

Bat Assessment and Survey

Proposed Rabbit Ings Regeneration Scheme,
Near Royston, Barnsley

On behalf of the City of Wakefield Metropolitan
District Council and Yorkshire Forward

By WYG Environment

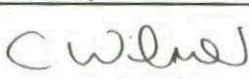
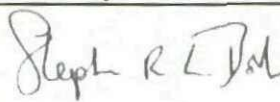
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CONTENTS

1. Introduction
2. Existing Information on Bat Species at Survey Site and Surrounding Area
3. Survey Methodology
4. Site Assessment & Survey
5. Interpretation and Evaluation
6. Mitigation & Compensation
7. References

RABBIT INGS REGENERATION SCHEME: BAT ASSESSMENT AND SURVEY**1. INTRODUCTION****1.1 Background to Activity**

WYG Environment (WYGE) was commissioned by Carillion on behalf of City of Wakefield Metropolitan Borough Council (WMDC) and Yorkshire Forward (YF) to undertake ecological work as part of a regeneration scheme for the Rabbit Ings site ('the Site') that covers 65.9 hectares of land near the village of Royston, Barnsley. The Site includes land formerly used as a colliery spoil heap, former drift mine and disused sports pitches/recreation ground. The Rabbit Ings Regeneration Scheme ('the Scheme') will include the importation of soil making materials, regrading of steep slopes for Health and Safety reasons, and reclamation works to provide formal and informal recreation uses including sports pitches with two team changing facilities with ancillary site access, car parks and informal open areas with landscape and ecological enhancements.

Following a Phase 1 survey undertaken by Scott Wilson at the Site in 2007, a number of specific habitat and protected/notable species surveys were recommended to accurately predict potential ecological impacts as a result of the proposals. This report provides details of ecological work undertaken at Rabbit Ings in relation to bats. The aims of this assessment and survey were:

- To determine whether the site was used by bats for roosting or as a place of shelter, with consequent implications for development work with respect to the *Wildlife and Countryside Act 1981* (as amended), the *Conservation (Natural Habitats, &c.) Regulations 1994* (as amended), and relevant planning and policy guidelines;
- To provide proposals for mitigation measures to offset any environmental impacts caused by the proposed work and to maintain the local bat population at a favourable conservation status; and
- To assist the client to operate within the law.

1.2 Site Location and General Description

The Site (centred around OS grid reference SE 381 118) is located to the north-east of the village of Royston, east of Lund Hill Lane (B6428), some 4.5km north-east of Barnsley, and covers approximately 65.9 hectares (ha). The site is within the administrative boundary of Barnsley Metropolitan Borough Council (BMBC). The majority of the site is owned by WMBC with the recreation ground owned by the Royston and Carlton Community Partnership (RCCP) and a relatively small parcel of land within the south part of the site under the ownership of BMBC.

The site effectively comprises three distinct area, namely as follows:

- (i) the former Rabbit Ings spoil heap;
- (ii) the former Royston drift mine site located to the north-west of the spoil heap;
and
- (iii) the RCCP recreation ground located to the south-west of the spoil heap.

The Rabbit Ings spoil heap occupies the majority of the Site covering an area of approximately 50.9 ha. Sandybridge Lane forms the eastern boundary of the spoil heap and Sandybridge Dyke is located to the south. A dismantled railway, part of Lund Hill Lane, along with the former Royston Drift Mine and some existing employment land is located to the west of the former spoil heap. Open agricultural fields and a former railway line forms the northern boundary of the spoil heap.

The spoil heap comprises a mound of colliery spoil rising approximately 35m to 40m above surrounding land. *There are some areas of tree and shrub growth mainly on the southern slopes of the spoil heap, but other parts are sparsely vegetated.* The spoil heap appears to be terraced on its northern flank, with steep embankments separating the terrace levels. Parts of the southern flank of the spoil heap are steep sided, leading to a much flatter area of land adjacent to Sandybridge Dyke that has more established areas of tree and shrub vegetation. The top of the spoil heap is generally flat with limited vegetation cover. There is evidence of surface erosion from uncontrolled surface water run-off on parts of the spoil heap. In addition, there is evidence of unauthorised use by motor bikes and 4x4 vehicles on the spoil heap and adjacent land within the site.

A man-made pond is located in the north-east corner of the sit and a former lagoon is located in the south-west corner.

The former Royston Drift Mine site occupies an area of land approximately 6.5ha, located to the north-west of the spoil heap, east of Lund Hill Lane, and to the north of existing industrial land. It comprises a relatively flat area of land with an area of hardstanding along with the remains of former roadways and footings for former colliery buildings.

The RCCP derelict sports pitches/recreation ground is located adjacent to the south-west part of the spoil heap and covers an area of approximately 8.5ha. The sports pitches are in poor condition and are infrequently used; they have been 'ploughed' to prevent motorcycle and 4x4 access. The eastern boundary of this part of the Site is formed by a disused railway line adjacent to the spoil heap. The western boundary is formed by a public footpath, with Lund Hill Lane to the west, and the southern boundary by a hedgerow.

A public footpath runs generally along the northern site boundary, in part within the Site, providing a link between Lund Hill Lane in the west and Sandybridge Lane to the east. In addition, a public footpath runs from Lund Hill Lane in a south-east direction, to the north of the sports pitches/recreation ground, and leaves the southern boundary of the Site to connect with the wider rights of way network including the Trans Pennine Trail.

1.3 Surrounding Area

Land to the north and east of the Site includes open fields used for agriculture. The village of Shafton is located approximately 0.5km to the south-east of the spoil heap with intervening agricultural land. The Sandybridge Dyke is located along the southern boundary of the Site and the Trans Pennine Trail, with woodland areas and agricultural land to the south.

South-west of the spoil heap and outside the Site is a restored waste disposal tip (Cudworth Landfill Site) forming a prominent mound rising 10m above the surrounding land. West of the RCCP recreation ground is a railway line that runs north-south, passing over Lund Hill Lane, approximately 100m west of the site boundary. In addition, a former landfill site is located outside and to the north of the former drift mine part of the Site.

Between Lund Hill Lane and the former spoil heap is an area of land that is currently used for employment purposes, including a pallet yard and a number of other business activities.

The Monckton Coke and Chemical Works is located to the west of the Site and Lund Hill Lane. North of this coke work and to the west of Lund Hill lane is a coal storage yard.

Royston Village is located to the south-west of the Site, some residential properties and a nursery school on the east side of this village are located to the west of Lund Hill Lane approximately 100m distant from the south-west of the Site boundary. There are some residential properties along Lund Hill Lane approximately 250m north of the Site.

The site is surrounded by arable land to the north, amenity fields and agricultural fields beyond to the south and is bordered by Lund Hill Lane and Sandybridge Lane to the west and east respectively.

1.4 Proposed Work

The Scheme provides for the regeneration of the Site and will primarily involve some importation of soil making materials, regrading and reclamation works to provide formal and informal recreation uses including sports pitches with two team changing facilities, ancillary site access, car parks, and informal open space areas with landscape and ecological enhancements. The Scheme will take 12-18 months to complete, subject to works being progressed within the appropriate soil handling season.

2. EXISTING INFORMATION ON BAT SPECIES AT SURVEY SITE AND SURROUNDING AREA

In a recent (2007) ecological survey, Scott Wilson Ltd made consultation with the West Yorkshire Biological Records Centre (WYBRC), the North and East Yorkshire Ecological Data Centre (NEYEDC) and the local mammal/bat group to obtain up-to-date information pertaining to the occurrence of bats within a 2km radius of the Site.

In 2002 Eric Bennett Consultancy undertook daytime bat assessments in proximity to the Site and in 2003 Rob Frith & Associates undertook evening bat activity

surveys across the Site. This data is complimented by dedicated daytime assessments for bat roosts undertaken by Scott Wilson Ltd in 2004.

2.1. Legislation

Throughout Britain, bat numbers have suffered a decline in recent years and, as a result, all 17 species of British bat are protected by UK and European legislation including under Schedule 5 of the *Wildlife & Countryside Act 1981* (as amended) with additional protection offered under Schedule 2 of the *Conservation (Natural Habitats, &c.) Regulations 1994* (as amended). As a result, it is an offence to intentionally kill, injure or take a bat as well as intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a bat or disturb an animal while it is occupying a structure or place which it uses for that purpose. Since bats tend to re-use the same roosts, legal opinion is that the roost is protected whether or not the bats are present at the time.

Seven species of bats are listed as Priority Species under the *Natural Environment and Rural Communities Act* (2006) including soprano pipistrelle, noctule, Barbastelle, Bechstein's, brown long-eared, lesser horseshoe and greater horseshoe bats. In addition, pipistrelle bats (*P.pipistrellus* & *P.pygmaeus*) are identified as Flagship Species (FLS2) within the *Barnsley Biodiversity Action Plan* (2002).

The Barnsley Metropolitan Borough Council's Biodiversity Action Plan has the following to say about bats in the locality:

"The pipistrelle has a widespread distribution in the Barnsley area, having been recorded in 86 (22.2%) of the one km grid squares which cover the district. This figure is based on existing records and is almost certain to be a gross underestimate of the true population."

2.2 Baseline Data

2.2.1 Ecological Records Centre Information

The local Biological Records Centre, West Yorkshire Ecology was consulted by Scott Wilson in 2007 to obtain information relating to records of bat species within the Site and within a radius of up to 2km from it. Four records were returned including:

- A pipistrelle (*Pipistrellus* sp) maternity roost in a house 350m west of the Rabbit Ings site (1995);
- Pipistrelle records 606m north of the Site (August 2000);
- Pipistrelle records 998m south of the Site (April 1990); and
- A vespertilionid bat species 1382m north-east of the Site (2001).

2.2.2 Daytime Assessments (2002)

A daytime bat assessment was undertaken by Eric Bennet Consultancy in September 2002. A Daubenton's (*Myotis daubentonii*) roost was discovered in a railway tunnel approximately 1km south of the site (within Carlton Marsh Local Nature Reserve). Daubenton's bats have also been recorded feeding on the Barnsley Canal (Scott Wilson, 2007), 1km north-west of the site; aerial photographs indicate that there are sufficient habitat connections from both locations to the Site.

2.2.3 Evening Activity Surveys (2002 - 2003)

It is understood that evening activity surveys undertaken in 2002 (Eric Bennet Consultancy) and 2003 (Rob Firth & Associates) identified foraging common pipistrelles (*Pipistrellus pipistrellus*) flying over the Site, the disused railway, and to the rear of the sports pitches/recreation ground. No further information pertaining to these surveys was available.

2.2.4 Daytime Assessments (2004)

Scott Wilson Ltd undertook a second daytime assessment of roosting potential for bats across the Site. Highlighted as a result of this investigation was the potential for the following features to be used by bats as a roosting site:

- Poplar trees bordering the sports pitches/recreational ground were deemed to be of moderate value for bats.
- Three established semi-mature trees on Site (not target noted) were deemed to have moderate roost potential for bats.
- In addition to the survey area, trees identified within the plantation woodland on the southern and western boundaries of the Site were found to have potential to support bats.

Since data such as weather, survey times and dates, number of personnel and their qualifications are absent from the available existing site information, the robustness of the existing data cannot be considered to be a comprehensive picture of the likely diversity of bat species occurring at Rabbit Ings. In the absence of data more recent than 2004, it is reasonable to assume that the existing bat roosts in the locality still occur and bats continue to actively forage across the Site.

3. METHODOLOGY

3.1 Tree Assessment

A tree assessment was undertaken at the Rabbit Ings site by two ecologists from WYGE on 14th March and 6th May 2008. As recommended in the Bat Conservation Trust's (BCT) *Bat Surveys: Good Practice Guidelines* (2007), the assessment was undertaken at an opportune time to determine the value of the trees as features of value to bats as they can be clearly seen from the ground without being obscured by leaves.

The assessment was undertaken from the ground using binoculars and no attempt was made to climb each tree to verify qualities such as depth of cavity due to time and health and safety constraints. Features noted included natural holes, woodpecker holes, cracks and splits in limbs, loose or flaking bark, ivy cladding and hollows or cavities. Any features identified were examined further (from the ground with binoculars) for evidence of bat activity including droppings, staining or scratch marks. The location of the tree within the Site and orientation of the feature was also recorded.

Trees were categorised following guidance set-out within the BCT guidelines. These categories detail further work required and methodologies to adopt when considering impacts:

- Category 1 (field evidence confirming the presence of bats);
- Category 2a (high potential to support bats);
- Category 2b trees (low to moderate potential to support bats); and
- Category 3 trees (negligible potential to support bats).

3.2 **Assessment of Built Structures**

Two bridges adjacent to the site were assessed for their potential to support roosting bats. One bridge was just outside the north-east boundary of the Site with the second bridge being located along the south-east boundary above Sandybridge Dyke. They were examined for potential bat roosts and access points, including holes in walls, cracks and crevices in stonework and brickwork, and areas where mortar has fallen out or decayed. A systematic search of the structures was undertaken for droppings, corpses, scratch marks, urine staining, grease marks and clean cobweb-free gaps around potential entrance points and crevice roost sites. The surveyors listened for sounds of bats during the survey. Potential access points and roosting sites were recorded regardless of whether there was direct evidence of use by bats.

3.3 **Activity Survey**

A programme of four activity surveys was undertaken by WYGE over 2008 across the Site.

In accordance with the BCT guidelines, the surveys were spread throughout the recommended survey period. Dusk activity surveys were undertaken by a team of four surveyors on 6th May, 9th June and 13th August 2008 which were complimented by a dawn activity survey on 14th August 2008.

Given the protracted period of survey work that has been undertaken at the Site, it is considered that the level of survey effort during 2008, with due consideration to activity surveys previously undertaken on the Site, provide an appropriate level of survey effort to determine a realistic view of levels of bat activity.

During each visit, the surveyors walked transects, usually working in tandem approximately 20-30m apart, to gauge the direction of any bats detected. Minimal artificial light was used during the surveys to minimise disturbance to bat behaviour. Surveyors used a combination of frequency division and time expansion bat detectors for call detection. Sound analysis, using recordings made on a Batbox Duet, Tranquility Transect and/or Pettersson D240x with an Edirol R09 or Sony MD Minidisk in conjunction with BatSound software, was undertaken where necessary. As no greater horseshoe bats records were returned during the consultation period, and no greater horseshoe bats were

encountered during the survey periods, there was no requirement to extend the survey duration or frequency as set out in the BCT guidelines.

4. SITE ASSESSMENT & SURVEY

4.1 Tree Assessment

Two ecologists from WYGE made an assessment of trees on the Site on 14th March and 6th May 2008. Weather conditions were suitable: bright, dry and still.

There are two lines of established and semi-mature poplar trees at the south-western corner of the Site (running north-south across the sports pitches' eastern boundary, and east-west on the sports pitches' southern boundary). It is understood that, although the sports pitches/recreation area will be enhanced through regrading and extension as part of the Scheme, the rows of mature black poplars along the eastern boundary are reaching over-maturity and are in need of works such as crown-raising, pruning or felling for Health and Safety reasons due to their hazardous nature and for reasons of public safety (refer to JCA Ltd. Arboricultural Survey report ref. 8260/AB for further details). These trees are of significant age and girth and were considered likely to contain features suitable for roosting bats. One tree is dead but provided features such as woodpecker holes which are considered highly suitable for roosting bats (Category 2a). These trees, located around the centroid 437517, 411475 are the subject of dedicated activity surveys detailed below.

Other trees assessed on the Site are either within regenerating secondary woodland or scattered and likely self-set juveniles, deemed to be young with no obvious opportunities for bats to enter and roost such as cracks, splits, hollows, hazard branches or dense mats of ivy. With the exception of the hybrid poplars discussed above, trees on the Site are therefore classified as Category 3, requiring no further survey work in connection to roosting bats and the *Wildlife & Countryside Act 1981* (as amended).

4.2 Assessment of Built Structures

Two bridges were assessed for their potential to support roosting bats; these are constructed of red brick and precast concrete. Both bridges are considered to have

limited value for bats as they are in a good state of repair with no obvious missing bricks or deterioration to mortar and have large open (and draughty) maintenance cavities which are subject to run-off. However, at least one bridge offers relatively sheltered roosting potential and both have sheltered areas suitable for foraging bats: one brick bridge crosses shallow flowing water features with associated scrub vegetation, providing suitable foraging habitat.

As a complex of structures, the two bridges were deemed unlikely to provide moderate or high value roosting opportunities for bats due to the lack of obvious missing bricks and the wet and draughty conditions of cavities inspected. Prior to surveyors withdrawing, one cavity was seen to contain a tawny owl (*Strix aluco*) nest. Owl nests are considered likely to deter bats from roosting within the same structure during the same period. Nevertheless, it was deemed prudent to undertake an emergence survey at each of the bridges to confirm the presence or likely absence of roosting bats at these features.

4.4 Activity Surveys

4.4.1 Survey 1: 6th May 2008

Sunset time: 20.45pm
Start time: 20:15pm (15.2°C, still, <10% cloud cover, dry)
End time: 22:20pm (11.7°C)

A single common pipistrelle was seen flying and foraging near the junction of the two rows of hybrid poplars adjacent to the sports pitches/recreation ground. Although no emergence was seen, the bat's early arrival on site indicates its roosting location may be close to the Site. A common pipistrelle was heard but not seen flying and foraging around the bridge crossing Sandybridge Dyke at the southern site boundary and several common pipistrelles were seen flying and foraging around the bridge at the north-eastern site boundary; however no emergence was observed.

Table 1: Surveyor records of bat activity – 6th May 2008

Time	Species	Surveyor location	Details
21.03	Common pipistrelle	Southern row of poplars	Commuting at canopy height. Heard at 45kHz and seen.
21.04	Common pipistrelle	Eastern row of poplars	Seen flying and heard foraging at south-eastern corner of recreation ground, at canopy height.
21.09 – 21.14	Common pipistrelle	Southern row of poplars	Foraging at tree height
21.21	Common pipistrelle	Eastern row of poplars	Heard at 45kHz, not seen
21.21	Common pipistrelle	Southern row of poplars	Seen and heard at 45kHz foraging near canopy at south-eastern corner of the recreation ground
21.23	Common pipistrelle	Southern row of poplars	Heard at 45kHz but not seen. Commuting, a fast pass with rapid echolocation.
21.28 – 21.35	Common pipistrelle	Eastern row of poplars	Heard at 45 kHz but not seen, flying and foraging for a period of approximately 7 minutes.
21.41	Pipistrelle sp	Southern row of poplars	A pipistrelle species, heard at 50kHz but not seen.
21.25	Common pipistrelle	Stream bridge at southern site boundary	Heard at 45kHz, not seen. No emergence from the bridge structure was recorded.
21.25	Common pipistrelle	Bridge at north eastern corner of site	Three pipistrelle seen and heard flying and foraging. These flew into the area and were not seen emerging from the bridge.
21.27	Common pipistrelle	Stream bridge at southern site boundary	Heard at 45kHz, not seen.
21.29	Common pipistrelle	Stream bridge at southern site boundary	Heard at 45kHz, not seen.
21.33	Common pipistrelle	Stream bridge at southern site boundary	Heard at 45kHz, not seen.
21.44	Common pipistrelle	Eastern row of poplars	Heard not seen near south-eastern corner of the recreation ground
21.48	Common pipistrelle	Bridge at north eastern corner of site	Flying and intermittently foraging for a period of approximately 9 minutes.
21.50	Common pipistrelle	Surveyors from both tree lines.	Heard at 45kHz and seen at the south-eastern corner of the site, flying and foraging.
21.55	Pipistrelle sp	Eastern row of poplars	Heard at 50kHz, not seen.
22.20	Common pipistrelle	Bridge to NE.	Fly-by seen and heard at 45kHz.
22.45	-	-	Survey ends after a period of 25 minutes without further bat activity.

4.4.2 Survey 2: 9th June 2008

Sunset time: 21.30pm
Start time: 20.30pm (18°C; fine after a hot day, dry with c.25% cloud cover and light-moderate westerly breeze)
Finish time: 23.50pm (15°C)

A single common pipistrelle was seen and heard foraging, predominantly at the junction of the eastern and southern line of poplars adjacent to the sports pitches/recreation ground. There was intermittent use by foraging pipistrelles of the ride to the east of the sports pitches/recreation ground.

Table 2: Surveyor records of bat activity – 9th June 2008

Time	Species	Surveyor location	Details
22.02	Common pipistrelle	Eastern row of poplars	Seen flying and heard echolocating (at 45kHz) across the field. No emergence observed.
22.02 – 22.04	Common pipistrelle	Southern row of poplars	Common pipistrelle heard (at 45kHz) but not seen
22.03	Common pipistrelle	Eastern row of poplars	Heard briefly (at 45kHz) but not seen. Near the south-eastern corner of the recreation ground.
22.05 – 22.20	Common pipistrelle	Eastern row of poplars	Intermittent and infrequent passes heard at 45kHz but not seen.
22.08	Common pipistrelle	Southern row of poplars	Common pipistrelle heard (at 45kHz) and seen crossing the field diagonally from south-west to north-east. No emergence was observed.
22.17	Noctule	Southern row of poplars	Heard (at 21kHz) flying over the site but not seen. No emergence was observed.
22.25	Common pipistrelle	Southern row of poplars	Heard (at 45kHz) but not seen.
22.30	Common pipistrelle	Southern row of poplars	Heard (at 45kHz) but not seen.
22.35	Common pipistrelle	Eastern row of poplars	Heard briefly (at 45kHz) but not seen. Near the south-eastern corner of the recreation ground.
22.50	Common pipistrelle	Southern row of poplars	Heard (at 45kHz) but not seen. Foraging near the north-east corner of the recreation ground.
23.10	Common pipistrelles	East of the recreation ground	Three common pipistrelles were heard and two were seen flying and foraging north-south along the footpath running along the east boundary of the recreation ground.
23.15	-	-	Survey finishes as too dark to see any further activity.

4.4.3 Survey 3: 13th August 2008

Sunset time: 22:25pm

Start time: 20:40pm

Finish Time: 22:50pm

Common pipistrelles were recorded commuting and foraging throughout the evening in the south-west corner (over and adjacent to the Sports pitches/recreation ground) and the north-east corner of the Site. No emerging bats were identified.

Table 3: Surveyor records of bat activity – 13th August 2008

Time	Species	Surveyor location	Details
20.50	Common Pipistrelle	Southern end of poplars	Foraging above the poplar trees, circling above the tree with woodpecker holes
20.55	Common Pipistrelle	Southern end of poplars	Commuting northwards along poplars
21.00	Common Pipistrelle	Southern end of poplars	Foraging between poplars and recreation ground to the west.
21.02	Common Pipistrelle	Recreation ground	Common pipistrelle (45 kHz) commuting along southern row of trees.
21.02	Common Pipistrelle	Southern end of poplars	Commuting northwards along poplars
21.10	Common Pipistrelle	Bridge to NE	Common pipistrelle heard at 45 kHz and seen foraging under the bridge and at either end, but not seen emerging from bridge. One bat present for entire duration of survey.
21.15	Common Pipistrelle	Recreation ground	Common pipistrelle (45 kHz) commuting along southern row of trees
21.20	Common Pipistrelle	Southern end of poplars	Foraging along track adjacent to poplars for 10 minutes continuously
21.20	Common Pipistrelle	Recreation ground	Common pipistrelle heard briefly (45 kHz)
21.23	Common Pipistrelle	Recreation ground	Common pipistrelle heard briefly (45 kHz)
21.28	Common Pipistrelle	Recreation ground	Common pipistrelle heard briefly (45 kHz)
21.36	Common Pipistrelle	Southern end of poplars	Foraging between poplars and south west line of poplars
21.40	Common Pipistrelle	Recreation ground	Common pipistrelle heard briefly (45 kHz)
21.42	Common	Southern	Foraging along poplars, 30 passes in 10 minutes

Time	Species	Surveyor location	Details
	Pipistrelle	end of poplars	
22.00	Common Pipistrelle	Southern end of poplars	2 common pipistrelle foraging above canopy of poplars
22.05	Common Pipistrelle	Recreation ground	Common pipistrelle (45kHz) heard feeding
22.12	Common Pipistrelle	Southern end of poplars	Foraging along poplars below canopy
22.17	Common Pipistrelle	Recreation ground	Common pipistrelle heard briefly (45 kHz)
22.22	Common Pipistrelle	Recreation ground	Common pipistrelle heard briefly (45 kHz)
22.30	Common Pipistrelle	Southern end of poplars	Bat echolocating at 50kHz foraging along tree line for 10 minuets
22.32	Common Pipistrelle	Recreation ground	Common pipistrelle heard briefly (45 kHz)
22.37	Common Pipistrelle	Recreation ground	Common pipistrelle heard briefly (45 kHz)
22.23	Common Pipistrelle	Bridge to NE	A second common pipistrelle briefly joins the first, foraging at bridge entrance.
22.40	Common Pipistrelle	Southern end of poplars	Bat echolocating at 45 kHz and 50kHz, foraging along tree line passing surveyor every 20 seconds.
22.50			End of survey.

4.4.4 Survey 4: 14th August 2008

Sunrise time: 06:15am

Start time: 04:00am

Finish Time: 05:40am (due to rain)

Common pipistrelles were recorded commuting and foraging in the south-west corner (at least five bats) and north-east corner (one bat) of Site. No roost re-entry behaviour was observed throughout the survey. The last bat recorded was at 05.32am; while the survey finished earlier than expected due to rain, the light conditions made further sightings unlikely.

Table 4: Surveyor records of bat activity – 14th August 2008

Time	Species	Surveyor location	Details
04.05			Start of survey
04.08	Common Pipistrelle	Bridge to NE	Heard briefly (at 45kHz) at far end of bridge but not seen.
04.20	Common Pipistrelle	Southern end of poplars	Numerous common pipistrelles flying along trees or track feeding at head height to tree top height. Up to 5 at one time. Seen constantly until 05.32.
04.26	Common Pipistrelle	Recreation ground	Bat heard in distance, not seen
04.32	Common Pipistrelle	Northern end of poplars	3 x common pipistrelle heard (45kHz) and seen foraging.
04.33	Common Pipistrelle	Recreation ground	Bat heard in distance, not seen
04.37	Common Pipistrelle	Bridge to NE	Common pipistrelle heard briefly (at 45 kHz) and seen at far end of bridge.
04.46	Common Pipistrelle	Recreation ground	Bat heard in distance, not seen
04.50	Common Pipistrelle	Recreation ground	Bat flew northwards towards coking plant
04.52	Common Pipistrelle	Recreation ground	Foraging in south-east corner of recreation ground along line of poplars
05.01	Common Pipistrelle	Recreation ground	Commuting northwards towards coking plant
05.03	Common Pipistrelle	Bridge to NE	Common pipistrelle (45 kHz) heard and seen at far end of bridge, but not seen roosting in bridge.
05.06	Common Pipistrelle	Recreation ground	Commuting northwards towards coking plant
05.09	Common Pipistrelle	Recreation ground	Foraging in south east corner of large field along line of Poplar.
05.14	Common Pipistrelle	Northern end of poplars	2 x common pipistrelle seen and heard (45kHz) commuting west to east along northern boundary of recreation ground and then south.
05.15	Common Pipistrelle	Recreation ground	Foraging high above canopy
05.17	Common Pipistrelle	Recreation ground	Commuting from south-east to south-west offsite.
05.20	Common Pipistrelle	Northern end of poplars	Common pipistrelle seen and heard (45kHz) commuting east to west along northern boundary of recreation ground.
05.24	Common pipistrelle	Recreation ground	Commuting from south-east to south-west offsite.
05.32	Common pipistrelle	Southern end of poplars	Last common pipistrelle seen due to rain.
05.45			End of survey (due to rain and light conditions)

5. INTERPRETATION & EVALUATION

5.1 Potential Impacts

5.1.1 Bat roosts

No bat roosts were confirmed within the boundaries of the Rabbit Ings site during any of the surveys undertaken, including the 2002/03 activity surveys, although potential roosts were identified in trees adjacent to the sports pitches in the south-west corner.

Low levels of activity were recorded throughout the 2008 activity surveys which may be as a result of the Site being part situated within a landscape mosaic which effectively fragments suitable foraging features from bat populations in the locality. A daytime assessment indicated that the foraging potential for bats on site was high and consultation revealed a number of historic roosts and records within a 2km radius of the Site.

Of the species commonly associated with tree roosts, only one noctule bat was recorded during the four 2008 activity surveys and no records of *Nyctalus* bats were provided from the previous activity surveys. It is, therefore, considered unlikely that a significant noctule roost is present within the Site although it is possible that small numbers of this species utilise trees within the area around the sports pitches/recreation ground throughout the year. There is a woodland area to the south of the sports pitches/recreation ground and outside the boundary of the Site which may accommodate roosting noctule bats. The potential impact of the Scheme on noctule roosts is, therefore, considered to be low.

Common pipistrelles are one of the more common and widespread bat species in England. They are more frequently associated with buildings and built structures than trees. However, the earliest incidence of pipistrelle activity at the Site during the 2008 activity surveys was approximately 18 minutes after sunset which falls within the window of time during which emergence from bat roosts might be anticipated. Furthermore, the majority of pipistrelle activity was associated along the trees on the perimeter of the sports pitches/recreation ground in the south-west corner of the site. These trees were assessed as having potential to provide bat roosting opportunities and therefore, while no

emergence activity was observed, it is considered possible that one or more of these trees constitutes a roost for a small number (<3) of pipistrelle bats at some point throughout the year.

Proposed operations will include the removal of these trees for health and safety reasons and the subsequent replanting of substantial semi-mature specimens along the eastern boundary of the sports pitches/recreation ground. The very low number of pipistrelle bats encountered during the activity surveys and the likely seasonal use of any potential tree roosts in a landscape which includes a large wooded area to the south of the Site and residential complexes (with previous pipistrelle roost records) beyond, indicates that the removal of these trees at a suitable time of year would likely constitute a negligible-to-low adverse impact on the local bat population.

Records of roosts of other species of bats were provided during consultation, specifically a roost of Daubenton's bats within a 1km radius of the Site. Daubenton's bats were not observed foraging or commuting across the Site although suitable habitat (ponds and watercourses) was observed.

Emergence surveys focusing on built structures adjacent to the Site (two bridges) revealed no emergence activity and limited pipistrelle foraging activity. No direct impact is anticipated to either of these built structures as a result of the Scheme.

5.1.2 Bat foraging and commuting habitat

The activity surveys undertaken during 2008 indicated that the Site provided foraging and commuting habitat for bats in the form of broad-leaved woodland, ponds and other water courses, together with sheltered glades and rides.

The species recorded at the Site are not specifically woodland foragers; common pipistrelle bats are frequently recorded foraging in highly urbanised areas and noctule bats forage high over fields. Furthermore the restoration of the site means that, while the temporary loss of foraging habitat in the form of secondary woodland constitutes an adverse impact, this will be ameliorated by tree planting and pond creation later on in the Scheme. This will be complimented by the retention of existing pathways (e.g. where bats were seen and heard commuting/foraging to the

north and east of the sports pitches/recreation ground) in conjunction with supplemental and replacement tree planting along these rides.

It is, therefore, considered that the loss of some suitable foraging habitat within the Site will have a low, temporary and reversible impact on the local foraging bat population. It is expected that these species, particularly the pipistrelle bats, will continue to use the Site post-development.

5.2 Constraints on Study Information

The methodology used during the daytime assessments and activity surveys provides information regarding the use of the Site by bats during the time periods of the visits.

To reduce possible constraints, surveys were conducted in suitable weather conditions using a variety of bat detector designs to ensure good frequency and detection coverage by experienced surveyors capable of identifying calls and interpreting behaviour.

6. MITIGATION & COMPENSATION

As potential roosting opportunities were identified within the Rabbit Ings site boundary, and as at least one bat species commonly associated with tree roosts (noctule) was recorded foraging or commuting over the site, the following measures will be taken to mitigate for the predicted impact on the local bat population as a result of the Scheme.

The aims of the proposed mitigation strategy are:

- To minimise disturbance to potentially roosting individuals within the Site as a result of the proposed operations;
- To minimise the impact of the proposed work on the potential roosting features themselves;
- To reduce the impact on the local bat population as a result of the loss of foraging habitat; and

- To enhance the Site to a variety of local bat species in accordance with planning guidance.

6.1 **Bat Roosts**

6.1.1 Category 2a and 2b Trees

It is considered that the significant size and number of poplar trees means that a dedicated emergence survey is unlikely to provide additional data over and above that already gathered by the activity surveys undertaken over 2008. It is considered that, had maternity roosts been present in any of these trees, the activity surveys undertaken between July and August 2008 would have revealed them; the low number of bats encountered at this location implies that, if these trees are used as a bat roost, it is most likely to be a non-breeding temporary summer roost.

As a precaution, all category 2a and 2b trees (high potential to support bats) will be subject to "soft-felling" i.e. sections of the tree will be gently lowered to the ground by rope and left overnight to allow the escape of any bats inside. The felling work will be supervised by a suitably experienced ecologist who will search each section with an endoscope once it has been felled. The felling work will be undertaken during January 2009, outside the bats' active period, to minimise the risk of injuring individuals during the work.

Should bats be confirmed to be using a felled tree as a roost, all outstanding work to the tree will cease while Natural England is consulted. It is possible that a European Protected Species Licence (EPSL) will be required to continue with the felling of the tree which may require that the section of the tree which accommodates the roost is strapped to a suitable tree within the nearby area which will be retained within the Scheme and will be of similar height and orientation to that in which it was found.

6.1.2 Category 3 Trees

No mitigation is considered necessary with regards to the felling of category 3 trees (negligible potential to support bats). However, should site operatives encounter any evidence of bats, all work on those trees will halt and both Natural England and a suitably experienced and licensed ecologist will be contacted for advice.

6.1.3 Built Structures

No roosts were identified during the 2008 activity surveys within any of the built structures adjacent to the Site and no direct impact by proposed operations is anticipated.

6.2 **Bat Foraging and Commuting Habitat**

Mature trees, grassland, woodland compartments and rides all represent good foraging and commuting opportunities for bats and bat activity was observed in these areas within the Site. Therefore, the following measures will be incorporated into the scheme to protect and enhance the Site for foraging and commuting individuals.

- Disturbance to mature trees, woodland compartments and grassland will be avoided wherever possible and existing pockets of suitable foraging habitat will be incorporated into the Scheme landscape plan where possible.
- While trees will be felled along the eastern boundary of the sports pitches/recreation ground, a row of substantial semi-mature specimens will be planted to ensure the integrity and continuity of opportunities for foraging and commuting bats.
- Some areas of scrub and secondary woodland will be de-vegetated. However, replacement planting will ensure that foraging habitat will be preserved for bats in the locality and furthermore a dedicated area for wildlife in the south-east corner of the Site will provide enhanced foraging opportunities for bats in the locality.
- A management plan will be prepared to ensure the site's value to wildlife, including bats, is maintained for at least 5 years after the scheme is complete.

6.3 **Lighting Schedule**

While some bats are known to be attracted to the invertebrates that feed around lights, it is generally accepted that, overall, lighting has an adverse effect on bats. Lighting within the Site, especially around the sports pitches, is considered to have the potential to significantly affect bat activity especially towards the boundary of the site and near areas of existing habitat that will be retained. To ensure illuminating

the site has the least effect on bats, the following precautions will be adopted (based on advice from the Bat Conservation Trust's *Bats and Lighting in the UK*, 2007):

- Lighting will be restricted to those areas where it is absolutely necessary for health and safety, security, etc and will be turned off when not required.
- The impact on bats will be minimised by the use of low pressure sodium lamps where appropriate instead of high pressure sodium or mercury lamps (Jones, 2000). If mercury lamps are used, they will be fitted with UV filters and the brightness will be as low as legally possible. Low pressure sodium lamps are less attractive to invertebrates and will be unlikely to encourage bats away from their usual foraging grounds.
- The lighting will be directed to where it is needed to avoid light spillage using light hoods/shields as necessary and to direct the light below the horizontal plane, at an angle $<70^{\circ}$. Lighting columns will be as short as possible.

7. REFERENCES

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