



Twickenham Riverside, Twickenham, London

Preliminary Roost Assessment

Validus

Author	Chris Savage BSc (hons) MSc GradCIEEM		
Job No	3496.2		
	Date	Checked by	Approved by
Revision 1.0	11/09/2017	Wendy McFarlane MA MSc MCIEEM	Toni Cohen BSc,MSc,MCIEEM
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Summary of Key Issues

The Ecology Consultancy was commissioned to undertake a Preliminary Roost Assessment to determine the presence or likely absence of bats within buildings and trees at Twickenham Riverside, Twickenham, London. The main findings are as follows:

- The development proposals for the site, based on current plans provided by the client are to demolish all four buildings/structures present on-site and to construct a new mixed-use building (commercial and residential) along with a car park.
- The site comprised four modern buildings and semi-natural habitats that included: hardstanding/buildings, amenity grassland, broadleaved woodland, species-poor non-native hedgerows, dense scrub, introduced shrub and scattered trees.
- An inspection of buildings and trees was carried out on 18 July and 15 August 2017 by a licensed bat ecologist.
- The four buildings were all assessed as having low potential to support roosting bats. All trees within the redline boundary and four mature trees immediately adjacent to the redline boundary were assessed as having negligible potential to support roosting bats.
- In line with current survey guidelines one dusk emergence survey was carried out on the four buildings in August 2017.
- No bats were recorded as emerging from, or suspected as having emerged from, any of the buildings on site. Limited commuting and foraging activity by three common species of bats was recorded on site.
- The development proposals are unlikely to have any significant impact on the favourable conservation status of the local bat population.
- Recommendations are made to compensate for lost habitat post-development so as to make the site more suitable for bats and to control lighting, both during construction and operationally; so as to be sensitive to bats using the area.

1 Introduction

BACKGROUND TO COMMISSION

- 1.1 The Ecology Consultancy was commissioned by Quinlan & Francis Terry LLP on 11 April 2016, to carry out a Preliminary Ecological Appraisal (PEA) of land at Twickenham Riverside, Twickenham, London. The subsequent report (The Ecology Consultancy, 2017) found that several buildings and trees may have potential to support roosting bats and that therefore further survey in the form of a Preliminary Roost Assessment (PRA) was recommended.
- 1.2 The Ecology Consultancy was commissioned by ValidusLM (on behalf of the London Borough of Richmond Upon Thames) in June 2017 to carry out the recommended PRA. ValidusLM who had taken over the project from Quinlan & Francis Terry LLP.
- 1.3 This current PRA was carried out in order to provide additional baseline ecological information on the site to inform the planning application. The survey covers all buildings within the planning application site boundary (hereon referred to as ‘the site’) as indicated on the plan provided by the client.

SCOPE OF REPORT

- 1.4 This report provides an assessment of the current status of bats within the site and outlines any avoidance, mitigation, compensation and enhancement measures as may be required.
- 1.5 The assessment is based on the following sources of information:
 - a desk study for bat records within a 2km radius of the site
 - a desk based assessment of the surrounding habitats for their likely value to bats
 - a detailed inspection of all buildings on site;
 - an assessment of the roost potential of all trees on site and four mature trees immediately adjacent to site; and
 - one dusk emergence survey(Collins, 2012)
- 1.6 This assessment has been prepared with reference to best practice guidance published by the Bat Conservation Trust (Collins, 2016) and as detailed in British Standard 42020:2013 *Biodiversity – Code of Practise for Biodiversity and Development* (BSI, 2013).

SITE CONTEXT AND STATUS

- 1.7 The proposed development site is 0.35 hectares (ha) in size and is centred on Ordnance Survey National Grid reference TQ 1627 7351. The site sits adjacent to the Diamond Jubilee Gardens, a children's playground and a number of buildings and lies 20m north-west from the River Thames and 50m from Eel Pie Island. Between the site and the Thames is The Embankment, a road with car-parking and pedestrian access. The site is bounded by Wharf Lane to the south-west, Water Lane to the north-east and is situated in a largely urban area.

DEVELOPMENT PROPOSALS

- 1.8 The development proposals for the site, based on current plans provided by the client are to demolish all four buildings/structures present on-site. Vegetation to the north east of the amenity gardens at the centre of the site will be cleared. This vegetation includes broadleaved woodland, introduced shrub, dense scrub, tall ruderal and scattered trees. A section of dense scrub to the south of the site is also to be removed to allow the profiling of the site towards the 'The Embankment'. A new mixed-use building (commercial and residential) will be constructed along with an under podium car park.

RELEVANT LEGISLATION AND PLANNING POLICY

- 1.9 The following key pieces of nature conservation legislation are relevant to this assessment. A more detailed description of this legislation is provided in Appendix 4.
- The Conservation of Habitats and Species Regulations 2010 (as amended)
 - Wildlife and Countryside 1981 (as amended); and
 - Natural Environment and Rural Communities Act 2006.
- 1.10 The National Planning Policy Framework (Department of Communities and Local Government, 2012) requires local authorities to avoid and minimise impacts on biodiversity and, where possible, to provide net gains in biodiversity when taking planning decisions.
- 1.11 The London Plan: The Spatial Strategy for Greater London (GLA, 2015) deals with matters of strategic importance for spatial development in London, including policies regarding protection, enhancement, creation, promotion and management of biodiversity and green infrastructure in support of the Mayor's Biodiversity Strategy (GLA, 2002), and urban greening to mitigate the effects of climate change.

1.12 Other planning policies at the local level which are of relevance to this development include the London Borough of Richmond upon Thames Core Strategy (2009). Further information is provided in Appendix 4.

2 Methodology

DESK STUDY

- 2.1 A desk study was conducted to obtain data relating to bats within a 2km radius of the site, as made available by the London Bat Group.
- 2.2 Additional contextual information was compiled from publically available data sources:
 - MAGIC (<http://www.magic.gov.uk>) – the Governments on-line mapping service. Information was sought about: the presence of ancient semi-natural woodland (ASNW), statutory designated nature conservation sites and extant or historic European Protected Species Mitigation licences for bats
 - Ordnance Survey mapping and publically available aerial photography to determine any features such as: running and standing water, woodland, tree lines, hedgerows, railway corridors and the surrounding landscape uses.

BAT SURVEY

Personnel

- 2.3 The surveys were led by Chris Savage BSc (Hons) MSc MCIEEM, an ecologist with 5 years commercial bat survey experience (Natural England Level 1 Class Licence).
- 2.4 Chris was assisted by Matt Pendry, James Read and Russell Mansfield, all ecologists with commercial bat survey experience.

Survey Area

- 2.5 The surveys covered all buildings and trees within the red-line boundary of the site (see Figure 1, Appendix 1) and also four mature trees just outside the redline boundary but with the potential to be disturbed by the construction operations.

Aims and Objectives

- 2.6 The aim of the survey methodologies outlined below is to establish the presence/likely absence of bat roosts within the buildings and trees within/immediately adjacent to the site boundary. If presence has been established the secondary aim is to obtain sufficient information to characterise the type of roost according to criteria set out in the current guidelines (Collins, 2016). The gathered information is then used to inform an assessment of the potential impacts of the development proposals and to devise an appropriate and proportionate mitigation strategy.

PRA: Building Inspections

- 2.7 The preliminary roost assessment building inspections were carried out on 18 July and 15 August 2017, in suitable weather conditions, of 23°C, no wind, 1/8 okta cloud cover with no rain and 24°C, no wind, 2/8 okta cloud cover and no rain, respectively.
- 2.8 The survey comprised an external inspection of each building, involving a detailed search of all accessible architectural features for bat droppings, urine staining, scratch marks, staining around suitable crevices and feeding remains. Window panes and other external surfaces were visually checked for droppings or other secondary evidence. A high powered torch was used to illuminate recesses and crevices at height and these were inspected using close focusing binoculars. This included external features, such as soffit boxes, roof tiles, hanging tiles, ridge areas and window casements. Any features that could potentially provide access into internal areas such as roof voids and cavity walls were noted.
- 2.9 During the internal inspection the surveyors examined the roof voids of the buildings, where present, in logical progression searching each adjoining void in turn as well as above false ceilings present. The roofing material was inspected for areas of overlapping materials, holes and potential access points inside.
- 2.10 The survey methodology followed best practice guidelines (Mitchell-Jones & McLeish, 2004; Collins, 2016). Equipment used and at hand during the building inspection included an extendable ladder, close-focusing binoculars, hand held LED torch and a high powered torch.

Assessment criteria - buildings

- 2.11 The potential for the buildings to support roosting bats was assessed using the findings of the survey. The following criteria were used to determine the level of potential of the buildings for roosting bats:
- **Negligible** – While presence cannot be absolutely discounted there were no significant visible features that could be used by bats for roosting.
 - **Low** – Small number of potential roosting features such as could be utilised by individual opportunistic roosting bats. Site situated within isolated habitat that could be used by foraging bats but which is not connected by prominent linear features such as woodland edge, hedgerows and tree lines.
 - **Moderate** – Several potential roosting features in the buildings or other structures. There is surrounding habitat such as woodland, scattered trees, hedgerows suitable

to support foraging and roosting bats. The site is connected with the wider landscape by linear features such as woodland edge, hedgerows and tree lines that could be used by commuting bats.

- **High** – Buildings or other structures, such as mines, caves, tunnels, ice houses and cellars, with numerous features of potential significance for roosting bats. Surrounding landscape has high value habitat for roosting, foraging and commuting that is contiguous with on-site habitats. The site is connected with the wider landscape by strong linear features and may be close to known roosts or other potentially valuable habitat resources.
- **Confirmed roost** – Evidence indicates a building or other structure is used by bats, for example:
 - bats seen roosting or observed flying from a roost or freely in the habitat;
 - droppings, carcasses, feeding remains;
 - bats heard ‘chattering’ inside on a warm day or at dusk.

PRA: Ground Level Roost Assessment of Trees

2.12 The purpose of the tree assessment was to:

- Identify any suitable arboreal features that could provide access points for bats, including; loose, flaking or folded bark, cracks and fissures in limbs, woodpecker holes, or any downward-facing crevice or hole in the limbs or trunk;
- Identify signs indicating possible use by bats, such as; tiny scratches, rub marks and staining around access points, bat droppings in around or below access points.

Assessment criteria - trees

2.13 All semi-mature or mature trees that may have a level of potential for a roost were assessed following Bat Conservation Trust’s Best Practice Guidance (Collins, 2016). The following values were assigned in considering the availability of suitable features for roosting bats:

- **Negligible potential** – No visible features that could be used by bats for roosting
- **Low potential** – One or two minor features, possible associated with feeding or night-time roosts, such as:
 - sparse ivy *Hedera helix*;
 - minor branch splits or fissures;
 - small areas of loose bark;
 - features less than ten years old.

- **Moderate potential** – Features that may provide a more secure site for individuals or small groups of bats, such as:
 - dense ivy;
 - significant branch splits;
 - small cavities such as woodpecker holes;
 - features present for between 10 and 30 years.
- **High potential** – Features of particular significance, suitable for high priority roost such as maternity roosts and likely to be used by larger groups of bats, such as:
 - features that provide rare or uncommon conditions in the local area;
 - large cavities or extensive branch or trunk splits;
 - multiple features in the same tree;
 - features present for more than 30 years that could have been used by several generations of bats.
- **Confirmed roost** – Evidence indicating use by bats, such as:
 - droppings, carcasses, feeding remains;
 - bats heard ‘chattering’ inside on a warm day or at dusk;
 - bats seen roosting or observed flying from a feature.

2.14 A standard recording form was completed for each mature tree that was likely to be impacted by the development proposals. This included recording the details listed above as well as the species, relative age and girth of the tree and a photograph of each tree or tree group.

PRA: Dusk Emergence Survey

2.15 The dusk emergence survey was carried out in suitable weather conditions;

Survey 1: 15 August 2017, 20°C, calm wind, 2/8 okta cloud cover and no rain. Sunset was at 20:23 and the survey commenced at 20:08 and continued until 21:53.

2.16 The four surveyors were positioned to allow clear views of each potential roost entry/exit point that had been identified during the building inspection.

2.17 Each surveyor carried a Batbox Duet or Elekon Bat Scanner with at least two Anabat SD1 or Anabat Express remote detectors employed at the site to record bat calls. A single Elekon Bat Logger M was deployed to provide full spectrum recordings to be taken. The surveyors recorded the time of bat passes, along with the species and

activity where apparent. All surveys followed standard protocols and accepted standards (Mitchell-Jones & McLeish 2004; Collins, 2016).

Sound analysis

- 2.18 The Anabat recordings were analysed post survey using Analook™ V3.3q. Bat Explorer™ was used to analyse recordings made by the Bat Logger M.

EVALUATION AND IMPACT ASSESSMENT

Evaluation

- 2.19 The ecological value of the bats using the site has been assessed broadly following guidance issued by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2016) which ranks nature conservation value according to a geographic scale of reference; international, national, county, district, local or of value at the site scale. The following factors are considered when making this evaluation: nature conservation designations, rarity, vulnerability, distribution and the conservation significance¹ of any roosts.

Impact Assessment

- 2.20 An assessment is provided on the likely impacts of the development proposals on the bats, bat roosts, foraging and commuting habitats located within or immediately adjacent to the site boundary. This assessment is made with reference to Section 6² of the Bat Mitigation Guidelines (Mitchell-Jones & McLeish, 2004) and Natural England's standing advice³. This includes a summary of the scale of impact according to roost type and development effect.

DATA VALIDITY AND LIMITATIONS

- 2.21 It is important to note that even where data is held, a lack of records for a defined geographical area does not necessarily mean that there is a lack of ecological interest; the area may be simply under-recorded.
- 2.22 Bats are highly mobile animals and can move roost sites both within and between years. Where surveys are not spread throughout the bat active season is possible that they could miss roosts that are occupied earlier or later in the year. However, where undisturbed, secondary evidence of bats inside a building is likely to be detectable throughout the year. The detection of small numbers of crevice dwelling species may

¹ Figure 4. Guidelines for proportionate mitigation, the Bat Mitigation Guidelines (Mitchell-Jones & McLeish, 2004)

² Predicting the Impact of Development, the Bat Mitigation Guidelines (Mitchell-Jones & McLeish, 2004)

³ Bats: surveys and mitigation for development projects, first published 28 March 2015

remain problematic in some cases, such as where droppings accumulate within an inaccessible void.

2.23 It was not possible to gain internal access to Building 2 due to the presence of steel grates over the doors and windows. These were put in place by site management to keep out vandals and could not be removed on the day of survey to allow access. Due to the lack of features on the building with the potential to support roosting bats, and the level of survey effort carried out during the dusk survey, this is not seen as a major limitation.

3 Results

DESK STUDY

- 3.1 The data search returned 478 records of bats or bat roosts from 1985 to 2016, two historic and one extant EPSM licenses and no sites designated for bats within a 2km radius of the site. A summary of the most pertinent results are presented in Table 3.1 and Table 3.2 below.

Table 3.1: Summary of pertinent data search results

Species	Distance & Orientation	Date	Record type	Notes
Soprano pipistrelle	700m east	2016	roost	Orleans House Gardens, Twickenham
Common pipistrelle	900m south-west	2010	roost	Bonser Road, Twickenham
Soprano pipistrelle	300m north-west	2010	roost	Queens Road, Twickenham
Common pipistrelle	1600m south-west	2016	Casualty	Teddington Park Road, Waldegrave Road
Nathusius pipistrelle	630m south-west	2006	Boat survey	River Thames : Teddington

Table 3.2: EPSM licences within 2km of the site boundary

Species licensed	Distance & Orientation	Notes
Common pipistrelle, soprano pipistrelle and brown long eared	0.57km east	Extant until 2021
Common pipistrelle, soprano pipistrelle	1.6km north-west	Licence ended 2014
Common pipistrelle,	1.9km north	Licence ended 2015

BAT SURVEYS

Overview

- 3.2 The building inspection surveys identified all four buildings on site as being of low potential to support roosting bats. A subsequent dusk emergence survey was carried out. During the survey, no bats were recorded as emerging from any of the buildings.
- 3.3 General levels of bat activity around the site was very low with foraging and commuting activity from at least three species.
- 3.4 Full survey results from the dusk emergence survey can be found in Appendix 3.

Building Inspection

- 3.5 The building inspection covered four buildings, each building is detailed individually below with a site plan provided in Appendix 1 and supporting photographs of key features in Appendix 2.
- 3.6 *Building 1 - Description:* Building 1 was a derelict two-storey building which was previously used as an office space. It was joined to B2, however, there was no direct access between them. B1 is of brick construction, roughly rectangular in shape with a flat concrete roof. The brickwork was in good condition. There were no chimneys or soffits or any other real architectural features. At the time of survey the doors and windows on the building were boarded up with timber.
- 3.7 Internally the building had no accessible loft space to inspect and the construction of the buildings would make it is likely that there is no gap.
- 3.8 *Building 1 - Results.* No bats or evidence of bats was identified during the internal and external inspections. However, there were features present with the potential to support roosting bats. Such features included gaps around the timber boarding on the north-east aspect and vents on the south-eastern aspect. It could not be determined whether these vents were meshed or open. Based on the above, Building 1 was assessed as having **Low** potential to support roosting bats and **Negligible** potential to support hibernating bats.
- 3.9 *Building 2 - Description:* Building 2 was a derelict one-storey building which was used as a recreational space (see Appendix 2, Photograph 1). It was joined to B1 though there was no direct access between them. B2 is of brick construction, roughly rectangular in shape and with a flat concrete roof. The brickwork was in good condition. There were no chimneys or soffits or any other real architectural features though there

were some areas of lead flashing with small gaps around guttering. At the time of survey the doors and windows on the building were boarded up with steel.

- 3.10 Internal access was not possible due to the presence of steel doors.
- 3.11 *Building 2 - Results.* No bats or evidence of bats was identified during the external inspection. There were no features present with the potential to support roosting bats though an internal inspection was not possible. Based on the above, it was decided that a precautionary approach should be taken and therefore Building 2 was assessed as having **Low** potential to support roosting bats and **Negligible** potential to support hibernating bats.
- 3.12 *Building 3 - Description.* Building 3 was a derelict one-storey building which was previously used as a recreational space. It was of brick construction, roughly rectangular in shape and with a flat concrete roof. The brickwork was largely in good condition. There were no chimneys or soffits or any other real architectural features. At the time of survey the doors and windows on the building were boarded up with steel gabions present on the south-eastern aspect which contained an abundance of 'insect hotels' (see Appendix 3, Photograph 2).
- 3.13 Internal access was not possible due to the presence of steel doors.
- 3.14 *Building 3- Results.* No bats or evidence of bats was identified during the external inspections. However, there were features present with the potential to support roosting bats. Such features comprised holes in brickwork on the north-western and south-eastern aspects respectively (see Appendix 3, Photograph 3). Building 3 was therefore assessed as having **Low** potential to support roosting bats and **Negligible** potential to support hibernating bats.
- 3.15 *Building 4 - Description.* Building 4 was an active two-storey building with a ground floor comprising commercial space and a second floor comprising an open-plan office. It was of brick construction, roughly rectangular in shape and with a flat concrete roof with a felt edge at the overhang. The brickwork was in good condition. The north-western façade was covered in ceramic tiles while the windows present were timber framed. There was a small 'rooflet' feature on the roof. This had pitched sides covered in bitumen felt and appeared to house fan utilities. It could not be inspected inside.
- 3.16 Internally the building's top floor had a false ceiling which, when removed to allow inspection, showed what appeared to be the bottom of the roof cap. This indicated the absence of any roof void.

3.17 *Building 4 - Results*. No bats or evidence of bats was identified during the internal and external inspections. However, there were features present with the potential to support roosting bats. Such features included missing mortar, gaps under lead flashing and gaps under roof overhang on the north-eastern façade; and gaps under overhang, gap under lead flashing, open brickwork and weep holes on the south-eastern façade. Based on the above, Building 4 was assessed as having **Low** potential to support roosting bats and **Negligible** potential to support hibernating bats.

Tree inspection

3.18 Details of all trees on site including species composition are contained within the PEA report (The Ecology Consultancy, 2017). All trees within the redline boundary and four mature trees immediately to the west of the site were assessed for their potential to support roosting bats and all were assessed as having **Negligible** potential to support roosting bats and **Negligible** potential to support hibernating bats.

Emergence Survey: 17 June 2006

3.19 No bats were recorded emerging or where suspected to have emerged from any buildings on site.

3.20 A low level of bat activity was recorded, with 34 calls recorded by the three surveyors. Three species were recorded commuting and foraging throughout the site – common pipistrelle, soprano pipistrelle and noctule.

- The first call recorded was a soprano pipistrelle at 20:48, 25 minutes after sunset and within the emergence time for this species. This species accounted for the majority of the activity observed, being recorded 23 times during the survey.
- Common pipistrelle was recorded seven times during the survey.
- Noctule bats were recorded four times, once by each surveyor at 20:55 and 20:56, indicating it was likely the same bat travelling around the site.
- The last call recorded was a soprano pipistrelle at 21:52.
- The majority of activity recorded was by commuting bats.

3.21 *Sound Analysis*: All calls were identifiable to species level.

4 Evaluation and Impacts

EVALUATION

Species

- 4.1 Common and soprano pipistrelle are the most common and widespread species; found throughout the UK with pre-breeding population estimates grouped at up to two million (Harris and Yalden, 2008). These species are believed to be common and widespread throughout London.
- 4.2 Noctule is rarer than common and soprano pipistrelle though is still found throughout Britain. This species is distributed fairly widely across London and in particular at the south – west of the city (London Bat Group, 2015).
- 4.3 Based on the findings, the site is assessed as being of limited importance for bat species with small numbers of common species present.

Foraging and commuting habitats

- 4.4 The site was used as a foraging and commuting resource by at least three species of bat; common pipistrelle, soprano pipistrelle and noctule at low numbers. The majority of calls were picked up by Surveyor 3 at the south-east of the site and the majority of animals recorded were utilising the River Thames as a commuting and foraging corridor rather than the site itself.
- 4.5 Based on the bat activity (foraging and commuting) information obtained from the dusk emergence survey, the site can be assessed as having very limited importance as a foraging and commuting resource.

IMPACT ASSESSMENT

Species

- 4.6 Based on the findings of the surveys carried out on site, it is not envisaged that the development proposals will result in the destruction or disturbance of any bat roosts nor have any significant effect on the favourable conservation status of bat species in the area.

Foraging and commuting habitats

- 4.7 The development proposals for the site are unlikely to have any significant impact on the ability of local bats to commute and forage on the area and will therefore not have a significant effect on the favourable conservation status of bats in the area.

5 Summary and Recommendations

SUMMARY

5.1 The following key ecological issues have been identified:

- An internal and external inspection of buildings and a ground level roost assessment of trees was carried out to determine the potential of the site to support bats;
- All buildings on site were assessed as having low potential. All trees were assessed as having negligible potential;
- A dusk emergence survey found no evidence of roosting bats and it can therefore be reliably inferred that roosting bats are likely absent from the site;
- There was a low level of foraging and commuting activity from at least three common species of bat recorded; and
- The construction and operational phase of development could potentially impact bat commuting routes due to higher levels of artificial lighting. It is therefore recommended that lighting scheme should be designed to minimise any light spillage onto the trees on site and also the river.

RECOMMENDATIONS

Further survey

5.2 No further survey is necessary.

Habitat compensation

5.3 The recommendations for ecological enhancement as detailed in the PEA report (The Ecology Consultancy, 2017) should be followed. These would compensate for the loss of semi-mature trees at the west of the site and improve the potential of the site to support commuting and foraging bats.

Bats and Lighting

5.4 While different species of bat react differently to night time lighting, research has found that bats overall are sensitive to artificial lighting. Excessive and/or poorly directed lighting may delay bats in emerging from their roosts; shortening the time available for foraging, as well as causing bats to move away from suitable foraging grounds, movement corridors or roosting sites, to alternative dark areas (Jones, 2000).

5.5 To minimise indirect impacts from lighting associated with the proposed development it is recommended that artificial lighting is only directed where necessary for health and safety reasons. Lighting should not illuminate any trees or vegetation on-site and should

also not be directed towards the River Thames which is already subject to excessive lighting. Lighting should only be used for the period of time for which it is required (Jones, 2000). This can be achieved by following accepted best practice (Fure, 2006; Institute of Lighting Engineers 2009; Bat Conservation Trust 2011):

- The level of artificial lighting including flood lighting should be kept to an absolute minimum;
- Where this does not conflict with health and safety and/or security requirements, the site should be kept dark during peak bat activity periods (0 to 1.5 hours after sunset and 1.5 hours before sunrise);
- Lighting required for security or safety reasons should use a lamp of no greater than 2000 lumens (150 Watts) and should comprise sensor-activated lamps;
- Lights utilising LED technology are the preferred option as these lights do not emit on the UV spectrum, are easily controllable in terms of direction/spill and can be turned on and off instantly;
- Avoid the use of sodium or metal halide lamps, these gas lamps require a lengthy period in which to turn off and the diffuse nature of the light emitted makes light spillage a significant problem.
- Lights required for night time deliveries or security patrols could be set to activate with pressure activated sensors set into the ground;
- Lighting should be directed to where it is needed to minimise light spillage. This can be achieved by limiting the height of the lighting columns and by using as steep a downward angle as possible and/or a shield/hood/cowl/ that directs the light below the horizontal plane and restricts the lit area;
- Artificial lighting should not directly illuminate any confirmed or potential bat roosting features or habitats of value to commuting/foraging bats. Similarly, any newly planted linear features or compensatory bat roosting features should not be directly lit; and
- Lighting design computer programs can be used to predict the potential impacts of light spillage.

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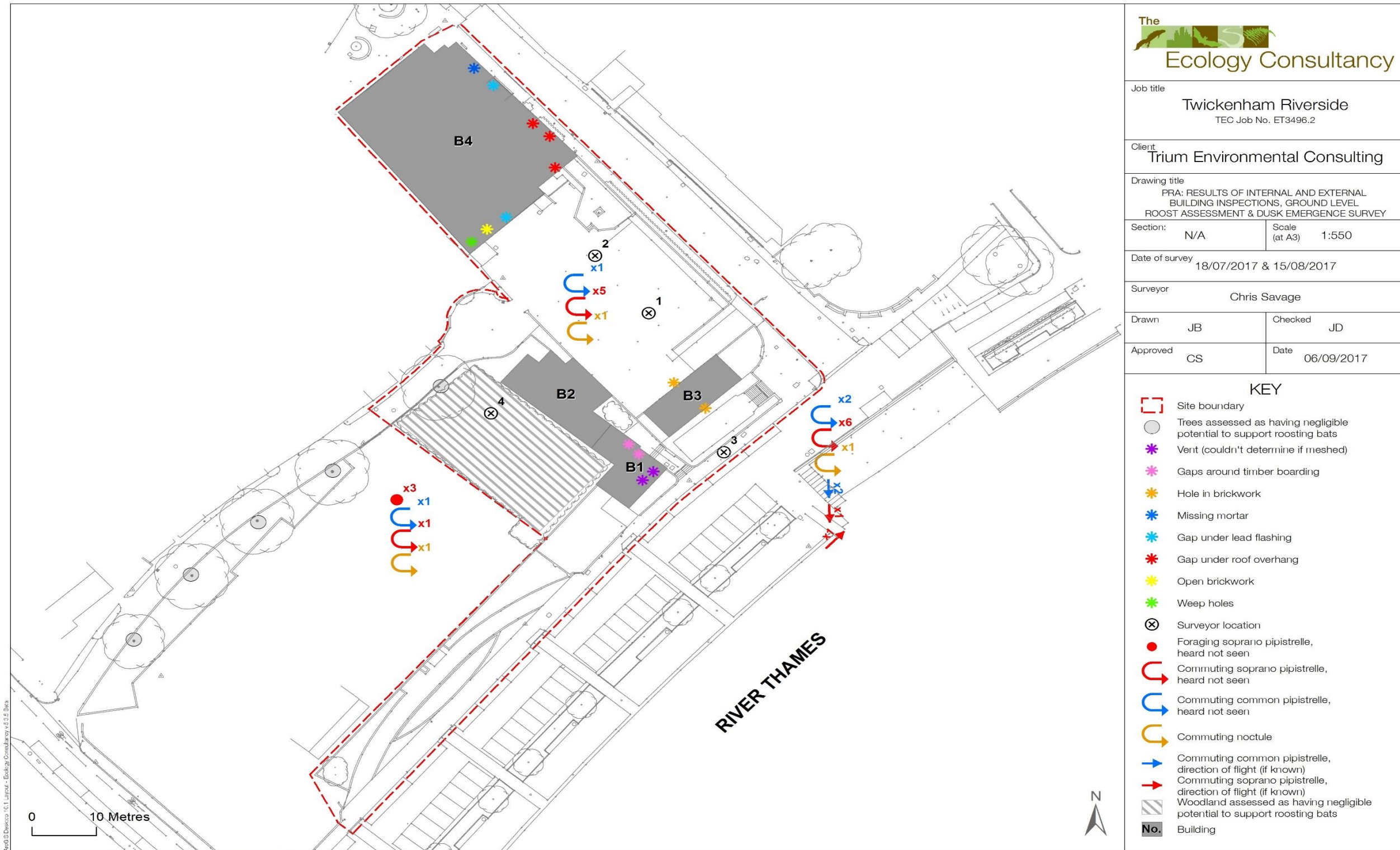
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Appendix 1: Survey Results Map

Map 1: Map of all bat survey results



The Ecology Consultancy

Job title
Twickenham Riverside
TEC Job No. ET3496.2

Client
Trium Environmental Consulting

Drawing title
PRA: RESULTS OF INTERNAL AND EXTERNAL
BUILDING INSPECTIONS, GROUND LEVEL
ROOST ASSESSMENT & DUSK EMERGENCE SURVEY

Section: N/A Scale (at A3) 1:550

Date of survey 18/07/2017 & 15/08/2017

Surveyor Chris Savage

Drawn JB Checked JD

Approved CS Date 06/09/2017

Appendix 2: Photographs

Photograph 1
Hole in brickwork on north-western elevation of Building 3



Photograph 2
South-western elevation of Building 2 with corrugated steel blocking windows and doors.



Photograph 3
View of Building 3 looking north.
Note the insect hotels in steel gabions.



Appendix 3: Survey Data

Project		3496.2		Building reference		B4	
Surveyor		James Read		Date		15-08-17	
Survey no		1 of 1		Survey start/end times		20:08-20:53	
Sunset/rise time		20:23		Equipment reference		EX7	
Surveyor-Easting, Northing				Surveyor location		1	
General weather conditions		Warm, calm, dry, clear					
Temperature (start and end)	22	Cloud cover (0-8)	2	Wind (Beaufort 0-12)	0	Rain (0-5)	0
Species - (CP=common pipistrelle, SP=soprano pipistrelle, LE=long-eared, N=Noctule, S=Serotine, M=Myotis, U=Unknown)							
Activity type - (E = Emergence, R = Return to roost, C = Commuting, F = Foraging, S = Socialising)							
Time	Species	Number of bats	Seen/not seen (S/NS)	Activity type	Direction of flight	Notes (inc map ref)	
20:55	N	1	NS	C	-	-	
21:00	SP	1	NS	C	-	-	
21:20	SP	1	NS	C	-	-	
21:34	SP	1	NS	C	-	-	
21:48	CP	1	NS	C	-	-	
21:49	SP	1	NS	C	-	-	
21:52	SP	1	NS	C	-	-	

Project		3496.2		Building reference		B2 & B3	
Surveyor		Russell Mansfield		Date		15-08-17	
Survey no		1 of 1		Survey start/end times		20:08-20:53	
Sunset/rise time		20:23		Equipment reference		BLogger	
Surveyor-Easting, Northing				Surveyor location		2	
General weather conditions		Warm, calm, dry, clear					
Temperature (start and end)	22	Cloud cover (0-8)	2	Wind (Beaufort 0-12)	0	Rain (0-5)	0
Species - (CP=common pipistrelle, SP=soprano pipistrelle, LE=long-eared, N=Noctule, S=Serotine, M=Myotis, U=Unknown)							
Activity type - (E = Emergence, R = Return to roost, C = Commuting, F = Foraging, S = Socialising)							
Time	Species	Number of bats	Seen/not seen (S/NS)	Activity type	Direction of flight	Notes (inc map ref)	
20:55	N	1	NS	C	-	-	
21:00	SP	1	NS	C	-	-	
21:20	SP	1	NS	C	-	-	
21:34	SP	1	NS	C	-	-	
21:48	CP	1	NS	C	-	-	
21:49	SP	1	NS	C	-	-	
21:52	SP	1	NS	C	-	-	

Project		3496.2		Building reference		B1 & B3	
Surveyor		Matt Pendry		Date		15-08-17	
Survey no		1 of 1		Survey start/end times		20:08-20:53	
Sunset/rise time		20:23		Equipment reference		EX1	
Surveyor-Easting, Northing				Surveyor location		3	
General weather conditions		Warm, calm, dry, clear					
Temperature (start and end)	22	Cloud cover (0-8)	2	Wind (Beaufort 0-12)	0	Rain (0-5)	0
Species - (CP=common pipistrelle, SP=soprano pipistrelle, LE=long-eared, N=Noctule, S=Serotine, M=Myotis, U=Unknown)							
Activity type - (E = Emergence, R = Return to roost, C = Commuting, F = Foraging, S = Socialising)							
Time	Species	Number of bats	Seen/not seen (S/NS)	Activity type	Direction of flight	Notes (inc map ref)	
20:49	CP	1	S	C	S	-	
20:56	N	1	NS	C	-	-	
21:00	CP	1	S	C	S	-	
21:01	SP	1	NS	C	-	-	
21:10	SP	1	S	C	S	-	
21:10	SP	1	S	F	NE	-	
21:11	SP	1	NS	C	-	-	
21:19	SP	1	NS	C	-	-	
21:20	SP	1	SN	C	-	-	
21:34	CP	1	NS	C	-	-	
21:38	SP	1	NS	C	-	-	
21:42	CP	1	NS	C	-	-	
21:45	SP	1	NS	C	-	-	

Project		3496.2		Building reference		B2	
Surveyor		Chris Savage		Date		15-08-17	
Survey no		1 of 1		Survey start/end times		20:08-20:53	
Sunset/rise time		20:23		Equipment reference		EX9	
Surveyor-Easting, Northing				Surveyor location		4	
General weather conditions		Warm, calm, dry, clear					
Temperature (start and end)	22	Cloud cover (0-8)	2	Wind (Beaufort 0-12)	0	Rain (0-5)	0
Species - (CP=common pipistrelle, SP=soprano pipistrelle, LE=long-eared, N=Noctule, S=Serotine, M=Myotis, U=Unknown)							
Activity type - (E = Emergence, R = Return to roost, C = Commuting, F = Foraging, S = Socialising)							
Time	Species	Number of bats	Seen/not seen (S/NS)	Activity type	Direction of flight	Notes (inc map ref)	
20:48	SP	1	NS	C	-	Faint	
20:53	SP	1	NS	F	-	-	
20:56	N	1	NS	C	-	-	
21:01	SP	1	NS	F	-	-	
21:42	CP	1	NS	C	-	-	
21:48	SP	1	NS	F	-	-	

Appendix 4: Legislation

Important Notice: This section contains details of legislation applicable in Britain only (i.e. not including the Isle of Man, Northern Ireland, the Republic of Ireland or the Channel Islands) and is provided for general guidance only. While every effort has been made to ensure accuracy, this section should not be relied upon as a definitive statement of the law.

A NATIONAL LEGISLATION AFFORDED TO SPECIES

The objective of the EC Habitats Directive⁴ is to conserve the various species of plant and animal which are considered rare across Europe. The Directive is transposed into UK law by The Conservation of Habitats and Species Regulations 2010 (as amended) (formerly The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended).

The Wildlife and Countryside Act 1981 (as amended) is a key piece of national legislation which implements the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and implements the species protection obligations of Council Directive 2009/147/EC (formerly 79/409/EEC) on the Conservation of Wild Birds (EC Birds Directive) in Great Britain.

Since the passing of the Wildlife and Countryside Act 1981, various amendments have been made, details of which can be found on www.opsi.gov.uk. Key amendments have been made through the Countryside and Rights of Way (CRoW) Act 2000 (as amended).

Other legislative Acts affording protection to wildlife and their habitats include:

- Deer Act 1991
- Countryside and Rights of Way Act 2000
- Natural Environment and Rural Communities (NERC) Act 2006
- Protection of Badgers Act 1992
- Wild Mammals (Protection) Act 1996

Species and species groups that are protected or otherwise regulated under the aforementioned domestic and European legislation, and that are most likely to be affected by development activities, include herpetofauna (amphibians and reptiles), badger, bats, birds, hazel dormouse, invasive plant species, otter, plants, red squirrel, water vole and white clawed crayfish.

⁴ Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora

Explanatory notes relating to species protected under The Conservation of Habitats and Species Regulations 2010 (as amended) (which includes smooth snake, sand lizard, great crested newt and natterjack toad), all bat species, otter, hazel dormouse and some plant species) are given below. **These should be read in conjunction with the relevant species sections that follow.**

- In the Directive, the term ‘deliberate’ is interpreted as being somewhat wider than intentional and may be thought of as including an element of recklessness.
- The Conservation of Habitats and Species Regulations 2010 (as amended) does not define the act of ‘migration’ and therefore, as a precaution, it is recommended that short distance movement of animals for e.g. foraging, breeding or dispersal purposes are also considered.
- In order to obtain a European Protected Species Mitigation (EPSM) licence, the application must demonstrate that it meets all of the following three ‘tests’: i) the action(s) are necessary for the purpose of preserving public health or safety, or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequence of primary importance for the environment; ii) that there is no satisfactory alternative and iii) that the action authorised will not be detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range.

Bats

All species of bat are fully protected under The Conservation of Habitats and Species Regulations 2012 (as amended) through their inclusion on Schedule 2. Regulation 41 prohibits:

- Deliberate killing, injuring or capturing of Schedule 2 species (all bats)
- Deliberate disturbance of bat species as:
 - a) to impair their ability:
 - (i) to survive, breed, or reproduce, or to rear or nurture young;
 - (ii) to hibernate or migrate³
 - b) to affect significantly the local distribution or abundance of the species
- Damage or destruction of a breeding site or resting place
- Keeping, transporting, selling, exchanging or offering for sale whether live or dead or of any part thereof.

Bats are also currently protected under the Wildlife and Countryside Act 1981 (as amended) through their inclusion on Schedule 5. Under this Act, they are additionally protected from:

- Intentional or reckless disturbance (at any level)
- Intentional or reckless obstruction of access to any place of shelter or protection
- Selling, offering or exposing for sale, possession or transporting for purpose of sale.

How is the legislation pertaining to bats liable to affect development works?

A European Protected Species Mitigation licence issued by the relevant countryside agency (e.g. Natural England) will be required for works liable to affect a bat roost or for operations likely to result in a level of disturbance which might impair their ability to undertake those activities mentioned above (survive, breed, rear young and hibernate). The licence is to allow derogation from the relevant legislation but also to ensure appropriate mitigation measures be put in place and their efficacy to be monitored.

Though there is no case law to date, the legislation may also be interpreted such that, in certain circumstances, important foraging areas and/or commuting routes can be regarded as being afforded *de facto* protection, for example, where it can be proven that the continued usage of such areas is crucial to maintaining the integrity and long-term viability of a bat roost⁵.

LOCAL PLANNING POLICY

The London Borough of Richmond upon Thames Core Strategy (2009) deals with matters of strategic importance for Twickenham. Key chapters include Chapter 8.1.4 CP4 – Biodiversity.

Policy CP4.A: Natural environment

The Borough's biodiversity including the SSSIs and Other Sites of Nature Importance will be safeguarded and enhanced. Biodiversity enhancements will be encouraged particularly in areas of deficiency (parts of Whitton, Hampton, Teddington, Twickenham and South Kew), in areas of new development and along wildlife corridors and green chains such as the River Thames and River Crane.

Policy ENV DM4: Protection of trees

Weighted priority in terms of their importance will be afforded to protected species and priority species and habitats in the UK, Regional and Richmond upon Thames Biodiversity Action Plans.

⁵ Garland & Markham (2008) Is important bat foraging and commuting habitat legally protected? Mammal News, No. 150. The Mammal Society, Southampton.



Ecology Consultancy

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Making places better for people and wildlife

London - Tempus Wharf, 33a Bermondsey Wall West, London, SE16 4TQ
T. 020 7378 1914 W. www.ecologyconsultancy.co.uk E. enquiries@ecologyconsultancy.co.uk

- **Sussex** - The Old Dairy, Barcombe Mills Road, Lewes, East Sussex BN8 5FF T. 01273 813739
- **East Anglia** - Thorpe House, 79 Thorpe Road, Norwich NR1 1UA T. 01603 628408
- **Midlands** - 9 The Mews, Trent Park, Eastern Avenue, Lichfield WS13 6RN T. 01543 728971
- **North** - Trinity Walk, Unit G37b, Market Walk, Wakefield, West Yorkshire WF1 1QR T. 01924 683558
- **Scotland** - 3 Coates Place, Edinburgh Scotland EH3 7AA T. 0131 225 8610