

West Burton C (Gas Fired Generating Station)

Appendix 9G: Bat Survey Report

EDF Energy (Thermal Generation) Limited

Project Number: 60572265

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1. Introduction

1.1 Background

- 1.1.1 AECOM was commissioned to complete a suite of bat surveys to inform the Ecological Impact Assessment (EclA) for the Proposed Development.
- 1.1.2 Suitable habitat for bats, such as woodland and wetland, was identified within and adjacent to the Proposed Development Site during an extended Phase 1 Habitat survey completed in February 2017 as part of the initial Preliminary Ecological Appraisal (PEA) (updated December 2017, May 2018 and January 2019 and presented in **Appendix 9C**, ES Volume II).
- 1.1.3 A suite of bat roost assessment and bat activity surveys were subsequently completed to gather baseline information on the status and distribution of bats within the zone of influence of the Proposed Development to inform an assessment of the potential impacts and effects.
- 1.1.4 This report describes the approach and findings of these bat surveys and provides an assessment of relative nature conservation value to inform the EclA. The terms of reference used in this report to describe the different elements of the Proposed Development are consistent with those defined within the main chapters of the ES (Volume I). However, for the purposes of this report, 'the Site' refers to all parts of the Proposed Development, excluding areas proposed for landscaping and biodiversity management and enhancement, as described within **Chapter 3: Description of the Site** (ES Volume I) and illustrated on **Figure 3.3** (ES Volume III). The landscaping and biodiversity management and enhancement areas would not be impacted in the same way as other parts of the Proposed Development and they fall outside the scope of this report.

1.2 Scope of Works

- 1.2.1 The following scope of bat survey work was identified as necessary during the PEA:
- preliminary bat roost assessment of all buildings and trees that would be impacted (directly or indirectly) by the Proposed Development to determine their suitability for roosting bats;
 - bat emergence and/or re-entry surveys of any buildings or trees identified during the preliminary bat roost assessment as having the potential to support roosting bats; and
 - bat activity surveys (walked transects and automated detector surveys) of suitable habitats within and adjacent to the Site to identify the bat species present and the levels and patterns of bat activity.

1.3 Relevant Legislation

- 1.3.1 The Wildlife and Countryside Act 1981 (as amended) (Ref 9G-1) Schedule 5 (animals) confers protection to all species of bat and their roosts (whether occupied or not). This Act has been amended several times by Orders and by primary legislation (e.g. Countryside and Rights of Way Act 2000 (Ref 9G-2); Natural Environment and Rural Communities Act 2006) (Ref 9G-3).
- 1.3.2 In addition, The Conservation of Habitats and Species and Planning (Various Amendments) (England and Wales) Regulations 2018 (the 'Habitats Regulations') (Ref 9G-4) transposes the European Union Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (the 'Habitats Directive') into domestic legislation, and places an obligation on the UK to protect bats and their habitats, and requires appropriate monitoring of bat populations to be undertaken.
- 1.3.3 All species of bat in the UK are afforded protection under the Habitats Regulations and it is an offence to intentionally kill, injure or disturb bats, to damage/destroy a place used by bats for shelter (regardless of whether bats are in occupation at the time), or intentionally or recklessly obstruct access to a bat roost. Works that are considered to result in disturbance to bats and/or bat roosts can apply for derogation to the Habitats Regulations through the European Protected Species Mitigation (EPSM) licensing scheme regulated by Natural England.

2. Methodology

2.1 Desk Study

2.1.1 The following sources of information were used to gain background information on bats in the vicinity of the Proposed Development:

- Nottinghamshire Biological and Geological Record Centre and Lincolnshire Environmental Records Centre - protected species records within 2km of the Site (including Nottinghamshire Bat Group and Lincolnshire Bat Group records; and
- Multi-Agency Geographic Information for the Countryside (MAGIC) website - information on granted EPSM licences for bats issued by Natural England within 2km of the Site.

2.2 Preliminary Bat Roost Assessment

2.2.1 All buildings and trees that could potentially be directly or indirectly impacted by the Proposed Development were appraised for their potential to support roosting bats by a suitably experienced and licensed AECOM ecologist during the extended Phase 1 Habitat survey in February 2017. This followed current best practice survey methodology (Ref 9G-5 and Ref 9G-6) and comprised a ground based visual inspection using close focussing binoculars and a high-powered torch for features of potential value to roosting bats, such as sheltered crevices, cavities and voids, as well as any evidence of bat presence such as bat droppings. A comprehensive list of suitable features in buildings and trees is provided in **Table A1** in Annex A.

2.2.2 Based on the results of the visual inspections, buildings and trees were categorised as having negligible, low, moderate or high suitability for roosting bats, in accordance with the criteria detailed in **Table A2** in Annex A. This categorisation informs the level of further survey effort that may be required to establish the presence or likely absence of roosting bats, as set out in best practice guidance (Ref 9G-6).

2.3 Bat Roost Emergence/Re-entry Surveys

2.3.1 Dusk emergence and dawn re-entry surveys were undertaken at a group of dead trees identified as having high potential to support roosting bats during the preliminary bat roost assessment. This involved continuously monitoring trees for bats emerging from roosts at dusk, or returning to roosts at dawn. Three separate surveys were completed during the period when bats are most active (May to September) in accordance with best practice (Ref 9G-6).

2.3.2 Dusk surveys were completed between 15 minutes prior to sunset and 90 minutes after sunset. Dawn surveys commenced 90 minutes before sunrise and ended 15 minutes after sunrise. All surveys were completed in suitable weather conditions (no rain or strong winds). Batbox Duet detectors were

used during the surveys and recordings were made on SM2BAT+ devices. Survey dates and weather conditions are summarised in **Table 1**.

Table 1: Bat roost emergence/re-entry survey dates and weather conditions

Dates	Survey type	Sunset/Sunrise time	Temperature	Weather conditions
4 th July 2017	Dusk emergence	21.32	18°C	Dry, overcast, no wind
1 st August 2017	Dawn re-entry	05.18	12°C	Dry, cloudy, light wind
24 th August 2017	Dawn re-entry	05.58	15°C	Dry, clear sky, no wind

2.4 Bat Activity Surveys

2.4.1 The habitats associated with the Proposed Development were appraised to have moderate suitability for foraging and commuting bats in accordance with criteria set out in best practice guidance (Ref 9G-6). Habitats to be affected largely comprise areas of seeded semi-improved neutral grassland and young planted scrub/trees bordered by blocks of semi-mature plantation broad-leaved woodland and areas of more mature woodland and wetland within adjacent Local Wildlife Sites (LWS).

2.4.2 In accordance with best practice guidance (Ref 9G-6), a combination of walked transect surveys and automated detector surveys were used to characterise bat activity within and adjacent to the Site.

Walked Transect Surveys

2.4.3 Walked transect surveys were undertaken at dusk on a monthly basis between May and September 2017. During August, a transect survey was also completed at dawn following the dusk transect survey. Each dusk survey commenced at around sunset and lasted for at least two hours; this coincides with peak activity periods as bats emerge and disperse from their roosts. The pre-dawn survey commenced two hours before sunrise and finished at around sunrise to coincide with peak activity before bats return to roost sites.

2.4.4 The surveys involved walking a defined transect route that provided representative coverage of the habitats of potential value to bats (see **Figure 9G.2**). The transect route was walked at a steady speed and bat activity was continuously monitored and recorded using full spectrum detectors (Batlogger M or combination of Batbox Duet and SM2BAT+). The transect route was reversed between survey visits in order to sample different areas

of the Site at different times of night, which reduces the likelihood that bat activity at a particular location and time will be overlooked.

2.4.5 Identification of bats during transect surveys was later verified by analysing bat call recordings using BatSound v4.2 and AnalookW software. Reference was made to bat call identification guidance (Ref 9G-7) where necessary, and calls were verified in accordance with AECOM technical review procedures (Ref 9G-5).

2.4.6 All survey visits were completed during suitable weather conditions (no rain or strong wind, temperature above 10°C). The dates and weather conditions during each of the transect surveys are provided in **Table 2**.

Table 2: Bat activity transect survey dates and weather conditions

Month	Dates	Survey type	Temperature	Weather
May	16 th May 2017	Dusk transect	16°C	Dry, overcast, rain during day and previous evening
June	21 st June 2017	Dusk transect	22°C	Warm period, heatwave previous weekend, cloudy
July	19 th July 2017	Dusk transect	21°C	Warm, damp, humid (thunderstorms after dry weather)
August	17 th August 2017	Dusk transect	18°C	Heavy rain just before start of survey, dry during survey, heavy rain previous night
	18 th August 2017	Dawn transect	16°C	Dry, heavy rain showers previous evening
September	19 th September 2017	Dusk transect	17°C	Clear night, warm, very little wind

Automated Detector Surveys

2.4.7 Automated detector surveys were undertaken at the following two locations, which were considered to be representative of the main habitats of value to bats within and adjacent to the Site. The automated detector locations are also shown on **Figure 9G.2**.

- location 1 - at the edge of a block of semi-mature broad-leaved woodland in the north of the Proposed Power Plant Site; and
- location 2 – on the edge of woodland associated with West Burton Power Station LWS to the east of the Site.

2.4.8 Automated monitoring was undertaken for a period of at least five nights per month between May and September 2017 at both locations.

2.4.9 Data was collected using SM2BAT+ automated bat detectors. These were set to start recording half an hour before sunset and to stop recording half an hour after sunrise. Bat calls were recorded in WAV format.

2.4.10 Typically the automated detectors were left to run for longer than required to compensate for any nights when conditions were suboptimal for bats e.g. cold, windy or wet. Data recorded on these nights was excluded from further analysis. The survey dates and associated environmental conditions are summarised in **Table 3** (minimum and maximum temperatures are logged automatically by the device whilst it is activated, so a range of temperatures for each monitoring period is provided).

Table 3: Automated Detector Survey Dates and Temperatures

Month	Dates	Temperature range
May	16-20 May 2017	8°C - 20°C
June	22-26 June 2017	9°C - 19°C
July	19-23 July 2017	13°C - 29°C
August	17-21 August 2017	11°C - 25°C
September	19-23 September 2017	6°C - 21°C

2.4.11 Bat call recordings made by automated detectors were later analysed using AnlookW software. This provides information on the species present at each location, as well as the number and timing of bat passes. A bat pass is defined as a single automated detector file made up of bat pulses of a single species; this can be one bat in a file or many bats in a file. The number of passes recorded on automated detectors gives an indication of the level of bat activity at a given location, but this cannot be reliably correlated to actual bat abundance because there is no observational context. Data derived from automated detectors needs to be contextualised using information gathered during bat transect surveys.

2.4.12 For the purposes of analysis, bat activity has been quantified using the average (mean) number of bat passes per hour of night (actual number of hours between sunset and sunrise). There is currently no published guidance on the categorisation of bat activity levels based on the number of bat passes. The following scale has been used in this report:

- Very Low Activity = mean of <2 passes per hour (at each survey location);
- Low Activity = mean of 2 to 25 passes per hour;
- Moderate Activity = mean of 26 to 99 passes per hour; and
- High Activity = mean of over 100 passes per hour.

2.5 Determination of Nature Conservation Value

- 2.5.1 The relative value of the bat species assemblage associated with the Site has been determined using the principles described in *Valuing Bats in Ecological Impact Assessment* (Ref 9G-8), as well as criteria within guidelines for the selection of LWS in Nottinghamshire (Ref 9G-9).

2.6 Limitations

- 2.6.1 The preliminary roost assessment of buildings was limited to an external inspection only in most cases. However, this is not considered to be a limitation as the buildings present have no internal features suitable for roosting, such as enclosed voids, and an accurate assessment of suitability could be made from the external appraisal alone.
- 2.6.2 Detailed inspections of all buildings within West Burton B (WBB) Power Station (labelled Building 1 in this report) were not undertaken. These comprise modern, pre-fabricated buildings and structures that do not provide suitable conditions for bat roosting. In addition, whilst many of these buildings fall within the Site boundary, they are unlikely to be significantly impacted by the Proposed Development.
- 2.6.3 The automated detector at Location 1 only recorded for 1 night during the June monitoring period and for 3.5 nights during the August monitoring period, resulting in a smaller data set during these months. However, this is not considered to significantly constrain the overall findings of the survey as good quality data was collected in all other months at Location 1, and across all months at Location 2, allowing the bat species and levels of activity at the Site to be accurately characterised.
- 2.6.4 The identification of bat echolocation calls recorded by bat detectors is not always possible due to poor quality recordings, which can be a result of bats recorded at distance, interference caused by weather or bats altering their call in response to different environmental factors. In addition, species identification within a genus is not always possible due to the similar echolocation call characteristics of closely related bat species; this is particularly true for different species within the *Myotis* genus. When identification to species level cannot be accurately made, calls are identified to genus level (for example, *Myotis* species) or as 'Unknown'.

3. Results

3.1 Desk Study

- 3.1.1 Local record centre data from Nottinghamshire and Lincolnshire reveal that at least four bat species have been recorded within a 2km radius of the Site in the recent past (last 10 years), including common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), noctule (*Nyctalus noctula*) and Daubenton's bat (*Myotis daubentonii*). All records relate to foraging activity by bats; no details of roosts were included in the data.
- 3.1.2 There are two records from the wider West Burton Power Station site, where common pipistrelle, soprano pipistrelle and an unidentified bat in the *Myotis* genus were recorded foraging over water bodies in 2008. All other records are from areas outside the power station.
- 3.1.3 No EPSM licences for bats have been issued by Natural England within 2km of the Site.

3.2 Preliminary Bat Roost Assessment

Buildings

- 3.2.1 The majority of buildings located within or directly adjacent to the Site are associated with WBB Power Station and comprise a range of modern, pre-fabricated buildings, warehouses and other structures. Other buildings associated with the Site, outside the WBB Power Station boundary, include brick and sheet material electricity sub-station and pumphouse buildings, pre-fabricated warehouses, and an open sided steel framed barn.
- 3.2.2 No potential roosting features were identified on any of the buildings surveyed and as a result all were appraised to have negligible suitability for roosting bats. Full results of the preliminary bat roost assessment of buildings, including photographs, are provided in **Table B1** in Annex B. Building locations are shown on **Figure 9G.1**.
- 3.2.3 As no potential roosting features were found on the buildings, no further bat roost surveys of buildings were necessary.

Trees

- 3.2.4 A group of dead willow (*Salix* sp.) trees located directly adjacent to the northern drainage connection corridor were assessed as having high suitability for roosting bats, due to the presence of multiple features such as woodpecker holes, splits and flaking bark. Full results of the preliminary assessments of these trees, including photographs, are provided in **Table B3** in Annex B and their locations are shown on **Figure 9G.1**.

3.2.5 No potential roosting features were identified on any other trees within or directly adjacent to the Site. Most trees associated with the Site are young or semi-mature in age and have therefore not developed features of potential value to roosting bats. More mature trees, mainly comprising willow, are present within West Burton Power Station LWS to the east of the Site, but the majority of these are located away from the Site boundary and are unlikely to be impacted. The small number of trees within or in close proximity to the Site were found to have no potential roosting features.

3.3 Bat Roost Emergence/Re-entry Surveys

3.3.1 No bats were recorded emerging from or re-entering any of the features within the group of dead trees during any of the dusk or dawn roost surveys completed.

3.4 Bat Activity Surveys

Walked Transect Surveys

3.4.1 The results of the bat activity transects are summarised below. Raw survey data is provided in **Tables B3 – B8** in Annex B and on **Figures 9G.2 – 9G.8**.

3.4.2 Foraging activity by common and soprano pipistrelle bats was recorded consistently during the surveys, mainly in association with wooded areas or tree lines within or adjacent to the Site. Most registrations were of individual bats, but two or three bats were observed foraging together on occasions. Levels of activity observed ranged from single passes to continuous foraging activity. Across the survey period, bats were regularly observed foraging up and down a glade between a line of Lombardy poplar (*Populus nigra italica*) trees and an area of plantation woodland to the south of the Site, as well as along the edge of areas of dense scrub and woodland to the east of the Site.

3.4.3 Single passes by a noctule bat and a bat in the *Myotis* genus were also recorded during the surveys. No obvious commuting activity was observed during any of the transect surveys, such as repeated movements of bats in one direction along a feature.

Automated Detector Surveys

3.4.4 A summary of the bat species and levels of activity recorded at each automated detector location is provided below and within **Table 4**. Full results of the automated detector surveys are provided in **Tables B9 – B13** in Annex B.

3.4.5 Analysis of bat call recordings from the automated detectors revealed the presence of at least seven bat species at the Site. The vast majority of recordings at both locations were of common and soprano pipistrelle bats. A very small number of recordings were made of noctule, Leisler's (*Nyctalus leisleri*), brown long-eared (*Plecotus auritus*) and unidentified bats in the

Myotis genus. Single recordings were also made of Nathusius' pipistrelle (*Pipistrellus nathusii*) in May and Daubenton's bat in June.

3.4.6 At Location 1, indicative bat activity levels ranged from low in May, to moderate in July and September and high in June and August. The majority of bat activity at this location was by soprano pipistrelle bats.

3.4.7 At Location 2, indicative bat activity levels increased through the survey period from very low in May, to low in June and July, and moderate in August and September. Activity was more evenly spread between common and soprano pipistrelles, but many calls could not be split between the two species.

3.4.8 Levels of bat activity at both locations often fluctuated markedly on consecutive nights, for example from low activity (2-25 passes per hour) to high activity (over 100 passes per hour).

Table 4: Summary of automated detector survey results

Month	Number of Passes per Bat Species (total over 5 nights)											Total bat passes (over 5 nights)	Bat Activity (passes/hour, mean of 5 nights)	Indicative Bat Activity Level
	Common pipistrelle	Soprano pipistrelle	Pipistrelle sp	Nathusius' pipistrelle	Noctule	Leisler	Nyctalus sp	Daubenton's	Myotis sp.	Brown Long Eared	Unknown			
Location 1														
May	161	15	8	0	4	0	0	0	0	0	0	188	4.69	Low
June	255	861	0	0	0	0	0	0	0	0	0	1116 ¹	159.4 ¹	High
July	244	1086	7	0	2	0	0	0	0	0	0	1339	34.53	Moderate
August	149	4340	560	0	4	1	0	0	7	1	0	5062 ²	159.4 ²	High
September	33	1797	99	0	2	0	0	0	1	1	0	1933	33.23	Moderate
Location 2														
May	51	0	2	1	1	2	0	0	1	0	1	59	1.49	Very low
June	68	178	18	0	0	2	0	1	6	0	0	273	7.77	Low
July	217	93	206	0	2	2	0	0	3	0	0	523	13.40	Low

¹ Based on 1 night of data

² Based on 3.5 nights of data

Month	Number of Passes per Bat Species (total over 5 nights)											Total bat passes (over 5 nights)	Bat Activity (passes/hour, mean of 5 nights)	Indicative Bat Activity Level
	Common pipistrelle	Soprano pipistrelle	Pipistrelle sp	Nathusius' pipistrelle	Noctule	Leisler	Nyctalus sp	Daubenton's	Myotis sp.	Brown Long Eared	Unknown			
August	177	471	894	0	5	4	0	0	25	0	0	1576	32.93	Moderate
September	96	542	1448	0	1	2	2	0	24	2	0	2117	36.13	Moderate

4. Discussion

4.1 Bat Roosting

4.1.1 No evidence of bat roosting activity was found within any of the buildings or trees that may be impacted by the Proposed Development. However, there is a possibility that the group of dead trees with potential roosting features to the north of the Site may be used in the future by roosting bats. Repeat surveys of these trees would, therefore, be required prior to construction to confirm presence or likely absence of bats.

4.2 Bat Activity

4.2.1 A combination of walked bat activity transects and automated detector surveys identified at least seven bat species using habitats associated with the Site. The vast majority of activity was by common and soprano pipistrelle bats, which are both common in Nottinghamshire (Ref 9G-9). Very low levels of activity were recorded by all other species, which include those that are considered to be common (noctule, brown long-eared, Daubenton's bat), scarce (Leisler's bat) and rare (Nathusius' pipistrelle) in Nottinghamshire (Ref 9G-9). Nathusius' pipistrelle was only recorded on a single occasion in May; this is likely to have been an individual migrating through the area as Nathusius' pipistrelle is a migratory species not known to be permanently resident in Nottinghamshire (Ref 9G-9). Daubenton's bat was also only definitively recorded on a single occasion, based on echolocation call characteristics, but many of the unidentified *Myotis* bat calls are likely to have been made by this species.

4.2.2 Average levels of bat activity recorded on automated detectors were low to moderate in most months and this is consistent with the observations of bat activity made during transect surveys. High levels of bat activity, mostly attributed to soprano pipistrelle, were recorded in June and August at Location 1; this is considered likely to be the result of regular or continuous foraging activity by a small number of bats in this area, based on observational data from the transect surveys, rather than indicating the presence of a large number of bats.

4.2.3 Levels of bat activity recorded on automated detectors often changed markedly on consecutive nights and this was likely a response to changes in local conditions (for example, wind speed and direction) and the resulting effect of this on the availability of invertebrate prey. The high levels of bat activity recorded at times during the monitoring period are considered to represent opportunistic foraging activity by bats when conditions were optimal for flying invertebrates, rather than reflecting a high level of importance of the habitats present for foraging bats.

4.3 Nature Conservation Value

4.3.1 Using the scoring system recommended in Wray et al (2010) (Ref 9G-8), the bat species assemblage at the Site is valued at a District/Local level. The determination of value using this system is summarised in **Table 5** and further details are provided in Annex C.

Table 5: The relative value of the bat species assemblage at the site using Wray et al (2010) (Ref 9G-8)

Species	Rarity	Number of bats	Roosts/potential roost nearby	Foraging Habitat Characteristics	Score	Value
Common pipistrelle	Common (2)	Small number (10)	Small number ³ (3)	Larger or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)	2+10+3+4=19	District / Local
Soprano pipistrelle	Common (2)	Small number (10)	Small number ³ (3)		2+10+3+4=19	District / Local
Nathusius' pipistrelle	Rarer (5)	Individual (5)	Small number ³ (3)		5+5+3+4=17	District / Local
Noctule	Rarer (5)	Individual (5)	Small number ³ (3)		5+5+3+4=17	District / Local
Leisler's	Rarer (5)	Individual (5)	Small number ³ (3)		5+5+3+4=17	District / Local
Daubenton's	Rarer (5)	Individual (5)	Small number ³ (3)		5+5+3+4=17	District / Local
<i>Myotis</i> species	Rarer (5)	Individual (5)	Small number ³ (3)		5+5+3+4=17	District / Local
Brown long-eared	Common (2)	Individual (5)	Small number ³ (3)		2+5+3+4=14	District / Local
Overall value of bat assemblage						District / Local

³ There were no records of bat roosts within a 2km radius of the Site). Only a small number of roosts are likely to be present nearby given the limited availability of old buildings and mature trees in the surrounding area.

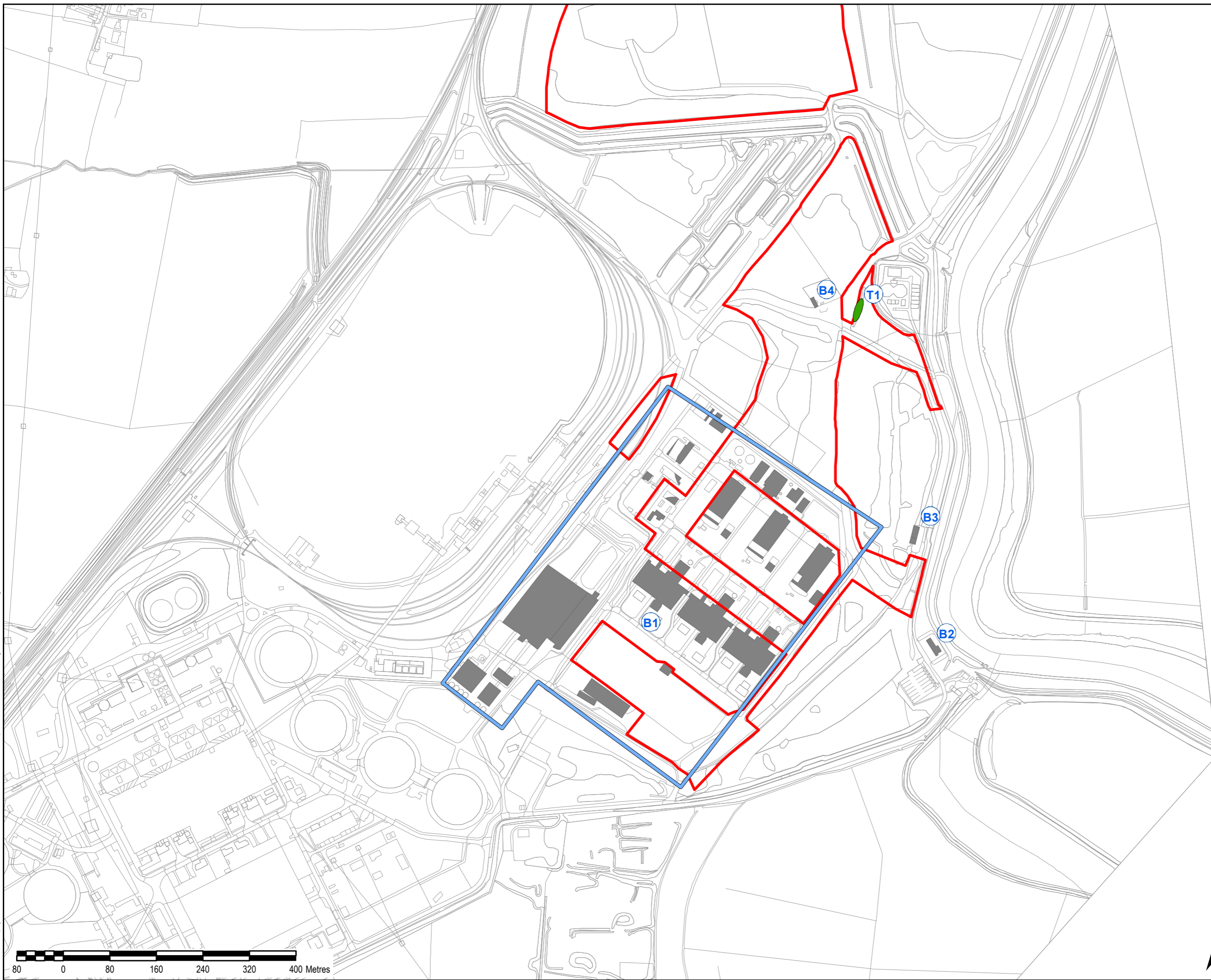
- 4.3.2 The bat species assemblage meets LWS selection criteria for bats (Ref 9G-9), indicating that it should be valued at county level. This is based on the presence of one scarce species (Leisler's) and five common species (common and soprano pipistrelle, noctule, brown long-eared and Daubenton's bat) in Nottinghamshire (Ref 9G-9). The single record of Nathusius' pipistrelle is not sufficient to demonstrate presence (i.e. residence) of the species at the Site, and therefore this species does not contribute to meeting the criteria.
- 4.3.3 The valuation derived from using LWS selection criteria is considered more appropriate as the criteria are based on recent, local knowledge of bat species status in Nottinghamshire. Therefore, the bat species assemblage at the Site is considered to be of county nature conservation value.

5. References

- Ref 9G-1 HM Government (1981) Wildlife and Countryside Act 1981.
- Ref 9G-2 HM Government (2000) Countryside and Rights of Way Act 2000.
- Ref 9G-3 HM Government (2006) Natural Environment and Rural Communities Act 2006.
- Ref 9G-4 HM Government (2018) The Conservation of Habitats and Species and Planning (Various Amendments) (England and Wales) Regulations 2018.
- Ref 9G-5 AECOM (2017) *Bat Survey and Reporting Standards*. Feb 2017.
- Ref 9G-6 Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines*, 3rd edition, Bat Conservation Trust, London.
- Ref 9G-7 Russ. J. (2012) *British Bat Calls A Guide to Species Identification*. Pelagic Publishing.
- Ref 9G-8 Wray. S., Wells. D., Long. E. and Mitchell-Jones. T. (2010) *Valuing bats in ecological impact assessment*. In Practice, No. 70, Institute of Ecology and Environmental Management.
- Ref 9G-9 Crouch, N.C. (2014) *Nottinghamshire LWS Handbook – Guidelines for the selection of Local Wildlife Sites in Nottinghamshire. Part 2A – Local Wildlife Sites selection criteria: species*. Nottinghamshire Biological and Geological Records Centre, Nottingham.

Figures

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LEGEND

- The Order Limits
- Trees with Potential Suitability for Roosting Bats (T1)
- Buildings
- Group of Buildings (B1 to B4)

First Issue	GB	SE	05.01.18	0
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Project Title
**WEST BURTON C (GAS FIRED
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Drawing Title
**FIGURE 9G.1
 PRELIMINARY BAT
 ROOST ASSESSMENT**

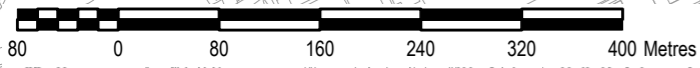
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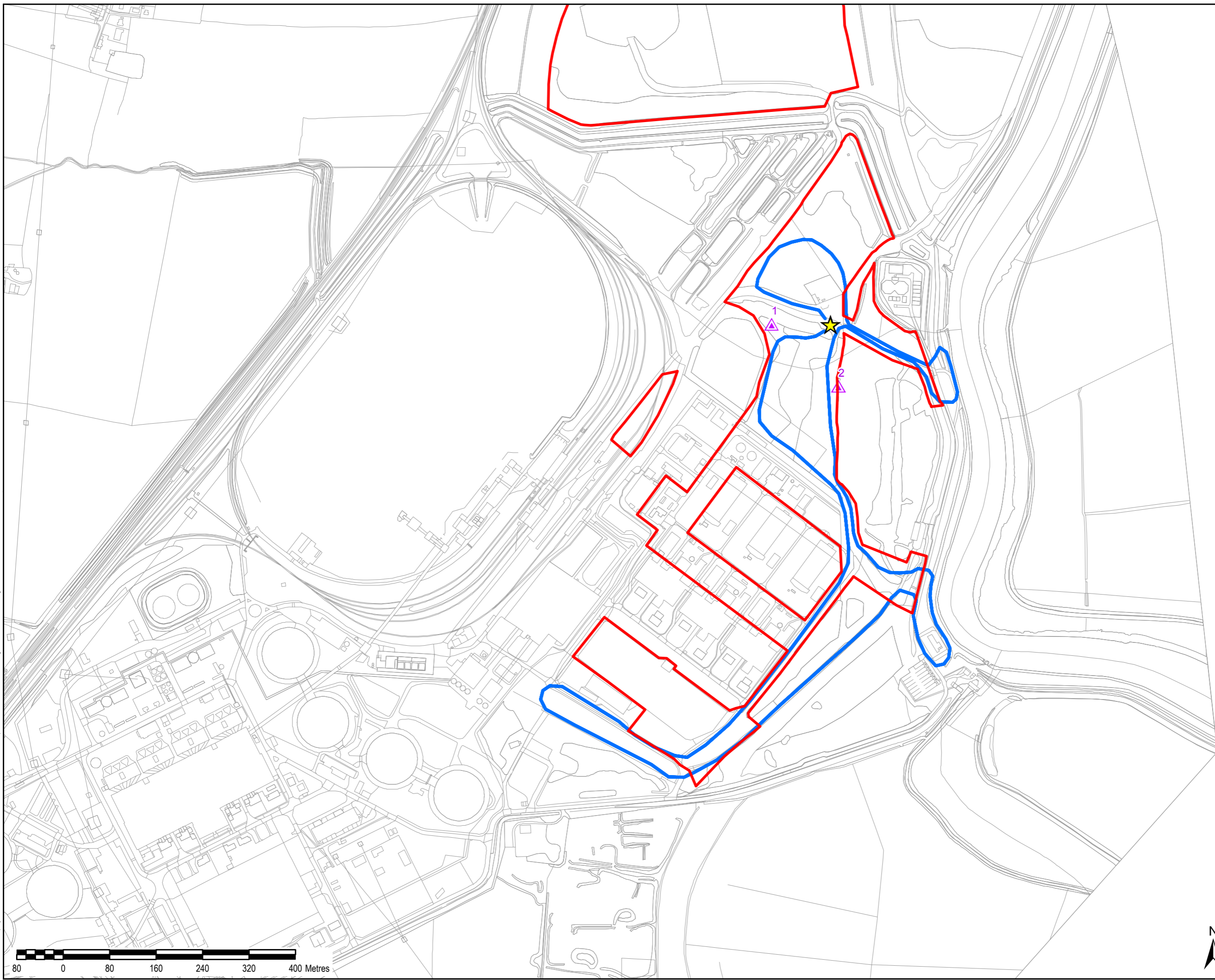
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Drawing Number 60527350/WBC/ESFIGURE 9G.1	Rev 0
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File Name: K:\Newproj\60527350 - West Burton C Gas Fired Power Station\06_GS\02_Maps\Environmental Statement\Figures\West Burton C\Figure 9G.2 - Rev 0.mxd



- The Order
- Transect Route
- ★ Transect Start and End
- ▲ Automated Detector

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ENVIRONMENTAL STATEMENT

Client
**EDF ENERGY
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Project Title
**WEST BURTON C (GAS FIRED
 GENERATING STATION)**

Drawing Title
**FIGURE 9G.2
 BAT ACTIVITY SURVEY -
 TRANSECT ROUTE AND
 AUTOMATIC DETECTOR
 LOCATIONS**

Drawn SM	Checked SB	Approved SW	Date 05.01.18
AECOM Internal Project No. 60527350		Scale @ A3 1:6,000	

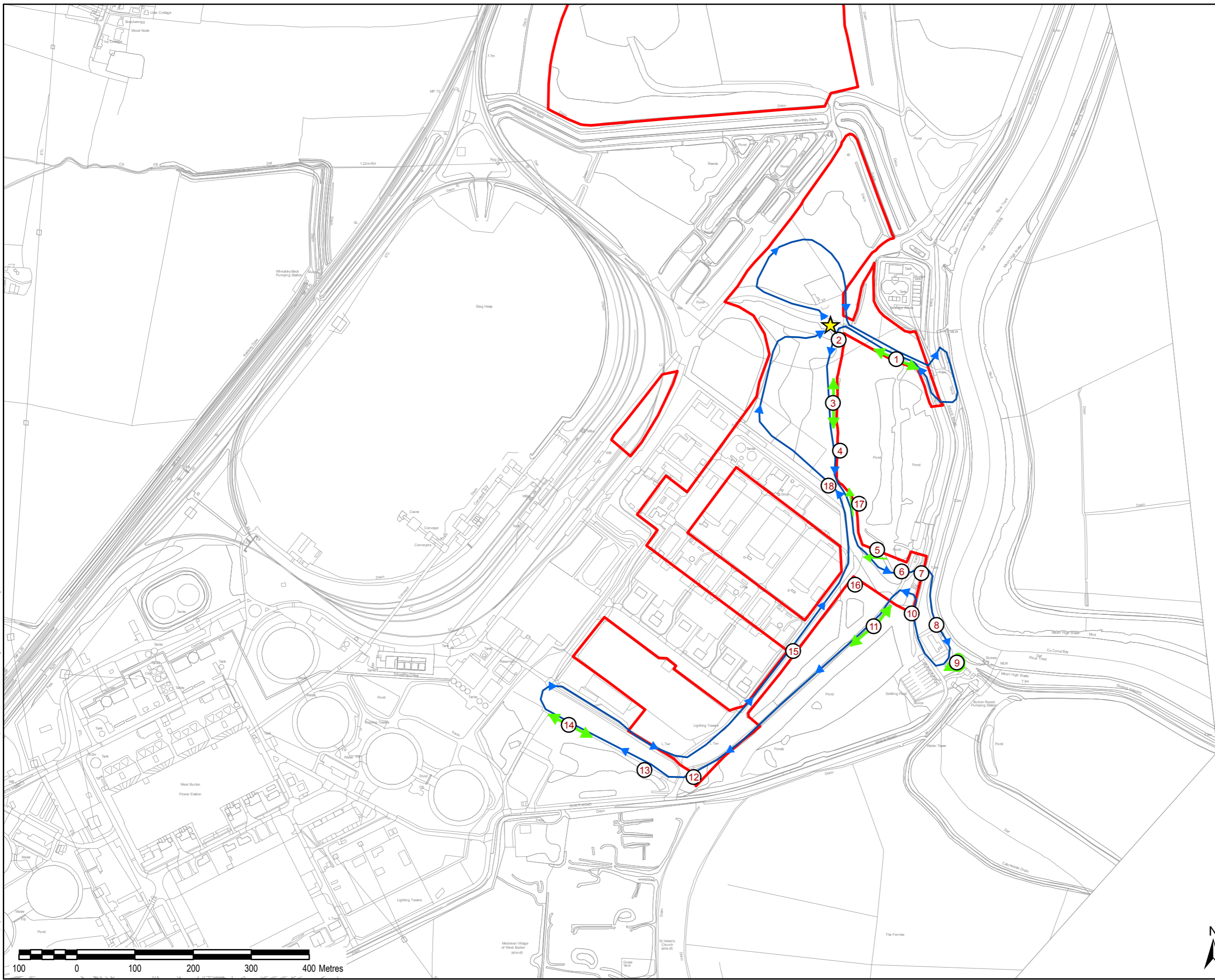
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- LEGEND**
- The Order Limits
 - ➔ Transect Route
 - ★ Transect Start and End Location
 - X Bat Registration
 - ➔ Bat Activity

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**FIGURE 9G.3
 BAT ACTIVITY TRANSECT
 RESULTS - MAY 2017**

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AECOM Internal Project No. 60527350		Scale @ A3 1:6,000	

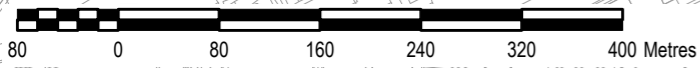
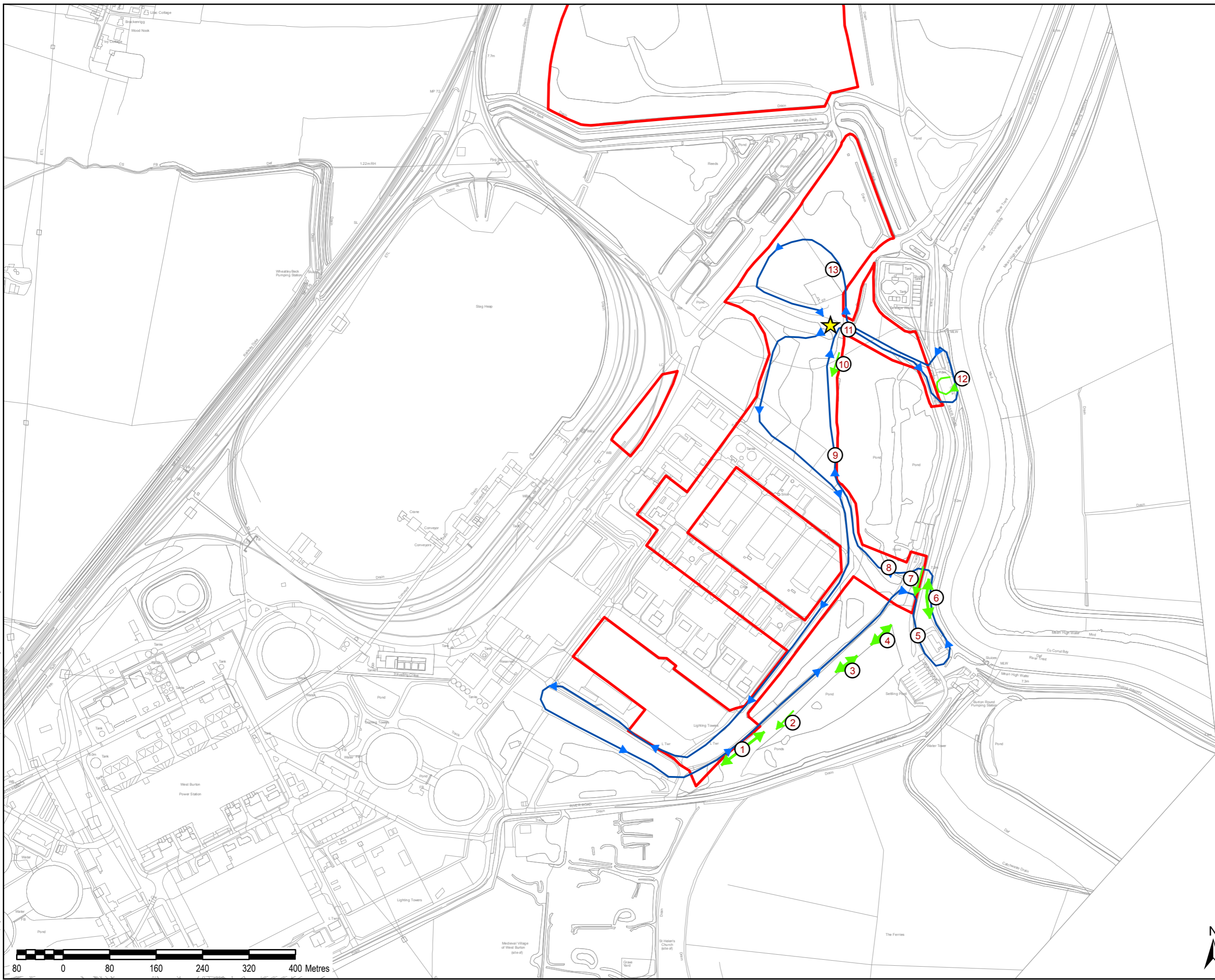
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LEGEND

- The Order Limits
- ➔ Transect Route
- ★ Transect Start and End Location
- X Bat Registration
- ➔ Bat Activity

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Drawing Title
**FIGURE 9G.4
 BAT ACTIVITY TRANSECT
 RESULTS - JUNE 2017**

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AECOM Internal Project No. 60527350		Scale @ A3 1:6,000	

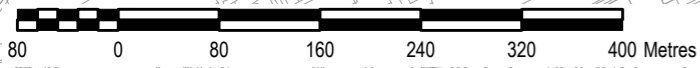
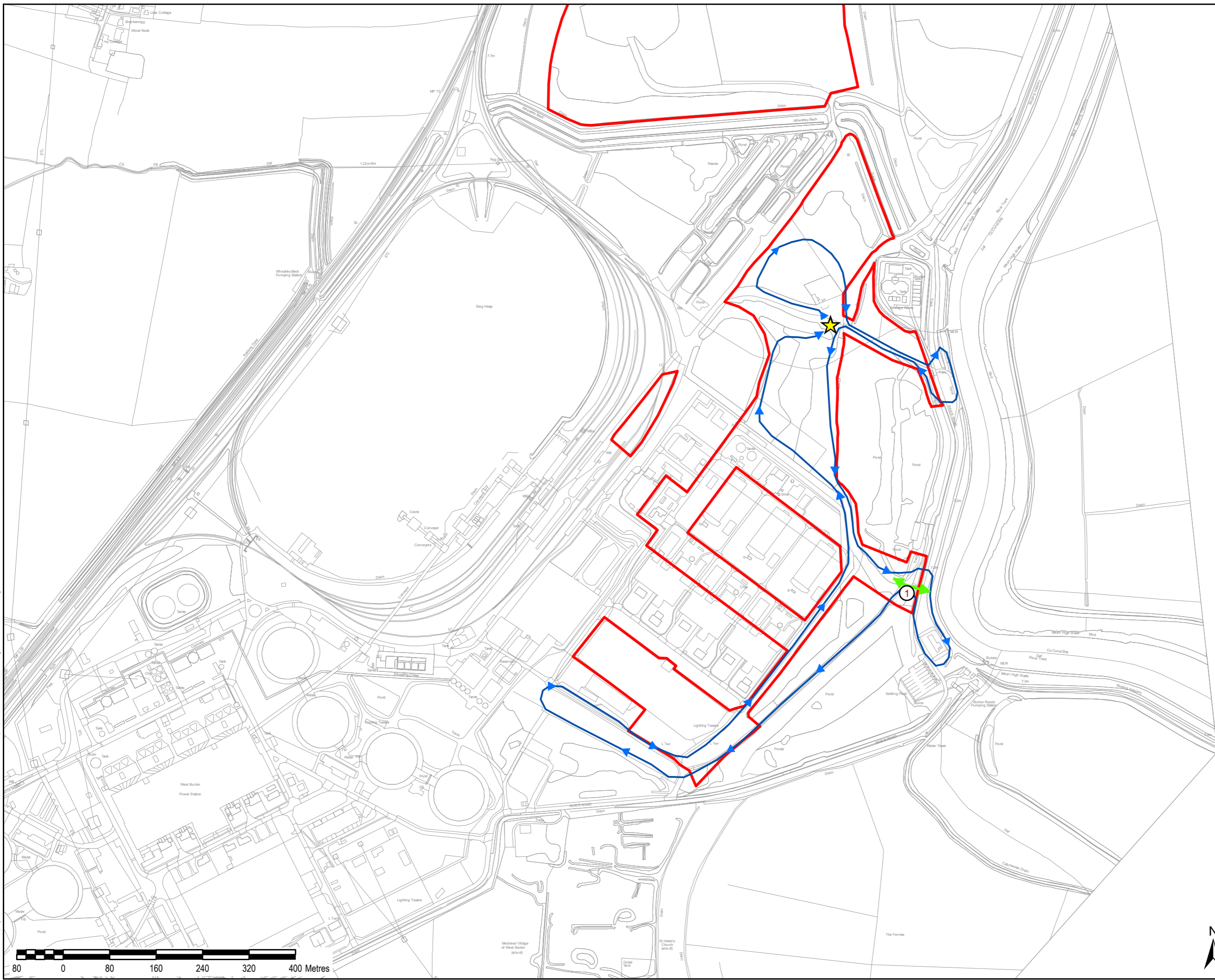
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- The Order
- ➔ Transect
- ★ Transect Start and End
- 1 Bat
- ➔ Bat Activity

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Drawing Title
**FIGURE 9G.5
 BAT ACTIVITY TRANSECT
 RESULTS - JULY 2017**

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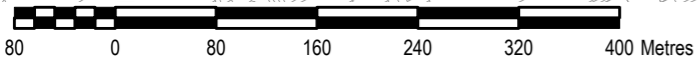
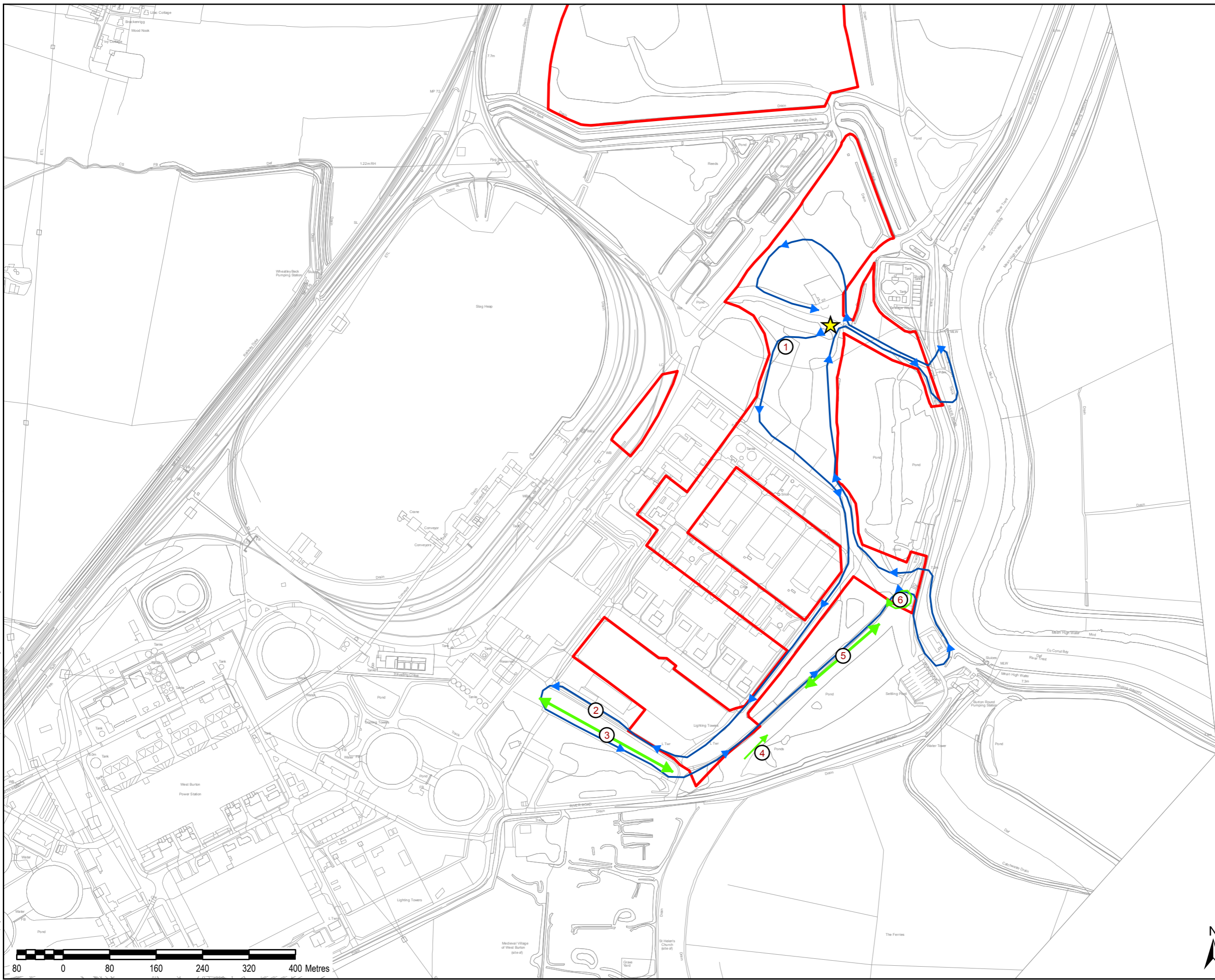
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- █ The Order
- ➔ Transect Route
- ★ Transect Start and End
- X Bat
- ➔ Bat Activity

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Drawing Title
**FIGURE 9G.6
 BAT ACTIVITY TRANSECT
 RESULTS - AUGUST 2017 (DUSK)**

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AECOM Internal Project No. 60527350		Scale @ A3 1:6,000	

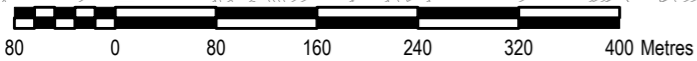
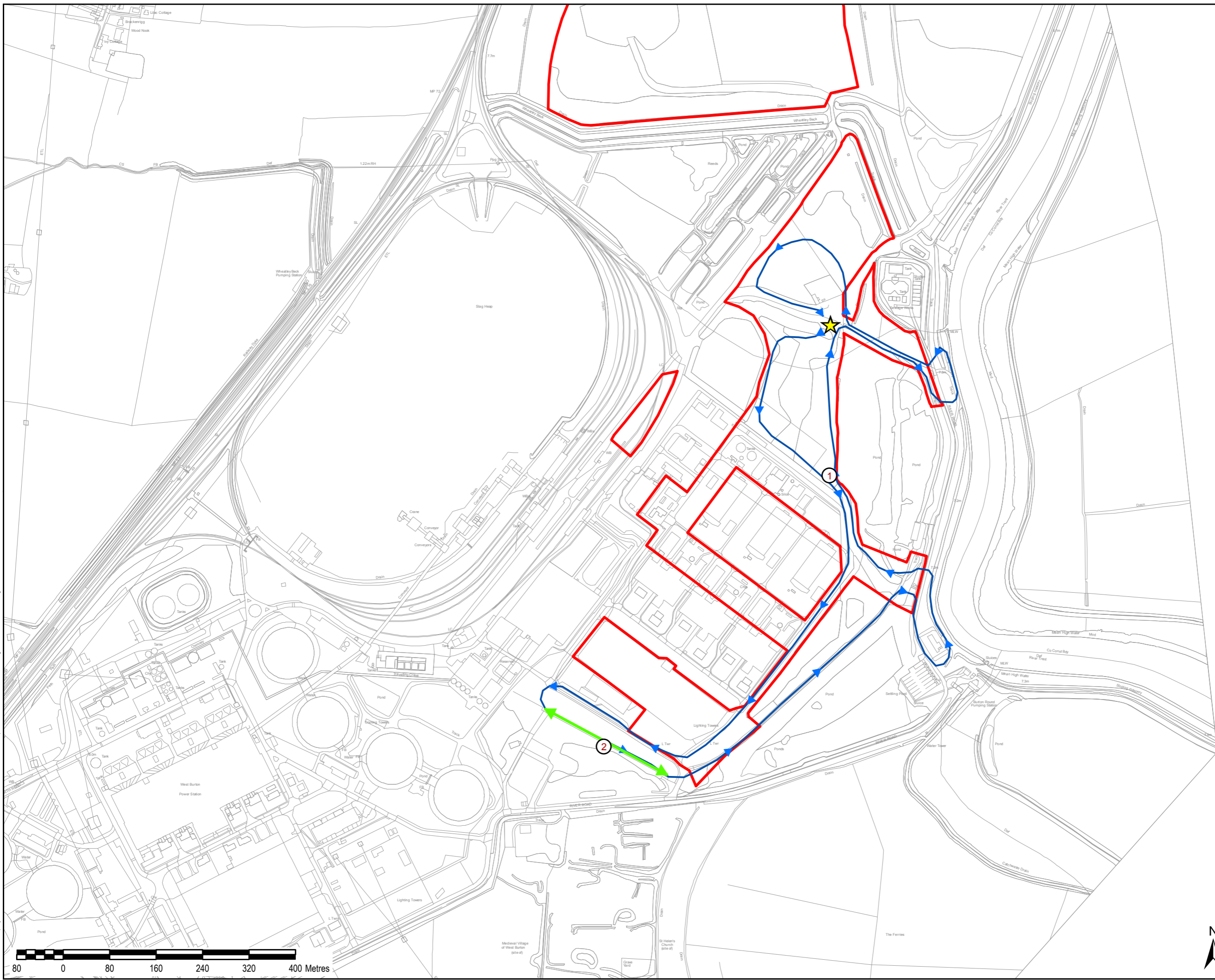
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LEGEND

- The Order Limits
- ➔ Transect Route
- ★ Transect Start and End Location
- X Bat Registration
- ➔ Bat Activity

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Drawing Title
**FIGURE 9G.7
 BAT ACTIVITY TRANSECT
 RESULTS - AUGUST 2017 (DAWN)**

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AECOM Internal Project No. 60527350		Scale @ A3 1:6,000	

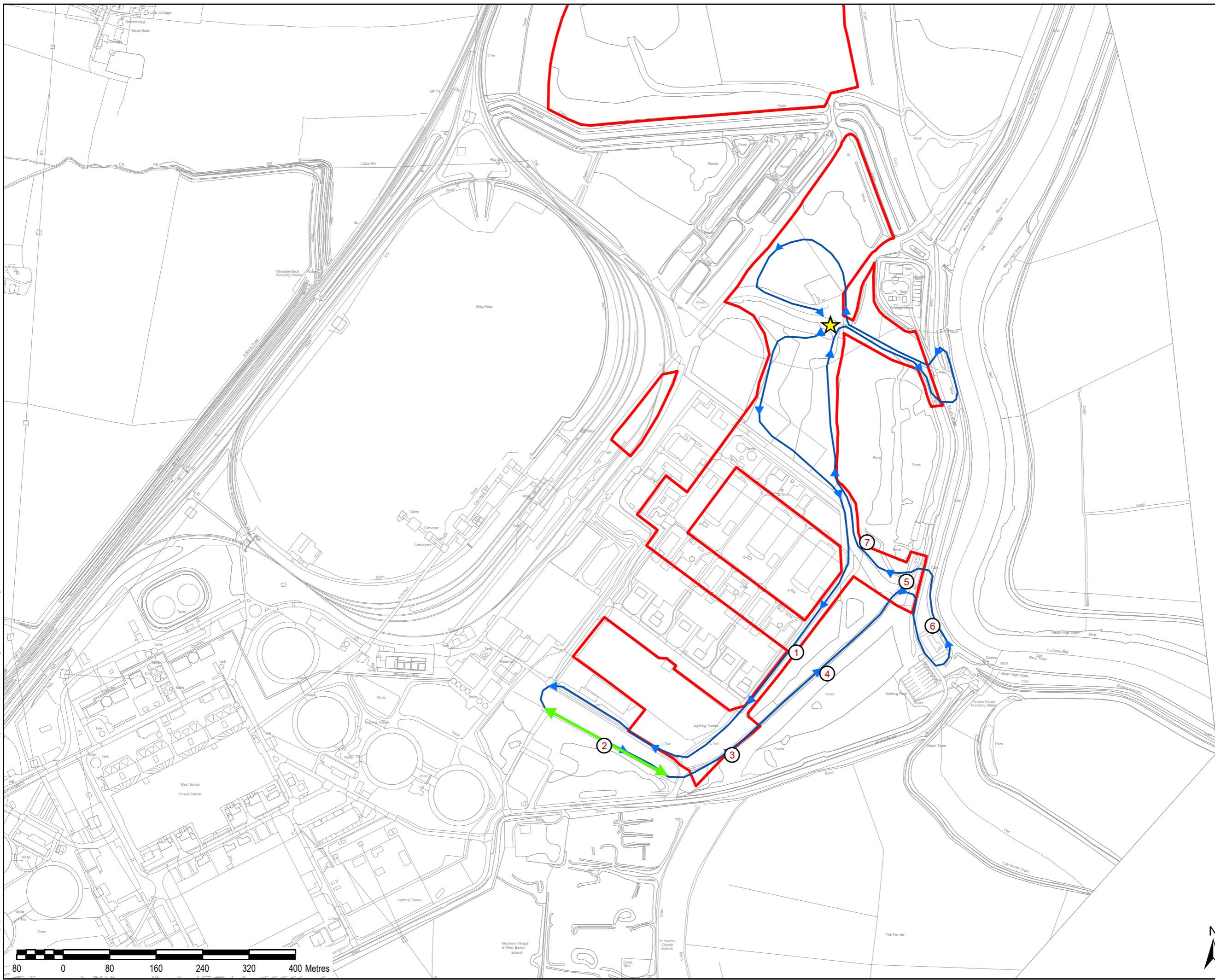
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- ▭ The Order Limits
- Transect Route
- ★ Transect Start and End Location
- ⊗ Bat Registration
- Bat Activity

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Drawing Title
**FIGURE 9G.8
 BAT ACTIVITY TRANSECT
 RESULTS - SEPTEMBER 2017**

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AECOM Internal Project No. 60527350		Scale @ A3 1:6,000	

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Annex A: Preliminary Bat Roost Assessment Methodology

Table A1. Survey Methodology for Assessing Potential Roost Features (PRFs)

Buildings (also application to other structures)

Bats utilise many different features in buildings for places of shelter and roosting. Features that should be observed, noted and graded (in accordance with criteria in table A2 below) during the external and internal survey of buildings includes:

External

External features associated with each building are visually inspected for their suitability for use by roosting bats. Equipment includes close focusing binoculars and powerful spot-lamps were used to study the walls, eaves and roofs of the buildings. Inspection mirrors and endoscopes are used as required.

Bats are able to enter a roosting cavity through small gaps at least 20mm wide. However, bats usually also require an area to land that is adjacent to the entrance hole and has a rough surface. Such features are looked for during the inspection.

Features include; gaps in ridge tiles (where mortar is missing) gaps under roof tiles or slates, lead flashing around chimney stacks and around dormer windows, gaps under the fascias and soffits, weatherboarding, missing mortar from joints in stone/brickwork, roof valleys and hips.

Special attention is paid to the areas directly below any potential access/ egress point in an attempt to identify any accumulation of bat droppings.

No work involving multi-sectional ladders over 5m in height should be undertaken as part of the external survey.

Internal (not applicable to this survey)

The most effective method of determining the presence of bat activity within a building is by the presence of their droppings. Bats deposit droppings in both roost and social areas, but the use of such sites by bats can change due to prevailing weather conditions or the time of year.

The internal inspection involves surveying all surfaces window ledges, rough wall surfaces, floors, cobwebs, cupboard tops and any relatively undisturbed surface.

Areas of particular interest (but not restricted to) are the tops of gable end walls, top of the ridge beam, hip and other roof beams, mortise joints, junction of roof beams, areas around chimney breasts, between roof tiles and felting.

Other features, such as accumulations of discarded wings of moths or butterflies are also recorded where present. Certain bat species are more likely than others to deal with prey items and leave evidence such as this, and so such features can help identify the species present. Similarly, the location of the droppings are recorded as this can provide an indication of both the species and the type of roost that is present.

Trees

Surveys can be undertaken at any time of year, but should preferably be carried out when the trees are not in full leaf, to aid the viewing of PRFs. Any constraints to surveys should always be noted.

The scoping survey to identify the existence of PRFs should include checks for the presence of the following features that bats might be able to use to determine features with the potential to support bats in accordance with criteria in the table below:

- a. *natural holes (e.g. knot holes) arising from naturally shed branches, or branches previously pruned back to the branch collar;*
- b. *man-made holes (e.g. cavities that have developed from flush cuts) or cavities created by branches tearing out from parent stems;*
- c. *woodpecker holes, cracks/splits in stems or branches (both vertical and horizontal);*
- d. *partially detached or loose, platy bark;*
- e. *cankers (caused by localized bark death) in which cavities have developed;*
- f. *other hollows or cavities, including butt rots;*
- g. *compression forks with included bark, forming potential cavities;*
- h. *crossing stems or branches with suitable space between for roosting;*
- i. *ivy stems with diameters in excess of 50 mm with suitable roosting space behind (or where a roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk);*
- j. *bird and bat boxes on trees; or l) other features that offer a place of shelter.*

NOTE: Roosts of some species can occur very low on trees so PRFs can be found at all heights.

Table A2. Criteria used to describe the level of suitability/risk of a potential roost feature (PRF) supporting roosting bats

Suitability/Risk	Description of Roosting Habitats
Negligible	Structure or tree with no or very limited roosting opportunities for bats. Feature may be isolated from foraging habitat.
Low	<p>Structure or tree with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation).</p> <p>A tree of sufficient size and age to contain PRF(s) but with none seen from the ground or features seen with only very limited roosting potential with a limited number of roosting opportunities.</p> <p>Low proximity and connectivity to low or moderate quality foraging habitat.</p>
Moderate	<p>Structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).</p> <p>Often will have some connectivity and proximity to moderate or high quality foraging habitat.</p>
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially longer periods of time due to their size, shelter one or more species of bat. With good connectivity to high quality foraging habitat.
Confirmed Roost	Presence of bats or evidence of bats. Confirmation of roost status may require further Roost Characterisation Survey .

Notes:


- a. Ref 9G-6 uses the terms negligible, low, moderate, etc to assess suitability for bats as per the levels shown in the table above. The BS 8596:2015 Surveying for bats in trees and woodland uses the term 'Risk' when assigning these categories to PRFs. Suitability is the preferred term to use.
- b. The Negligible category is used where a feature has been inspected and found not to contain any features of use to bats, and hence provides confirmation that a feature has been inspected or considered.
- c. For buildings/structures with PRFs assessed as having Low to High suitability, further surveys are likely to be required in accordance with standard survey



guidance to attempt to determine roost presence/absence. There is provision for the professional bat ecologist to decide on whether further surveys are needed for low suitability buildings.




- d. For tree PRFs assessed as having Moderate to High suitability, further surveys are likely to be required in accordance with standard survey guidance to attempt to determine roost presence/absence (see Ref 9G-6).
- e. Confirmed Roosts may require Roost Characterisation Surveys to inform planning/mitigation requirements.

Annex B: Field Survey Data

Table B1: Preliminary bat roost assessment results - buildings

Building reference	Description and Features of Potential Suitability for Roosting Bats	Overall Suitability	Photograph
B1	<p>Large number of modern, pre-fabricated operational buildings associated with WBB Power Station. Unsuitable for roosting bats.</p>	Negligible	

Building reference	Description and Features of Potential Suitability for Roosting Bats	Overall Suitability	Photograph
			
B2	<p>Pump house building of brick construction with flat roof.</p> <p>No potential access points or crevices were identified around the walls or at the junction between the walls and the flat roof.</p>	Negligible	

Building reference	Description and Features of Potential Suitability for Roosting Bats	Overall Suitability	Photograph
			
B3	Modern pre-fabricated warehouse building. No features suitable for roosting bats.	Negligible	
B4	Modern, open-sided barn constructed from steel and sheet panelling. No features suitable for roosting bats.	Negligible	


Building reference	Description and Features of Potential Suitability for Roosting Bats	Overall Suitability	Photograph
			

Table B2: Preliminary bat roost assessment results - trees


Tree reference	Species	Potential roosting features	Overall Suitability	Photograph
T1	Willow – standing dead trees	Woodpecker holes, cracks, flaking bark.	High	

Table B3: Bat activity transect results – May 2017

Date: 16\05\2017		Temperature (°C): 16		Rain (0-5)²: 0
Sunset time: 20:58		Wind (0-7)³: 2-5		Cloud Cover (0-5)⁴: 4
Start Time: 21:05	Finish Time: 23:09	Equipment used: SM2bat + Duet		Weather description (incl. previous evening): Dry, Overcast, rain during day + previous evening
Reference Number	Time	Species¹	No. of bats	Activity/Description
1	21:27	Cpip	1	Foraging, 3 passes
2	21:32	Cpip	1	Heard not seen, 3 passes
3	21:34	Cpip	1	Foraging along tree line, 2 passes
4	21:42	Cpip	1	Foraging around scrub, 3 passes
5	21:48	Spip	1	Single pass
6	21:49	Cpip	2	Foraging
7	21:54	Cpip	1	2 passes
8	21:57	Spip	1	Heard not seen, 2 passes
9	21:59	Spip & Cpip	3	Foraging near river, 12 passes
10	22:02	Cpip	1	Foraging, 3 passes
11	22:06	Cpip	1	Foraging, 2 passes
12	22:26	Cpip & Spip	2	Foraging along scrub line, 4 passes
13	22:29	Cpip	1	Foraging along scrub line, 2 passes
14	22:33	Cpip	1	Foraging, 2 passes
15	22:49	Cpip	2	Foraging along tree line, 5 passes
16	22:58	Cpip	1	Foraging along band of plantation, 3 passes
17	23:06	Myotis	1	Single pass
18	23:08	Cpip & Spip	2	Foraging, 3 passes
<p>¹Species: Cpip: common pipistrelle (<i>Pipistrellus pipistrellus</i>); Spip: soprano pipistrelle (<i>Pipistrellus pygmaeus</i>); Myotis: <i>Myotis</i> species; Noc: noctule (<i>Nyctalus noctula</i>)</p> <p>²Rain scale: 0 = none, 1 = drizzle, 2 = shower, 3 = rain, 4 = downpour, 5 = flood</p> <p>³Beaufort wind force scale: 0 No wind, 1 Light air smoke drifts, 2 Light Breeze leaves rustle, 3 Gentle Breeze small twigs move, 4 Mod Breeze small branches move, 5 Fresh Breeze small trees sway, 6 Strong Breeze large branches move, 7 Mod Gale whole trees in motion</p> <p>⁴Percentage scale based on: 1 = 0-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61-80%, 5 = 81-100%</p>				

Table B4: Bat activity transect results – June 2017

Date: 21\06\2017		Temperature (°C): 22		Rain (0-5)²: 0
Sunset time: 21:35		Wind (0-7)³: 1		Cloud Cover (0-5)⁴: 3 > 1
Start Time: 21:35	Finish Time: 23:30	Equipment used: Batlogger M		Weather description (incl. previous evening): Warm period , heatwave previous weekend, Cloudy
Reference Number	Time	Species¹	No. of bats	Activity/Description
1	22:18	Cpip	1	Foraging, 3 passes
2	22:21	Cpip	1	2 passes
3	22:25	Cpip & Spip	2	6 passes
4	22:29	Cpip & Spip	2	5 passes
5	22:33	Cpip	2	2 passes
6	22:37	Spip	1	3 passes
7	22:42	Cpip	1	1 pass
8	22:44	Cpip	1	
9	22:55	Noc	1	1 pass
10	23:00	Cpip	1	1 pass
11	23:02	Cpip	1	2 passes
12	23:10	Spip	1	5 passes
13	23:19	Spip	1	1 pass
<p>¹Species: Cpip: common pipistrelle (<i>Pipistrellus pipistrellus</i>); Spip: soprano pipistrelle (<i>Pipistrellus pygmaeus</i>); Myotis: <i>Myotis</i> species; Noc: noctule (<i>Nyctalus noctula</i>)</p> <p>²Rain scale: 0 = none, 1 = drizzle, 2 = shower, 3 = rain, 4 = downpour, 5 = flood</p> <p>³Beaufort wind force scale: 0 No wind, 1 Light air smoke drifts, 2 Light Breeze leaves rustle, 3 Gentle Breeze small twigs move, 4 Mod Breeze small branches move, 5 Fresh Breeze small trees sway, 6 Strong Breeze large branches move, 7 Mod Gale whole trees in motion</p> <p>⁴Percentage scale based on: 1 = 0-20%, 2 = 21--40%, 3 = 41-60%, 4 = 61-80%, 5 = 81-100%</p>				

Table B5: Bat activity transect results – July 2017

Date: 19\07\2017		Temperature (°C): 21		Rain (0-5)²: 0
Sunset time: 21:19		Wind (0-7)³: 2 - 3		Cloud Cover (0-5)⁴: 5
Start Time: 21:19	Finish Time: 23:19	Equipment used: Batlogger M		Weather description (incl. previous evening): Warm, Damp, Humid (thunderstorms after dry weather)
Reference Number	Time	Species¹	No. of bats	Activity/Description
1	21:59	Cpip	1	Foraging
<p>¹Species: Cpip: common pipistrelle (<i>Pipistrellus pipistrellus</i>); Spip: soprano pipistrelle (<i>Pipistrellus pygmaeus</i>); Myotis: <i>Myotis</i> species; Noc: noctule (<i>Nyctalus noctula</i>) ²Rain scale: 0 = none, 1 = drizzle, 2 = shower, 3 = rain, 4 = downpour, 5 = flood ³Beaufort wind force scale: 0 No wind, 1 Light air smoke drifts, 2 Light Breeze leaves rustle, 3 Gentle Breeze small twigs move, 4 Mod Breeze small branches move, 5 Fresh Breeze small trees sway, 6 Strong Breeze large branches move, 7 Mod Gale whole trees in motion ⁴Percentage scale based on: 1 = 0-20%, 2 = 21--40%, 3 = 41-60%, 4 = 61-80%, 5 = 81-100%</p>				

Table B6: Bat activity transect results – August 2017 (dusk)

Date: 17\08\2017		Temperature (°C): 18		Rain (0-5)²: 0
Sunset time: 20:32		Wind (0-7)³: 1		Cloud Cover (0-5)⁴: 5
Start Time: 20:32	Finish Time: 22:55	Equipment used: SM2 & Duet		Weather description (incl. previous evening): Heavy rain just before start of survey, dry during survey, heavy rain previous night
Reference Number	Time	Species¹	No. of bats	Activity/Description
1	20:53	Cpip	1	Heard not seen, call was very brief
2	21:28	Cpip	1	Heard not seen, call was very brief
3	21:32	Cpip	1	Foraging along tree line, 10 minutes of calls
4	21:42	Cpip	1	Brief pass, commuting
5	21:50	Cpip	2	Foraging along path
6	21:58	Cpip	1	Foraging
<p>¹Species: Cpip: common pipistrelle (<i>Pipistrellus pipistrellus</i>); Spip: soprano pipistrelle (<i>Pipistrellus pygmaeus</i>); Myotis: <i>Myotis</i> species; Noc: noctule (<i>Nyctalus noctula</i>) ²Rain scale: 0 = none, 1 = drizzle, 2 = shower, 3 = rain, 4 = downpour, 5 = flood</p>				

³**Beaufort wind force scale:** 0 No wind, 1 Light air smoke drifts, 2 Light Breeze leaves rustle, 3 Gentle Breeze small twigs move, 4 Mod Breeze small branches move, 5 Fresh Breeze small trees sway, 6 Strong Breeze large branches move, 7 Mod Gale whole trees in motion
⁴**Percentage scale based on:** 1 = 0-20%, 2 = 21--40%, 3 = 41-60%, 4 = 61-80%, 5 = 81-100%

Table B7: Bat activity transect results – August 2017 (dawn)

Date: 18\08\2017		Temperature (°C): 16		Rain (0-5)²: 0
Sunrise time: 05:49		Wind (0-7)³: 1		Cloud Cover (0-5)⁴: 2
Start Time: 03:49	Finish Time: 05:49	Equipment used: SM2 & Duet		Weather description (incl. previous evening): Dry, heavy rain showers previous evening
Reference Number	Time	Species¹	No. of bats	Activity/Description
1	04:01	Unknown	1	Seen but not heard or recorded
2	04:49 – 04:56	Cpip	2	Foraging along length of the tree line, constant activity
<p>¹Species: Cpip: common pipistrelle (<i>Pipistrellus pipistrellus</i>); Spip: soprano pipistrelle (<i>Pipistrellus pygmaeus</i>); Myotis: <i>Myotis</i> species; Noc: noctule (<i>Nyctalus noctula</i>) ²Rain scale: 0 = none, 1 = drizzle, 2 = shower, 3 = rain, 4 = downpour, 5 = flood ³Beaufort wind force scale: 0 No wind, 1 Light air smoke drifts, 2 Light Breeze leaves rustle, 3 Gentle Breeze small twigs move, 4 Mod Breeze small branches move, 5 Fresh Breeze small trees sway, 6 Strong Breeze large branches move, 7 Mod Gale whole trees in motion ⁴Percentage scale based on: 1 = 0-20%, 2 = 21--40%, 3 = 41-60%, 4 = 61-80%, 5 = 81-100%</p>				

Table B8: Bat activity transect results – September 2017

Date: 19\09\2017		Temperature (°C): 17		Rain (0-5)²: 0
Sunset time: 19:10		Wind (0-7)³: 0		Cloud Cover (0-5)⁴: 1
Start Time: 19:10	Finish Time: 21:11	Equipment used: SM2 & Duet		Weather description (incl. previous evening): Clear night, warm, very little wind
Reference Number	Time	Species¹	No. of bats	Activity/Description
1	19:40	Cpip	1	Heard not seen
2	20:05	Cpip	2	Foraging up and down along tree line, continuous activity
3	20:20	Cpip	1	Heard not seen
4	20:28	Cpip	1	Heard not seen
5	20:37	Cpip	1	Foraging around trees
6	20:47	Cpip	1	Heard not seen
7	20:50	Cpip	1	Heard not seen
<p>¹Species: Cpip: common pipistrelle (<i>Pipistrellus pipistrellus</i>); Spip: soprano pipistrelle (<i>Pipistrellus pygmaeus</i>); Myotis: <i>Myotis</i> species; Noc: noctule (<i>Nyctalus noctula</i>)</p> <p>²Rain scale: 0 = none, 1 = drizzle, 2 = shower, 3 = rain, 4 = downpour, 5 = flood</p> <p>³Beaufort wind force scale: 0 No wind, 1 Light air smoke drifts, 2 Light Breeze leaves rustle, 3 Gentle Breeze small twigs move, 4 Mod Breeze small branches move, 5 Fresh Breeze small trees sway, 6 Strong Breeze large branches move, 7 Mod Gale whole trees in motion</p> <p>⁴Percentage scale based on: 1 = 0-20%, 2 = 21--40%, 3 = 41-60%, 4 = 61-80%, 5 = 81-100%</p>				

Table B9: Results of automated detector survey – May 2017

Date	Sunset	Sunrise	Hours of darkness	Temp (min and max)	Total no. bats	Species and number of bat passes								Bat Activity (passes per hour)	
						Common pipistrelle	Soprano Pipistrelle	Common / Soprano pipistrelle	Nathusius' Pipistrelle	Noctule	Leisler	Myotis Sp.	Unknown		
<i>Location 1</i>															
16/05/17	20:57	05:01	8.07	17-20	85	63	14	7	0	1	0	0	0	10.54	
17/05/17	20:58	04:59	8.02	9-18	70	69	0	0	0	1	0	0	0	8.73	
18/05/17	21:00	04:58	7.97	8-13	3	1	0	0	0	2	0	0	0	0.38	
19/05/17	21:02	04:56	7.90	10-13	30	28	1	1	0	0	0	0	0	3.80	
20/05/17	21:03	04:55	7.87	9-14	0	0	0	0	0	0	0	0	0	0.00	
Total						161	15	8	0	4	0	0	0	Mean bat activity	4.69
<i>Location 2</i>															
16/05/17	20:57	05:01	8.07	17-20	11	6	0	2	1	1	0	1	0	1.36	
17/05/17	20:58	04:59	8.02	9-18	1	0	0	0	0	0	0	0	1	0.12	
18/05/17	21:00	04:58	7.97	8-13	2	0	0	0	0	0	2	0	0	0.25	
19/05/17	21:02	04:56	7.90	10-13	41	41	0	0	0	0	0	0	0	5.19	
20/05/17	21:03	04:55	7.87	9-14	4	4	0	0	0	0	0	0	0	0.51	
Total						51	0	2	1	1	2	1	1	Mean bat activity	1.49

Table B10: Results of automated detector survey – June 2017

Date	Sunset	Sunrise	Hours of darkness	Temp (min and max)	Total no. bats	Species and number of bat passes						Bat Activity (passes per hour)	
						Common pipistrelle	Soprano Pipistrelle	Common / Soprano pipistrelle	Leisler	Daubenton's	Myotis Sp.		
<i>Location 1</i>													
22/06/17	21:41	04:35	7.00	16-17	1116	255	861	0	0	0	0	159.43	
23/06/17	Automated detector failed												
24/06/17	Automated detector failed												
25/06/17	Automated detector failed												
26/06/17	Automated detector failed												
Total						255	861	0	0	0	0	Mean bat activity	159.43
<i>Location 2</i>													
22/06/17	21:41	04:35	7.00	15-16	36	18	17	0	0	1	0	5.14	
23/06/17	21:41	04:35	7.00	15-19	13	8	4	1	0	0	0	1.86	
24/06/17	21:41	04:36	7.02	15-19	12	10	2	0	0	0	0	1.71	
25/06/17	21:41	04:36	7.02	9-16	9	5	4	0	0	0	0	1.28	
26/06/17	21:41	04:37	7.03	14-16	203	27	151	17	2	0	6	28.86	
Total						68	178	18	2	1	7	Mean bat activity	7.77

Table B11: Results of automated detector survey – July 2017

Date	Sunset	Sunrise	Hours of darkness	Temp (min and max)	Total no. bats	Species and number of bat passes						Bat Activity (passes per hour)	
						Common pipistrelle	Soprano Pipistrelle	Common / Soprano pipistrelle	Noctule	Leisler	Myotis Sp.		
<i>Location 1</i>													
19/07/17	21:18	05:01	7.72	23 - 29	722	14	701	7	0	0	0	93.56	
20/07/17	21:17	05:03	7.77	16 - 23	416	65	351	0	0	0	0	53.56	
21/07/17	21:16	05:04	7.80	14 - 21	20	18	2	0	0	0	0	2.56	
22/07/17	21:14	05:06	7.87	13 - 21	70	49	19	0	2	0	0	8.90	
23/07/17	21:13	05:07	7.90	14 - 17	111	98	13	0	0	0	0	14.05	
Total						244	1086	7	2	0	0	Mean bat activity	34.53
<i>Location 2</i>													
19/07/17	21:18	05:01	7.72	22 - 26	25	10	10	5	0	0	0	3.24	
20/07/17	21:17	05:03	7.77	14- 22	32	12	7	13	0	0	0	4.12	
21/07/17	21:16	05:03	7.80	13 - 20	388	156	48	182	0	2	0	49.74	
22/07/17	21:14	05:04	7.87	15 – 19	70	36	24	5	2	0	3	8.90	
23/07/17	21:13	05:06	7.90	13 - 17	8	3	4	1	0	0	0	1.01	
Total						217	93	206	2	2	3	Mean bat activity	13.40

Table B12: Results of automated detector survey – August 2017

Date	Sunset	Sunrise	Hours of darkness	Temp (min and max)	Total no. bats	Species and number of bat passes							Bat Activity (passes per hour)	
						Common pipistrelle	Soprano Pipistrelle	Common / Soprano pipistrelle	Noctule	Leisler	Myotis Sp.	Brown Long Eared		
<i>Location 1</i>														
17/08/17	20:26	05:47	9.35	18-25	1680	26	1399	254	0	0	1	0	179.68	
18/08/17	20:24	05:49	9.42	13-18	1072	43	981	48	0	0	0	0	113.84	
19/08/17	20:22	05:50	9.47	12-16	1870	34	1667	161	0	1	6	1	197.54	
20/08/17	20:20	05:52	3 ⁴	12-16	440	46	293	97	4	0	0	0	146.67	
21/08/17	Automated detector failed													
Total						149	4340	560	4	1	7	1	Mean bat activity	159.43
<i>Location 2</i>														
17/08/17	20:26	05:47	9.35	17-25	60	9	48	0	0	0	3	0	6.42	
18/08/17	20:24	05:49	9.42	15-16	4	1	1	0	0	0	2	0	0.42	
19/08/17	20:22	05:50	9.47	12-16	7	1	6	0	0	0	0	0	0.74	
20/08/17	20:20	05:52	9.53	12-17	422	91	201	123	2	0	5	0	44.27	
21/08/17	20:18	05:54	9.60	11-19	1083	75	215	771	3	4	15	0	112.81	
Total						177	471	894	5	4	25	0	Mean bat activity	32.93

Table B13: Results of automated detector survey – September 2017

⁴ The automated detector stopped recording 3 hours after sunset on 20/08/2017

Date	Sunset	Sunrise	Hours of darkness	Temp (min and max)	Total no. bats	Species and number of bat passes								Bat Activity (passes per hour)	
						Common pipistrelle	Soprano Pipistrelle	Common / Soprano pipistrelle	Noctule	Leisler	Nyctalus	Myotis Sp.	Brown Long eared		
<i>Location 1</i>															
19/09/17	19:17	06:52	11.58	11 - 21	685	15	647	21	0	0	0	1	1	59.14	
20/09/17	19:15	06:54	11.65	10 - 18	1151	12	1067	70	2	0	0	0	0	98.80	
21/09/17	19:12	06:56	11.73	10 - 16	23	3	16	4	0	0	0	0	0	1.96	
22/09/17	19:10	06:58	11.80	6 - 15	8	0	8	0	0	0	0	0	0	0.68	
23/09/17	19:07	06:59	11.87	12 - 17	66	3	59	4	0	0	0	0	0	5.56	
Total						33	1797	99	2	0	0	1	1	Mean bat activity	33.23
<i>Location 2</i>															
19/09/17	19:17	06:52	11.58	11 - 21	601	66	196	330	1	1	0	7	0	51.88	
20/09/17	19:15	06:54	11.65	9 - 18	680	6	152	519	0	1	1	2	0	58.37	
21/09/17	19:12	06:56	11.73	10 - 16	22	1	10	8	0	0	0	3	0	1.88	
22/09/17	19:10	06:58	11.80	6 - 15	175	2	164	0	0	0	0	9	1	14.83	
23/09/17	19:07	06:59	11.87	14 - 17	635	21	20	591	0	0	1	3	1	53.51	
Total						96	542	1448	1	2	2	24	2	Mean bat activity	36.09

Annex C: Method for Valuing Bats in Ecological Impact Assessment

Rarity	Species
Rarest (population Under 10,000)	Greater horseshoe Bechstein's Alcathoe Greater Mouse-eared Barbastelle Grey-long eared
Rarer (population 10,000-100,000)	Lesser horseshoe Whiskered Brandt's Daubenton's Natterer's Leisler's Noctule Nathusius' pipistrelle Serotine
Common (population over 100,000)	Common pipistrelle Soprano pipistrelle Brown long eared

Species	Number of Bats	Roosts/Potential Roosts Nearby	Foraging and Commuting Habitat Characteristics
Common (2)	Very Low (5)	None (1)	Industrial or other site without established vegetation (1) Absence of (other) linear features (1)
		Small number (3)	Suburban areas or intensive arable land Un-vegetated fences and large field sizes (2)
Rarer (5)	Low (10)	Moderate number/Not known (4)	Isolated woodland patches, less intensive arable and/or small towns/villages Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3)
		Large number of roosts, or close to a SSSI for the species (5)	Larger or connected woodland blocks, mixed agriculture, and small villages/hamlets Well-grown and well-connected hedgerows, small field sizes (4)
Rarest	Moderate/	Close to or within a SAC	Mosaic of pasture, woodlands and

Table C2: Scores used to Value Bat Commuting and Foraging Habitat			
Species	Number of Bats	Roosts/Potential Roosts Nearby	Foraging and Commuting Habitat Characteristics
(20)	High (20)	for the species (20)	Wetland areas Complex network of mature well-established hedgerows, small fields and rivers/streams (5)

Table C3: Explanation of the 'Number of Bats' Categories used in Table C2	
Number of bats	Explanation
Individual bats (5)	Up to 3 bats recorded regularly along a commuting route
Small numbers of bats (10)	Estimated 3 to 10 bats using a resource for foraging
Large numbers of bats (20)	A large number of bats (estimated to be at least 20) from a nearby maternity roost using a resource for regular foraging

Table C4: Scoring system for valuing commuting and foraging bats	
Geographic frame of reference	Score (sum of scores presented in Table C2)
International i.e. European	>50
National i.e. England	41 - 50
Regional i.e. East Midlands	31 – 40
County i.e. Nottinghamshire	21 – 30
District/Local i.e. Bassetlaw	11 – 20
Not important i.e. less than local value	1 - 10