LEGGATTS CAMPUS
NORTH WATFORD

BAT SURVEY REPORT

Prepared by
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for

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BAT SURVEY REPORT

1.0 BACKGROUND

Development Background

1.1 It is proposed to re-develop Leggatts Campus of West Herts College, North Watford, for housing. It is understood that the planning application is to be submitted during the week commencing 24th September, with a view to the application being determined in December 2007 and site works (i.e. site clearance and building demolition works) commencing immediately thereafter.

Ecology Background

1.2 An extended Phase 1 habitat survey and informal desk study was carried out by ACD Landscape Architects in July 2007 in order to provide a preliminary assessment of any identified or potential ecological constraints associated with the re-development proposals. This survey identified that three of the relatively older on-site buildings (B1, B4 and B7) as well as one of the relatively more modern on-site buildings (B10) possess at least some (moderate) potential to support roosting bats.

1.3 In addition, during the site visit, mature oak tree (T3) and mature cherry (T4) were considered to possess features which afford both trees, at most, negligible bat roost potential. Specifically, rot holes where branches had been lost/removed were noted on both the oak and cherry whilst the cherry additionally possessed flaking bark. Another mature oak (T1) was also subsequently assessed to possess at least some (negligible) bat roost potential following the identification of significant internal decay by ACD's arboriculturist.

1.4 It is understood that all on-site buildings are to be demolished as part of the site re-development, though it is not known whether T1, T3 and/or T4 are to be felled.

1.5 Most bat populations have declined dramatically in recent years and as a consequence, all sixteen species of bat resident in the UK receive full protection under the Wildlife & Countryside Act 1981, Countryside and Rights of Way Act 2000 and Conservation (Natural Habitats etc) Regulations 1994. Taken together, this makes it an offence to intentionally or deliberately capture, kill or injure or disturb bats (whether in a roost or not), and intentionally or recklessly damage, destroy or obstruct access to their roosts.

1.6 Several species of bat are also Priority Species in the UK Biodiversity Plan and species of principal importance for the conservation of biodiversity in England, including common and soprano pipistrelles, i.e. the most common species of bat and thus most frequently encountered during development works.

1.7 Given the proposed development works and the legal protection afforded to bats, the extended Phase 1 habitat survey report therefore makes a recommendation that further bat survey work should be carried out for buildings B1, B4, B7 and B10 and ACD Landscape Architects was accordingly commissioned to carry out this work.

1.8 This report concerns only the bat survey work recommendations for buildings B1, B4, B7 and B10 since the specific trees which are to be felled are yet to be finalised and so further bat survey work for on-site potential bat roost trees has yet to be commissioned and undertaken.

Survey Objectives

1.9 The objectives of the bat survey work for buildings B1, B4, B7 and B10 were to:

- to determine the presence or likely absence of roosting bats from these buildings;
- identify any legal and planning policy constraints relevant to nature conservation which may affect the development; and,
- determine the need for further surveys and mitigation.

2.0 METHODOLOGY

2.1 The further bat survey work comprised an internal inspection and detector surveys of each of the four buildings as detailed below:

2.2 *Internal Inspection*

2.3 The inspections were undertaken by a Natural England licensed bat worker (licence number: 20071804) and an assistant. Where accessible and where health and safety considerations allowed, each roof space was surveyed for evidence of bats (e.g. droppings, scratch marks, staining and sightings) using a high-powered torch and endoscope (where required). Notes were made relating to the relevant characteristics of internal features providing potential access points and roosting opportunities for bats, including (but not exclusively):

- Suitable gaps between tiles and roof lining;
- Access points via eaves;
- Gaps between timbers;
- Gaps around mortise joints;
- Gaps around top of gable end walls;
- Gaps within roof walling;
- Gaps around tops of chimney breasts; and,
- Clean ridge beams.

2.4 A number of the roof spaces could not be directly entered on account of limited accessibility (see Appendix 2), including the majority of the loft space within building B7 and also several of the numerous loft spaces within B1. In these instances an inspection was made from the loft hatch itself with the aid of high powered torch and binoculars.

2.5 *Detector Surveys*

2.6 One dusk (emergence) and one dawn (re-entry) detector survey of buildings B4, B7 and B10 were undertaken, whilst two dusk and two dawn surveys of building B1 were conducted.

2.7 In accordance with current guidelines (Bat Conservation Trust, 2007; Mitchell-Jones, A.J, 2004) and best practice the evening surveys commenced

approximately half an hour before sunset and continued for the following two hours whilst the dawn surveys commenced two hours before sunrise and ended at sunrise.

2.8 Frequency division and time expansion bat detectors (Batbox Duet and Pettersson D240X) were used by each surveyor and calls were recorded on to a minidisk and later analysed using computer software (Batscan 9 and BatSound 3.31) to species level (where possible): bat passes which were either too brief and/or faint to record and/or analyse were recorded as unidentified bats, i.e. Vesper species.

2.9 The bat detector survey work was undertaken between 13th August and 30th August 2007, given the project deadline for completion of this project survey work and reporting by the 24th September 2007. Exact dates and weather conditions of each detector survey are provided in Appendix 3.

2.10 The bat survey work was carried out during the optimal survey window, i.e. during the month of August when maternity roosts or at least some individuals from any maternity roosts may still be present. Further, every effort was made to schedule the detector survey work during suitable weather conditions, i.e. mild, dry and non-windy conditions. In exception, however, gusty wind conditions were encountered during the dusk/dawn survey of B50, during which surveys minimal bat activity was detected. Numerous moths and night feeding invertebrates, however, were noted to be on the wing, and it is not clear whether the weather conditions were a factor in the lack of bat activity. Given that the internal inspection of this building has revealed the presence of a bat roost, however, it is considered that, taken together, the detector surveys and internal inspection provide valid survey data for building B10.

Results

2.11 *Internal Inspection*

2.12 During the internal inspections, evidence of bats was recorded within one (building B10) of the four surveyed buildings. Specifically, a total of approximately 200-300 pipistrelle droppings were found at the south-eastern end of the loft directly beneath the ridge beam.

2.13 Although no evidence of roosting bats was identified within the surveyed roof/loft spaces of buildings B1, B4 and B7, possible bat access points and roosting features were noted in at least some of the roof/loft spaces. For example, light at eave level was noted in several of the loft spaces (e.g. east side of B1 and B7) whilst the under-felt beneath the roof tiles on the northern roof of building B1 was noted to be torn in several places affording access from the exterior of the building into the interior and vice versa.

2.14 Photographs of selected roof/loft spaces are given in Appendix 1 and a description of the roof/loft spaces of each of the four buildings is included within Appendix 2.

2.15 *Detector Surveys*

2.16 No emergence or re-entry of roosting bats from or into any of the 4 surveyed buildings was detected during the detector survey woks. That said, bat activity

was recorded in the vicinity of buildings B1, B4 and B7 close to (i.e. both shortly after and also before) dusk and dawn (i.e. shortly before). Specifically, a single pipistrelle bat was recorded at 20:24 (i.e. 23 minutes after sunset) on 27th August to fly from the western side of building B1 westwards towards the neighbouring gardens. In addition, during the following dawn survey a soprano pipstrelle was observed to forage along the northern side of B1 roof at 05:43 (i.e. 20 minutes before sunrise) on 28th August and another unobserved soprano pipistrelle was detected at the south-west corner of this building at 05:45 (i.e. 18 minutes before dawn) on 28th August.

2.17 Similarly activity close to dusk was noted for buildings B4 and B7. For building B4, a common pipistrelle was first observed at 20:38 (i.e. 12 minutes after sunset) on 13th August immediately west of building B4 forging at tree height above the courtyard area. For building B7, a single common pipistrelle was observed at 20:14 (i.e. 10 minutes *before* sunset) on 16th August to fly (forage) along the tree-line on the site's western boundary and immediately west of B7.

2.18 The timings of the pipistrelle bat observations made close to dusk and dawn suggest that these individuals are likely to roost within the surrounding area of the site, potentially within the surveyed buildings or possibly neighbouring residential properties and/or within trees of the neighbouring woodland. This interpretation is based upon Kapteyn's (1993) principle that the earlier a bat is seen at sunset, then the closer it is likely to be to its roost. It can therefore be assumed that bats seen shortly after dusk have recently emerged from their roosts nearby (where 'early' is defined as within 20 minutes after sunset for pipistrelle species).

2.19 Despite these notable observations close to both dusk and dawn, no conclusive evidence of roosting bats within buildings B1, B4 and B7 has been identified during the survey work.

2.20 As for building B10, despite pipistrelle droppings having been found within building B10 during the internal inspection, no bats were observed or detected to either exit or re-enter building B10 and no bat activity (e.g. swarming at dawn etc) to indicate the presence of roosting bats was noted during the detector surveys. It is possible that that the lack of evidence for roosting bats during the detector surveys of B10 could be explained by the fact that the identified roosting colony had already disbanded or that any roosting bats present chose not to exit the roost on the specific dusk/dawn during which the detector surveys were undertaken.

2.21 Other incidental records of bat activity were made during the detector surveys. This activity was dominated by low numbers of soprano and common pipistrelles, though noctule bats were also occasionally detected. Activity principally included pipistrelle foraging and feeding behaviour associated with the line of trees along the western boundary of the site, the neighbouring gardens and also the woodland edge adjacent to the sports centre car park.

2.22 Detailed survey results are given in Appendix 5.

Discussion

2.23 The findings of the bat survey work allow an evaluation to be made as to the status, seasonal usage and, accordingly, conservation significance of the bat roost

identified in building B10 as well as a discussion of the potential for roosting bats to use buildings B1, B4 and B7.

2.24 *Building B10*

2.25 The occurrence of c. 200-300 pipistrelle droppings at the south-east end of building B10 is considered to be indicative of a maternity pipistrelle roost. Since no bats were observed to emerge or re-enter during the detector survey work, the estimation of the size of this colony has necessarily been based upon number of droppings alone. Estimation of colony size based on droppings alone is acknowledged to be difficult as it is unlikely that all droppings would be visible and the proportion visible would depend upon how readily the roosting bats can move from the roost through to the inside.

2.26 Based upon professional judgement, however, it is considered likely to comprise a relatively average-sized roost, i.e. fewer than c. 50 bats. A maternity roost of c. 50 pipistrelle bats would fit into the size range quoted for pipistrelle maternity roosts: according to Warwickshire Bat Group pipistrelle breeding colonies are taken to include at least 25 individuals whilst the Bat Conservation Trust cite that the average size of soprano pipistrelle and common pipistrelle roosts is 288 and 66 individual bats, respectively.

2.27 The survey findings, however, should be placed in the context that pipistrelle bats have had a poor year and also that pipistrelles (particularly common pipistrelles) exhibit changeable roosting patterns and may even during the maternity period irregularly move locally between alternative roosting sites (this behaviour is typically associated with relatively new buildings). The potential therefore exists for the numbers of roosting bats occupying B10 to significantly fluctuate over the summer months and also year-to-year.

2.28 In terms of seasonal roost usage, occupation of B10 by roosting pipistrelle bats may not, however, be restricted to summer months. Although it is expected (and apparently supported by the detector survey work) that the majority, if not all, of the bats using the roost in the summer would leave in autumn, it is possible that small numbers could remain and use B10 for hibernation, i.e. the building could potentially be utilised for roosting throughout the entire year.

2.29 Although the exact position of the roost was not determined during the internal inspection, based upon the location of the droppings it is considered likely to occur between the roof and gable end wall. Further, from this position it is possible that roosting bats may also access any wall cavity.

2.30 Roosting in such a confined space within the building's exterior is typical of pipistrelle bats and these species would additionally use such exposed sites over the hibernation period, to take advantage of warmer weather to feed. In terms of the access point to the roost, it is envisaged that the moderately sized circular hole within the brickwork at the apex of the south-eastern gable end is the most likely point of access.

2.31 To summarise, the roost within B10 has been tentatively classified as an average-sized pipistrelle maternity roost and possible small pipistrelle hibernation roost. This roost is therefore considered to possess ecological value at the local level,

based upon the categories given in the Guidelines for Ecological Impact Assessment (IEEM 2006) and to be of medium conservation significance according to the scale of conservation significance given in English Nature's Bat Mitigation Guidelines (2004).

2.32 *Buildings B1, B4 and B7*

2.33 No conclusive evidence of the occurrence of roosting bats was found during either the internal inspections and/or detector surveys for buildings B1, B4 or B7. However, it should borne in mind that these buildings all possess features which could potentially be used by roosting bats (e.g. missing roof tiles [B1, B4 and B7] and holes in soffit box [B1] etc) and given that the survey work can only provide a snapshot of bat activity, the use of these buildings by roosting bats cannot be wholly discounted.

Impacts and Legal Constraints

2.34 The proposed site re-development works will necessarily involve the demolition of the on-site buildings including the B1, B4, B7 and B10, i.e. including one building (B10) within which roosting bats have been identified.

2.35 The demolition of B10 will therefore result in the destruction of the identified bat roost and potentially, depending upon the timing of the demolition works, also result in the killing and/or injury of bats. This would be unlawful without a licence and would equate to a significant impact at the local level for bats, according to the Guidelines for Ecological Impact Assessment (IEEM 2006) and high magnitude impacts according to the impact matrix given in the Bat Mitigation Guidelines (EN, 2004), the relevant components of which are tabulated as follows:

Roost Type	Development Effect	Scale of Impact		
		Low	Medium	High
Maternity	Destruction			✓
	Isolation			✓
	Partial destruction / modification		✓	
	Temporary disturbance – outside breeding season	✓		
	Post-development interference			✓
Minor Hibernation	Destruction			✓
	Isolation			✓
	Partial destruction / modification/ modified management		✓	
	Temporary disturbance – outside breeding season	✓		
	Post-development interference		✓	
	Temporary destruction, then reinstatement	✓		

2.36 Given that the demolition works will involve offences under the Conservation Regulations 2004 being committed then it would be necessary to apply for a European Protected Species (EPS) [Bat] licence from Natural England to allow the demolition of B10 to proceed lawfully.

2.37 The demolition works (for not only B10 but also the 3 buildings [B1, B4 and B7] which have been identified to possess bat roost potential) would also need to be timed and conducted in such a manner as to minimise the impact upon roosting

bats – see the Recommendations Section for further details.

2.38 To re-iterate, the legal basis for avoiding and/or mitigating for any impact on roosting bats within B5 and B6 are provided by the full legal protection afforded to bats under the Wildlife & Countryside Act 1981, Countryside and Rights of Way Act 2000 and/or Conservation (Natural Habitats etc) Regulations 1994. Taken together, this makes it an offence to intentionally or deliberately capture, kill or injure or disturb bats (whether in a roost or not), and intentionally or recklessly damage, destroy or obstruct access to their roosts.

2.39 It is currently unknown whether any of the 3 identified potential bat roost trees are to be felled. If so, a precautionary approach to felling would need to be adopted, as outlined in the Recommendations section below.

Recommendations

2.40 *European Protected Species Licensing*

2.41 A European Protected Species (EPS) licence from Natural England (NE) should be gained in order to permit the demolition works for B10 to proceed lawfully.

2.42 Buildings B1 B4 and B7 are not, however, considered to constitute confirmed bat roosts and therefore it would not be appropriate to licence the demolition works associated with these buildings, though mitigation would nonetheless be required (as discussed below).

2.43 *Current System*

2.44 Under the current licensing EPS NE system, the ecologist is issued the licence and the LPA is consulted directly by Natural England when the licence is submitted.

2.45 The licence application currently comprises an application form, a Method Statement and a Reasoned Statement. The Method Statement is prepared by the ecologist and consists of survey information, assessment and mitigation/enhancement measures.

2.46 Prior to granting such a licence, planning approval must be in place and the licensing authority (i.e. Natural England) must be satisfied that there is no satisfactory alternative to the proposed action and that it will not be detrimental to the favourable conservation status of the bats.

2.47 *New System*

2.48 The current system, however, is shortly to be changed. The changes to the EPS licensing system will mean that once Natural England releases the new licensing forms (due middle October 2007), the developer rather than the ecologist will be the licensee. In addition, under the new system it will be an offence to breach the licence conditions. Also, another significant change is that the LPA will need to respond to a Planning Authority Consultation document prior to submission of the licence (and associated documentation – i.e. method statement and reasoned statement) to Natural England, which will potentially increase the length of time to

process the licence.

2.49 Therefore, the minimum length of time between submitting the Planning Authority Consultation to the LPA and obtaining a decision from Natural England on a licence application is likely to be in the order of 30 working days to 50 working days: the LPA's statutory response time is not officially defined but considered likely to be no more than 20 working days whilst NE's statutory response time is 30 working days, though it is understood that whenever possible NE will attempt to provide a decision sooner.

2.50 *Amendments to the Conservation Regulations*

2.51 It is noteworthy that changes have recently been made (in August 2007) to the Conservation Regulations.

2.52 One of the principal changes to the Conservation Regulations has been the raising of the threshold above which a person will commit an offence of deliberately disturbing a wild animal of an EPS. Prior to their amendment, disturbance was absolute and did not have a lower limit. Under the revised regulations, however, a person will commit an offence only if he deliberately disturbs wild animal of an EPS in such a way as to be likely to significantly affect:

- (a) the ability of any significant group of animals or that species to survive, breed or rear or nurture their young, or
- (b) the local distribution and abundance of that species

2.53 To summarise, the amendment of the disturbance offence now permits trivial disturbance to continue lawfully and without a licence.

2.54 It is, however, considered that a licence would nonetheless be required to undertake the demolition works associated with B10, as these works would necessarily involve the damage and destruction of the identified bat roost.

2.55 *Mitigation for building B10*

2.56 As discussed above, the demolition works associated with B10 should be carried out under an EPS Natural England licence. The method statement which accompanies the licence application would detail the mitigation measures which would be adopted to ensure that in accordance with section 44(3)(6)of the Conservation Regulations "the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range".

2.57 EN 2004 provides guidance as to the necessary level of mitigation, based upon the relative conservation significance of the roost in question. The roost within B10 has been assigned medium conservation significance. The suggested mitigation for roost of medium conservation value given in EN 2004 is:

- Timing constraints.
- More or less like-for-like replacement.
- Bats not to be left without a roost and must be given time to find the replacement.

- Monitoring for 2 years preferred.

2.58 It is proposed that the method statement would likely include, but not necessarily be limited to, the following mitigation measures:

- Sensitive timing of demolition works – works to be carried out in autumn (say September / October) or that failing early spring – i.e. outside both hibernation and maternity periods (when bats are must vulnerable) and also a time of year when bats are least likely to be present.
- Soft-approach to demolition works – e.g. soft stripping by hand of roof tiles, soffit boxes etc, regular checks of cavity wall with endoscope and high powered torch, etc, under supervision of a licensed bat worker to ensure that any bats displaced from roost sites can be dealt with appropriately.
- Provision of appropriate replacement bat roosts prior to demolition works commencing to ensure that bats are not left without a roosting site and are given time to find the replacement roosting site(s) before the destruction of the current ones.
- Roost sites and access points replicating existing features to be designed into the new buildings (roosts design considerations are set out in EN 2004 and The Bat Workers' Manual, 2004, by Tony Mitchell-Jones & A.P. McLeish) and their long-term existence must be assured.
- Minimisation of post-development interference with replacement roost(s), to include minimisation of lighting around the buildings with the replacement bat roosts, particularly in the vicinity of the roof and access points.
- Commitment to monitoring the roosts post-construction.

2.59 In terms of the nature of the replacement bat roost or roosts, it / they should aim to replicate the type of roost to be lost and be suitable for the species that will be affected by the development. The roost or roosts should therefore be suitable to support maternity and hibernation roosts of pipstrelle bats. The replacement roost or roosts should accordingly include the following features:

- numerous crevices both within the roof void itself and externally (e.g, within soffit boards, beneath weather boarding and roof tiles) to provide a multitude of roosting opportunities;
- areas where daytime temperatures reach a maximum of between 30-50°C during the summer; and
- areas where winter temperatures are a constant 0 – 6 °C.

2.60 Following discussion with the project team is anticipated that the proposed bin store could potentially be designed to serve a dual purpose as both a storage compound and as a 'bat house'. This 'bat house' should ideally be sited as close to the existing position of B10 as possible and would need to have been constructed prior to demolition of B10.

2.61 Since the mitigation measures associated with the demolition works will need to be agreed with Natural England, the recommendations given above are for guidance only. Detailed mitigation would be provided in the method statement which would accompany the Natural England EPS licence application, and is beyond the scope of this report.

2.62 *Mitigation for buildings B1, B4 and B7*

2.63 Although no evidence of roosting bats has been identified associated with buildings B1 B4 and B7, it is nonetheless recommended that a soft approach to the demolition works and sensitive timing of the works be adopted for all 3 buildings.

2.64 The justification for such a soft approach pertains to the fact that these buildings possess suitable roosting features and, given the changeable roosting patterns of pipistrelle bats, their use by roosting bats cannot be discounted.

2.65 The soft approach to demolition would likely encompass:

- Sensitive timing (i.e. works to be undertaken in autumn [i.e. September / October] or that failing, early spring – i.e. outside both hibernation and maternity periods).
- Soft-approach to demolition works – e.g. soft stripping by hand of roof tiles, soffit boxes etc, under supervision of a licensed bat worker if appropriate.

2.66 Further, it is recommended that this soft approach to the demolition works for buildings B1, B4 and B7 is formalised as a works methodology which should be agreed in advance with the Council Ecologist and/or Natural England.

2.67 If roosting bats are found during soft demolitions works, then works should cease and an EPS NE licence be applied for. This would be required to allow demolition works to continue. In such a case, in order to satisfy a licence application it may be considered necessary to undertake further bat surveys to fully classify the roost(s) present, the level of activity and species using those roosts.

2.68 *Mitigation for loss of potential bat roost trees*

2.69 Should the intention be to fell any of the three identified potential bat roost trees (T1, T3 and T4), then they should be subject to a pre-felling bat survey. Specifically, they should be subject to a pre-felling detector (dawn) survey on the morning the tree is to be felled. The felling should ideally take place in autumn or, that failing, early spring. Assuming that no bats are confirmed to be roosting within the tree during this survey, then the tree should be felled, in sections (if the trunk is hollow), the same day.

2.70 The rationale for the precautionary approach to felling a tree with bat roost potential is the difficulty in proving the presence of roosting bats in trees on account of the nomadic nature and therefore only occasional presence at a tree roost of tree-dwelling bats.

2.71 Should bats be identified to be roosting in any of the potential bat roost trees, then the felling works should halt and advice of a licensed bat worker be sought as to how to proceed and the potential requirement for a Natural England licence.

2.72 *Operational mitigation*

2.73 The replacement bat roost(s) (and particularly its/their access points) should not be directly illuminated. In addition, external lighting within the new development should, as far as is practicable, be minimised in the vicinity of bat commuting and

foraging areas. Commuting and foraging areas are taken to include hedgerows, the woodland edge and tree lines. The rationale for light minimisation is that bat species are believed to be dissuaded from using well lit areas.

2.74 Several means by which external lighting can be minimised are suggested by the Bat Conservation Trust, tabulated as follows:

BCT Recommended External Light Minimisation Guidelines
The use of low pressure sodium lamps instead of high pressure sodium or mercury lamps
Mercury lamps used should be fitted with UV filters
The brightness should be as low as legally possible
The times during which the lighting can be used should be limited to provide some dark periods
The lighting should be directed to where it is needed to avoid light spillage
Any upward lighting should be minimal to avoid light pollution
Light can be restricted to selected areas by fitting hoods which direct the light below the horizontal plane, at preferably an angle less than 70 degrees.
Limiting the height of lighting columns and directing light at a low level reduces the ecological impact of the light.
Road or trackways in areas important for foraging bats should contain stretches left unlit to avoid isolation of bat colonies.
No bat roost (including access points) should be directly illuminated (i.e. replacement roosts and any bat boxes should not be illuminated).

2.75 *Mitigation for loss of potential roost sites*

2.76 To compensate for the loss of features which maybe used by roosting bats as a result of the demolition of a total of four buildings with bat roost potential and the 3 identified potential bat roost trees (should they be felled), it is suggested that, in addition to the licensed mitigation, bat boxes should be erected upon any on-site mature trees which are to be retained (as well as those mature trees within the grounds of the neighbouring sports centre, if appropriate) and additionally bat boxes should be incorporated into at least some of the new buildings. It is considered that providing a minimum of 20 bat boxes would be appropriate.

2.77 A selection of bat box designs is provided in Appendix 5.

2.78 *Breeding birds*

2.79 It should also be noted that birds may nest on and/or within on-site buildings including B1, B4, B7 and B10. All birds, their eggs and active nests are protected under the Wildlife and Countryside Act 1981, as amended, with the exception of a number of species considered as pests. This protection includes the birds themselves. Their nests are also protected from damage or destruction both whilst the birds are constructing and using them.

2.80 As it is an offence to damage or destroy bird's eggs or nest whilst they are in use, care should be taken to ensure that no nesting birds are present prior to undertaking the demolition works. Specifically, should any of the demolition works be undertaken during the bird breeding season (i.e. between March and July inclusive), it is recommended that the works are preceded by a nest check. If any active nests are found in this area then renovation works in the immediate vicinity should cease and an appropriate buffer zone should be established. This buffer zone should be left intact until it has been confirmed that the young have fledged

and the nest is no longer in use.

2.81 *Habitat creation and enhancement*

2.82 Opportunities for habitat creation and enhancement within the new development which would both benefit local bat populations and be in accordance with Policy SE37 of the Watford District Plan 2000 (adopted December 2003) could include:

- Retention of hedgerows and scattered / lines of trees, as far as is practicable.
- Creation of a wildlife pond set within wild flower meadow.
- Planting of lines / avenues of trees and interlinking hedgerows, which should adjoin existing tree lines / hedges, also in order to maintain and maximise connectivity of wildlife corridors.
- Creation of a tall grass headland (c. 1 metre wide) along new and planted hedgerows and tree-lines in order to strengthen and widen wildlife corridors.

2.83 Other opportunities for general wildlife enhancement are given in the extended Phase 1 habitat survey report.

3.0 TIME-SCALES

3.1 It is understood that planning permission is likely to be gained in December 2007. It is recommended that, in order to avoid unnecessary project delays, the EPS Natural England licence application and associated documentation is prepared in advance for planning permission being granted such that as soon as planning consent is obtained the licence application can be submitted to Natural England.

3.2 The processing time under the new licensing system (which is to be implemented in mid-October 2007) is understood to likely be in the region of 30-50 working days. Assuming that the licence application is submitted in December 2007 then the licence should be granted in time to allow B10's licensable demolition works to be conducted in early spring 2008.

3.3 Please note, however, that licence applications are often rejected and require re-submission and that NE would typically take 20 working days to process any re-submission. Re-submission could potentially compromise achieving the early spring window for the licensable works (i.e. demolition of B10) and require that these licensable works (i.e. demolition of B10) be postponed until autumn 2008.

3.4 Further, to re-iterate, the replacement bat roost or roosts would need to be created prior to demolition of B10 to ensure that bats are not left without a roosting site and are given time to find the replacement roosting site(s) before the destruction of the current one. This would involve the creation of a roost which would be suitable for a maternity pipistrelle colony and hibernating bats, prior to early spring 2008. Following discussion with the project team is anticipated that the proposed bin store could potentially be designed to serve a dual purpose as both a storage compound and as a 'bat house'. This 'bat house' should ideally be sited as close to the existing position of B10 as possible and would need to have been constructed by early spring 2008.

APPENDIX 1: SELECTED PHOTOGRAPHS

Building No. **1** - Photograph showing building B1 from the eastern courtyard showing gaps around piping in soffit box, which could provide potential access points to bats

Building No. **1** - Photograph showing loft space on the north side of building B1

Building No. 4 - Photograph showing building B4 from car park at the front of the campus

Photograph of loft space at the north-western corner of building B4

Building No. 7 - Photograph showing building B7 showing gaps between roof tiles, which may afford access to bats

Building No. 7 - Photograph of the small southern section of the loft space of building B7

Building No. 7 - Photograph of the larger northern section of the loft space of building B7

Building No. 10 – Photograph showing the north-western gable end of the building

Building No. 10 - Photograph of the pile of pipistrelle droppings at the south-eastern end of B10's loft

APPENDIX 2: INTERNAL INSPECTION

No.	Description
1	A total of 4 loft spaces were identified and inspected within building B1, on the north, west, south and east sides of the building. The loft space on the north side of the building was pitched with wooden boarding (termed sarking) supported by timber beams (and steel inner frame) with felt between the sarking and roof tiles whilst the section at the western end possessed underfelt. This space was considered to extend the length of the building and to be c. 7-8 m wide by 4-5 m high and to include an expansion tank. Drafts were noted within the loft and could pertain to the mesh-wired ventilation tiles and/or skylight. The felting was noted to be torn in several places, through which the exterior of the building was visible (on the northern side of the roof). The loft floor comprised loose fibre-grass insulation material and wooden beams. The loft space on the west side of the building was estimated to be c. 12 m long by 6 m wide by 3 m high with pitched roof and wooden boarding (termed sarking) supported by timber beams with loose fibre-glass floor as before. This loft was also noted to be quite drafty (probably on account of the ventilation tiles) and also quite light, though there was no light evident at eave level. This loft space could not be directly accessed and so was inspected from the hatch itself. The loft space on the south side of the building was estimated to be similar in size and structure as that on the building's west-side, though also accommodated a water tank. Again the roof space was noted to be quite light and drafty (on account of ventilation tiles). This loft space could not be directly accessed and so was inspected from the hatch itself. The loft space on the east side of the building was considered to be equivalent in size ans structure to the loft on the building's west and south sides. A total of 3 ventilation tiles were noted, as was a sky-light (on the west side of the roof). Some light spillage at eave level was noted (on the east side of the roof).
4	Three loft spaces were identified within building B4: at the north-western, north-eastern and southern ends of this building. The loft space at the north-western corner of the building was L-shaped, with each wing of the 'L' approximately 7-8 m long, 4 m wide, c. 1.5 m high with hipped ends. The loft space was pitched with wooden boarding (termed sarking) supported by timber beams with felt between the sarking and roof tiles. Cobwebs were noted along the ridge beam, there was no obvious gaps (or light spillage) at eave level and no droppings evident on the exposed cream-coloured insulation material covering the loft floor. The loft space at the north-eastern corner of the building (i.e. above the gas meter room) was rectangular in shape c. 7-8 m long, c. 2 m wide and c. 1.2-1.3 m high, with a roof structure as per the north-western loft space. The floor comprised a series of beams and plasterboard ceiling. The loft was quite cobweb-ed, no droppings were apparent and although a gap was noted between the sarking boards, there was no hole within the felting itself. The loft space at the southern end of the building was L-shaped and hipped, with each wing of the 'L' being c. 10 m long x 4 m wide x 1.5 m high and c. 6 m long x 4 m wide x1.5 m high. The roof structure was as per the north-western corner loft though a gap was apparent between the sarking boards and the ridge but on inspection the felt was found to be intact. A lidded water tank was noted mid way along the 10 m arm of the loft.
7	One loft space divided into 2 separate sections by the chimney towards the southern end of this building. The southern section of the loft space was of as similar construction to the north-western corner loft of B4, with a hipped southern wall and a vertical northern wall adjoining the chimney. This section was c. 2.5 m long by 4 m wide by 1.5 m high, and occupied by 2 water tanks (one metal and one plastic). Although light was noted at eave level, numerous cobwebs were noted on the exposed beams and the ventilation tile was provided with wire meshing. The northern section of the loft space could not be directly access but was noted to be c. 8 m long by 4 m wide by 1.5 m high and to include a chimney.
10	One loft space accessed from a 1st floor bedroom. The pitched loft space was noted to be c. 10 m long by 5-6 m wide by 1.2 m high with vertical end walls with under-felt and timber beams. Approximately 200-300 variously aged (including this and last season, i.e. 2007 and 2006) pipistrelle droppings were found clustered on the floor beams at the south-eastern end of the loft directly beneath the ridge beam.

APPENDIX 3: BAT DETECTOR SURVEY – WEATHER CONDITIONS

Building No.	Survey Date	Dusk or Dawn	Survey Weather Conditions
1	27-08-07	Dusk 20:01	Min. temp. = 15.5°C, Max. temp. = 18°C, dry, still, 4-7/8 cloud cover
1	28-08-07	Dawn 06:03	Min. temp. = 11.5°C, Max. temp. = 10.5°C, dry, still, 5-7/8 cloud cover
1 - quadrant	29-08-07	Dusk 19:57	Min. temp. = 14.5°C, Max. temp. = 17.5°C, dry, still to very light breeze, 1/8 cloud cover (high and light)
1 - quadrant	30-08-07	Dawn 06:08	Min. temp. = 11.5°C, Max. temp. = 12°C, dry, still to cool light breeze, 3-7/8 cloud cover, light drizzle between 05:30 and 05:40
4	13-08-07	Dusk 20:26	Min. temp. = 10°C, Max. temp. = 11.5°C, dry, still to light / moderate breeze, 3-7/8 cloud cover (light and thin)
4	14-08-07	Dawn 05:44	Min. temp. = 12.5°C, Max. temp. = 13.5°C, dry, still to light / moderate breeze, 5-8/8 cloud cover
7	16-08-07	Dusk 20:24	Min. temp. = 16°C, Max. temp. = 14°C, dry, light breeze becoming still, 0-4/8 cloud cover
7	17-08-07	Dawn 05:46	Min. temp. = 10°C, Max. temp. = 11.5°C, dry, still, 0-3/8 cloud cover (high and light)
10	20-08-07	Dusk 20:15	Min. temp. = 13°C, Max. temp. = 14°C, dry, light breeze to gusty cool wind, 6-8/8 cloud cover
10	21-08-07	Dawn 05:56	Min. temp. = 14°C, Max. temp. = 14°C, dry though light drizzle in last 5 minutes of survey, light breeze to gusty cool wind, 8/8 cloud cover

APPENDIX 4: BAT DETECTOR SURVEY – RESULTS

Building No.	Date	Dusk or Dawn	Surveyor	Position	Species	Comments
1	27-08-07	Dusk	1	North-west corner	Vesper sp.	Two bat passes detected, both unseen, brief and distant (Vesper sp.) at 20:30 and 20:50.
1	27-08-07	Dusk	2	South-west corner	Noctule Pipistrelle sp.	Several bat passes were detected. The first was an unseen noctule (at 20:23). The subsequent bat pass (at 20:24) was of a pipistrelle bat which was observed to fly from western side of building B1 westwards towards the neighbouring gardens. Subsequent passes comprised a single foraging pipistrelle sp. bat (peak frequency intermediate between common and soprano) within gardens to west of the site and also north-south and vice versa along the fence/line between the site and these gardens (between 20:35 and 20:45). No emergence from building.
1	27-08-07	Dusk	3	South-east corner	Common pipistrelle Noctule	Two bat passes detected during the survey, the first (at 20:16) of a single common pipistrelle which was observed to fly from the south northwards across the car park of the sports centre, overhead and over the roof of building B2. The second bat pass was of an unseen noctule (at 20:23). No emergence from the building. Common pipistrelle detected foraging along the woodland edge adjacent to the sports centre car park.
1	28-08-07	Dawn	1	North-west corner	Soprano pipistrelle Vesper sp.	Two bat passes detected, the first unseen, brief and distant (Vesper sp.) and the second, a soprano pipistrelle which was observed to be foraging east to west parallel with the north-facing roof of building B1 at 05:43. No re-entry into building.
1	28-08-07	Dawn	2	South-east corner		No bat activity observed or detected. No re-entry into building.
1	28-08-07	Dawn	3	South-west corner	Soprano pipistrelle	One bat pass was detected: an unseen soprano pipistrelle recorded at 05:45. No re-entry into building.
1 – quadrant	29-08-07	Dusk	1	Eastern quadrant	n/a	No bat activity observed or detected.
1 - quadrant	29-08-07	Dusk	2	Western quadrant	n/a	No bat activity observed or detected.
1 -	30-08-07	Dawn	1	Eastern	n/a	No bat activity observed or detected.

Building No.	Date	Dusk or Dawn	Surveyor	Position	Species	Comments
quadrant				quadrant		
1 - quadrant	30-08-07	Dawn	2	Western quadrant	n/a	No bat activity observed or detected. No re-entry into building.
4	13/08/07	Dusk	1	North	Common pipistrelle Vesper sp.	5 seen recordings (between 20:38 and 21:18) and 2 unseen recordings (between 21:03 and 21:35) and 1 unseen unrecorded bat pass (Vesper sp.) at 21:45. All common pipistrelle foraging and feeding activity. First sighting at 20:38 and third sighting 20:45 was to the west of building at tree height over the courtyard area. Other sightings were in the carpark/courtyard at the north of the building. Both unseen recordings were at the north-west corner of the building. No emergence from building.
4	13/08/07	Dusk	2	South-east	Common pipistrelle Pipistrelle sp.	Several bat passes were detected. The first 3 observations were of a single pipistrelle bat flying around the northern end of building B4 (between 20:40 and 20:51). At 20:52 and 20:53 a common pipistrelle was observed to be foraging along the tree line on the western side of building B4. At 20:55 a common pipistrelle made a foraging flight along the eastern side of the building from north to south. At 20:57 a pipistrelle sp. bat was noted foraging around the northern end of B4 whilst at 20:58 a pipistrelle sp, bat was observed to fly north to south along the tree line. At 20:59 a common pipistrelle bat flew from south to north to building B4 and finally at 21:45 an unseen common pipistrelle was detected at the southern end of B4. No emergence from building.
4	14/08/07	Dawn	1	North	n/a	No bat activity between 03:45 – 05:45. No re-entry into building.
4	14/08/07	Dawn	2	South-east	Soprano pipistrelle	One bat pass detected, specifically an unseen soprano pipistrelle bat (at 05:09) which was considered to be commuting. No re-entry into building.
7	16-08-07	Dusk	1	South	Common pipistrelle	Several bat passes detected. The first at 20:14 was of a single common pipistrelle which flew from north to south along the far side (west) of tree line long the site's western boundary. A single foraging common pipistrelle is subsequently observed to forage along tree line west of building B7 and within gardens beyond between 20:26 and 20:58. 3 unseen bat passes were detected (2 pipistrelle sp. at 21:04 and 21:06 and one common pipistrelle at 21:09). A common pipistrelle was then observed at

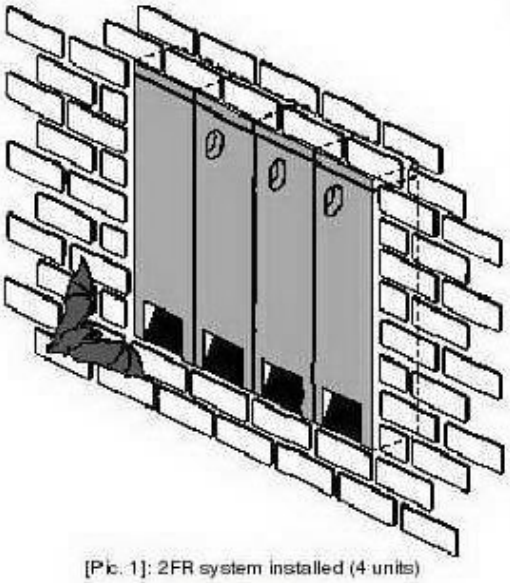
Building No.	Date	Dusk or Dawn	Surveyor	Position	Species	Comments
						21:10 to fly from the gardens (west of the site) along the south side of B7 and circled B7 twice at roof height and then at 21:15 a common pipistrelle was noted to circle B7 once at roof height. A final unseen common pipistrelle was detected at 21:20. No emergence from building.
7	16-08-07	Dusk	2	North-eastern corner	Common pipistrelle	Two bat passes were detected, both of a single unseen common pipistrelle at 21:12 and 21:21. No emergence from building.
7	17-08-07	Dawn	1	South	n/a	No bat activity detected. No re-entry into building.
7	17-08-07	Dawn	2	North-eastern corner	n/a	No bat activity detected. No re-entry into building.
10	20-08-07	Dusk	1	South-east	Common pipistrelle	One bat pass detected, of a single unseen common pipistrelle considered to be commuting.
10	20-08-07	Dusk	2	North-west	Pipistrelle sp.	One bat pass, of a pipistrelle bat which was observed to fly from the north southwards and to forage over the garden of B10 before heading north again. No emergence from building.
10	21-08-07	Dawn	1	South-east	n/a	No bat activity detected. No re-entry into building.
10	21-08-07	Dawn	2	North-west	n/a	No bat activity detected. No re-entry into building.

APPENDIX 5 BAT BOX DESIGNS

Bat tube (Schwegler 2FR)

Bat Tube 2FR

- for creation of spaces for large bat colonies
- with integrated access to existing cavities in walls



[Pic. 1]: 2FR system installed (4 units)

This maintenance-free concept enables Bat Tubes to be built into the masonry of a wall.

A number of these Tubes can be placed next to one another in modular form to create much larger spaces with transverse connecting holes. Each Tube has three different types of internal partition.

One of the special features is an optional passage through the rear panel: This enables existing cavities occupied by bats in the walls or structure of a building to be retained, providing an unobtrusive solution when conversion, renovation or insulation work is being carried out on older buildings. The animals can crawl from one Tube to another and through the rear into the existing cavities.

Siting: Listed buildings, industrial buildings, bridges and buildings of slab-type construction.

Suitable for: Bat species that inhabit buildings

Material: SCHWEGLER wood-concrete with integrated internal partitions

Colour: grey material, paintable with standard air-permeable wall-paint

Dimensions: height 47 x width 20 x depth 12.5 cm

Entrance: width 15 x height 2 cm

Weight: ca. 9,8 kg

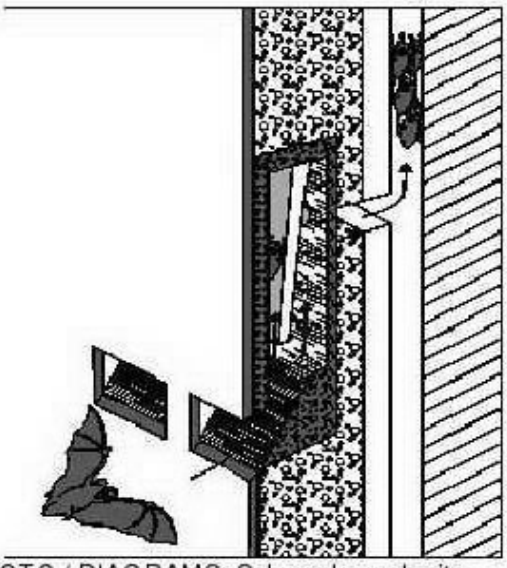


PHOTO / DIAGRAMS: Schwegler web-site

Bat brick (Schwegler N27)

Stockist – Jacobi Jayne, Alana Ecology, Wildlife & Countryside Services

PHOTO: Pearce Environmental Ltd web-site

Woodcrete- constructed brick with an entrance hole of c. 55 x 26 mm.
Dimensions: 29cm h x 18cm w x 23.5cm d, weight 4kg.

This box can be incorporated into a wall during building work and should be sited where conditions are relatively humid. It is therefore particularly useful for incorporating into new buildings to attract bats. This box contains a single internal wooden panel to simulate a crevice where bats can roost. The front panel is removeable to allow for easy cleaning.

No painting is required, but if necessary, a natural breathable paint should be used.

Bat box (Schwegler 1FQ)

Stockist - Alana Ecology, Wildlife & Countryside Services

PHOTO: Alana Ecology web-site

This is the latest model from Schwegler and is designed specifically to be fitted on the external wall of a building, including any house or barn. It is designed to be used both as a non-hibernation roost and as a nursery roost and encompasses a special porous coating to help maintain the ideal temperature inside alongside a roughened front panel to allow bats to land securely. Access into the box is via a step-like recess.

Inside the box, rough pieces of wood incorporated into the back are good insulators and are used by the bats as perches. The internal layout offers three different areas with varying degrees of brightness and temperature.

This durable box is easy to attach to most walls, requires no maintenance or cleaning and

will last for decades.

Dimensions 56.5cm h x 35cm w x 8.5cm d. It should be noted that this box is designed to be fitted to a wall and would be unsuitable for fences or sheds on account of its weight (15kg).

Bat roost unit

Stockist – Wildlife & Countryside Services, Marshalls Clay Products

PHOTO: Wildlife & Countryside Services web-site

This unit is designed to be used in conjunction with the Bat Access Brick (see below) and would be built into the wall behind the access brick, within which it would provide a suitable roosting area for bats, without permitting the bats access to the roof void or cavity.

Bat Access Brick

Stockist – Wildlife & Countryside Services, Marshalls Clay Products

PHOTO: Wildlife & Countryside Services web-site

This brick is designed to afford access to bats into roof voids and cavities, and can be used in conjunction with the Bat Roost Unit (see above) to create an enclosed bat roosting area or independently to permit access to an existing roof.

Dimensions: 61mm high x 211mm wide x 103mm deep

Bat Hibernation Box 1FW (Summer- & Winterquarter for Bat colonies)

This box has the same internal design as the 1FS but its special multi-layered cavity wall provides excellent insulation while also allowing the air to permeate. This makes it ideal both for hibernation in winter and for encouraging large colonies in summer. 180 hibernating individuals have been recorded and this is not at all uncommon. Interior design: There are three internal, grooved, wooden panels which can be easily lifted out for inspection and cleaning, and the same roof panel as the 1FS.
It should be noted that this bat box is heavy and so if mounted above ground should be firmly secured and also sited away from public areas.

Colour: Black, grey front panel
Material: SCHWEGLER wood-concrete, galvanised steel hanger
Siting & Fixing: Ideal for use on trees.
Mounting blocks, Aluminium Nails and fixing instructions are supplied.
External dimensions: Ø 38cm, height: 50 cm
Internal dimensions: Ø 20cm, height: 38 cm
Weight: approx. 28 kg

General Purpose Bat Box 2F with Double Front Panel

This box has the same shape as the 2F but the front panel has a second inner wooden panel fitted to it to create a cavity wall. This provides ideal quarters for bats that inhabit crevices, such as Nathusius´ Pipistrelle (Pipistrellus nathusii), Daubenton`s Bat (Myotis daubentonii) and the Common Pipistrelle (Pipistrellus pipistrellus). Note that this box can be converted at a later to a 2F or 2M Bird Box simply by replacing the front panel.

Material: SCHWEGLER wood-concrete
Colour: Black, grey front panel
Dimensions: Ø 16 cm
Height: 33 cm
Weight: 4.1 kg

1FF Bat Box

The rectangular shape makes the 1FF suitable for attaching to the sides of buildings or in sites such as bridges, though it may also be used on trees. It has a narrow crevice-like internal space to attract Pipistrelle and Noctule bats.

Woodcrete (75% wood sawdust, concrete and clay mixture)
Width: 27cm
Height: 43cm
Weight: 8.3kg

Bat Box 2FN (special)

This model has two entrances, one at the rear against the tree trunk and one at the front. Bats often creep into the rear entrance but leave by the front. It has a domed roof to form clusters and an increased internal height. It is very suitable for woodland species like the Noctule (Nyctalus noctula) and has proven highly successful. In one instance 28 Great Bats with nine young was recorded in a 2FN, and this is not uncommon. It is effective against small predators and excludes draughts and light. This model is particularly suitable for use in parks and forests.

Material: SCHWEGLER wood-concrete, galvanised steel hanger
Colour: Black, grey front panel
Dimensions: Ø 16 cm
Height: 36 cm
Weight: 4.3 kg

Large Colony Bat Box 1FS (Summer quarter)

This model is very popular for accommodating large colonies in summer, especially of Noctule (Nyctalus noctula), Nathusius` Pipistrelle (Pipistrellus nathusii) and Common Long-eared Bat (Plecotus auritus). It provides plenty of space for a large number of individuals to congregate. Bats are highly sociable creatures, so this box provides many places from which they can hang and which they can also use as a nursing area to rear their young. The front panel consists of three grooved wooden panels, and a special roof panel with an insulated grill is ideal for bats to cling to.

Colour: Black, grey front panel
Material: SCHWEGLER wood-concrete, galvanised steel hanger
External dimensions: Ø 28 cm
Height: 44 cm
Weight: 10 kg

Oak/Larch Double Chambered Bat Box

This wooden box with two internal chambers and access ladder is made from natural sustainable materials and will provide a habitat for many bat species. The heavy construction provides good insulation and longevity, as well as preventing predators from chewing the entrance slot. The front door is hinged for inspection and cleaning.

Wooden boxes should not be painted or treated with any type of preservative, as these can harm the bats. This box can be expected to last 15-20 years.

Dimensions: 300mm h x 135mm w x 135mm d

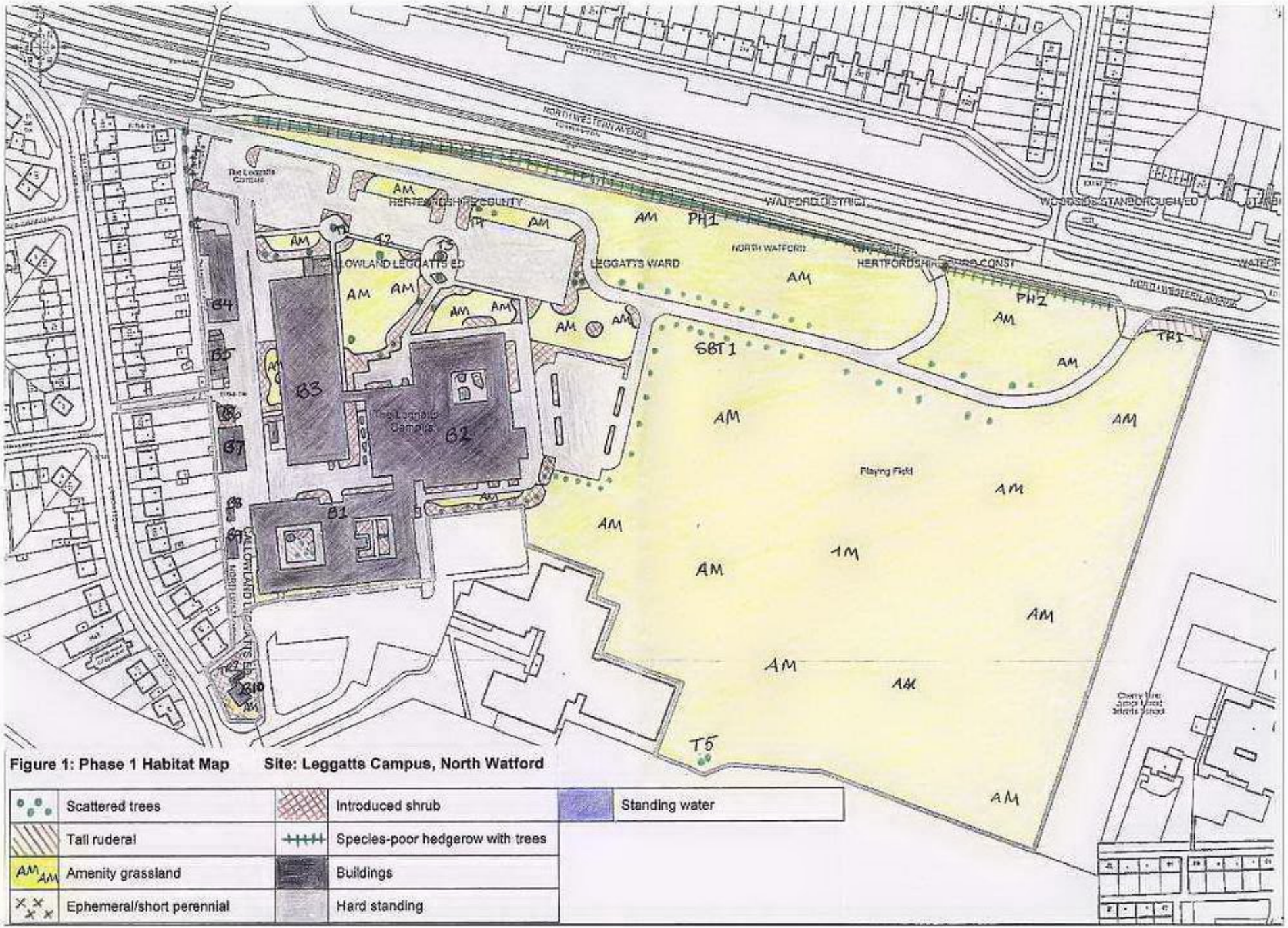


Figure 1: Phase 1 Habitat Map **Site: Leggatts Campus, North Watford**

	Scattered trees		Introduced shrub		Standing water
	Tall ruderal		Species-poor hedgerow with trees		
AM AM	Amenity grassland		Buildings		
	Ephemeral/short perennial		Hard standing		