survey code to provide a unique identified for use on project mapping.

Overview of bat species status in the vicinity of CA2

- 2.3.62 There are no statutory designated sites (within 10km) or non-statutory designated sites (within 5km) of CA2 which mentions bats within their citations.
- 2.3.63 Habitats within CA2 suitable to support roosting, foraging and commuting bats include scattered woodland blocks, four of which are potential ancient woodland sites; other woodlands include broadleaved semi-natural woodlands. Hedgerows (mostly species-poor) demarcate field boundaries throughout the area. Two main watercourses are crossed by the Proposed Scheme, the River Trent and the Trent and Mersey Canal. There are several smaller watercourses throughout CA2 that will be affected by the Proposed Scheme.

2.3.64 Grassland areas are mainly improved with some semi-improved grassland. Areas of lowland meadow are present both sides of Moreton Brook and south of Toldish Lane. Floodplain grazing marsh is also present in the River Trent valley near Great Haywood.

2.3.65 Field surveys recorded at least eight species of bats in this area. The desk study further identified Natterer's bat and Daubenton's bat in the local area. The total bat assemblage is as follows:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- Noctule;
- Leisler's bat;
- *Nyctalus/Eptesicus*;
- Brown long-eared bat;
- Whiskered bat;
- Lesser horseshoe bat;
- Daubenton's bat; and
- Natterer's bat.

Roosting (trees)

2.3.66 A total of 1367 trees were subject to an initial ground based assessment and subsequent further detailed climbed surveys where appropriate in line with the methods described in the FSMS document.

2.3.67 Of the 1367 trees that were initially assessed, the following results were obtained:

- 167 trees have high potential to support roosting bats;
- 457 trees have moderate potential to support roosting bats; and
- the remaining 743 trees were classified as having low or negligible potential to support roosting bats. These trees were subsequently scoped out of further survey.

2.3.68 Of the 624 trees assessed as having moderate of high potential to support bats:

- a total of 182 trees were subject to further surveys in the form of tree climbing inspection during which no roosts were identified;
- 117 trees were reassessed as having low to negligible potential to support roosting bats and were scoped out of further surveys;
- 96 trees were subject to emergence surveys during which ten roosts were identified; and

- 199 trees were surveyed via back-tracking surveys during which a further 27 roosts were identified.

- 2.3.69 Twenty-five back-tracking surveys were conducted at 13 sites in this area in August and September 2016. Of those sites six were identified as supporting roosting bats or with notable bat activity. The woodland at Lea Hall Farm found low to moderate levels of activity of pipistrelle and noctule bats in and around the woodland and also commuting along the adjoining hedgerow to the south-east. Occasional *Myotis* species and brown long-eared bats were also recorded. Two possible day roosts, one *Myotis* species and one species unknown, were also identified in trees at the south-west fringe of the woodland. Further surveys will be undertaken to confirm roosting bats.
- 2.3.70 Back-tracking surveys of the areas adjacent to Hoo Mill found high levels of Pipistrelle and *Myotis* species activity, which was particularly associated with the River Trent and around the bridge. Occasional brown long-eared passes were also recorded. Six confirmed roosts supporting *Myotis* species, three soprano pipistrelle roosts, one common pipistrelle roost and one unknown bat roost were found in trees during the back-tracking surveys. Three possible tree roosts were also identified, supporting common pipistrelle and soprano pipistrelles.
- 2.3.71 Back-tracking surveys of the western end of the woodland to the south of Ingestre Golf Club found moderate levels of soprano pipistrelle foraging, commuting and social activity. Occasional common pipistrelle, noctule and *Myotis* species passes were also recorded. Two pipistrelle day roosts were identified; a further two possible pipistrelle day roosts were also recorded.
- 2.3.72 Back-tracking surveys of trees covering the western portion of Ingestre golf course found five confirmed soprano pipistrelle roosts, one common pipistrelle roost, a *Myotis* species maternity roost of six to 15 individuals, another *Myotis* species roost with ten individuals circling the tree, and one noctule roost. Potential roosts for common and soprano pipistrelle were also identified in the area. Other activity included low levels of pipistrelle, noctule and *Myotis* species commuting and foraging across the areas surveyed.
- 2.3.73 Back-tracking surveys of a wooded embankment adjacent to Hopton Lane found low levels of common pipistrelle activity and occasional noctule, brown long-eared, *Myotis* species and *Nyctalus/Eptesicus* passes in August 2016. A common pipistrelle roost was identified in an adjacent farm building during the course of the back-tracking survey.
- 2.3.74 Back-tracking surveys of land at Sunny Hill Farm found high levels of pipistrelle and noctule activity, with occasional *Myotis* species passes. Bats were recorded foraging and commuting along Yarlet Lane to the south and along the hedgerow at the north-east boundary. An individual common pipistrelle was also recorded emerging from a tree with moderate roosting potential along Yarlet Lane.
- 2.3.75 Details of confirmed tree roosts in this area of the route are provided in Table 15, details of roosts over 100m from the Proposed Scheme are provided in Table 16.

Table 15: Confirmed tree roosts within CA2

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-202082	South-west of Lount Farm.	SK024226	Pedunculate oak.	Common pipistrelle (1).	27 September 2016, tree re-entry.	Day/summer/transitional.	Return into oak tree.	2	Within.
000-BT3-202078	North of Bishton.	SK023225	Pedunculate oak.	Soprano pipistrelle (1).	26 September 2016, tree emergence.	Day/summer/transitional.	Emergence from tree.	2	Within
000-BT3-202097	South-east of Moreton House.	SK023228	Pedunculate oak.	<i>Myotis</i> sp.(1).	6 September 2016, back-tracking survey.	Transitional.	Roost in largest oak in lower field of two fields adjacent to house.	2	Within.
000-BT3-202108	South-east of Moreton House.	SK023228	Pedunculate oak.	Unknown.	5 September 2016, back-tracking survey.	Transitional.	Emerged from line of trees further towards the wind turbine.	2	Within.
000-BT3-203028	South-west of Moreton Lane.	SK017230	Pedunculate oak.	Soprano (7) and common pipistrelle (6).	1 September 2016, tree emergence.	Day/summer/transitional.	Emerged from second branch up from split in branch.	2	Within.
000-BT3-205065	North-west of Trent and Mersey Canal.	SJ996236	Common elder.	Soprano pipistrelle (1).	19 September 2016, back-tracking survey.	Day/summer/transitional.	One emergence and one possible emergence from callus roll.	2	Within.
000-BT3-207017	North-west of the Flushing Covert.	SJ980240	Common ash.	Soprano pipistrelle (1).	26 September 2016, tree emergence.	Day/summer/transitional.	Emerged from a feature half way up the tree.	2	Within.
000-BT3-208004	South-east of Ingestre Wood.	SJ973243	Pedunculate oak.	Soprano pipistrelle (1).	21 September 2016, tree re-entry.	Day/summer/transitional.	Flew into the tree on the south side.	2	Within.
000-BT3-207042	Within Town Field Plantation.	SJ977240	Common ash.	Soprano pipistrelle (2).	14 September 2016, back-tracking survey.	Day/summer/transitional.	Re-entry on the north west side of tree.	2	Within.

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-207500	Within Town Field Plantation.	SJ977240	Pine species.	Common pipistrelle (5).	18 August 2016, back-tracking survey.	Other.	Swarming behaviour and re-entry of five common pipistrelles.	2	Within.
000-BT3-207502	North-west of Town Field Plantation.	SJ976241	Pedunculate oak.	<i>Myotis</i> sp. (15).	19 August 2016, back-tracking survey.	Maternity.	Fifteen <i>Myotis</i> sp. seen swarming and entering hole in dead branch ~5m up on north west of tree.	2	Within.
000-BT3-209093	North-west of Park Farm.	SJ956251	Pedunculate oak.	Common pipistrelle (1).	6 September 2016, back-tracking survey..	Transitional.	Emergence from tree.	2	Within.
000-BT3-214023	North-east of Yarlet Lane.	SJ920280	Common ash.	Common pipistrelle (1).	12 September 2016, back-tracking survey.	Transitional.	Single common pipistrelle emerging from southern fork of tree.	2	Within.
000-BT3-205079	North-west of Hoomill Lane.	SJ994239	Small-leaved lime.	<i>Myotis</i> sp. (2) and soprano pipistrelle (3).	13 September 2016, back-tracking survey.	Transitional.	Recorded emerging from the south side of the tree.	2	1 north-east.
000-BT3-208008	South-east of Ingestre Wood.	SJ972241	Sycamore.	Soprano pipistrelle (1).	28 September 2016, back-tracking survey.	Day/summer/transitional.	Single bat emerged approximately 8m from the ground.	2	1 south-east.
000-BT3-203002	North-west of Moreton House.	SK023231	Pedunculate oak.	Soprano pipistrelle (2).	6 September 2016, back-tracking survey.	Transitional.	Emerged from the side of tree, then went back in.	2	2 north-east.
000-BT3-205500	North-west of Hoomill Lane.	SJ994239	Lime.	Soprano pipistrelle (3).	14 September 2016, back-tracking survey.	Transitional.	Recorded going into lime tree just north of bridge.	2	2 north-east.
000-BT3-205116	North-west of Hoomill Lane.	SJ994240	Lime.	Soprano pipistrelle (4).	13 September 2016, back-tracking survey.	Transitional.	Recorded emerging from tree.	2	4 north-east.

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-205081	North-west of Hoomill Lane.	SJ994239	Small-leaved lime.	Soprano pipistrelle (6).	14 September 2016, back-tracking survey.	Transitional.	Six soprano pipistrelle flying into lime tree.	2	5 north-east.
000-BT3-210279	South-east of Battle Ridge.	SJ948258	Common ash.	Noctule (1).	31 August 2016, tree emergence.	Day/summer.	Noctule emerged from woodpecker hole.	2	11 north-east.
000-BT3-210103	South-east of A518.	SJ955251	Pedunculate oak.	Common pipistrelle (3).	6 September 2016, back-tracking survey.	Day/summer/transitional.	Emerged from branch 40ft from ground.	2	16 north-east.
000-BT3-205123	North-west of Hoomill Lane.	SJ994240	Sycamore.	Common pipistrelle (1).	27 September 2016, back-tracking survey..	Transitional.	Emerged out of tree and flew along trees.	2	19 north-east.
000-BT3-205097	South west of River Trent.	SJ995239	Common hawthorn.	Soprano pipistrelle (1).	14 September 2016, back-tracking survey.	Transitional.	One soprano pipistrelle emerged from hawthorn.	2	28 south-west.
000-BT3-208017	South-east of Ingestre Wood.	SJ972241	Sycamore.	Soprano pipistrelle (1).	14 September 2016, back-tracking survey.	Day/summer/transitional.	One soprano pipistrelle emergence from large sycamore.	2	34 south-west.
000-BT3-210500	North-east of A518.	SJ954250	Pedunculate oak.	Common pipistrelle (1).	15 September 2016, back-tracking survey..	Day/summer/transitional.	Emergence from top south side of oak	2	37 south-west.
000-BT3-207018	North-west of Flushing Covert.	SJ981241	Pedunculate oak.	Soprano pipistrelle (1).	19 August 2016, back-tracking survey..	Day/summer.	Single re-entry into tree.	2	37 north-east.
000-BT3-205068	South-east of Hoomill Bridge.	SJ997241	Poplar – other.	Soprano pipistrelle (4).	22 September 2016, tree re-entry.	Transitional.	Returned to roost.	2	46 north-east.

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-207033	North-east of Town Field Plantation.	SJ979242	Pedunculate oak.	Common (4) and soprano pipistrelle (2).	21 September 2016, tree emergence.	Day/summer/transitional.	Common pipistrelle entered roost in west dead limb. Soprano pipistrelle flew into knot hole 3m up eastern face of tree.	2	62 north-east.

Table 16: Confirmed tree roosts beyond 100m buffer in CA2

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-202115	North-west of Moreton House.	SK023231	Pedunculate oak.	Soprano pipistrelle (1).	5 September 2016, back-tracking survey.	Transitional.	Emergence of a single bat seen.	2	109 north-east.
000-BT3-202126	North-west of Moreton House.	SK023231	Pedunculate oak.	Noctule (1).	6 September 2016, back-tracking survey.	Transitional.	Single noctule observed returning.	2	120 north-east.

2.3.76 In addition to the tree roosts identified in Table 15 and Table 16, further roosts were detected via back-tracking surveys but not identified to a specific tree. This included a day/summer/transitional roost supporting up to four bats on 16 August 2016 within the woodland at Lower Berryhill. An area within Ingestre Golf Course was found to support roosting behaviour of eight soprano pipistrelles and one noctule roost on 19 August 2016 and was considered to be a day/summer roost, however the exact location of the tree was not identified.

Roosting (buildings and structures)

- 2.3.77 A total of 53 buildings in this area were subject to initial inspections resulting in the following:
- 14 buildings were confirmed to support 15 roosts;
 - one buildings was identified as having high potential to support roosting bats; and
 - 38 buildings were identified as having moderate potential to support roosting bats.
- 2.3.78 Of the 53 buildings confirmed as having roosts or assessed as having high or moderate potential to support bats:
- 38 buildings were subject to internal inspections resulting in the identification of thirteen roosts;
 - no buildings were subject to emergence surveys; and
 - a common pipistrelle roost was identified in a building during a back-tracking survey.
- 2.3.79 Details of confirmed roosts in buildings/structures in this area of the route are provided in Table 17.

Table 17: Confirmed roosts in buildings and structures within CA2

Ecology Survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-208001	South-east of Upper Hanyards.	SJ966244	Residential.	Brown long-eared bat (DNA), whiskered bat (DNA).	19 October 2016, internal inspection.	Maternity.	Residential building, Second floor of house uninhabited. Droppings found in two rooms of three in second floor of house; two concentrations in a cupboard.	2	Within.
000-BS1-209001	South-west of Park Farm.	SJ957249	Residential.	Unconfirmed.	18 August 2016, external inspection.	Transitional.	Two storey house with single storey projection and garage, approximately 40 years old.	2	Within.
000-BS1-209002	South-west of Park Farm.	SJ957249	Residential.	Brown long-eared bat (DNA), droppings found in centre of loft under ridge beams.	22 July 2016, internal inspection.	Maternity.	Large detached property, built 1976 with part flat-roof extension.	2	Within.
000-BS1-215003	South-east of A34.	SJ911289	Residential.	Brown long-eared bat (DNA).	28 October 2016, internal inspection.	Day/summer.	Two story detached house with conservatory. Age around 100 years old.	2	1 south-west.
000-BS1-215004	South-east of A34.	SJ911289	Barn.	Unconfirmed, droppings not viable but thought to be brown long-eared bat.	28 October 2016, internal inspection.	Feeding.	L-shaped block-built barn. Age approx. 100 years.	2	6 south-east.
000-BS1-211008	North-west of Hopton Lane.	SJ941262	Residential.	One common pipistrelle returned to roost under ridge tile to the west of the chimney on the rear aspect.	18 August 2016, back-tracking survey.	Day/summer.	Two story detached house with conservatory 100 years old. Bituminised mineral felt underlay. Good number of droppings throughout the L-shaped loft but no aggregations.	2	8 north-east.
000-BS1-202007	North-west of Lount Farm.	SK028228	Residential.	Common pipistrelle (DNA).	25 November 2016, internal inspection.	Day/summer.	Conventional two-story brick built house with single story extensions at gable walls. Built in 1990.	2	12 south-west.

Ecology Survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-205006	South-east of Hoomill Lane.	SJ993239	Residential.	Unconfirmed, only external inspections and droppings found outside not viable for DNA.	10 August 2016, external inspection.	Day/summer.	Brick built residential house with multiple roof voids. Lifted tiles present.	2	14 south-west.
000-BS1-213003	North-west of Marston Lane.	SJ929277	Residential.	Common pipistrelle (DNA).	18 October 2016, internal inspection.	Day/summer.	Two story detached house, age around 20 years.	2	17 north-east.
000-BS1-214002	South-west of Yarlet Lane.	SJ921278	Residential.	Likely brown long-eared bat (from visual dropping ID). A mixture of fresh to very old long-eared droppings. At least 50 droppings were scattered around the roof space, no accumulations were found in the area accessed.	13 October 2016, internal inspection.	Day/summer.	Residential building with lifted tiles.	2	32 south-west.
000-BS1-202013	North-west of Moreton House.	SK023230	Barn.	<i>Pipistrellus</i> sp. (visual dropping ID).	5 August 2016, internal inspection.	Feeding.	Open metal framed barn.	2	59 north-east.
000-BS1-202012	South-east of Moreton House.	SK024230	Barn.	Unconfirmed, droppings unviable.	5 August 2016, internal inspection.	Occasional.	Red brick barn. 100 years old. The barn is open to the roof internally and is un-lined	2	62 north-east.
000-BS1-211002	South-west of Wilmore Hill Lane.	SJ943261	Residential.	Brown long-eared bat (DNA).	26 September 2016, internal inspection.	Transitional.	Loft in original cottage had droppings under ridge; bats possibly present. Loft in modern extension had no signs of bat use.	2	64 north-east.

Ecology Survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-210004	North-west of A518.	SJ956256	Residential.	Likely pipistrelle bat (from visual dropping ID). Two piles of 40+ bat droppings.	24 November 2016, internal inspection.	Day/summer.	The building comprises a single, enclosed loft void, which extends throughout the majority of the roof space, including over the double garage.	2	67 north-east.

Bat activity surveys

2.3.80 The following eight species have been recorded during the range of bat activity surveys conducted in the survey area:

- Common pipistrelle;
- Soprano pipistrelle;
- Brown long-eared bat ;
- *Myotis* species;
- Leisler’s bat;
- Noctule;
- Nathusius’ pipistrelle; and
- Lesser horseshoe bat.

Table 18: Bat activity surveys conducted within CA2

Ecology survey code	Transect location	Numbers of surveys conducted	First survey date	Final survey date	CA	Map reference
000-BA1-205001	8	7	1 June 2016	24 August 2016	2	EC-06-313, EC-06-314
000-BA1-207001	9	6	28 July 2016	15 August 2016	2	EC-06-314, EC-06-315

Table 19: Bat activity transect survey results for Transect 8

Ecology survey code	Transect location				Description of habitats covered by transect																
	Land adjacent to Trent and Mersey Canal and River Trent.				Area of floodplain adjacent to Trent and Mersey canal and River Trent. The canal is well vegetated on the eastern bank.																
Visit number and date	Weather conditions				Total species passes during transect survey																
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	Nl	Es	Ny/Es
Visit 1: Dusk: 1 June 2016	18	8	0	0	26	101		29							10			1			4
Visit 2: Dusk: 22 June 2016	21	6	0	0	76	44		30						9	14		37				31
Visit 3: Dusk: 7 July 2016	20	4	0	1	25	66		67						33			109	1			
Visit 4: Dusk: 7 August 2016	17	3	0	4																	
Visit 5: Dusk: 5 September 2016	22	8	0	2	40	34		23						1							
Visit 6: Dawn, 4 October 2016	11	4	0	2																	
Visit 7: Dusk: 5 October 2016	15	8	0	5											2						1

2.3.81 Low to moderate numbers of soprano pipistrelles and common pipistrelles were recorded at this location with peaks of 101ppn and 76ppn. Moderate numbers of noctule passes were recorded with the most being 109ppn in July 2016. Low to moderate levels of non-defined pipistrelle species were also present throughout the study with a maximum of 67ppn in July 2016. Moderate levels of *Myotis* species and *Nyctalus/Eptesicus* species were also present with maxima of 33ppn and 31ppn in July and June 2016 respectively. Low and sporadic brown long-eared bat activity was recorded with a maximum of 14ppn in June 2016. There was also one solitary Leisler's bat call detected in July 2016. No activity was recorded in August 2016 and very little activity in October 2016.

Table 20: Bat activity transect survey results for Transect 9

Ecology survey code	Transect location				Description of habitats covered by transect																
	Ingestre Golf Club.				Woodland connected to a woodland finger via hedges, hedgerows with mature trees linking pockets of woodland. Ingestre Golf Course provides a mosaic of suitable bat activity habitats.																
Visit number and date	Weather conditions				Total species passes during transect survey																
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	Nl	Es	Ny/Es
Visit 1: Dusk: 31 May 2016	16	8	0	2	42	58	1	10							11	4		5			4
Visit 2: Dusk: 23 June 2016	18	4	0	4	26	107		16							2	2					8
Visit 3: Dusk: 28 July 2016	19	6	0	2	1	22									2						
Visit 4: Dusk: 10 August 2016	15	8	2	2	17	46									3			14			3
Visit 5: Dusk: 6 September 2016	23	6	0	1	16	43		1										3			2
Visit 6: Dusk: 3 and 4 October 2016	13	0	0	1	17	27		20							7	7					10

2.3.82 Low to moderate numbers of soprano pipistrelles and common pipistrelles were recorded at this location with peaks of 42ppn and 107ppn respectively. Low levels of non-defined pipistrelle species were also present throughout the study with a maximum of 20ppn in October 2016. Low levels of *Myotis* species with a peak of 11ppn in July 2016, *Nyctalus/Eptesicus* species with a peak of 10ppn in October 2016, noctules with a peak of 14ppn in August 2016, were recorded. Brown long-eared bats were uncommon and sporadic with a maximum of 7ppn in October 2016. There was a solitary *Nathusius'* pipistrelle call detected in May 2016. Only two *Myotis* species passes were recorded in July 2016.

Table 21: Summary of static detector monitoring results for Transect 8

Ecology survey code	Location	OS Grid	Description of habitats															
000-BA2-205001	Land adjacent to Trent and Mersey Canal and River Trent.	SJ 994239	In a woodland block adjacent to the River Trent.															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																
		Pp	Ppy	Pn	P.sp	Rh	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
1 June 2016 to 6 June 2016	5	17	131	2	23							2	3		1			13
27 July 2016 to 31 July 2016	4												2					1
8 August 2016 to 11 August 2016	4	623	1239		212							82	81		3			1
September 2016 to 15 September 2016	11	61	121		22	1						57	53					3

2.3.83 In this location, the land adjacent to Trent, Mersey Canal and River Trent moderate to very high numbers common and soprano pipistrelle activity passes were recorded at 623ppn and 1239ppn respectively in August 2016. A high number of non-defined pipistrelle species were also present in August 2016 showing a peak at 212ppn. *Myotis* species and brown long-eared bats were also detected at moderate levels in August 2016 with maxima of 82ppn and 81ppn. Also present at this location were Nathusius' pipistrelle, noctule and *Nyctalus/Eptesicus* species at very low levels indicating peaks at 2ppn, 3ppn and 13ppn respectively. Finally, a single pass of a lesser horseshoe bat (Annex II) species was recorded on the static data.

2.3.84 Due to the lack of data in July 2016 it is thought that the detector had encountered a software error.

Table 22: Summary of static detector monitoring results for Transect 9

Ecology survey code	Location	OS Grid	Description of habitats															
000-BA2-207001	Ingestre Golf Club	SJ 979241	Within a tree line in the golf course															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
2 June 2016 to 5 June 2016	3	28	43		8							5	3		1			
28 July 2016 to 4 August 2016	7																	
10 August 2016 to 15 August 2016	5	12	76									8	4					
15 September 2016 to 20 September 2016	5	18	101		1							72						

2.3.85 At the Ingestre Golf Club, bat species were present at mainly low to moderate levels of bat activity. A low number of passes for soprano pipistrelles was detected in September 2016 at 101ppn. Low levels of common pipistrelle and low to moderate *Myotis* species were also present with maxima of 28ppn during June 2016 and 72ppn in September 2016 respectively. Very low numbers of non-defined pipistrelle species and brown long-eared bats were also detected with respective maxima of 8ppn and 4ppn. Additionally, a solitary noctule pass was also noted in June 2016.

2.3.86 There were no calls recorded on the static in July 2016 which suggests that the detector failed.

Discussion

Bat assemblage

- 2.3.87 Field surveys carried out in 2016 confirmed the presence of eight bat species, including rarer species; noctule, Leisler's bat, whiskered bat, and Nathusius' pipistrelle and the rare lesser horseshoe bat which is listed on Annex II on the Habitats Directive⁵. The desk study did not return any records of lesser horseshoe bat although there are historic references to the species occurring in south Staffordshire (G. Halfpenny 1997).
- 2.3.88 Natterer's bat and Daubenton's bat were further identified from the desk-study as being present in the local area.
- 2.3.89 Common and widespread species including common pipistrelle and soprano pipistrelle were the most frequently recorded bat with the highest levels of activity recorded in the area.
- 2.3.90 The lack of access may have resulted in some roosts going unrecorded; the key areas where access was not available during the summer survey season included Lionlodge Covert (semi-natural broadleaved woodland), Yarlet Grove (a potential ancient woodland site). Restricted access between Marston and Yarlet meant that surveys at New Farm, Grange Farm and Woodhill Farm buildings were not possible.

Roosts

- 2.3.91 A Daubenton's bat roost supporting a peak count of 52 bats was identified in the desk study records approximately 500m to the south-west of the Proposed Scheme. Three common pipistrelle maternity roosts were identified in the desk study; all were recorded over 3km to the south-west of the Proposed Scheme.
- 2.3.92 Thirty eight roosts were identified in 34 trees across CA2. Trees within roosts were generally located in land north of Colwich, land around Lionlodge Covert; and land south east of Hopton. Only six roosts supported rarer bat species, three noctule roosts, and three *Myotis* species roosts. One of these rarer tree roosts, identified via back-tracking, was a *Myotis* species maternity roost located to the west of Ingestre Golf Club. Another noctule and soprano pipistrelle roost was located near Ingestre Golf Club.
- 2.3.93 Five trees around Moreton House and Moreton Lane support day/summer roosts of soprano pipistrelle (two identified), *Myotis* species, and noctule. A tree within land adjacent to Great Haywood Marina supported a day/summer/transitional soprano pipistrelle roost.
- 2.3.94 Four lime trees located around Hoo Mill provided transitional roosting habitat for soprano pipistrelles and one of these trees also support a transitional *Myotis* species roost. A further two trees supported a transitional common and a soprano pipistrelle roost in this area.
- 2.3.95 Nine trees within Ingestre Golf Club, north of Town Field Plantation, were found to support roosts of a range of species and are considered to be important for bats in the

⁵ Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Annex 2). European Commission

local area. Nine day/summer/transitional roosts of common and soprano pipistrelle were identified in six trees. A *Myotis* species maternity roost was identified in an oak tree near the western boundary of the golf course near the Town Field Plantation Woodland. Swarming behaviour of common pipistrelles was also noted with re-entry of approximately five bats in a pine tree adjacent to the *Myotis* species maternity roost.

- 2.3.96 Fourteen buildings supported roosting bats, two of those had potential to support maternity roosts due to the large amounts of droppings present but have not been confirmed via emergence surveys. These are located in a residential building east of Lower Berryhill and in a building near Upper Hanyards west of Ingestre Wood, the latter also supports a whiskered bat roost.
- 2.3.97 The remaining roosts appear to support low to moderate numbers of common bat species; common pipistrelle, soprano pipistrelle and brown long-eared bat.

Foraging habitat

- 2.3.98 Land around the River Trent and Trent and Mersey Canal to the east of Hoo Mill supported a varied assemblage of foraging bats; common pipistrelle, soprano pipistrelle, brown long-eared bat, *Myotis* species, noctule and Leisler's. Foraging was recorded in low to moderate levels along the watercourses and connected tree line and hedgerows. Common and soprano pipistrelles were the dominant species.
- 2.3.99 In August 2016, very high levels of common pipistrelle and soprano pipistrelle were recorded on the static detector near the River Trent to the east of Hoo Mill, with 623ppn and 1239ppn respectively. *Myotis* species and brown long-eared bats were also recorded in high numbers on the static detector again with peaks in August 2016. High levels of noctule were noted on the walked transect with 109ppn were recorded in July. The habitats within and adjacent to the River Trent and Trent and Mersey Canal to the east of Hoo Mill are assumed to be key for a wide range of bat species. In September 2016 a lesser horseshoe bat was recorded on the static detector.
- 2.3.100 Ingestre Golf Club and nearby land supported moderate levels of foraging common and soprano pipistrelle. A single Nathusius' pipistrelle pass was recorded within the area as well as low levels of foraging *Myotis* species, brown long-eared bat and noctule. The foraging behaviour was mostly recorded along the woodland rides created by the golf drives and to Town Field Plantation to the west. High levels of *Myotis* species passes were recorded in September 2016. This location is an assumed key foraging area for bats.

Commuting habitat

- 2.3.101 The hedgerow network throughout CA2 is well established and connected, and, in combination with the tree lined watercourses and roads, provides an extensive network for commuting bats.
- 2.3.102 Commuting activity was relatively low around the River Trent and Trent and Mersey Canal to the east of Hoo Mill and was more established around Ingestre, where soprano pipistrelle and *Myotis* species were noted using woodland edges as assumed key commuting routes. The area near the River Trent and Trent and Mersey canal supports a diverse species assemblage of bats, including rarer bats such as noctule,

Leisler's in low to moderate numbers and a single pass of the Annex II lesser horseshoe bat and is therefore an assumed key commuting area.

- 2.3.103 The lesser horseshoe bat was recorded in September 2016 adjacent to the River Trent and thought to be transitioning from maternity roost to the hibernation roosts. The lesser horseshoe bat can commute up to 20km from maternity sites to hibernation sites and given that no other calls from this species were identified it is possible that low numbers of this bat are using the River Trent/Trent and Mersey Canal as a commuting route to their hibernation sites. Alternatively the species range is expanding and this could be a dispersing or prospecting individual from the core population from the south of England.
- 2.3.104 The habitat in the areas around Ingestre supported a slightly less diverse bat assemblage than around the River Trent and also in lower numbers. Rarer bats were recorded near Ingestre Golf Course with a single Nathusius' pipistrelle pass and low numbers of sporadic noctule passes however given the roosts identified in this area this area is expected to be important for commuting bats.

Stone and Swynnerton (CA3)

- 2.3.105 Tables 23 to Table 25 provide summaries of bat roosts identified in CA1 from field surveys. These tables should be read in conjunction with map series EC-05, (Volume 5, Ecology map book). Survey information collected has been allocated an ecology survey code to provide a unique identified for use on project mapping.

Overview of bat species status in the vicinity of CA3

- 2.3.106 There are no statutory designated sites (within 10km) or non-statutory designated sites (within 5km) of CA3 which mentions bats within their citations.
- 2.3.107 Habitats within CA3 suitable to support roosting, foraging and commuting bats include water bodies, woodland and farmland, many of which are located within and adjacent to the land required for the construction of the Proposed Scheme.
- 2.3.108 A large amount of the area is dominated by woodland, with 20 woodland blocks scattered throughout the area or directly adjacent to the Proposed Scheme. There are three potential ancient woodland sites within the land required for the Proposed Scheme: Birchwood, Closepit Plantation, and Clifford's Wood. A large amount of these woodlands fall within the land required for construction of the Proposed Scheme.
- 2.3.109 There are no major watercourses within this area but Fill Brook, Filly Brook Millstream and multiple unnamed watercourses will be crossed by the Proposed Scheme.
- 2.3.110 There are numerous ponds and wet ditches within this area, 102 of which are between 100m and within the land required for the construction of the Proposed Scheme. There are some scattered areas of marshy grassland associated with waterbodies present throughout the area but the majority of grassland is improved and semi-improved agricultural grassland.
- 2.3.111 Field surveys recorded at least eight species of bats in this area. A further three species were identified from the desk study namely Daubenton's bat, Natterer's bat and Whiskered/Brandt's bat.

2.3.112 The total bat assemblage is as follows:

- Common pipistrelle;
- Soprano pipistrelle;
- Brown long-eared bat;
- Nathusius' pipistrelle;
- Noctule;
- Leisler's bat;
- Serotine;
- *Myotis* species;
- Daubenton's bat;
- Natterer's bat; and
- Whiskered/Brandt's bat.

Roosting (trees)

2.3.113 A total of 1255 trees were subject to an initial ground based assessment and subsequent further detailed climbed surveys where appropriate in line with the methods described in the FSMS document.

2.3.114 Of the 1255 trees that were initially assessed, the following results were obtained:

- 109 trees as having high potential to support roosting bats;
- 517 trees as having moderate potential to support roosting bats; and
- the remaining 629 trees were classified as having low or negligible potential to support roosting bats. These trees were subsequently scoped out of further survey.

2.3.115 Of the 626 trees assessed as having moderate or high potential to support roosting bats:

- a total of 330 were subject to further surveys in the form of a tree climbing inspection during which six roosts were identified;
- 197 were reassessed as having low to negligible potential to support roosting bats and were scoped out of further surveys; and
- 84 trees were subject to emergence surveys during which a further three roosts were recorded. Forty-three trees were subject to back-tracking surveys.

2.3.116 Back-tracking surveys were completed at two areas but no roosts were identified. The surveys did not identify any additional species and activity was very low.

2.3.117 Details of confirmed tree roosts in this area of the route are provided in Table 23 and 24.

Table 23: Confirmed tree roosts within CA3

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-223003	North-west of Birchwood.	SJ869347	Pedunculate oak	Common pipistrelle (5), unknown (6).	26 August 2016, tree re-entry. Recording device failed.	Day/summer.	Eleven bats returning to roost.	3	Within.
000-BT3-225017	South-west of A51.	SJ855361	Pedunculate oak	Unknown (1).	24 September 2016, tree emergence.	Day/summer.	Emerged from main branches in top of trees.	3	Within.
000-BT2-225038	North-east of Beswick Green.	SJ853361	Pedunculate oak	Droppings not viable for DNA.	23 September 2016, tree climbing inspection.	Day/summer.	Dropping found at entrance to cavity.	3	Within.
000-BT2-225080	South-west of A51.	SJ852364	Pedunculate oak	Droppings not viable for DNA.	23 September 2016, tree climbing inspection.	Feeding.	Droppings found near knot-hole entrance.	3	Within.
000-BT2-225065	South-west of A51.	SJ854363	Pedunculate oak	Droppings not viable for DNA.	22 September 2016, tree climbing inspection.	Feeding.	Deadwood 18m east. Dropping found on small piece of deadwood possibly used as feeding platform.	3	10 north-east.

Table 24: Confirmed tree roosts beyond 100m buffer in CA3

Ecology Survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT2-224152	South-west of A51.	SJ857363	Common ash.	Noctule (1).	22 September 2016, tree climbing inspection.	Transitional.	Noctule bat recorded in flush cut at top of tree.	3	125 north-east.
000-BT2-228030	South-east of Swynnerton Old Park.	SJ830390	European larch.	Unknown (1), bat seen but not identified.	3 August 2016, tree climbing inspection.	Day/summer.	Woodpecker hole with bat seen but not identified.	3	347 north-west.
000-BT2-220014	North-east of Micklow Wood.	SJ891330	Common ash.	Noctule (4).	29 July 2016, tree climbing inspection.	Day/summer/maternity.	Four noctules present.	3	479 north-east.

Roosting (buildings and structures)

- 2.3.118 A total of 32 buildings in this area were subject to initial inspections, resulting in the following:
- eight buildings were confirmed to support eight roosts all of which were identified from initial inspections;
 - nine buildings had high potential to support bats; and
 - 15 buildings had moderate potential to support bats.
- 2.3.119 Of the 32 buildings confirmed as having roosts, or assessed as having high or moderate potential to support bats:
- 18 buildings were subject to internal inspections resulting in identification of four bat roosts;
 - the remaining four bat roosts were identified from external evidence of roosting bats; and
 - one building was subject to one emergence survey but no further roosts were identified.
- 2.3.120 Details of confirmed roosts in buildings/structures in this area of the route are provided in Table 25.

Table 25: Confirmed roosts in buildings and structures within CA3

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-230004	South-east of Bent Lane.	SJ817394	Residential.	Brown long-eared bat (visual dropping ID).	21 July 2016, internal inspection.	Day/summer.	Converted, semi-detached residential barn. Converted 10 years ago, but barn was built probably over 100 years ago. Droppings were found at the gable end and under ridge beam.	3	Within.
000-BS1-223006	North-west of Blakelow.	SJ866353	Barn.	Unknown, no internal access and dropping not viable for DNA analysis.	29 June 2016, internal inspection.	Day/summer.	Pre 1900 barn with access to first floor via gaps between wooden ceiling boards.	3	5 north-west.
000-BS1-227002	North-west of Clifford's Wood.	SJ834375	Other (ammunition store).	Unknown.	8 September 2016, external survey.	Unknown.	Double skin brick walled ex-mod ammunition store, with flat concrete roof, single roller door. No other apertures. One bat dropping on external surface. No internal access.	3	14 north-east.
000-BS1-225005	North-west of Whitehouse.	SJ849363	Residential.	Unknown, no internal access and droppings could not be reached for collection.	7 July 2016, external survey.	Unknown.	Large, detached period house, white rendered traditional construction. 1930's / 1940's build.	3	16 south-west.
000-BS1-224001	South-west of A51.	SJ857362	Residential.	Unknown, droppings and feeding remains found on the external walls. No internal access and dropping not viable for DNA analysis.	2 August 2016, external survey.	Unknown.	Brick residential property.	3	17 north-west.
000-BS1-224002	South-west of A51.	SJ857362	Garage.	Unknown, droppings and feeding remains found in the garage, not viable for DNA analysis.	2 August 2016, internal survey.	Occasional / feeding.	Brick garage open to the roof.	3	17 south-west.

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-227001	North-west of Clifford's Wood.	SJ836376	Other (ammunition store).	Unknown, no internal access and droppings not viable for DNA analysis.	8 September 2016, external survey.	Unknown.	Double skin brick walled ex-mod ammunition store, with flat concrete roof. Some gap under roof felt on overlap onto walls and bat droppings on external surface of roller shutter door. No internal access.	3	20 north-east.
000-BS1-218001	South of North Pirehill Farm.	SJ897313	Residential.	Droppings found at entry to attic space, droppings not viable for DNA analysis.	1 August 2016, internal survey.	Unknown.	Red-brick farmhouse	3	81 south-east.

Bat activity surveys

2.3.121 The following eight species have been recorded during the range of bat activity surveys conducted in the survey area:

- Common pipistrelle;
- Soprano pipistrelle;
- Brown long-eared bat;
- Nathusius' pipistrelle
- *Myotis* species;
- Leisler's bat;
- Noctule; and
- Serotine.

Table 26: Bat activity surveys conducted within CA3

Ecology survey code	Transect location	Numbers of surveys conducted	First survey date	Final survey date	CA	Map reference
000-BA1-223001	20	7	2 June 2016	5 October 2016	3	EC-06-324, EC-06-324-L1, EC-06-325, EC-06-326
000-BA1-226001	15	8	31 May 2016	11 October 2016	3	EC-06-326, EC-06-327
000-BA1-227001	13	1	1 June 2016	1 June 2016	3	EC-06-327, EC-06-328
000-BA1-228001	11 (to replace 13)	3	15 August 2016	17 October 2016	3	EC-06-328, EC-06-328-R1, EC-06-329a, EC-06-329b

Table 27: Bat activity transect survey results for Transect 20

Ecology survey code	Transect location				Description of habitats covered by transect																
	East of Swynnerton Park near Blakelow.				Hedgerows cross the route multiple times, Lodge Covert and Fox Covert covered by transect. Multiple ponds and wet ditches in arable and grassland habitats.																
Visit number and date	Weather conditions				Total species passes during transect survey																
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
Visit 1: Dusk: 2 June 2016	13	2	0	0	52	13		3							19	4		1			1
Visit 2: Dusk: 23 June 2016	18	5	0	0	31	20	15	31							1	4					7
Visit 3: Dusk: 4 July 2016	18	7	0	1	21	32		7							3	3					1
Visit 4: Dusk: 2 August 2016	20	6	0	0	10	3		4							1	2					
Visit 5: Dusk: 6 September 2016	20	7	0	0	44	16		5							2	2					1
Visit 6: Dusk: 4 October 2016	16	3	0	2	9	38		3													
Visit 7: Dawn 5 October 2016	15	6	0	4	8	20		8								3					

2.3.122 Over the duration of the survey, low to moderate numbers of common and soprano pipistrelles were detected in this location in most months with the exception of a high number passes of common pipistrelle in June 2016 (52ppn) and soprano pipistrelle on October 4, 2016 (38ppn). Non-defined pipistrelle species were also present in low to moderate numbers throughout the survey with maximum on June 23 2016 of 31ppn and Nathusius' pipistrelle species were also present on June 23 2016 with 15ppn. *Myotis* species were present in very low numbers with the peak being 19ppn on June 2 2016. Brown long-eared bats were also present throughout the survey in very low

2.3.123 Low numbers of bats were detected in this area throughout the survey. The most common bats were the common and soprano pipistrelles which had a maximum number of passes in June 2016 of 33ppn and 22ppn respectively. Other bats present in low numbers were non-defined pipistrelle species which were present throughout the survey dates with a peak of 8ppn in September 2016. A number of species were present on only one date in this location including Nathusius' pipistrelle (4ppn on 29 June 2016), *Myotis* species (8ppn on 3 June 2016) and *Nyctalus/Eptesicus* (3ppn in May 2016). Solitary passes of noctules and brown-long eared bats occurred on 29 June 2016 and 10 October 2016 respectively.

Table 29: Bat activity transect survey results Transect 13

Ecology survey code	Transect location				Description of habitats covered by transect																
	000-BA1-227001	Clifford's Wood.				Clifford's Wood is a potential Ancient Woodland site, supporting broad-leaved trees and wet ditches.															
Visit number and date	Weather conditions				Total species passes during transect survey																
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.s.	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
Visit 1: Dusk: 01 June 2016	15	8	0	1	45	30		14							1	1					8

2.3.124 On the one transect walked at this location in June 2016 low numbers of common and soprano pipistrelles were recorded with peaks of 45ppn and 30ppn respectively. Low number of non-defined pipistrelle species (14ppn) and *Nyctalus/Eptesicus* species (8ppn) were also present. Solitary passes from a *Myotis* species and a brown long-eared bat was also detected.

Table 30: Bat activity transect survey results for Transect 11

Ecology survey code	Transect location				Description of habitats covered by transect																
	Land adjacent to Common Lane north of Upper Hatton.				Transect includes boundary surveys of Hatton Common and Nursery Common woodlands. Arable fields with connecting hedgerows and tree standards.																
Visit number and date	Weather conditions				Total species passes during transect survey																
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp.	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.s p.	Pa	Bb	Nn	Nl	Es	Ny/Es
Visit 1: Dusk: 15 August 2016	20	2	0	0	9	8									3	1		4	1	2	5
Visit 2: Dusk: 19 September 2016	16	7	0	1	26	38		12							2	3					4
Visit 2: Dusk: 17 October 2016	12	4	0	2	7			4													3

2.3.125 Low numbers of soprano pipistrelles were recorded at this location with a peak of 38ppn in September 2016. There were similarly low numbers of common pipistrelles with a peak of 26ppn in September 2016. There were also very low levels of activity by a range of different bat species; non-defined pipistrelle species with a peak of 12ppn in September 2016, *Myotis* species with a peak of 3ppn in August 2016, brown long-eared bats with a peak of 3ppn in September 2016, noctules with a peak of 4ppn in August 2016, serotines with a peak of 2ppn in August 2016 and *Nyctalus/Eptesicus* species with a peak of 5ppn in August 2016. There was also one solitary Leisler's bat call detected in August 2016.

Table 31: Summary of static detector monitoring results for Transect 20

Ecology survey code	Location	OS Grid	Description of habitats															
000-BA2-224001	Lodge Covert.	SJ860356	Planted broad-leaved woodland.															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
23 June 2016 to 28 June 2016	5	16	39		5							1	6					1
6 September 2016 to 12 September 2016	6	28	109		23							9				1		1

2.3.126 At the Lodge Covert, soprano pipistrelles were present in moderate levels with a maximum of 109ppn in September 2016. Low levels of common pipistrelle, non-defined pipistrelle species and *Myotis* species were present with respective maxima of 28ppn, 23ppn and 9ppn in September 2016. Low levels of brown long-eared bats were also present with peak of 6ppn. A solitary noctule pass was also detected in September 2016 and solitary *Nyctalus/Eptesicus* species passes were recorded in June and September 2016.

Table 32: Summary of static detector monitoring results for Transect 15

Ecology survey code	Location	OS Grid	Description of habitats																
000-BA2-226001	North-west corner of Cash's Pit.	SJ846368	Cash's Pit woodland, broad-leaved woodland.																
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																	
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es	
31 May 2016 to 6 June 2016	6	5	4															3	
29 June 2016 to 5 July 2016	6	23	8		15							6	2					1	
13 July to 20 July 2016	7		7		17							2	1						
9 August 2016 to 15 August 2016	7	22	10		2							4	1		7			1	
12 September 2016 to 19 September 2016	7	128	70	2	16							8	2		6			4	

2.3.127 In the north-west corner of Cash's pit common and soprano pipistrelle were detected the most often with a moderate peak value of 128ppn and a low peak of 70ppn respectively in September 2016. Low levels of non-defined pipistrelle species were present at this location with a maximum of 17ppn in July 2016. Additionally a low number of passes were detected at this location for *Myotis* species and noctule with peak values of 8ppn and 7ppn respectively in September 2016. Very low levels and respective maxima of 2ppn and 4ppn were detected for brown long-eared bats and *Nyctalus/Eptesicus* species throughout the survey. Two passes of Nathusius' pipistrelle were also noted in September 2016.

Table 33: Summary of static detector monitoring results for Transect 13

Ecology survey code	Location	OS Grid	Description of habitats															
000-BA2-227001	Clifford's Wood.	SJ837375	Dense woodland supporting broad-leaved trees.															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring [insert the highest number of bat passes recorded on any one night during deployment]																
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
1 June 2016 to 6 June 2016	5	29	21	1	6							6	5		3			5

2.3.128 Measurements in Clifford's Wood were taken for 5 nights in early June 2016. The most common bat species detected were low levels of common and soprano pipistrelles showing maxima of 29ppn and 21ppn respectively. Low levels of non-defined pipistrelle species, *Myotis* species, brown long-eared bat, noctules and *Nyctalus/Eptesicus* species were also detected with none exceeding 6ppn. A solitary pass of a *Nathusius* pipistrelle was also measured.

Table 34: Summary of static detector monitoring results for Transect 11

Ecology survey code	Location	OS Grid	Description of habitats															
000-BA2-228001	West boundary of Hatton Common.	SJ827383	Semi-natural woodland.															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring [insert the highest number of bat passes recorded on any one night during deployment]																
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
15 August 2016 to 22 August 2016	7	73	51		59							61	4		1			5
19 September 2016 to 26 September 2016	6	171	209		32							13	1		1			6

2.3.129 Soprano pipistrelle was detected in high numbers in September 2016 and common pipistrelles were detected in moderate numbers at this location in September 2016. Non-defined pipistrelle species and *Myotis* species were present at low to moderate levels with maxima of 59ppn and 61ppn respectively in August 2016. Low levels of brown-long eared bats, noctules and *Nyctalus/Eptesicus* species were also present showing maxima of 4ppn, 1ppn and 6ppn respectively.

Discussion

Bat assemblage

- 2.3.130 Field surveys carried out in 2016 confirmed the presence of eight bat species along the route, including rarer species; serotine, Leisler's bat, noctule and Nathusius' pipistrelle.
- 2.3.131 The desk study data identified Daubenton's bat, Natterer's bat and whiskered/Brandt's bat.
- 2.3.132 Common and widespread species including common pipistrelle and soprano pipistrelle were the most frequently recorded species in the area. Brown long-eared bat and noctule were recorded on all the transects in the area suggesting that they are widespread in the area.
- 2.3.133 Rarer species including *Myotis* species, noctule and *Nyctalus/Eptesicus* were recorded on all the transects with low numbers of passes on all the transects.
- 2.3.134 Low numbers of Nathusius' pipistrelle passes were recorded on three transects, in land east of Swynnerton Park, near Cash's Pit and Clifford's Wood transect in June 2016 near Lodge Covert.
- 2.3.135 Common and soprano pipistrelles were the most abundant species recorded during field surveys in CA3 with peak counts of 171ppn and 209ppn, both of these peaks were recorded on the western boundary of Hatton Common in September 2016.
- 2.3.136 Rarer bat such as Leisler's and serotine were only recorded in very low numbers on one transect in land near Hatton Common.
- 2.3.137 The lack of access may have resulted in some roosts going unrecorded; the key area where access was not always available was Clifford's Wood ancient woodland and associated woodland parcels. Activity surveys were limited to one survey in June 2016 and completion of roost assessments and emergence/return surveys through these woodland areas was also affected.

Roosts

- 2.3.138 Roosts of common bats, common pipistrelle, soprano pipistrelle and brown long-eared bat were recorded in the desk study. A possible brown long-eared bat maternity colony (supporting 55 bats) was recorded in a building 600m to the east of the Proposed Scheme in the desk study.
- 2.3.139 Roosts were located within nine trees across the area. A noctule day/summer roost was identified in a small area of wood to the west of Walton. Closepit Plantation (south-west of the A51) and trees near to the wood supported a noctule feeding roost and a transitional roost of an unknown species, and four day/summer/feeding roosts of unknown species. The majority of roosts are of unconfirmed species and have been identified from evidence of bat usage such as droppings, feeding remains and other signs. Emergence surveys identified a common pipistrelle day roost in a tree east of Swynnerton Grange adjacent to the M6 (this roost was originally identified as having moderate potential to support roosting bats). A tree to the west of Shelton under Harley Farm supported a soprano pipistrelle day roost.

- 2.3.140 Eight buildings were found to support roosting bats. A brown long-eared roost (day/summer) was identified via visual dropping ID in a building at Shelton under Harley Farm.
- 2.3.141 No other species were confirmed in the remaining seven buildings but the roosts were located in a building at Blakelow (day/summer), an occasional/feeding roost in a building at Sandyford Farm, south-west of the A51 as well as an unknown roost. Unknown roosts were also identified in two ammunition stores north-west of Clifford's Wood, a building at North Pirehill Farm and in a building in Whitehouse north of Swynnerton.

Foraging habitat

- 2.3.142 An assemblage of both common and rarer species has been recorded foraging along hedgerows and tree cluster to the east of Swynnerton Park near Blakelow including Nathusius' pipistrelle, *Myotis* species and noctule and is assumed to be a key foraging area and incorporates the area around Lodge Covert.
- 2.3.143 Cash's Pit between Clifford's Wood and The Stretters supported low levels of bats and only common and soprano pipistrelles were recorded foraging in the nearby area.
- 2.3.144 Only one transect survey was undertaken in Clifford's Wood due to access constrictions. This recorded foraging common pipistrelle and *Nyctalus* species but due to the habitats the woodland supports it is considered to be an assumed key resource for a range of bat species. Foraging common pipistrelle, soprano pipistrelle, brown long-eared bat and noctule were recorded in Hatton Common woodland and along hedgerows connecting to Nursery Common and Swynnerton Old Park.
- 2.3.145 Due to the presence of suitable habitat but lack of access to undertake surveys Nursery Common and Harley Thorns is an assumed key foraging habitat.

Commuting habitat

- 2.3.146 Hedgerows to the east of Swynnerton Park near Blakelow were found to support commuting common pipistrelle, soprano pipistrelle in moderate numbers and low levels of brown long-eared bat. Rarer species were not recorded commuting during the walked transects but the suitable habitat and numbers of passes suggests that they could commute along the transects in low numbers. These hedgerows are assumed to be key commuting routes.
- 2.3.147 Woodland blocks including Hatton Common, Hatton Rough and the hedgerows in between were considered to provide suitable habitats and assumed a key route for commuting bats.
- 2.3.148 Commuting soprano pipistrelles were recorded along hedgerows near Cash's Pit and within Clifford's Wood. Low numbers of commuting bats were recorded during transect surveys but given the many intact hedgerows, connecting large woodland blocks. They are considered to offer key commuting corridors for bats in the local area.

Whitmore Heath and Madeley (CA4)

- 2.3.149 Tables 35 to 38 provide summaries of bat roosts identified in CA1 from field surveys. These tables should be read in conjunction with map series EC-05, (Volume 5, Ecology map book). Survey information collected has been allocated an ecology survey code to provide a unique identified for use on project mapping.

Overview of bat species status in the vicinity of CA4

- 2.3.150 There are no statutory designated sites (within 10km) or non-statutory designated sites (within 5km) of CA4 which mentions bats within their citations.
- 2.3.151 The landscape within CA4 is dominated by large arable fields with field boundary hedgerows and trees. Habitats within this area suitable to support roosting, foraging and commuting bats include watercourses, water bodies, woodland, grassland and farmland, many of which are located within and adjacent to the land required for the construction of the Proposed Scheme.
- 2.3.152 There are several woodland blocks within the land required for the Proposed Scheme which include two ancient woodland inventory sites namely Whitmore Wood and Barhill Wood. These woodlands both support lowland mixed deciduous habitats. Two woodland areas are potential ancient woodland, including an area between Whitmore Wood and Hey Sprink and an area adjacent to Wrinehill Wood.
- 2.3.153 There are three areas of broadleaved woodland within the land required for the Proposed Scheme, a small patch to the south-east of Barhill Wood, a small area of woodland at Whitmore Heath and woodland boarding the Silverdale disused railway connected to the south west boundary of Hey Sprink.
- 2.3.154 Three main watercourses are crossed by the Proposed Scheme, Meece Brook, Checkley Brook and the River Lea as well as eight unnamed smaller watercourses and culverts. There are also numerous waterbodies throughout the area.
- 2.3.155 There is marshy grassland present south of Hey Sprink wood and the West Coast Main Line (WCML), as well as an area of lowland meadow, east of Meece Brook. Other potentially species-rich grassland which could support a diverse invertebrate assemblage includes neutral grassland to the south of Whitmore and the east of Baldwin's Gate and an acid grassland north of Barhill Wood.
- 2.3.156 The large extents of woodland, with connective intact hedgerows are likely to be of high value to a range of bat species. In general, the extent, continuity, and mixture of different habitat types in this area are likely to support a variety of bat species.
- 2.3.157 Field surveys recorded at least seven species of bats in this area. No additional bats were identified in the desk study. The total bat assemblage is as follows:
- Common pipistrelle;
 - Soprano pipistrelle;
 - Noctule;
 - Leisler's bat;
 - Serotine;

- Brown long-eared bat; and
- *Myotis* species.

Roosting (trees)

- 2.3.158 A total of 833 trees were subject to an initial ground based assessment and subsequent further detailed climbed surveys where appropriate in line with the methods described in the FSMS document.
- 2.3.159 Of the 829 trees that were initially assessed, the following results were obtained:
- 192 trees as having high potential to support roosting bats;
 - 472 trees as having moderate potential to support roosting bats; and
 - the remaining 165 trees were classified as having low or negligible potential to support roosting bats. These trees were subsequently scoped out of further survey.
- 2.3.160 Of the 664 trees assessed as having moderate or high potential to support roosting bats:
- a total of 337 trees were subject to further surveys in the form of a tree climbing inspection during which one roost was identified;
 - 223 were reassessed as having low to negligible potential to support roosting bats and were scoped out of further surveys; and
 - 110 trees were subject to emergence surveys during which a further eight roosts were recorded.
- 2.3.161 Two back-tracking surveys were conducted at Whitmore Wood and found high levels of commuting and foraging activity from common and soprano pipistrelles and moderate numbers of *Nyctalus* and *Myotis* species, and brown long-eared bats. Key foraging and commuting routes were identified along the farm track adjacent to the woodland and also along the woodland rides that run west to east. Pipistrelle social activity also featured during the September survey
- 2.3.162 A soprano pipistrelle roost was identified at dusk in a mature tree with high roost potential at the south-east edge of the woodland. A *Myotis* species was also identified returning to roost in an oak at the north-west edge of the woodland. This indicates that the site has suitable habitat that supports moderate to high numbers of bats and provides roosting sites and foraging areas for local bats.
- 2.3.163 Details of confirmed tree roosts in this area of the route are provided in Table 35, details of roosts over 100m from the Proposed Scheme are provided in Table 36.

Table 35: Confirmed tree roosts within CA4

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-230001	South-west of Bent Lane.	SJ814394	Common ash.	Soprano pipistrelle (1).	16 August 2016, tree re-entry.	Day/summer.	Re-entry into tree.	4	Within.
000-BT3-230002	South-west of Bent Lane.	SJ814394	Common ash.	Soprano pipistrelle (1).	16 August 2016, re-entry.	Day/summer.	Returned to a feature 8m on the tree on the north-east side.	4	Within.
000-BT3-233024	Within Whitmore Wood.	SJ793414	Pedunculate oak.	Soprano pipistrelle (2).	11 August 2016, back-tracking survey.	Day/summer.	Bats emerged from split in trunk/callus roll, circled around tree (veteran tree).	4	Within.
000-BT3-233160	Within Whitmore Wood.	SJ789417	Common ash.	<i>Myotis</i> sp. (1).	11 August 2016, back-tracking survey.	Day/summer.	<i>Myotis</i> sp. returned to split in a dead branch half way up tree.	4	Within.
000-BT3-235035	North-east of Manor Road Verges.	SJ775431	Unknown.	Soprano pipistrelle (1).	2 September 2016, tree emergence.	Day/summer.	Emerged from crack in limb on south side.	4	Within.
000-BT3-236033	North-east of Red Lane.	SJ769436	Unknown.	Unknown (1).	13 September 2016, tree emergence.	Day/summer.	Emerged from hole on western branch into field and flew north along hedge.	4	Within.
000-BT3-236034	North-west of Red Lane.	SJ768435	Pedunculate oak.	Soprano pipistrelle (1).	9 August 2016, tree re-entry.	Day/summer.	Returned to roost, feature not seen.	4	Within.
000-BT2-237212	South-west of The Lum (River Lea Corridor).	SJ763449	Pedunculate oak.	Unknown, droppings not viable.	15 December 2016, tree climbing.	Day/summer.	Split in stem with droppings.	4	3 south-west.
000-BT3-235052	North-east of Manor Road.	SJ774435	Common alder.	<i>Myotis</i> sp. (1).	9 August 2016, tree emergence.	Day/summer.	<i>Myotis</i> sp. emerged from branch on north side of tree.	4	21 north-east.
000-BT3-235003	North-east of Manor Road.	SJ776423	Common ash.	<i>Myotis</i> sp. (1).	8 August 2016, tree emergence.	Day/summer.	Emerged from split in tree.	4	32 south-east.

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-239003	North-west of Wrinehill Hall.	SJ750460	Common ash.	Noctule (2).	16 August 2016, tree emergence.	Day/summer.	Chattering heard inside the tree. Two noctules emerged.	4	83 north-east.

Table 36: Confirmed tree roosts beyond 100m buffer in CA4

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT3-237199	North of Bower End Lane.	SJ764447	Common alder.	Noctule (1).	1 September 2016, tree emergence.	Day/summer.	Large bat launched from tree from a point that was either the top knot hole or the adjacent woodpecker hole. Presumed to be noctule.	4	113 south-west.

Roosting (buildings and structures)

- 2.3.164 The desk study identified day/summer roosts of common pipistrelle, soprano pipistrelle and brown long-eared bat. The nearest roost supported one brown long-eared bat and was located 220m to the south west of the Proposed Scheme.
- 2.3.165 A total of 34 buildings were subject to initial inspections, resulting in the following:
- nine buildings were confirmed as roosts by internal inspection;
 - six buildings had high potential to support bats; and
 - 19 buildings had moderate potential to support bats.
- 2.3.166 Of the 34 buildings assessed as having roosts or assessed as having high or moderate potential to support bats:
- 23 buildings were subject to internal inspections resulting in nine buildings supporting eight roosts; and
 - three buildings were subject to four emergence surveys and two roosts were confirmed in one building.
- 2.3.167 Details of confirmed roosts in buildings/structures in this area of the route are provided in Table 37, roosts identified over 100m are provided in Table 38.

Table 37: Confirmed roosts in buildings and structures within CA4

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-232001	North-west of A53.	SJ801407	Residential.	Brown long-eared (DNA), droppings found in the east and western voids.	25 November 2016, internal inspection.	Day/feeding/night.	The central section of the roof void is used for storage and has been lined and boarded.	4	Within.
000-BS1-233004	South-east of Whitmore Wood.	SJ793413	Residential.	Brown long-eared (DNA), droppings found next to loft hatch – full access were not safe.	19 December 2016, internal inspection.	Hibernation/day/feeding/night.	Roosting signs throughout the roof void.	4	Within.
000-BS1-233002	North-west of Snape Hall Road.	SJ793913	Residential.	Brown long-eared bat (visual dropping ID).	1 November 2016, internal inspection.	Maternity.	Two storey house approx. 150 years old with modern two storeys and a single storey extension (30 years old). Roost located along ridge beam.	4	9 north-west.
000-BS1-237003	South-east of Bower End Lane.	SJ765445	Residential.	Brown long-eared (DNA). Substantial pile of droppings under roof support beam.	2 November 2016, internal inspection.	Feeding/transitional.	Converted barn/ farm buildings. Brick construction with slate roof. Building 20th century, conversion to residential building in more recent times.	4	21 south-west.
000-BS1-237002	South-east of Bower End Lane.	SJ765445	Residential.	Unknown, numerous droppings found but no DNA confirmation.	3 November 2016, internal inspection.	Day.	Converted barn/ farm buildings. Brick construction with slate roof. Building 20th century, conversion to residential building in more recent times.	4	24 south-west.
000-BS1-237004	South-east of Bower End Lane.	SJ765445	Garage.	<i>Pipistrellus</i> sp. (visual dropping ID). Droppings found in the corner of the garage and in the connecting passage between	2 November 2016, internal inspection.	Night/feeding.	Garage attached to main house.	4	36 south-west.

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
				kitchens. Droppings found directly underneath wooden frame.					
000-BS1-236003	South-east of A525.	SJ764436	Barn.	Common pipistrelle (1), soprano pipistrelle (2).	22 September 2016, building emergence.	Day.	Barn used for livestock and near farm shop.	4	61 south-east.
000-BS1-235001	North-east of Manor Road.	SJ775423	Residential.	<i>Pipistrellus</i> sp. (visual dropping ID). Approximately 40 to 50 droppings were noted on the wall beneath a gap.	9 August 2016, internal inspection.	Maternity.	Two storey house with ground floor single storey extension to the rear. Pitched tiled roof with opportunities for bats to enter voids behind all of the four dormers on the front (south east) and rear (north west) elevations of the building.	4	69 north-west.

Table 38: Confirmed roosts in buildings and structures beyond 100m buffer in CA4

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-236004	South-east of A525.	SJ 765436	Residential.	Brown long-eared (DNA and emergence (1)), Hundreds of droppings found on top of insulation material.	14 July 2016, internal inspection.	Maternity.	200 year old Edwardian house. Gap on side of dormer clear and used for bat access.	4	109 south-east.

Bat activity surveys

2.3.168 The following six species have been recorded during the range of bat activity surveys conducted in the survey area:

- Common pipistrelle;
- Soprano pipistrelle;
- Brown long-eared bat;
- *Myotis* species;
- Leisler’s bat; and
- Serotine.

Table 39: Bat activity surveys conducted within CA4

Ecology survey code	Transect location	Numbers of surveys conducted	First survey date	Final survey date	CA	Map reference
000-BA1-233001	16	5	5 July 2016	15 September 2016	4	EC-06-331, EC-06-332

Table 40: Bat activity transect survey results for Transect 16

Ecology survey code	Transect location				Description of habitats covered by transect																	
	Whitmore Wood.				Ancient woodland with a wetland area.																	
Visit number and date	Weather conditions				Total species passes during transect survey																	
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es	
Visit 1: Dusk: 31 May 2016	16	6	0	1	108	52		1							13	2						
Visit 2: Dusk: 5 July 2016	15	6	0	2	96	26		35							2	6						
Visit 3: Dusk: 15 August 2016	18	0	0	1	34	25		6							6	2				1	1	
Visit 4: Dusk: 7 September 2016	21	7	0	1	52	2																
Visit 5: Dusk: 4 October 2016	15	2	0	1	55	22									2				1			

2.3.169 Low to moderate numbers of common and soprano pipistrelles were detected in this location between May and October 2016. The maximum passes of both of these bat species were detected in May 2016 with 108ppn for common pipistrelle and 52ppn for soprano pipistrelle. A low number of non-defined pipistrelle species were also present with a maximum in July 2016 of 35ppn. Low number of *Myotis* species and brown long-eared bat passes were also detected throughout the survey with a maximum in May 2016 of 13ppn for *Myotis* species and 5ppn for brown long-eared in July 2016. Solitary passes of Leisler's bat, serotine and *Nyctalus/Eptesicus* bat were also noted in August 2016 and October 2016 respectively.

Table 41: Summary of static detector monitoring results for Transect 16

Ecology survey code	Location	OS Grid	Description of habitats															
000-BA2-233001	Whitmore Wood.	SJ 790417	A mixture of broad-leaved and coniferous woodland.															
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
May 31 2016 to 5 June 2016	5	126	26		6							1						1
June 23 2016 to June 28 2016	5	476	74		168							1	5				1	
5 July 2016 to 10 July 2016	6	1990	2		339							8	7					1
16 August 2016 to 21 August 2016	5	38	22									11	15					
7 September 2016 to 12 September 2016	6	38	43									4	4					

2.3.170 High levels of bat activity were detected in Whitmore Wood with common pipistrelles, soprano pipistrelles and non-defined pipistrelle species being the most common in the area with the former showing very high levels. Common pipistrelles showed a maximum in July 2016 of 1990ppn while peak values were 74ppn and 339ppn for soprano and non-defined pipistrelle species respectively. Low numbers of *Myotis* species and brown long-eared bats were also present with 15ppn and 11ppn peak values. Solitary *Nyctalus/Eptesicus* species passes were also detected in June 2016 and July 2016 as well as a solitary serotine pass in June 2016.

Discussion

Bat assemblage

- 2.3.171 The desk study data provided no additional species or distribution data.
- 2.3.172 Field surveys carried out in 2016 confirmed the presence of six bat species, including rarer species; serotine, Leisler's bat, and *Myotis* species. Noctule was not recorded in Whitmore Woods but undefined *Eptesicus/Nyctalus* were present.
- 2.3.173 Common and widespread species including common pipistrelle and soprano pipistrelle were the most frequently recorded species. Brown long-eared bats are using the area and have been identified in five buildings.
- 2.3.174 Common pipistrelle was the most abundant species recorded during field surveys in CA4 with peak counts of 1990ppn recorded on the static detector in July 2016.
- 2.3.175 Low levels of brown long-eared bat and *Myotis* species were also recorded in Whitmore Wood and solitary passes of serotine and Leisler's bat were recorded in Whitmore Wood.
- 2.3.176 The lack of access may have resulted in some roosts and foraging/commuting areas going unrecorded in Bar Hill Wood, Hey Sprink and Grafton's Wood ancient woodlands.

Roosts

- 2.3.177 Eleven trees within the area supported roosting bats. Bat tracking surveys identified two tree roosts in Whitmore Wood; one supported an undefined *Myotis* species summer roost and the other supported a soprano pipistrelle summer roost.
- 2.3.178 Three trees around Manor Road supported two summer *Myotis* species roosts and a summer soprano pipistrelle roost.
- 2.3.179 Land around Red Lane was found to support a summer roost of an unknown bat species and a soprano pipistrelle summer roost.
- 2.3.180 A tree in the grounds of Wrinehill Hall supported a noctule roost. A tree to the south-west of The Lum supported a summer roost of an unidentified bat species. A summer soprano pipistrelle roost was identified in a tree to the south-west of Bent Lane. A tree to the north of Bower End Lane supported a summer noctule roost.
- 2.3.181 Ten buildings roosts were located in the area, three of which were maternity roosts of common species (one non-defined pipistrelle roost and two brown long-eared roosts). The non-defined pipistrelle roost was located within Manor Holding south of the River Lea, the two brown long-eared roosts within Barhill House and Snape Hall Cottage.

Foraging habitat

- 2.3.182 The landscape in this area comprises mixed agricultural fields with woodland areas and established hedgerows. There are marshy grasslands and species-rich grasslands scattered throughout the area. Foraging habitats for common and soprano pipistrelle were identified along tree lines south of Checkley Brook where moderate numbers of bats were recorded during back-tracking surveys.

- 2.3.183 Whitmore Wood was also found to support moderate to high levels of foraging activity from common pipistrelle and moderate levels of soprano pipistrelle, with lower numbers of *Nyctalus* and *Myotis* species and moderate numbers of brown long-eared bats. The woodland is considered to be an important resource for foraging bats. One serotine bat and one Leisler's bat was recorded in the June 2016 and October 2016 respectively. *Myotis* species was recorded on the transect every month except September 2016 in low numbers.

Commuting habitat

- 2.3.184 The hedgerow network in this area is long established and has good connectivity to other suitable bat habitat such as woodlands. Along with the watercourses in the area, it provides an extensive network of habitat features suitable for commuting bats. In particular the disused railway, and woodland rides within Whitmore Wood.

South Cheshire (CA5)

- 2.3.185 Tables 42 to 45 provide summaries of bat roosts identified in CA1 from field surveys. These tables should be read in conjunction with map series EC-05, (Volume 5, Ecology map book). Survey information collected has been allocated an ecology survey code to provide a unique identified for use on project mapping.

Overview of bat species status in the vicinity of CA5

- 2.3.186 Habitats within CA5 suitable to support roosting, foraging and commuting bats include water bodies, watercourses, small areas of woodland and farmland. Most of the farmland areas are demarcated by hedgerows with standard trees. These habitats are located within and adjacent to the land required for the construction of the Proposed Scheme.
- 2.3.187 More specific areas include land north of Checkley Brook, woodland north of Checkley Lane and surrounding fields and water bodies south of Den Lane. The surrounding landscape comprises farmland with mature hedgerows.
- 2.3.188 Field surveys recorded at least eight species of bats in this area. The total bat assemblage is as follows:
- Common pipistrelle;
 - Soprano pipistrelle;
 - Brown long-eared bat;
 - Nathusius' pipistrelle;
 - Noctule;
 - Leisler's bat;
 - Serotine; and
 - Natterer's bat.

- 2.3.189 A further bat species, the Daubenton's bat, was identified to be present within this area along Basford Brook from the desk study.

Roosting (trees)

- 2.3.190 A total of 503 trees were subject to an initial ground based assessment and subsequent further detailed climbed surveys where appropriate in line with the methods described in the FSMS document.
- 2.3.191 Of the 503 trees that were initially assessed, the following results were obtained:
- a total of 191 trees as having high potential to support roosting bats;
 - a total of 220 trees as having moderate potential to support roosting bats; and
 - the remaining 92 trees were classified as having low or negligible potential to support roosting bats. These trees were subsequently scoped out of further survey.
- 2.3.192 Of the 411 trees assessed as having moderate or high potential to support roosting bats:
- a total of 130 were subject to further surveys in the form of a tree climbing inspection during which seven roosts were identified;
 - 66 were reassessed as having low to negligible potential to support roosting bats and were scoped out of further surveys; and
 - 64 trees were subject to emergence surveys during which a further four roosts were recorded. One tree supported two bat roosts (soprano pipistrelle and common pipistrelle). Forty-eight trees were surveyed via back-tracking and one roost was identified.
- 2.3.193 Five back-tracking surveys were undertaken in this area, although only one of the surveys found anything other than very low numbers of common species. Back-tracking surveys along Checkley Brook found low to moderate levels of commuting and foraging activity by individual common and soprano pipistrelles and *Myotis* species. Occasional passes by noctule and brown long-eared bats were also recorded. Behaviour indicating a possible noctule roost was recorded near a tree lining the brook where six noctules were seen flying away from the tree 20 minutes after sunset.
- 2.3.194 Details of confirmed tree roosts in this area of the route are provided in Table 42, tree roosts over 100m are provided in Table 43.

Table 42: Confirmed tree roosts within CA5

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance(m) from the Proposed Scheme
000-BT2-239020	North-east of Checkley Brook.	SJ748459	Pedunculate oak.	Unknown – droppings not viable.	4 August 2016, tree climbing.	Unknown.	Branch wound on south aspect of stem at 4m with droppings. Extends 300mm in and >1m up.	5	Within.
000-BT2-241034	South-east of Den Lane.	SJ738475	Sessile oak.	Species unknown, droppings not viable.	18 August 2016, tree climbing.	Feeding.	Branch cavity on top of branch with some opportunities for single bats, very old bat droppings.	5	Within.
000-BT3-246004	South-east of Weston Lane.	SJ722522	Pedunculate oak.	Noctule (2).	8 August 2016, tree emergence.	Summer.	Two noctule bats emerging from tree cavity.	5	Within.
000-BT3-246036	North-west of Larch Avenue.	SJ713523	Common alder.	Common pipistrelle (1),	12 September 2016, tree emergence.	Summer.	Tree with trunk cavities.	5	Within.
000-BT3-246063	South-west of A500.	SJ713525	Pedunculate oak.	Common (2) and soprano pipistrelle (2)	17 August 2016, tree re-entry.	Summer.	Two soprano pips returned followed by a common pip in a different area of the tree	5	Within.
000-BT2-245033	South-west of Chorlton Bank Farm.	SJ723513	Wild cherry.	<i>Pipistrellus</i> sp.	30 October 2016, tree climbing.	Unknown.	Pipistrelle bat present in branch wound at 3m on north aspect	5	26 north-east.
000-BT2-246071	North-east of Weston Lane.	SJ711524	Pedunculate oak.	Species unknown, DNA not viable.	13 December 2016, tree climbing.	Day/summer.	Knot-hole 6m south. Smooth substrate all the way to top. Small cluster of droppings half way up. Travels upwards for 3ft. Unable to get sample of droppings due to location, possible <i>Pipistrellus</i> species.	5	52 south-east.

Table 43: Confirmed tree roosts beyond 100m buffer in CA5

Ecology survey code	Location	OS grid reference	Tree species	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BT2-246026	North-east of Weston Lane.	SJ710521	Small-leaved lime.	Species unknown, DNA not viable.	12 December 2016, tree climbing.	Transitional.	Branch tear-out 6m west. Travels inwards for 8 inches. Conical in shape. Droppings found on entrance.	5	148 south-west.
000-BT2-244016	North-west of Chorlton Lane.	SJ721502	Pedunculate oak.	Species unknown, DNA not viable.	5 August 2016, tree climbing.	Transitional.	Approximately 50 droppings in the left hand cavity off a broken limb. Old droppings approx. 50 found in the left hand cavity.	5	218 south-west.
000-BT2-244037	North-west of Chorlton Lane.	SJ721502	Pedunculate oak.	Species unknown, DNA not viable.	21 October 2016, tree climbing.	Feeding.	Branch cavity from old tear out 20cm diameter upward facing offering a 4cm shelf at bottom for feeding but open, exposed. One dropping found old, disfigured. Feature probably been used as feeding platform.	5	251 south-west.

2.3.195 In addition to the tree roosts identified in Table 42 and Table 43, a summer noctule roost was detected via back-tracking surveys but not identified to a specific tree along Checkley Brook.

Back-tracking surveys

- 2.3.196 Back-tracking surveys were undertaken on 48 trees and one roost was identified.
- 2.3.197 Back tracking surveys along Checkley Brook found low levels of commuting and foraging activity by individual common and soprano pipistrelles and *Myotis* species. Occasional passes by noctule and brown long-eared bats were also recorded.
- 2.3.198 Land to the north of Checkley Lane supported moderate common pipistrelle commuting and foraging activity along the northern boundary with occasional *Myotis* species and noctule passes.

Roosting (buildings and structures)

- 2.3.199 No data on roosts found within buildings was present in the desk study records.
- 2.3.200 A total of 36 buildings were subject to initial inspections, resulting in the following:
- 16 buildings supported 21 bat roosts;
 - 12 buildings had high potential to support bats; and
 - eight buildings had moderate potential to support bats.
- 2.3.201 Of the 36 buildings confirmed as having roost or assessed as having high or moderate potential to support bats:
- 25 were subject to internal inspection resulting in 14 buildings supporting 17 roosts; and
 - 10 buildings were subject to a total of 12 emergence/re-entry surveys confirming four roosts in three buildings.
- 2.3.202 Details of confirmed roosts in buildings/structures in this area of the route are provided in Table 44, building roosts over 100m are provided in Table 45.

Table 44: Confirmed roosts in buildings and structures within CA5

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-245001	South-west of Chorlton Lane.	SJ724510.	Stable.	Brown long-eared bat (DNA), three to four bat droppings and moth wings found on floor amongst dust and straw.	19 July 2016, internal survey.	Feeding perch.	Wooden stable/ storage unit. Location of wings and droppings were under timber rafter.	5	Within.
000-BS1-245008	North-east of Back Lane.	SJ717512.	Stable.	Brown long-eared bat (visual dropping ID). A few droppings and moth wings/feeding remains.	19 July 2016, internal survey.	Feeding perch/ night.	Stable building, wooden with breeze block base.	5	9 south-east.
000-BS1-246001	South-east of Casey Lane.	SJ721518.	Stable.	Brown long-eared bat feeding perches, presence of feeding remains and some droppings (17 to 22 + 25).	15 September 2016, internal survey.	Feeding perch.	Block of 26 stables arranged in a 'U' shape. Block walled with tiled, pitched roof. No ceiling - single void, floor to roof. Roofs interconnected. Less than 40 years old.	5	10 north-east.
000-BS1-245005	South-west of Chorlton Bank Farm.	SJ723513.	Garage.	Brown long-eared (visual dropping ID).	5 October 2016, internal survey.	Night.	Droppings found within garage on top of parked car.	5	14 north-west.
000-BS1-245007	South-west of Chorlton Bank Farm.	SJ723513.	Barn.	Possible brown long-eared (visual dropping ID).	5 October 2016, internal survey.	Feeding perch.	Access with suitable feeding perches within barn.	5	17 north-west.
000-BS1-245004	North-west of Chorlton Bank Farm.	SJ723513.	Residential.	Possible brown long-eared (visual dropping ID). Garage section of the building had approx. 30 long-eared droppings.	5 October 2016, internal survey.	Night.	Roosting opportunities in the garage consist of perches from the roof timbers or the internal felting.	5	16 south-east.

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-240001	North-west of Checkley Lane.	SJ743463	Residential	Common pipistrelle (1).	25 July 2016 , building emergence.	Day.	1902 detached Brick built house. Common pipistrelle flew out eastern side of building.	5	17 north-west.
000-BS1-239001	South-east of Checkley Lane.	SJ749466	Residential	Unknown species, DNA not viable.	3 August 2016, internal survey.	Day.	1902 Detached Brick built house. Droppings found on cobweb over gable end.	5	26 south-east.
000-BS1-246011	North-west of Weston Lane.	SJ721523	Residential	Brown long-eared bat, Natterer's bat (identified from DNA), common pipistrelle (5) and soprano pipistrelle (1) identified from emergence/re-entry surveys.	8 August 2016, internal survey.	Day/summer.	Emergence of bats from multiple locations and four different species recorded roosting within the complex building. Multiple roof voids and areas to roost.	5	30 north-west.
000-BS1-241001	South-east of Mill Lane.	SJ730475	Residential	Unknown.	26 October 2016, internal survey.	Unknown.	Red brick wall construction with dark clay pan tile roof covering, ridges and verges appear to be dry. No internal access but pest control confirmed bat presence when undertaking a wasp nest removal.	5	41 south-west.
000-BS1-246010	North-west of Weston Lane.	SJ720523	Barn	Brown long-eared bat (DNA and emergence (1)), common pipistrelle emergence (14). There were extensive signs of feeding perches and use by long-eared bats (moth and butterfly wings). 100+ droppings.	8 August 2016, internal survey.	Feeding/day/summer.	Modern barn with wooden timber trusses on the internal walls and at roof level.	5	51 north-west.
000-BS1-246007	South-west of Basford Brook And Mere Gutter.	SJ723523	Shed	Unknown, droppings found inside the barn, not viable for DNA.	3 August 2016, internal survey.	Feeding perch.	Wooden shed suitable for foraging bats.	5	99 north-east.

Table 45: Confirmed roosts in buildings and structures beyond 100m buffer in CA5

Ecology survey code	Location	OS grid reference	Building / structure type	Species confirmed as utilising roost and (peak count)	Date of peak count and nature of survey	Roost type	Roost description	CA	Approximate distance (m) from the Proposed Scheme
000-BS1-246016	North-east of Weston Lane.	SJ712521	Barn	Pipistrelle sp. and brown long-eared bat (visual dropping ID).	2 August 2016, internal survey.	Day.	Ground floor (open section) Scattered Pipistrelle droppings and approx. 20 brown long-eared droppings below ridge.	5	134 south-west.
000-BS1-246009	South-east of Weston Lane.	SJ724523	Residential	Brown long-eared bat (in situ). Two hundred droppings different ages.	3 August 2016, internal survey.	Day/summer.	Brick house, one brown long-eared male bat roosting along the ridge beam.	5	153 north-east.
000-BS1-246017	North-east of Weston Lane.	SJ712521	Residential	Brown long-eared bat (visual dropping ID.)	5 October 2016, internal survey.	Night.	Farmhouse. The only roosting point is hanging from the common rafters.	5	156 south-east.
000-BS1-246004	South-east of Back Lane.	SJ716519	Barn	Brown long-eared bats, in-situ (3).	29 September 2016, internal building survey.	Transitional/ day feeding.	Three bats in-situ along ridge beam in two locations. Many gaps in brickwork and where timbers enter walls with potential for hidden hibernating bats.	5	291 south-west.

Bat activity surveys

2.3.203 The following eight species have been recorded during the range of bat activity surveys conducted in the survey area:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- Brown long-eared bat;
- *Myotis* species;
- Leisler's bat;
- Noctule; and
- Serotine.

Table 46: Bat activity surveys conducted within CA5

Ecology survey code	Transect location	Numbers of surveys conducted	First survey date	Final survey date	CA	Map reference
000-BA1-239001, 000-BA1-239002	17	3	24 May 2016	6 June 2016	5	EC-06-335, EC-06-336a, EC-06-336b
000-BA1-240001	19	4	31 May 2016	4 August 2016	5	EC-06-336a, EC-06-336b, EC-06-337
000-BA1-243001, 000-BA1-243002	21 (replacing transect 17 and 19)	3	28 September 2016	29 October 2016	5	EC-06-338, EC-06-339

Table 47: Bat activity transect survey results for Transect 17

Ecology survey code	Transect location				Description of habitats covered by transect																
	Land north of Checkley Brook, south-east of Checkley Lane.				Ponds surrounded with trees, hedgerows connecting Checkley Brook to surrounding areas.																
Visit number and date	Weather conditions				Total species passes during transect survey																
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
Visit 1: Dusk: 24 May 2016	14	2	0	1	98	59		19							5	1		1			1
Visit 2: Dusk: 22 June 2016	18	2	0	1	52	25									1			1			1
Visit 3: Dusk: 6 July 2016	19	8	0	0	67	13												2			

2.3.204 Low to moderate numbers of common and soprano pipistrelles were detected in this location between May and July 2016. The maximum passes of both of these bat species were detected in May 2016 with 98ppn for common pipistrelle and 59ppn for soprano pipistrelle. A low number of non-defined pipistrelle species passes (19ppn) were also recorded in May 2016. Low numbers of *Myotis* species and noctules were only present in May 2016 (5ppn) and July 2016 (2ppn) respectively. Solitary passes of brown long-eared bats and *Nyctalus/Eptesicus* occurred in both May and June 2016.

Table 48: Bat activity transect survey results for Transect 19

Ecology survey code	Transect location				Description of habitats covered by transect																
	Land north of Checkley Lane.				Small woodland with well-connected to the surrounding landscape by hedgerows and tree-lined country roads.																
Visit number and date	Weather conditions				Total species passes during transect survey																
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es
Visit 1: Dusk: 31 May 2016	16	8	0	3	44	35		10							2			9		20	10
Visit 2: Dusk: 22 June 2016	18	2	0	1	154	77		4						3	4					1	
Visit 3: Dusk: 7 July 2016	18	7	0	2	34	1		21													
Visit 4: Dusk: 4 August 2016	18	4	0	2	55	26		3						7	3			3			

2.3.205 Low to high numbers of common and soprano pipistrelles were detected in this location with maximum passes of each in June 2016 of 154ppn and 77ppn respectively. There were low to moderate numbers of non-defined pipistrelle species between May and July 2016 with a peak of 21ppn in July 2016. *Myotis* species, brown long-eared bats and noctules were present in May and June 2016 in very low numbers, the latter peaking in June 2016 with 9ppn. Serotines and *Nyctalus/Eptesicus* were only detected May 2016 with 20ppn and 10ppn respectively. In August 2016 low to moderate activity levels of common and soprano pipistrelle were recorded (55ppn and 26ppn respectively). Low activity levels of other pipistrelle species, *Myotis* species, brown long-eared bats and noctules were also recorded in the area.

Table 49: Bat activity transect survey results for Transect 21 (to replace transect 17)

Ecology survey code	Transect location				Description of habitats covered by transect																	
	Land south of Chorlton.				Arable field with improved grassland, ponds with trees and tree-lined hedgerows providing connectivity across the route.																	
Visit number and date	Weather conditions				Total species passes during transect survey																	
	Temp (°C)	Cloud (0-8)	Rain (0-5)	Wind (0-12)	Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es	
Visit 1: Dusk: 28 September 2016	17	7	0	6	69	23										2						
Visit 2: Dusk: 29 September 2016	16	6	0	4	22	33										1						
Visit 3: Dusk: 28 October 2016	15	6	0	0	83	68		47								1						

2.3.206 Low to moderate numbers of common and soprano pipistrelles were present over September and October 2016 at this location. Peak passes of both species occurred in October 2016 and also non-defined pipistrelle species. The only other bat species present was brown long-eared bats in very low numbers (1-2ppn).

Table 50: Summary of static detector monitoring results for Transect 17

Ecology survey code	Location	OS Grid	Description of habitats covered by transect																
000-BA2-239001	Land north of Checkley Brook.	SJ 749459	Log pile adjacent to Checkley Brook.																
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																	
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es	
22 June 2016 to 26 June 2016	5	531	620		156							11	9		2				
1 August 2016 to 5 August 2016	4	668	106		5														

2.3.207 The highest numbers of bat passes at the location north of Checkley Brook were common, soprano and non-defined pipistrelle species with high peak values of 668ppn and 620ppn. Also present were low numbers of *Myotis* species, brown long-eared bats and noctules in June 2016 with maxima of 11ppn, 9ppn and 2ppn respectively.

Table 51: Summary of static detector monitoring results for Transect 19

Ecology survey code	Location	OS Grid	Description of habitats covered by transect																
000-BA2-240001	Land north of Checkley Lane.	SJ 744466	On the northern edge of the woodland.																
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																	
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es	
7 July 2016 to 12 July 2016	5	228	360	1	10							42	11		2	2			

2.3.208 At the location north of Checkley Lane common and soprano pipistrelle species recorded high levels of activity with peaks of 228ppn and 360ppn respectively in July 2016. Low to moderate passes of *Myotis* species and brown long-eared bats were also recorded with maxima of 42ppn and 11ppn respectively. Also present in very low numbers were non-defined pipistrelle species, noctules and Leisler's bat with peaks of 10ppn, 2ppn and 2ppn respectively. There was also a solitary pass of a Nathusius' pipistrelle.

Table 52: Summary of static detector monitoring results for Transect 21

Ecology survey code	Location	OS Grid	Description of habitats covered by transect																
000-BA2-243001	Land south of Chorlton.	SJ 727497	Adjacent to pond with trees.																
Date (night monitoring commenced to night monitoring ceased)	Number of nights detector deployed	Species peak night count during monthly monitoring																	
		Pp	Ppy	Pn	P.sp	Mb	Md	Mn	Mm	Mbr	Mm/Mbr	M.sp	Pa	Bb	Nn	NI	Es	Ny/Es	
28 September 2016 to 1 October 2016	3	1268	39		1							9	2						
18 October 2016 to 21 October 2016	3	1156	143									1	1						

2.3.209 At this location common and soprano pipistrelle were detected the most often with the peak values of 1268ppn and 143ppn respectively in September and October 2016. Very low levels of *Myotis* species and brown long-eared bats were also present with maximum passes of 9ppn and 2ppn respectively in September 2016. Additionally a solitary non-defined pipistrelle species pass was detected in September 2016.

Discussion

Bat assemblage

- 2.3.210 Field surveys carried out in 2016 confirmed the presence of eight bat species including rarer species; Nathusius' pipistrelle, Natterer's bat, Leisler's bat, noctule and serotine.
- 2.3.211 Common and widespread species including common pipistrelle and soprano pipistrelle were the most recorded in CA5 with moderate levels of activity recorded in most areas during walked transects and high numbers of passes recorded on static detectors at all locations.
- 2.3.212 The transect north of Checkley brook recorded low levels of *Myotis* species, brown long-eared bats, and noctule. The transect north of Checkley Lane recorded low activity of rarer species namely noctule, Leisler's bat and serotine and *Myotis* species.
- 2.3.213 In arable fields south of Chorlton very high activity of common pipistrelles were recorded on the static detector with over 1000 passes during one night recorded in September and October 2016. Low numbers of *Myotis* species and brown long-eared bat were recorded in this area.
- 2.3.214 Brown long-eared roosts were recorded in eleven buildings across CA5 and are considered to be using the area in relatively high numbers but are under-recorded due to their quiet and infrequent calls.
- 2.3.215 The rarer bat species were all recorded in low numbers, with many recording single passes.
- 2.3.216 Desk studies provided evidence of Daubenton's bat along Basford Brook west of Weston.

Roosts

- 2.3.217 Ten trees were identified as support roosting bats across CA5, and a noctule roost within the Checkley Brook area was identified. Four of these tree supported summer roosts of common pipistrelle, soprano pipistrelle, and noctule. Six roosts have unidentified species due to the DNA not being viable for analysis.
- 2.3.218 Seven of the tree roosts were identified through climbing surveys, three were from emergence surveys and one was from a back-tracking survey. All these roosts recorded low numbers of individual bats.
- 2.3.219 Land south of Den Lane supported a summer roost of an unknown species. Two trees located in land to the north of Weston Lane, east of Shavington Hall supported a feeding roost and a summer roost of an unknown bat species.
- 2.3.220 Two trees in land west of Swill Brook supported unknown summer roosts.
- 2.3.221 Three trees north of Basford town south of the A500 supported four roosts, one noctule summer roost, one common pipistrelle roost, and one of the trees supported a common and a soprano pipistrelle summer roost.
- 2.3.222 A tree near Basford House supported a non-defined pipistrelle summer roost.

- 2.3.223 A total of 21 roosts were located in 16 buildings across CA5. One building, Dairy House, north of Weston Lane, which is outside the land required for construction but within 100m of the Proposed Scheme supported four different species; brown long-eared bat, common pipistrelle, soprano pipistrelle and the rarer Natterer's bat and had approximately 15 sightings of bats emerging. The barn adjacent to this building also supported 14 roosting common pipistrelle bats and one brown long-eared bat.
- 2.3.224 Overall no maternity roosts of rarer bat species have been recorded in CA5 however not all surveys are completed and not all trees/buildings accessible.

Foraging habitat

- 2.3.225 The landscape in this area comprises farmland with small areas of woodland, watercourses, water bodies and established hedgerows. Watercourses that provide foraging habitat include Checkley Brook, Basford Brook and Swill Brook. Moderate populations of rarer bat species (including Nathusius' bat, noctule, Leisler's, serotine, and *Myotis* species) are known to be present in this area from field surveys and could utilise these habitats for foraging, Checkley Brook is assumed to be a key foraging area due to the habitats it supports.
- 2.3.226 Serotine was recorded in low numbers in May 2016 near the woodland north of Checkley Lane.
- 2.3.227 The transect south of Chorlton only support common species in low to moderate numbers.

Commuting habitat

- 2.3.228 The hedgerow network in this area is well established and has some connected links to other suitable bat habitat. Along with the watercourses cited above, it provides an extensive network of habitat features suitable for commuting bats. Activity levels along Checkley Brook were moderately low. Checkley Brook is assumed to be a key commuting route for bats due to the habitats it supports.


3 References

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