BAT SURVEY & REPORT
at
Union Mills
Tanyard Road
Huddersfield
HD3 4NB

Client:
Acumen Designers & Architects

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JCA Ref:
13809a/JB

Date of Report:
DRAFT

JCA Limited
Arboricultural & Ecological Consultants

Quality Assurance

JCA ref.	Version	Desktop Survey Completed:		Site Surveyed:		Report Completed:		Checked:	
		Date	Name	Date	Name	Date	Name	Date	Name
13809c/JB	Planning Application	26/10/17	Jenny Butler	26/10/18, 16/05/18, 31/05/18, 11/07/18	Jenny Butler				

This report has been prepared and provided in accordance with the *British Standard 42020: Biodiversity – Code of practice for planning and development*

Risk Assessment Completed	
Bio-security Procedure Completed	
Lone Worker Procedure Completed	

Summary

A report is required at **Union Mills, Tanyard Road** to assess the site's potential for supporting bat species, in the form of roosting sites, foraging habitat and/or commuting routes. The aim of this report is to investigate the potential impact that the proposed development may have on the local/national bat population. The development proposed on this site is a conversion from commercial use to residential flats.

All bat species and their roosts in the UK are protected under European and UK law. The main item of legislation protecting UK bats is the Conservation of Habitats and Species 2017. In addition to this, bats and their roosts are also protected in England and Wales under the Wildlife and Countryside Act 1981 and The Countryside and Rights of Way Act 2000.

A desktop study was undertaken in order to obtain any records of bats and designated conservation sites within a 2km radius of the site to determine the significance of the area for supporting these protected species. A thorough assessment of the habitat and buildings on site was carried out to assess the site's potential for supporting roosting and foraging bats.

The Bat Scoping Survey determined Union Mills to have a high potential for supporting roosting bat species. After potential for roosting bats was concluded, three emergence/re-entry surveys were carried out to assess the absence/presence of roosting bats.

After conducting a thorough Bat Roost Potential survey and a detailed Desktop Study, we consider **Union Mills** to have a high potential for supporting foraging, commuting and roosting bats.

As the site had been considered to have a high potential of supporting bat roosting sites, we recommended that dawn/dusk emergence surveys should be carried out to establish the absence/presence of roosting bats at **Union Mills.**

As the site had been considered to have a high potential of supporting bat roosting sites, three emergence/re-entry surveys were required, with a total of **five** surveyors to cover all aspects of the building.

After conducting three emergence/re-entry surveys Common Pipistrelle bats were determined to be roosting within the Union Mills property.

As bats have been confirmed to be roosting at **Union Mills**, a **Bat Mitigation Licence** must be applied for from Natural England, and a mitigation plan devised so development causes as little impact on local bat populations as possible, and alternative roosting options are given.

Bat hibernation surveys: Due to the presence of Myotis bats along the canal (adjacent to the site boundary) bat hibernation surveys were carried out. Three surveys were undertaken, one per month from January until February, totalling three surveys. No bats were found to be hibernating or present during the hibernation surveys in December or January. The February hibernation survey is still waiting to be undertaken.

The development of any building or structure has the potential risk of removing bat roosting habitat. Therefore JCA always recommended that alternative bat roosting opportunities should be provided to replace any that are lost due to building alterations. Should you like advice on putting up bat boxes, or on increasing your site's value to bats through carefully designed planting schemes and habitat creation, JCA can provide this service.

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1. Introduction and Terms of Reference

1.1 Purpose of the Report

1.1.1 A report is required at **Union Mills, Tanyard Road** to assess the site's potential for supporting bat species, in the form of roosting sites, foraging habitat and/or commuting routes.

1.1.2 The aim of this report is to investigate the potential impact that the proposed development may have on the local/national bat population.

1.2 Terms of Reference

1.2.1 I am instructed by **Acumen Designers & Architects** to visit the site and prepare my findings in a report.

1.2.2 For this purpose I have been supplied with a site map and brief details of the proposal.

1.3 Scope of the Report

1.3.1 This report is compiled in accordance with the Bat Conservation Trust's (BCT) '*Bat Surveys - Good Practice Guidelines*', the Joint Nature Conservation Committee's (JNCC) '*Bat Workers Manual*' (3rd Edition) and Natural England's '*Bat Mitigation Guidelines*'.

1.4 Details of Proposed Development

1.4.1 The development proposed on this site is a conversion from commercial use (small businesses) to residential flats.

1.5 Site Description

1.5.1 **Union Mills, Tanyard Road** is situated 167m north of Milnsbridge town centre, at grid reference: SE118158.

1.5.2 The site is in commercial use. Within the Union Mill building are a number of small businesses. The surrounding habitat is predominantly hard standing, which is currently used for car parking.

1.5.3 The site is surrounded predominantly by commercial and residential properties. To the east and south of the site are a number of mills which have been converted into residential properties. Adjacent to Union Mills is the River Colne.

1.6 Bats in the UK

1.6.1 In the UK there are thought to be 18 native species of bat (17 known to be breeding), and may account for more than a quarter of mammal species present in the UK. Nearly all UK bat species have experienced serious declines over the last century and all species are protected under UK and European Law.

1.7 Bat Ecology

1.7.1 All species of bat in the UK are insectivorous and have evolved to hunt a different set of insects, present in different habitat types. Preferred bat habitats include woodland, grassland, agricultural land, wetland and rivers.

1.7.2 Bats typically roost close to foraging sites, and use linear features such as hedgerows, tree lines and rivers to navigate. Removal of these linear features is thought to have a significant negative impact on their movement, which could be contributing to their decline.

1.7.3 Bats will roost in a wide range of different sites including built structures, underground sites and mature trees. Due to bats ecology different roost sites will be used at different times of the year. Known roost types include:

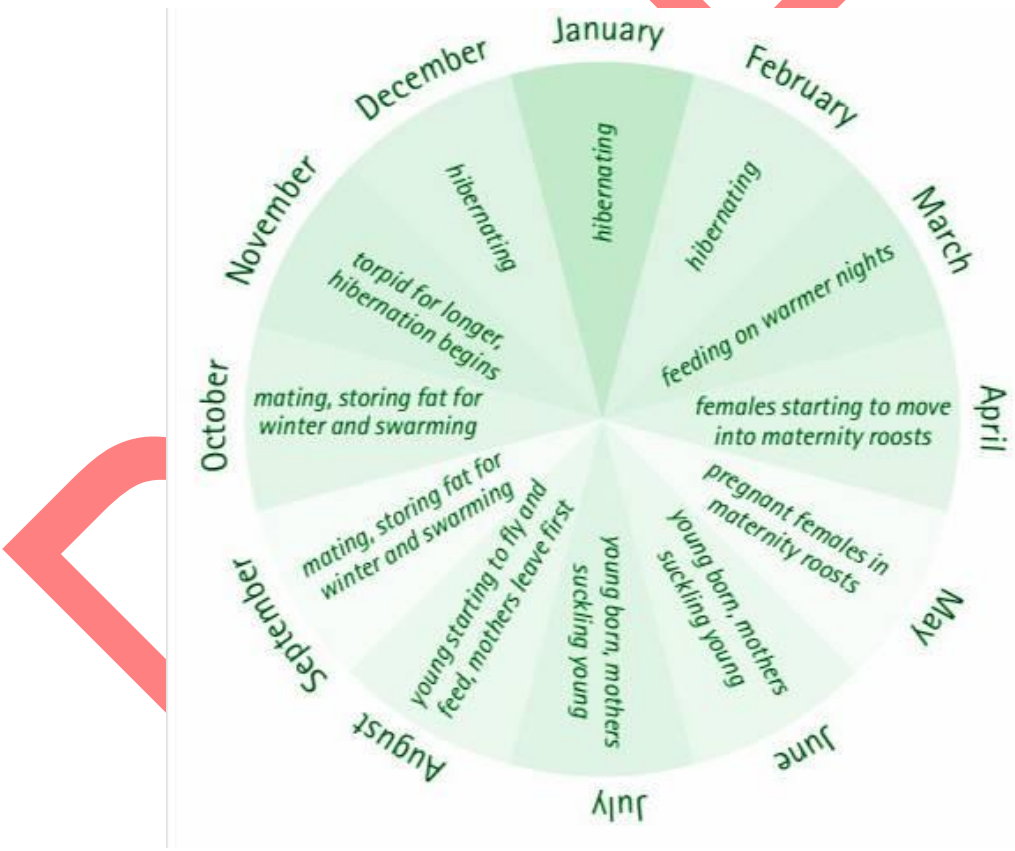
- Night Roosts: A place where individual bats, or sometimes the colony, rest or shelter in the night, but are rarely found in the day. Can be used throughout the year.
- Day Roosts: A place where individual bats, or small groups of males, rest or shelter during the day but are rarely found by night in the summer months.
- Feeding Roosts: A place where individual or a few individuals rest or feed during the night, but are rarely found in the day during the summer months.
- Transitional/Occasional Roosts: Used by a few individuals or occasionally by small groups for short periods of time on waking from hibernation, or in the period prior to hibernation. Usually found during February-April or during September to November.
- Swarming Sites: Where large numbers of males and females gather during late summer to autumn. Appear to be important mating sites. September – November.
- Mating Sites: Where mating takes place from late summer and can continue through the winter. August – March.
- Maternity Roosts: Where female bats give birth and raise their young to independence. May-September.

- Hibernation Roosts: Where bats may be found individually or together during the winter. They have a constant cool temperature and high humidity. December- February.
- Satellite Roosts: An alternative roost found in close proximity to the main nursery colony used by a few individual breeding females to small groups of breeding females throughout the breeding season. May-September.

1.7.4 The three main roosts to be considered, with respect to buildings and development, are maternity roosts, satellite and hibernation roosts. Disturbance of these roosts can have significant negative impacts on local bat populations.

1.7.5 **Figure 1** below provides a visual representation of the life cycle of a bat; showing the life cycle on a month by month basis.

Figure 1: Diagram of a bat's life-cycle (*taken from the BCT: Bat surveys for professional Ecologists, Good Practice Guidelines, 3rd Edition).*



1.8 UK Bat Species

1.8.1 Within the UK there are 17 species of bat known to be breeding, with a further one species listed as a resident, non-breeding species within the UK. **Table 1** below details the roosting preferences of the breeding species of bats currently

listed as being found within the UK.

Table 1: Roosting preferences of the known UK breeding resident bat species *(taken from the BCT: Bat surveys for professional Ecologists, Good Practice Guidelines; 3rd Edition).*

Species Common Name	Species Scientific Name	Species Roosting Preferences
Greater Horseshoe Bat	*Rhinolophus ferrumequinum*	During the summer females use large, old, undisturbed buildings including coach houses, stable blocks and barns. This species prefers to fly directly into the roost and to their roosting position and bats hang freely Maternity sites are often found in large spaces at least 3–4m high, providing a sufficiently large flight area. This species generally uses night roosts to rest whilst foraging, which are found in a variety of structures, for example outbuildings, garages, stables, milking sheds, porches and trees. In winter, both male and female bats choose underground sites for hibernation, including tunnels, mines, caves or cold building basements.
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	Roost sites include attics, chimneys and boiler rooms of buildings, rural houses and outbuildings in the summer, and cellars, tunnels, disused mines and caves for hibernation. Also found in industrial buildings. This species prefers to fly directly into roost sites and into their roosting position. Maternity sites are often found in large roof spaces at least 3–4m high providing a large flight area. A range of conditions is required throughout the year but this may be found in one building with, for example, an attic for the summer and a cellar for the winter. Summer and winter roost sites are generally no more than 5–10km apart. The lesser horseshoe bat also uses alternative roost sites during the night and day.
Daubenton's Bat	*Myotis daubentonii*	Roosts are found in hollow trees, bridges or sometimes buildings and generally close to water. Nursery roosts are not exclusively female – males may make up 25% or more of the colony and large male-only colonies have also been recorded. This species selected oaks over beech trees and preferred roosts on the edges of woodlands in a study in the Netherlands. Hibernation sites are usually underground including caves, mines and suitable tunnels where bats are found both in crevices and on open walls. They may also hibernate in tree cavities.
Bandt's Bat, Whiskered Bat and Alcathoe's Bat	*Myotis Brandtii, Myotis mystacinus, Myotis alcathoe*	These species can roost in trees and a wide range of buildings in the summer. These species hibernate in caves or other underground sites, where they can be found in the open or in cracks and crevices.

Natterer's Bat	*Myotis nattereri*	Roost sites include tree holes and different types of buildings but has also been is found in bridges. Usually roost in attics between late May and mid-July and often roosts have enough space for internal flight (Swift, 1997). This species also breeds in bat boxes. Timber-framed barns built between the 12th and 19th centuries may be particularly important to this species, with roosts found in mortise joints in both the summer and winter. Hibernates in cracks and crevices in caves and mines. Other hibernation sites recorded are canal and railway tunnels, ice houses and tree cavities.
Bechstein's Bat	*Myotis bechsteinii*	Maternity roosts are found in tree holes in the canopy, generally in old trees with dead branches. May be found in woodpecker holes in old oaks. Recorded switching roosts frequently. One study recorded roosts in rot holes, woodpecker holes and in a gap behind thick ivy. A study of ten colonies across the Isle of Wight found 90% of maternity roosts in woodpecker holes in ash trees. Another study found a maternity roost in a woodpecker hole in an oak tree on a golf course. Hibernates in trees and sometimes caves or other underground sites. Chilmark Quarry is an example of Bechstein's bats using an abandoned mine for hibernation.
Noctule	*Nyctalus noctula*	Roosts almost exclusively in tree holes, but sometimes found in bat boxes or buildings. One Netherlands study found that woodpecker holes are preferred, in trees close to woodland edge. Hibernates in trees but sometimes found in buildings.
Leisler's Bat	*Nyctalus leisleri*	Roosts in trees, bat boxes and buildings such as houses; for example, around the gable end of lofts, under tiles, under soffit boards and in disused chimneys. Often uses a variety of sites in the summer. Hibernates in tree holes, buildings and sometimes underground sites.
Common Pipistrelle and Soprano Pipistrelle	*Pipistrellus pipistrellus, Pipistrellus pygmaeus*	Maternity colonies are found mainly in buildings, usually roosting out of sight in crevices. Colonies may use a number of sites through the summer but are often loyal to the same sites for many years. Maternity colonies are extremely variable in terms of numbers, from 20 to over 1,000 bats. Soprano pipistrelle colonies tended to be larger than those of the common pipistrelle. Common pipistrelle shift roosts between pregnancy and lactation. Roost selection is based on temperature for common pipistrelle and on surrounding habitats (woodland and water) for both species. Males roost singly or in small groups in the summer, in buildings or trees. Bat boxes are used by both males and females but generally only males use them during the summer. These species do not use underground sites for hibernation but are sometimes found in the cracks and crevices of buildings in the winter.
Nathusius' Pipistrelle	*Pipistrellus nathusii*	The very few known British nursery roosts are in buildings, with hibernation roosts in hollow trees and crevices in cliffs, walls and caves. One study recorded males roosting under lead flashing and roof tiles.

Serotine	*Eptesicus serotinus*	Roosts in buildings in small cavities or crevices with high access points such as gables but occasionally also found in trees. Recorded hibernation sites include cavity walls, disused chimneys and occasionally caves.
Barbastelle	*Barbastella barbastellus*	In summer, breeding females move regularly between large numbers of different tree roosts. One study found that they preferred dead trees surrounded by holly under-storey and another found them in tree crevices and cavities, between overlapping limbs and behind ivy, on average 6.9m above ground level. Tree roosts are in relatively undisturbed places and frequently in thick cover, although cracks much higher up in trees were used at the time of birth. Bat boxes are also used. Almost all roosts found in two studies were behind loose bark and in mixed locations not always surrounded by under-storey. Winter roosts include deep, hollow trees (usually dead and among holly under-storey) and sometimes buildings or underground sites. Other winter roosts recorded are flaking bark and splits less than 2m above the ground and disused railway tunnels, barns, outbuildings, church porches and lime kilns. Chilmark Quarry is an example of barbastelle bats using an abandoned mine for hibernation. 24 Spring and autumn roosts have been recorded behind loose bark, in dead tree stumps and in splits in limbs mainly less than 2m above ground level.
Brown Long-Eared Bat	*Plecotus auritus*	Maternity roosts found in trees, in the voids of large, old buildings and bat boxes in woodland. Usually roosts against wooden beams at the roof apex in attics or farm buildings. Bats often cluster at the highest part of the roof and require enough space for unobstructed, internal flight. Shows high roost fidelity. Commonly uses feeding perches and night roosts in porches or outbuildings separate from the main roost. Hibernate in underground sites, tree holes and buildings.
Grey Long-Eared Bat	*Plecotus austriacus*	Frequently roosts on ridge beam in spaces between rafters. Maternity colonies show high roost fidelity. Number of males in maternity colony increases through summer. Many males are, however, solitary.

1.8.2 Greater Mouse-eared bats *(Myotis myotis)* are extremely rare in Britain and little is known about where they roost in the summer or winter, they are listed as a resident, non-breeding species within the UK within this species currently found at one site in Sussex.

1.9 Bats and the Law

1.9.1 All bat species and their roosts in the UK are protected under European and UK law. The main piece of legislation protecting UK bats is the Conservation of Habitats and Species Regulations 2017.

1.9.2 In addition to this, bats and their roosts are also protected in England and Wales under the Wildlife and Countryside Act 1981 and The Countryside and

Rights of Way Act 2000.

1.9.3 Under these legislations, it is an offense to:

- Deliberately capture, injure or kill a bat.
- Deliberately disturb a bat in a way that would affect its ability to survive, breed or rear young (or hibernate or migrate in England, Wales and Northern Ireland) or (significantly in England, Wales and Scotland) affect the local distribution or abundance of the species.
- Damage or destroy a roost (this is an 'absolute' offence).
- Possess, control, transport, sell, exchange or offer for sale/exchange any live or dead bat or any part of a bat.
- Intentionally or recklessly disturb a bat at a roost.
- Intentionally or recklessly obstruct access to a roost.

If it is discovered that development may impact upon bat roosts (thus leading to an offence being committed) a **Mitigation Plan** should be devised and a **Bat Mitigation Licence** applied for from the relevant government department (i.e. Natural England). Gaining a licence will depend on many variables, such as the bat species present, roost type, roost size and its local/regional/national importance.

2. Methodology

2.1 Desktop Study Methodology

2.1.1 A desktop study has been undertaken in order to obtain any relevant records of bats from local bat groups and ecology units within a 2km radius of the site.

2.1.2 The Multi-Agency Geographic Information for the Countryside (MAGIC) website was used to locate any designated sites, both statutory and non-statutory, such as; Local Nature Reserves (LNRs), Ramsar Sites, Special Areas of Conservation (SACs), Special Protection Areas (SPAs) or Sites of Special Scientific Interest (SSSIs) that may be present within 2km of the survey site.

2.2 Scoping Survey Methodology

2.2.1 The site was surveyed for foraging, commuting and roosting potential. A detailed search of habitat and buildings was conducted during daylight hours in order to identify potential bat roosting sites and look for evidence of bat activity. Potential roost sites and features deemed to be of value to bats were documented on the site map (please refer to **Appendix 1**) and photographic evidence was taken (please refer to **Appendix 2**).

2.2.2 All surveys are conducted by experienced surveyors using the following equipment to ensure an accurate assessment; a printed site map, camera, 1 million candlelight torch, binoculars, ladders and a full spectrum bat detector.

2.2.3 Signs that bats have previously or are currently using a potential roost site include:

- Scratch marks, urine and oil stains around holes in buildings or trees.
- Droppings, carcasses and/or food remains found around the site.
- Bats observed flying in/out of a hole in a building or tree.
- Bats heard 'chattering' within a potential roost site, especially on warm summer days.

2.2.4 Limitations: It must be highlighted that the absence of any of these signs is not proof that the site is not being used by bats. Weathering and other factors will often remove any signs of bat activity, especially when present on the exterior of a building or a tree. As previously explained, many bat species will have several roost sites which they regularly move between and therefore an absence during a survey visit does not exclude their presence at a later date.

2.3 Emergence/re-entry Survey Methodology

2.3.1 Emergence re-entry surveys are conducted either 15 minutes before sunset and up to two hours after or up to 2 hours before sunrise and 15 minutes after. Due to the lifecycle of bats emergence surveys are conducted between the months of May through to August, and can occasionally run into September. All surveyors used by JCA have experience in conducting bat emergence surveys and an appropriate level of knowledge in bat ecology.

2.3.2 At **Union Mills, Tanyard Road** it was recommended in **JCA report ref: 13809/JB** that three emergence/re-entry surveys were required on the mill building.

2.3.3 All surveyors present are equipped with the following items during each survey; a suitable (frequency division or full spectrum as appropriate) bat detector, Walkie Talkie, clock, printed site map, note pad and pen.

2.3.4 An initial Scoping survey of the site will highlight all areas of the site that are likely to support bat roost sites. This information will then be used to influence the number of surveyors used and their positions around the site.

2.3.5 Limitations: Detecting bats using bat detectors can be limited. Bat species that produce calls at both a high amplitude (loud) and a low frequency, such as Noctules are easier to detect than bats with low amplitude (quiet) and high frequency calls such as the Brown Long-Eared bat and Greater Horseshoe bats respectively.

2.4 Bat Hibernation Survey Methodology

2.4.1 Bat hibernation surveys are deemed necessary when a structure has been considered to have the potential to support hibernating bats, or bats in extended periods of torpor. This is determined within the bat scoping assessment, and is usually based on the quality of the neighbouring foraging and commuting habitat, temperature, and humidity levels, light pollution and levels of human disturbance/occupation. Sites that are unoccupied by people, have consistently low temperatures during the winter period and high humidity are favoured as hibernation sites by bats.

2.4.2 Bat Hibernation surveys are carried out during the winter period when temperatures are consistently falling below 8°C. Surveys are carried out once a month in order to limit the level of disturbance during a period in the bats life cycle when they are highly vulnerable to light and noise increases. Excessive disturbance to hibernating bats increases mortality rates exponentially *(Merlin Tuttle, 2017).*

2.4.3 Bat hibernation surveys are carried out during daylight hours with a minimal number of surveyors. Cracks and crevices are inspected for hibernating bats, beams, joists and joints are surveyed for bats in torpor or hibernation. The survey is carried out using a torch, preferably an LED bulb to keep heat emission from the light minimal. Close focusing binoculars, torch and counting device are also used to ensure as may areas as possible are checked for bats. Recent signs of bat use, such as droppings or oil marks are also checked for as the presence of these signs could indicate bats are using the site at some point during the hibernation period.

2.4.4 Bats move hibernation sites throughout the hibernation period, and will emerge from torpor to feed at regular intervals, therefore more than one survey visit is required to determine likely presence or absence.

2.4.5 Bat hibernation surveys should be carried out up to four times within one survey period; however two to three separate counts is classed as a good, and widely accepted survey effort. The Bat Conservation Trust recommend between two and three surveys carried out in January to February. The surveys are to be carried out when temperatures are consistently cold (below 10, and during the hours of daylight.

2.4.6 Limitations and Considerations: Surveyors undertaking hibernation counts and checks must hold the relevant survey licence from the issuing governing body (in this case Natural England). Surveyors must be able to competently survey and demonstrate past survey experience of bats in hibernation.

2.4.7 The absence of bats in hibernation or torpor during a check does not rule out the presence of hibernating bats entirely. 100% confidence cannot be given that bats are not hibernating at a site, however reasonable survey effort can be undertake to draw likely presence or absence conclusions.

3. Results

3.1 Desktop Study Results

3.1.1 Local Data Centre Records: West Yorkshire Ecology has been commissioned to provide the records held for bats within a 2km radius of the survey site. The results for bat species have been summarised below. It should be noted that the absence of records should not be taken as confirmation that a species is absent from the search area.

3.1.2 Bats: The data search revealed records of Common Pipistrelle *(Pipistrellus pipistrellus)*, Soprano Pipistrelle *(Pipistrellus pygmaeus)*, Unknown Pipistrelle Species *(Pipistrellus sp.)*, Brown Long-Eared Bat *(Plecotus auritus)*, Leisler's Bat *(Nyctalus leisleri)*, Noctule *(Nyctalus noctula)* and unknown bat species *(Vespertillionidae)* within 2km of the site. No records of bats have been obtained within 500m of the site.

3.1.3 Nature Conservation Designations: Nature designations are split into two types; those that confer some form of statutory protection, and other designations. These designated sites are summarised in the table below.

3.1.4 The site does not fall within the Kirklees Wildlife Habitat Network area.

3.1.5 There are no statutorily designated areas within 2km of the site boundary.

Table 2: Non-statutorily designated sites with 2km of the site. Designated sites within 500m of the site are marked with an asterisk *

Name	Designation	Description	Distance from Site
Huddersfield Narrow Canal*	Local Wildlife Site (LWS)	The section of the Huddersfield Narrow Canal which is included within this site stretches from the entrance of the Standedge Tunnel at Marsden, to Aspley Basin in the centre of Huddersfield, where it joins the Sir John Ramsden Canal. The canal lies in close proximity to the River Colne. The canal is navigable having been opened to boat traffic in 2001. Some vegetation cover has been lost due to engineering work.	Adjacent to Union Mills

Delves Wood	Local Wildlife Site (LWS) & Site of Wildlife Significance (SWS)	Delves Wood is located the north west of Netherton. Surrounding land use includes grassland to the south and west (improved or semi-improved neutral, some horse grazed) and houses and gardens to the north and east. Most of the woodland is very steep and hummocky, consistent with an old quarry site.	1900m South
Gledholt Woods	Local Wildlife Site (LWS) & Local Nature Reserve (LNR)	Ancient semi-natural woodland, good public access.	1600m Northeast
Johnson Wellfield Quarries	Local Geological Site (LGS)	One face of Wellfield Quarry has been left exposed as part of the quarry restoration plan. The rock is Upper Carboniferous (Namurian) Rough Rock and the face is about 250m long by 8-10m high. At the south end of the face there is a cutting, showing some interesting features, crossed by a footbridge. The rock is a medium–grained sandstone with much cross-lamination in small beds, sometimes flaggy in nature. Some beds wedge out orare replaced with micaceous siltstones with disseminated carbon. There are some plant fossils.	1800m South
Beaumont Park	Local Geological Site (LGS)	Exposures of Upper Carboniferous Namurian (Millstone Grit) Rough Rock and Rough Rock Flags are revealed in a line of former quarries in the grounds of Beaumont Park overlooking the Holme Valley. A series of exposed cliffs illustrate a range of sedimentary features including cross bedding, flaggy bedding, massive bedding and sections of fine fissile bedding.	1800m Southeast

3.2 Scoping Survey Results

3.2.1 The site was surveyed on the 26/10/18 by lead surveyor Jenny Butler *BSc (Hons).* Survey conditions are summarised in **Table 3**.

Table 3: Survey times and weather conditions.

Survey date	Lead surveyor	Temp	Humidity	Wind speed/Direction		Cloud Cover	Precipitation
26/10/17	Jenny Butler	10°C	75%	5mph	WSW	80%	None

3.2.2 Habitats and Features Present

The site comprises of buildings (Union Mill), hard standing, forming a car parking area, semi-improved grassland and scattered scrub. The site is used for commercial purposes.

Union Mills is a four floored Victorian era mill complex. The building is currently used by small businesses. A number of the office spaces are currently disused. The entire top floor is closed off and has not been occupied for a number of years. There is no enclosed loft space within the mill building. A number of the units within the mill are used solely for storage. The proposed development does not include the other buildings located within this commercial area.

3.2.3 Building Assessment

The Union Mills building is a Victorian era mill complex. The building is currently split into a number of commercial units used by small businesses. Some of the units are used as storage only. The top floor is not in use. This floor has been disused for a number of years. There is not an enclosed loft space within the mill. The top floor contains a spiral stair case leading to the roof. The beams can be seen clearly from the top floor. The top floor contains thick, old and damaged timbers, with some newer timbers replaced in recent years. The roof is primarily tin sheeting, with a small section of slate tiled roofing to the west.

The internal timbers within Union Mills have been painted. Some of the timbers have been coated in creosote. The majority of the units currently in use have had the timbers treated to prevent rot and damage. Some timbers still require treatment. The first and second floors of the mill complex are boarded with laminate sheets, nailed to the roofing timbers.

The pointing externally is in good condition, with recent signs of repair. The internal pointing has been recently repaired and painted. The mill is constructed of stone, with the walls containing a cavity filled with loose stones and rubble. Some access points into this stonework can be seen throughout the mill

complex.

Externally there are floodlights on the front and back of the mill complex which are in use regularly. There are no soffits, fascia or weatherboards on the exterior of the mill building. The roof cannot be seen externally from ground level. The roof appears to be in good condition from an internal inspection via the fourth floor.

No droppings, urine stains or oil stains were found within the mill building. On the top floor butterfly wings were found in small piles – these are signs that bats have been feeding within this area of the building. Species such as Brown Long-Eared bat will favour certain areas within a building to rest and feed, dropping wings of moths and butterflies on the ground below. These wings were relatively recent and fresh looking. Some older signs of feeding activity could also be seen on the top floor of the mill building.

Signs of Bat Use: Feeding remains were found within the Union Mills building.

3.2.4 Tree Assessment

No trees are to be removed or impacted upon by the proposed development at Union Mills. The trees on site have not been surveyed for bat roosting potential as they will not be affected by the proposed development. Should the current development plans change and the revised plans require the removal (or maintenance) of any trees on site then a scoping survey will be required on these trees prior to removal or maintenance in order to determine the bat roosting potential of these trees prior to removal or maintenance.

3.3 Emergence Survey Results

3.3.1 The site was surveyed from the 16/05/18 to the 11/07/18 by lead surveyor Jenny Butler *BSc (Hons)*, NE Level 2 Class Licence – 2018-33192-CLS-CLS. Survey conditions are summarised in **Table 4**.

Table 4: Survey times and weather conditions.

Survey date	Lead surveyor	Start/Finish		Temp Start/Finish		Humidity	Wind speed/Direction		Cloud Cover	Precipitation
16/05/18	Jenny Butler	20:30	10:30	14°C	13°C	54%	7mph	ENE	40%	None
31/05/18	Jenny Butler	03:05	05:15	14°C	14°C	96%	1mph	ESE	25%	None
11/07/18	Jenny Butler	02:30	04:45	13°C	13°C	81%	5mph	NE	80%	None

3.3.2 Emergence Survey 1 results – 16/05/18

Bat Emergence – No bats were seen to emerge from the building during the time of the survey.

Bat Activity - There was a high level of bat activity from 21:26 until 22:39 along the adjacent canal, and at the rear of the Union Mills building. The bats were foraging near to floodlights located on the buildings exterior. The majority of activity was Common Pipistrelle species, with Daubenton's Bat activity recorded along the canal between 21:48 and 22:15. Activity was high along the canal with Daubenton's Bat, Common Pipistrelle, Soprano Pipistrelle and unknown Myotis species recorded foraging in this area.

3.3.3 Re-entry Survey 2 results – 31/05/18

Bat Emergence – Five Common Pipistrelle bats were seen re-entering the building. See photo 1 for location of entry. These bats carried out social behaviour in front of the roost entry before re-entering the roost area. Common Pipistrelles re-entered the roost between 03:38 and 04:27. Activity levels of Common Pipistrelle bats were high around the roost area, with social calls noted. Two bats

Bat Activity - There was a high level of Common Pipistrelle foraging and commuting activity across the canal area, and surrounding vegetation from 03:11 until 03:30. Daubenton's Bats were recorded along the canal between 3:20 and 03:25. Common Pipistrelle commuting activity was observed from the rear of Union Mills, across the car park, heading towards nearby mill buildings. Commuting activity was also recorded from the roadside edge of Union Mills, across the car park towards the tree lined area to the south of the site.

Below are the summarised Anabat survey results, the Anabat was placed near the canal, facing the Union Mills building:

Table 5: Automated Activity Survey - 31/05/18

Common Name	Scientific Name	Time of first Detection	Time of last Detection
Natterer's Bat	*Myotis nattereri*	04:52	04:54
Daubenton's Bat	*Myotis daubentonii*	04:30	05:20
Brown Long Eared Bat	*Plecotus auritus*	04:52	04:56
Common Pipistrelle	*Pipistrellus pipistrellus*	05:30	05:50
Soprano Pipistrelle	*Pipistrellus pygmaeus*	05:50	05:55

3.3.4 Re-Entry Survey 3 results – 11/07/18

Bat Emergence – 28 Common Pipistrelle bats were seen re-entering the building. Three entry points were observed, see **Appendix 4.** Two satellite roosts and one maternity roost are present within the Mill building. Two bats were seen foraging within the Mill building. Species could not be determined; however the behaviour and foraging activity suggests Brown Long-Eared. It is likely the building is used as a feeding perch for Brown long-Eared bats.

Bat Activity - There was a high level of Common Pipistrelle foraging activity along the canal, and in front of the Union Mills building throughout the morning survey. Myotis bat species were recorded along the canal area between 02:35 and 03:50.

3.4 Hibernation Survey Results

3.4.1 Due to the presence of features deemed suitable for supporting bats in torpor, hibernation surveys were carried out. The following areas of the site were surveyed for hibernating bats:

- Main mill complex, focussing on the roof space, stairwell and window frames/mantels.
- Lean to section of the mill which was inaccessible during the scoping surveys and borders the river.
- Wall of the mill that borders the river.
- The river, opposite side of the river to the site, and the bridge downstream.
- Exterior stonework of the mill.

3.4.2 January Hibernation Survey Results – 17/01/19

The weather conditions on site at the time of the survey were as follows, see **Table 6** below:

Table 6: Survey times and weather conditions

Survey date	Lead surveyor	Start/Finish		Temp Start/Finish		Humidity	Wind speed/Direction		Cloud Cover	Precipitation
17/01/19	Jenny Butler	09:45	12:40	3°C	3°C	69%	10mph	WNW	30%	None

The site was surveyed for bats in torpor/hibernation using torches, endoscopes and close focusing binoculars. No bats were found to be present during the

survey. No recent or fresh evidence of bat use (e.g. droppings or oil stains) were found.

3.4.3 January Hibernation Survey Results – 31/01/19

The weather conditions on site at the time of the survey were as follows, see **Table 7** below:

Table 7: Survey times and weather conditions

Survey date	Lead surveyor	Start/Finish		Temp Start/Finish		Humidity	Wind speed/Direction		Cloud Cover	Precipitation
31/01/19	Jenny Butler	09:30	11:15	-4°C	-2°C	92%	7mph	ESE	100%	Light Snow Showers

The site was surveyed for bats in torpor/hibernation using torches, endoscopes and close focusing binoculars. No bats were found to be present during the survey. No recent or fresh evidence of bat use (e.g. droppings or oil stains) were found.

3.4.4 February Hibernation Survey Results – (DATE)

3.4.5 The weather conditions on site at the time of the survey were as follows, see **Table 8** below:

Table 8: Survey times and weather conditions

Survey date	Lead surveyor	Start/Finish		Temp Start/Finish		Humidity	Wind speed/Direction		Cloud Cover	Precipitation

4. Discussion and Analysis of Results

4.1 Nature Conservation Designations

4.1.1 No designated nature conservation sites are located within the boundary of the site.

4.1.2 There are no statutorily designated conservation sites within 2km of the site. The site does not fall within the Kirklees Wildlife Habitat Network Area.

4.1.3 There are five non-statutorily designated sites within 2km of Union Mills. The closest non-statutorily designated site to Union Mills is the Huddersfield Canal. This is a Local Wildlife Site (LWS) and borders the western boundary of the Union Mills site. The proposed development will have an effect on this Local Wildlife Site due to the close proximity of the proposed development at Union Mills to the Huddersfield Canal.

4.2 Scoping Survey

4.2.1 The main Union Mills building has high bat roosting potential. Please refer to **Section 3.2** for further details. The Union Mills building contains numerous cracks, crevices and areas with the potential to support roosting bats.

4.2.2 The bat scoping survey highlighted a number of features on the site suitable for supporting roosting bat species, including cracks and crevices in the stonework, gaps between the stonework and roof, slipped or missing roof slates and damaged window frames.

4.2.3 This site has **high potential for supporting roosting bat species.** Please see **Table 6** below for the guidelines used for assessing the roosting potential of a site. Please note these guidelines are applied using the professional judgement of the licensed bat worker undertaking the assessment.

Table 6: Guidelines used for assessing the bat roosting suitability of a site *(taken from the BCT: Bat surveys for professional Ecologists, Good Practice Guidelines; 3rd Edition).*

Roosting Suitability	Roosting Features Present
Negligible	No visible features on the site likely to be used by roosting bats. No signs of bats found during the initial assessment.
Low	A structure with one or more potential roosting opportunities that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough shelter, protection, surrounding habitats, or the appropriate conditions to be used on a regular basis by larger numbers of bats e.g. unlikely to support hibernation or maternity roosts. A tree of sufficient size and age to contain features suitable for bat roosting, but with no features seen from the ground. No signs of bat use found during the initial assessment.

Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to the size of the potential roosting feature which is sufficient to provide: shelter, protection, optimal conditions and surrounding habitats. The feature(s) are unlikely to support a roost of high conservation status. Signs (potential signs) of bat use found during the initial assessment.
High	A structure or tree with one or more potential roost sites that could be used by bats due to the size of the potential roosting feature which is sufficient to provide: shelter, protection, optimal conditions and surrounding habitats. The features have the potential to support large colonies of bats (e.g. maternity or hibernation) for long periods of time. Signs of bat use present.

4.3 Emergence Surveys

The bat emergence survey identified three areas bats are currently roosting within Union Mills. Common Pipistrelle roosts were identified within the Union Mills property.

Two satellite Common Pipistrelle roosts and one maternity roost for Common Pipistrelle species were identified within the Union Mills building. See Appendix 1 for locations of these roosts.

5. Conclusions and Recommendations

5.1 After conducting a thorough Bat Roost Potential survey and a detailed Desktop Study, we consider **Union Mills** to have a high potential for supporting foraging, commuting and roosting bats.

As the site had been considered to have a high potential of supporting bat roosting sites, we recommended that dawn/dusk emergence surveys should be carried out to establish the absence/presence of roosting bats at **Union Mills.**

As the site had been considered to have a high potential of supporting bat roosting sites, three emergence/re-entry surveys were required, with a total of **five** surveyors to cover all aspects of the building.

After conducting three emergence/re-entry surveys Common Pipistrelle bats were determined to be roosting within the Union Mills property.

Brown Long-Eared bats were found to be using the interior of the Union Mills building – likely as a feeding perch during the night.

As bats have been confirmed to be roosting at **Union Mills**, a **Bat Mitigation Licence** should be applied for from Natural England, and a mitigation plan devised so development causes as little impact on local bat populations as possible. The mitigation licence must be applied for prior to construction/demolition works taking place.

Due to the presence of Myotis bat species along the site boundary (the canal area), and Brown Long-Eared bats being recorded within the building, bat hibernation surveys are required to determine whether the building supports hibernating bat species.

Three bat hibernation surveys were carried out from January until February in appropriate weather conditions. No bats in torpor or hibernation were found to be present within the mill complex or within the walls along the river. The bridge downstream of the site was also surveyed for hibernating bats. No hibernating bats or evidence of bat use was found within the bridge structure. STILL AWAITING FINAL SURVEY RESULTS.

The development of any building or structure has the potential risk of removing bat roosting habitat. Therefore JCA always recommended that alternative bat roosting opportunities should be provided to replace any that are lost due to building alterations. Should you like advice on putting up bat boxes, or on increasing your site's value to bats through carefully designed planting schemes and habitat creation, JCA can provide this service.

6. References

Bat Mitigation Guidelines (Jan. 2004). A. J. Mittchell-Jones. English Nature.

Bat Survey Guidelines: Good Practice Guidelines (2007). Bat Conservation Trust (BCT).

Bat Workers Manual (3rd Edition 2004). A. J. Mitchell-Jones & A. P. McLeish. Joint Nature Conservation Committee (JNCC).

https://www.merlintuttle.org/resources/disturbance-harms-hibernating-bats/ Merlin Tuttle's Bat Conservation. How Disturbance Harms Hibernating Bats, written 2017. Accessed 04/02/19

Websites:

Bat Conservation Trust (BCT). <http://www.bats.org.uk/>

Google Maps. **<**http://maps.google.co.uk/**>**

Multiple-Agency Geographic Information for the Countryside (MAGIC). <http://www.magic.gov.uk/>

National Biodiversity Network (NBN) Gateway. <data.nbn.org.uk>

Natural England. < http://www.naturalengland.org.uk/>

Nature on the Map. Natural England. <www.natureonthemap.org.uk>

Relevant Legislation:

Wildlife and Countryside Act 1981 <http://jncc.defra.gov.uk/page-3614>

The Conservation of Habitats and Species Regulations 2017 <https://www.legislation.gov.uk/uksi/2017/1012/contents/made>

Countryside and Rights of Way Act 2000 <http://www.legislation.gov.uk/ukpga/2000/37/pdfs/ukpga_20000037_en.pdf?view=interweave>

Appendices

Appendix 1: Bat Activity Plan – 16/05/18

Appendix 2: Bat Activity Plan – 31/05/18

Appendix 3: Bat Activity Plan – 11/07/18

Appendix 4: Bat Roost Location Plan

Appendix 5: Photographic Evidence

Photo 1: External view of Union Mills, from driveway entrance

Photo 2: Exterior view of rear of Union Mills, from car park

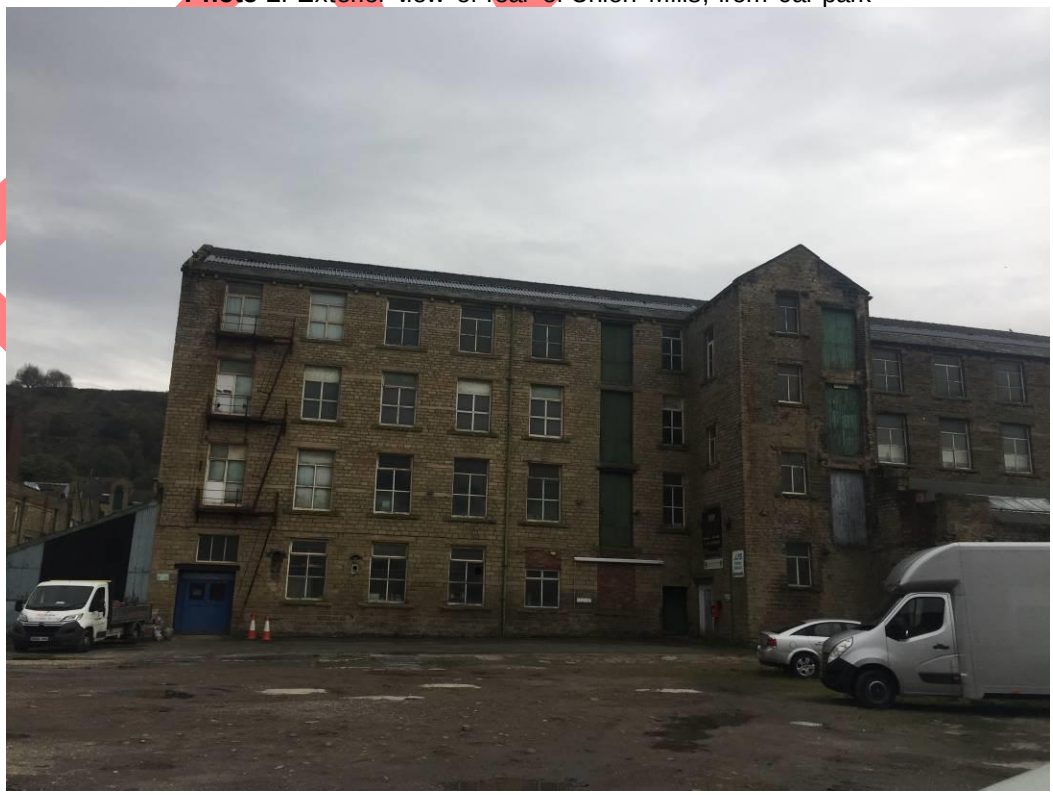
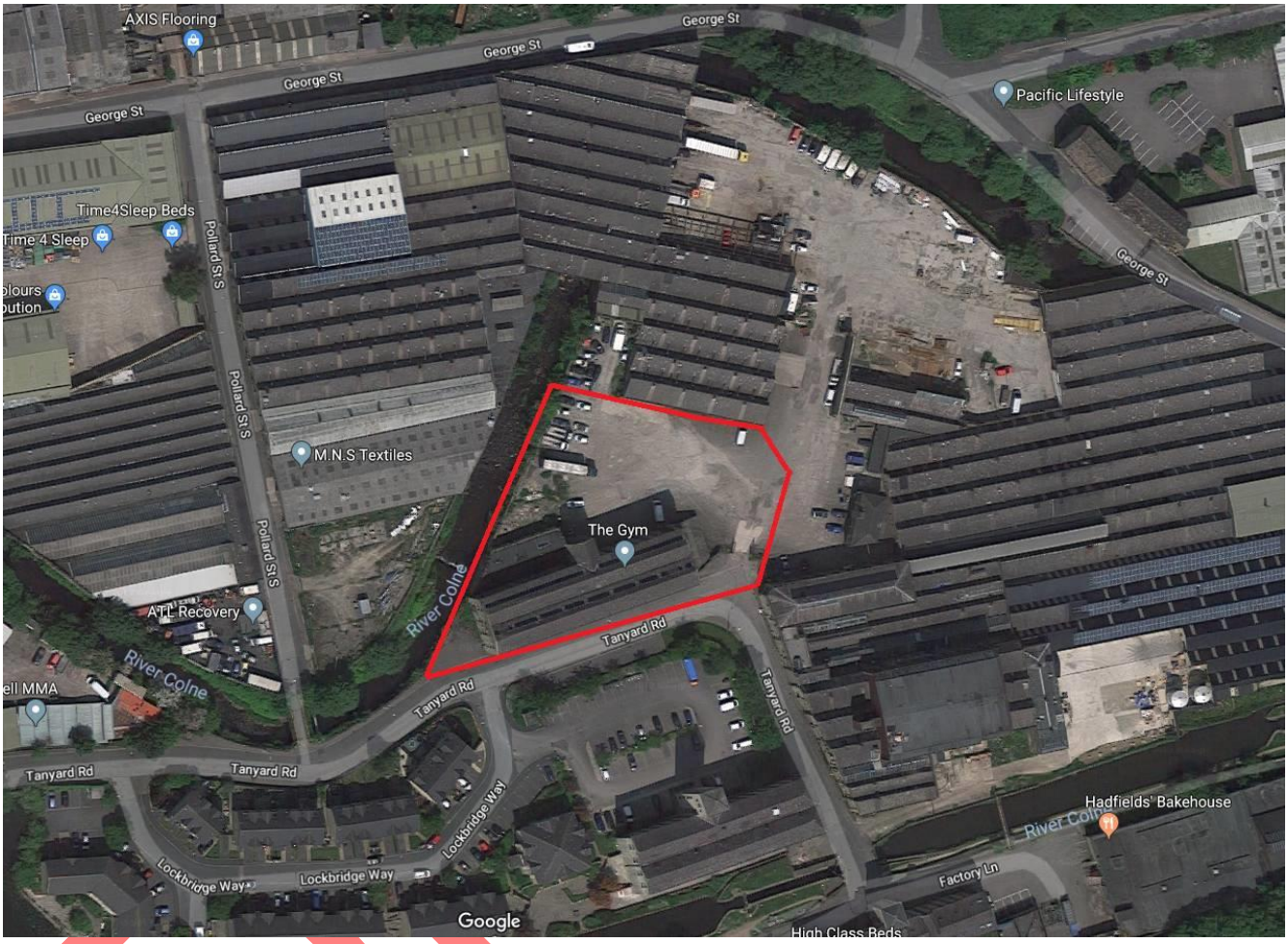


Photo 3: Derelict single storey extension to Union Mills, adjacent to canal

Appendix 6: Map of Surrounding Landscape

Figure 2: Google Maps image of **Union Mills, Tanyard Road**, showing the survey site in relation to the surrounding landscape and habitats. Red line indicates site boundary. © **Google**



Google map image © 2017

Appendix 7: Bat Survey Calendar

Figure 3: Survey timings calendar (taken from BCT: Bat surveys for professional Ecologists, Good Practice Guidelines; 3rd Edition).

Survey type	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Preliminary ecological appraisal - fieldwork												
Preliminary roost assessment – structures[a]												
Emergence/re-entry survey for maternity or summer roosts[b]												
Emergence/re-entry[c] survey for transitional roosts[b]												
Emergence survey for mating roosts[b]												
Hibernation survey – structures[a]												
Preliminary ground level roost assessment - trees[d]												
Potential roost feature (PRF) inspection survey - trees												
Ground level bat activity survey – transects and automated/static												
Pre-, during and post-hibernation – automated/static bat activity survey												
Swarming survey												
Back-tracking survey												
Trapping survey[e]												
Radio tagging and tracking survey[e]												

= optimal period = sub-optimal period

= weather or location dependent (i.e. may not be suitable due to spring and autumn conditions in any one year or in more northerly latitudes). Note that October surveys are not acceptable in Scotland.

[a] Not including trees

Appendix 8: Glossary

Activity surveys - are used to assess the level of bat activity at a site. This can be done either by using equipment such as an AnaBat device, or manually walking around a site with a heterodyne detector, documenting the number of bat passes and interceptions.

Dawn surveys - begin around 2 hours before and up to sunrise when bats are returning to their roosts from foraging, and swarming behaviour can be seen close to roost entrances.

Dusk surveys - begin around 30 minutes before sunset and up to 2 hours afterwards. These are done in order to see bats emerging from their roost sites at night.

Echolocation – is a system similar to sonar that allows bats to travel and forage even in total darkness. Bats make a call and then listen to the returning echoes in order to build up a map of their surrounding area. This allows bats to gauge the identity and distance of an object by how long the echo takes to return to them.

Habitat - the ecological or environmental area that is inhabited by a particular species of animal, plant or other type of organism.

Hibernation - is a state of inactivity and metabolic depression characterized by lower body temperature, slower breathing, and lower metabolic rate. Hibernating animals conserve energy, especially during winter when food is short, tapping energy reserves, i.e. body fat, at a slow rate.

Hibernacula - typically consist of underground sites, such as caves and cellars, which remain relatively cold and humid. Bats will hibernate to conserve energy over the winter months when falling temperatures cause a drop in the abundance of insects. These will typically be colonised around November to around March.

Insectivorous – is when an organism feeds exclusively on insects.

Nocturnal - a behaviour characterized by being active during the night and sleeping during the day.

Maternity roosts – colonised around late May early June and consist of mature females and their young. These roosts need to be warm and quiet, and are used up until around August, with females typically leaving first and then the young.

Mating roosts – mating begins around late October to November. Males of most species use special mating calls to attract females. These can include purrs, clicks and buzzing.

Roost – a site where bats live during the day, rear young and hibernate. These can be in man made structures, such as buildings, bridges, tunnels, cellars and mines, or natural features such as mature trees and caves.

Roosts in buildings – many types of buildings will be used by bats. The most likely sites are agricultural buildings (e.g. farmhouses and barns), buildings with exposed wooden beams (greater than 20cm thick), buildings with weather boarding and/or hanging tiles, and buildings close to woodland and/or water.

Roosts in trees – these are typically in mature trees with deep sheltered cracks, under loose sections of bark, or in woodpecker holes.

Species – a group of organisms in which all members can interbreed and produce viable offspring.

Summer roosts (non-breeding) - these are generally occupied by groups of males and immature females during the summer, and are usually only occupied for a short period before the group moves to another location.

Swarming – a behaviour exhibited by bats returning to their roost sites at dawn. Bats can be seen repeatedly flying to and from the roost entrance, making it much easier for consultants to identify where roosts are on a building or structure.

Temporary/Transitory roosts – These are used after hibernation (March – April) before mature females disperse to maternity roosts and male/immature females colonise summer (non-breeding) roosts. Similarly, temporary roosts form before hibernation (August -October).

Underground Roosts – these are typically used during the winter and can be mines, caves, tunnels or cellars.

Appendix 9: Author Qualifications

Principal Consultant and Managing Director

Jonathan Cocking *F.R.E.S., Tech. Cert. (Arbor.A), PDipArb (RFS) FArborA CBiol MSB. MICFor.* Jonathan is a Registered Consultant and Fellow of the Arboricultural Association and sits on its Professional Committee. He has 31 years experience in the Arboricultural profession and served for eight years as Senior Arboriculturist with a large local authority before establishing JCA in 1997. Jonathan has since developed JCA's portfolio of services and its extensive client base. He is a Chartered Biologist, a Chartered Arboriculturalist and an Expert Witness with much experience of litigation work.

Technical Director

Toby Thwaites *BSc (Hons), HND (Arboriculture).* Toby joined JCA in 1998 after graduating in Ecology at the University of Huddersfield and has since graduated in Arboriculture at the University of Central Lancashire. A former JCA team leader and Consulting Arboriculturist, Toby is now Technical Director and oversees all office and on-site activities at JCA and is on hand to offer technical support and advice.

Consulting Staff: Arboriculture

Toby Parsons *Cert. Arb. (RFS), Tech. Cert. (Arbor.A).* Toby joined JCA after spending 6 years working as a senior climber for various Arboricultural contractors in the East Midlands and the South-West. He has gained the Level 2 Certificate in Arboriculture (RFS) and an Arboricultural Technicians Certificate. Toby is LANTRA certified in Professional Tree Inspection.

Scott Reid ***ND*** *(Arboriculture and Forestry).* Scott joined JCA after working with other consultancy companies in the south of England. He specialises in trees in relation to development and holds a National Diploma, various NPTC qualifications and is currently studying for his Level 4 Diploma in Arboriculture.

Andrew Bussey. Andrew joined JCA having spent 12 years working as a tree surgeon for various private companies and a Local Authority. He has various NPTC qualifications, is QTRA qualified and is currently studying for his Arboricultural Technicians Certificate.

Phil Humeniuk *FdSc (Arboriculture).* Phil joined JCA having spent 3 years working for various tree surgery companies and as a Tree Officer for a Local Authority. He also has several years experience working as a consultant both for JCA and for another consultancy. Phil obtained his foundation degree in Arboriculture at the University of Central Lancashire and has various NPTC's and is LANTRA certified in Professional Tree Inspection.

Emily Wilde *FdSc (Arboriculture).* Emily joined JCA having previously worked for various private tree surgery and consultancy companies over the past 8 years. She initially obtained a ND in Forestry & Arboriculture, followed by a FdSc in Arboriculture at Askham Bryan College, York. Emily has various NPTC certificates and is QTRA qualified.

Mick Eltringham *ND (Forestry).* Mick joined JCA after spending 12 years working in the industry for various private companies in the north and south of England. He has also spent the last five years working as a consultant for two canopy research projects in the Amazon Rainforest, working with Oxford University and the University of Arizona. He has various NPTC Qualifications.

Charles Cocking *(FdSc Arboriculture).* Charles joined JCA in January 2014 as an Apprentice having previously worked for the company on a part time basis during 2013. Charles obtained his Foundation Degree in Arboriculture at Askham Bryan College, York, and is now part of our qualified Arboricultural consultancy team.

Consulting Staff: Ecology

David Bodenham *BSc Ind (Hons) Zoology, MSc Biodiversity and Conservation.* David joined JCA as an addition to the expanding ecology department. An advocate of evidence based conservation, he studied Zoology (Ind) at University and moved onto an MSc in Biodiversity and Conservation where he gained the myriad of skills needed as an ecologist. With over 7 years of experience, David specialises in bat and amphibian ecology.

Jenny Butler *Bsc (Hons) Environmental Science.* Jenny joined JCA's ecology department in 2017, bringing with her a bachelor degree in Environmental Science from Bangor University. Jenny has previously worked as an Environmental Consultant for an Agri- Environment company and as a freelance ecological consultant. Jenny specialises in great crested newt and bat ecology.

Amanda Beck *Cert He in Field Ecology, StudentCIEEM.* Amanda joined JCA's ecology department in 2018, previously working as a freelance Ecological Consultant in North Wales and Liverpool and as a trainee Ecologist in South Wales. Amanda has extensive practical experience in surveying for botanical, amphibians, terrestrial and marine mammals along with invertebrate research work. She has practical experience in habitat management and creation and is a CIEEM student member.

Administrative Staff

Sue Guest Administrative Team Leader.
Catherine Cocking Accounts Manager.
Lisa Hampson Marketing Manager.
Simeon Haigh *BSc (Hons).* IT Director.
Lorraine Spink Administrative Assistant.

The information which we have prepared and provided is true. We confirm that the opinions expressed are our true and bona fide opinions.

Signed

.....

Jenny Butler *BSc (Hons) Environmental Science*

DATE

Proofread by

.....

Amanda Beck *Cert He in Field Ecology, StudentCIEEM*

DATE

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- Great Crested Newt eDNA Sampling
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- Preparation for Environmental Impact Assessment (EIA)
- Invasive Species Surveys
- Code for Sustainable Homes
- Butterfly & Insect Surveys

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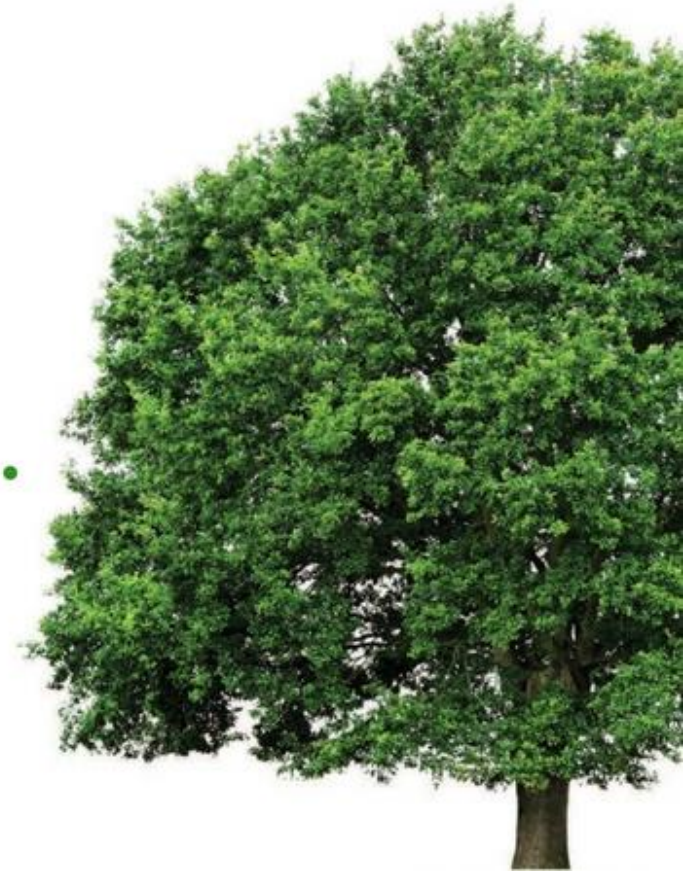

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