KIDDERPORE AVENUE

Biodiversity Report

The Ecology Consultancy

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The Ecology Consultancy

Kidderpore Avenue, Hampstead / Biodiversity Strategy / **Report for Barratt Homes**

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Biodiversity Strategy

Report for Barratt Homes

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1 Introduction

SCOPE

1.1 This report outlines the Biodiversity Strategy for the site at Kidderpore Avenue.

1.2 This strategy should be read alongside the following ecological survey reports and drawings completed for the 2013 planning application, which are:

- The Ecology Consultancy, 2012, Bat Survey Report.
- The Ecology Consultancy, 2011, Building Inspection (Bats) Survey Report.
- The Ecology Consultancy, 2011, Phase 1 Habitat Survey Report.
- The Landscape Partnership, 2012, Arboricultural Implications Assessment and Arboricultural Method Statement, Drawing Number 602_TS02.
- Neil Tulley Associates, 2012, Kidderpore Avenue Landscape Proposal - Softworks Layout, Drawing Number D0159_005_B.
- Allies and Morrison, 2012, Kidderpore Avenue – Proposed Roof Plan, Drawing Number 809_02_012 Rev P1.

1.3 The findings of the ecology surveys and reports have identified the ecological features within the site which may be impacted as a result of the proposed development. Briefly, these are roosting bats, foraging bats, breeding birds and the habitats that support these species groups.

1.4 The strategy presented here therefore includes measures by which these impacts would be mitigated. In addition to this, opportunities for the biodiversity value of the site to be enhanced through landscape proposals and design are also identified. The strategy specifically addresses these points: retention and protection of a bat roost, preservation and enhancement of bat foraging and commuting habitat, enhancement of breeding bird habitat, as well as a range of landscaping proposals, including green roofs, green walls and sustainable horticulture.

SITE CONTEXT AND STATUS

1.5 The site is located between Kidderpore Avenue and the A41 Finchley Road in the London Borough of Camden. The surrounding landscape is residential with King's College London (KCL) Campus located on the northern side of Kidderpore Avenue. The National Grid Reference for the site is TQ 252 858.

1.6 Extensive woodland and grassland habitat are located 730m north-east of the site and include West Heath, Bishops Wood (Ancient Semi-Natural Woodland) and Hampstead Heath (which includes Hampstead Heath Wood Site of Special Scientific Interest), all of which would provide suitable foraging and commuting habitats for bats (see site plan in Appendix 1).

1.7 To the south-east of the site is Westfield Open Space and north of the site is King's College Hampstead Campus Site of Importance for Nature Conservation (SINC) - Borough Grade II. Both sites comprise scattered trees and amenity grassland, which would also provide suitable foraging and commuting habitats for bats.

1.8 The development site is connected to Westfield Open Space and Hampstead Heath through a series of residential gardens, which offer suitable treelines for bats to utilise as commuting routes. This habitat connectivity may increase the possibility of bats finding and using suitable roosting features within the site.

1.9 The site itself consists of a number of different buildings in varying states of condition and occupation. The entire site once comprised the King's College Hampstead Campus South Site, however only the north-west of the site, comprising 2–6 Platt's Lane and 27–29 Kidderpore Avenue, remain under the ownership and use by KCL as student accommodation (Phase 2). The south-east portion of the site, comprising 328–338 Finchley Road, 17a–25 Kidderpore Avenue and the Caroline Skeel Library, is under the ownership of BWL (Phase 1).

1.10 No statutory or non-statutory designations apply to the site. The nearest statutory site is Westbere Copse Local Nature Reserve, located approximately 907m to the south-west. It is a small reserve (approximately 0.38 hectares (ha) comprising meadow, woodland and a pond. Hampstead Cemetery SINC also lies approximately 100m south-west of the site.

DEVELOPMENT PROPOSALS

1.11 Proposals include the demolition of Nos. 328 & 330, 332 & 334, 336 & 338 Finchley Road, 2-6 Platt's Lane and 27-29 Kidderpore Avenue to provide new residential blocks and the residential conversion of 17a, 19, 21, 23 and 25 Kidderpore Avenue and former Caroline Skeel Library to provide a total of 128 residential dwellings including affordable housing, basement car parking, landscaped communal and private gardens, public realm improvements including a new pedestrian street and

provision of new purpose built D1 floorspace to house the relocated Hampstead School of Art.

2 Ecological Features

ROOSTING BATS

2.1 Number 25 Kidderpore Avenue has been confirmed to be a roost for common pipistrelle bats.

2.2 Three common pipistrelle *Pipistrellus pipistrellus* bats were recorded using this roost. Two access / egress points were identified under tiles on the double bay window on the east elevation of the property. The roost is likely to be a summer roost for small numbers of common pipistrelle bats. The roosting features would be retained within the proposed development.

FORAGING BATS

2.3 Four species of bats were recorded during the surveys at Kidderpore Avenue, common pipistrelle, soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula* and serotine *Eptesicus serotinus*. Common pipistrelle was the commonest species during all surveys, with soprano pipistrelles also frequently present.

2.4 Two key foraging/commuting habitat used consistently by bats were identified.

- The main foraging / commuting route was from the south-east of the site, progressing along the scattered semi-mature and mature broadleaved trees, scrub and introduced shrubs between buildings 17, 19-21, 23 and 25 Kidderpore Avenue (south side) and the Caroline Skeel Library (north side), and continuing northwards between buildings 19-21, 23 and 25 Kidderpore Avenue. This route was consistently used (over 13 survey visits) by (absolutely) high numbers of pipistrelle bats, including common and soprano pipistrelles, and a single serotine bat. This foraging/commuting route connects to Westfield Gardens, which is a protected area of Open Space as designated on the London Borough of Camden Proposals Map, 2010.
- The second foraging / commuting route was identified to the north of Kidderpore Avenue. This route was often used by (absolutely) high numbers of pipistrelle bats, including common and soprano pipistrelle bats. This foraging/commuting route connects to King's College Hampstead Campus SINC.

2.5 These foraging / commuting routes are of local value to bat species.

BREEDING BIRDS

2.6 The site contains broadleaved semi-natural woodland, scattered semi-mature trees, scrub and buildings of high potential to support nesting birds.

BIODIVERSITY ACTION PLANS (BAPs)

2.7 Biodiversity Action Plans are produced at a national, regional and local level. They describe those biological resources present at a defined scale and include a framework to conserve and enhance these resources through action plans. Habitats and species that will be potentially promoted as part of the scheme include the following (Table 1):

Table 1: Relevant Biodiversity Action Plans

Species Action Plan	UK BAP	London BAP	Camden BAP
House sparrow	●	●	
Dunnock	●		
Starling	●		
Song thrush	●		
Black redstart		●	
Bats	●[1]	●[2]	●[3]
Stag beetle	●	●	
Hedgehog	●		
Habitat Action Plan	**UK BAP**	**London BAP**	**Camden BAP**
Parks and Urban Green Spaces		●	●
Private Gardens		●	●
Open Mosaic Habitats / Wasteland / Brownfield Sites	●	●	
Built Structures / Built Environment		●	●
Woodlands, Hedgerows and Trees	●		●
Waterways and Wetlands			●

LOCAL PLANNING POLICY

[1] Barbastelle bat *Barbastella barbastellus*, Bechstein's bat *Myotis bechsteinii*, noctule bat *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus* and greater and lesser horseshoe bats *Rhinolophus ferrumequinum* and *R. hipposideros*.
[2] All bat species.
[3] All bat species.

2.8 Camden's Planning Guidance: Sustainability CPG3 states that "*Biodiversity is integral to the planning process and we will expect it to be fully incorporated into the design and construction stages. In principle, all development activity should have minimal impacts on biodiversity and enhance it wherever possible*".

2.9 CPG3 sets out appropriate measures for biodiversity to be considered at the design stage. This requires planning proposals for all sites to demonstrate:

- how biodiversity considerations have been incorporated into the development;
- if any mitigation measures will be included, and;
- what positive measures for enhancing biodiversity are planned.

2.10 The guidance also identified that "*It is also important to conserve and improve land outside designated areas as these areas support biodiversity networks through connecting, stepping stone and buffering qualities. Opportunities to improve biodiversity must be considered in all developments*".

2.11 The process by which planning proposals demonstrate that these aspects are considered is by following a 'five-point approach' to planning decisions for biodiversity. These points are based on the five following principles – information, avoidance, mitigation, compensation and new benefits (based on Royal Town Planning Institute Good Practice Guide - 'Planning for Biodiversity'):

1. Information – We will require appropriate information at the outset on habitats and species and the impact of development on them;
2. Avoidance – Developments should avoid adverse effects to wildlife and habitats as far as reasonably possible;
3. Mitigation - Where avoidance is not possible, biodiversity impacts should be reduced as far as reasonably possible. We may use conditions or planning obligations/agreements to achieve this;
4. Compensation - Appropriate replacement and compensation will be required, where, exceptionally development that is harmful to biodiversity is permitted, and;
5. New benefits - In all cases, opportunities should be taken to enhance on-site biodiversity, or within the locality or borough, to provide new benefits for wildlife, for example, by habitat creation or enhancement.

2.12 For the proposed development at Kidderpore Avenue, these five points are met by the provision of the ecological survey reports (information), the retention of ecological features, such as the bat roost within 25 Kidderpore Avenue and green corridors through the site (avoidance), minimising impacts such as lighting habitats and carrying out works to the bat roost under European Protected Species Mitigation licence , replacement planting where habitat is lost (compensation) and offering additional biodiversity value, such as landscape planting of known wildlife value, green roofs, green walls, rain gardens (new benefits). The new benefits are explained in more detail in Section 3.

3 Design Opportunities for Biodiversity

DESIGN APPROACHES FOR LANDSCAPE PLANTING

3.1 The proposed scheme will result in the provision of 3140m^2 of private amenity space, 1436m^2 shared soft surface/garden and 2008m^2 of shared hard surface/paths/roads.

3.2 Native and non-native planting will be used in landscaping to both compensate for any loss of habitat and to provide enhancements for wildlife. The following guidelines will be followed:

- Native tree and shrub species will be typical of the local landscape and published plant species lists;
- British native stock will be used for tree, shrub and hedgerow planting following best practice guidance and lists of reputable suppliers as listed by Flora Locale;
- The use of invasive species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) as part of landscape planting will be avoided;
- Planting will be positioned so as to enhance existing green corridors in particular in the north-east corner of the site;
- Non-native species will comprise a high percentage of species of known wildlife value; and
- Double flowering forms of both native and non-native species, such as the 'Flore Pleno' forms, will be avoided.

TREES & HEDGEROWS

3.3 Thirty trees/tree groups will be retained as part of development proposals. The twenty-three trees to be removed include twelve different species. Of these, eight species are non-native and four species are native.

3.4 Tree planting will take place across the site and include eight species. It will include more than 50 individual trees comprised of eight different native species. Of these, two species are non-native (but with one being of known wildlife value) and six species are native. This will also include some species with broad canopies to maximise ecosystem services such as the reduction of urban heat island effects (UHIE).

3.5 Formal native hedgerows will be planted in around the edges of private gardens and will comprise hornbeam *Carpinus betulus* and box *Buxus* sp.

WOODLAND EDGE PLANTING

3.6 A dense woodland understorey will be planted in the southern corner of the site and will comprise eight different native species. Due to its location and nature it will provide a relatively undisturbed area of habitat for wildlife such as foraging and nesting birds. It also is connected to and extends key bat foraging/commuting habitat present on-site.

3.7 Woodland shrubs will be planted around the edges of the central courtyard area to provide increased structure and species diversity. Eight different species will be used including five native and three non-native but of known wildlife value.

3.8 Alongside the woodland shrubs there will be bands of woodland glade planting to create a graded woodland edge. This will comprise 25 species herbaceous perennials and bulbs, 60% of which (No.15) are native and/or of known wildlife value.

GRASSLAND

3.9 Amenity grassland is proposed through the middle section of the central courtyard area.

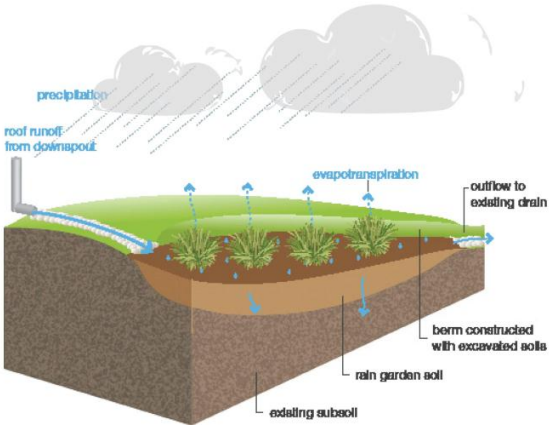
OTHER LANDSCAPE PLANTING

3.10 Other than woodland edge, hedgerow and tree planting the scheme will provide a variety of other landscape/habitat types, including shrubs, herbaceous perennials, grasses and native ferns. Approximately 50 additional species will be used. Of these over 50% are of known wildlife value providing foraging (nectar/pollen/fruit), cover and nesting habitat for widespread species of invertebrates and birds.

RAIN GARDENS

3.11 Five rain garden planting schemes will incorporated at a number of locations. They will be designed to intercept water running off roofs (via drain pipes) and hard surfaces to reduce both the rate and volume of water discharging into the drainage system. They will be planted with thirteen species suitable for rain garden conditions and which provide both amenity and wildlife value. Of these, eleven species are native and/or non-native but of known wildlife value.

Rain garden providing storm water/SuDS feature and amenity/visual value
(Photo: The Green Roof Consultancy)



Cross section of typical domestic rain garden
(Photo: http://www.raingardens.info)

GREEN ROOFS

3.12 A series of green roofs are proposed across ten separate flat roof areas on Blocks F, G, H, J and K. These will comprise green roofs designed specifically for their ecological value i.e. 'biodiverse green roofs', as pioneered by the Green Roof Consultancy. A green roof masterplan for the site, including green roof specifications, will be provided at the detailed design stage.

3.13 Biodiverse green roofs will provide foraging for invertebrates and birds such as the black redstart as well as conditions analogous to the BAP habitat of 'Open Mosaic Habitat'. Such green roofs are typified by substrates of varying type and depth, include dead wood habitat and open areas of vegetation, are low maintenance and are attractive to people as well as wildlife. They also provide opportunities for natural colonisation by plants and invertebrates. Such roofs are preferable to standard stonecrop *Sedum* spp. roofs which deliver fewer biodiversity services as they are typically less species-rich and have a shallower substrate depth[4].

GREEN WALLS

3.14 Small scale green walls comprising climbing plants and wall trained shrubs will be installed. These will contribute to both London's Built Structures BAP and help to connect green space as part of the schemes green infrastructure routes.

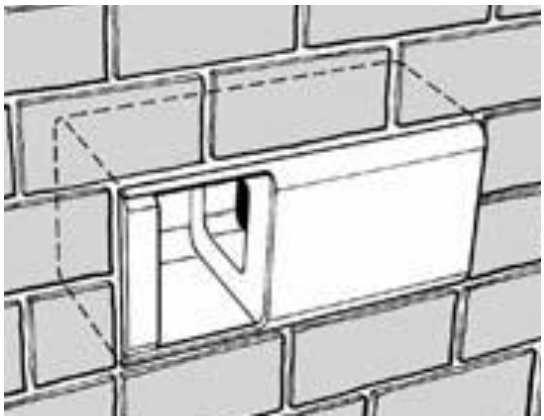
[4] Please note that the UK's *Green Roof Code of Best Practice* (GRO, 2011) advocates a minimum depth of 80mm for extensive green roofs. A biodiverse green roof required 80-150mm substrate depth.

3.15 Green walls are proposed in bespoke planters in rear gardens and comprise eight different species, all of which are native or of known wildlife value.

BIRDS

3.16 A range of artificial bird nesting boxes will be provided across the site. A detailed bird box specification will be provided at the detailed design stage. It is recommended that a minimum of twenty boxes are provided.

Example of a sparrow terrace designed to be fitted to the wall of a building
(Photo: Schwegler Catalogue No.68).



Example of a swift box designed to be built into a wall so that it is flush with the building
(Photo: Schwegler Catalogue No.68).

3.17 Boxes should include a combination of models suitable for colonial, semi-colonial and territorial species, positioned in suitable locations on buildings as well as in vegetation. This will provide nesting habitat for widespread species of garden bird as well as rare/declining urban species such as black redstart, house sparrow and swift. The following guidelines should be followed:

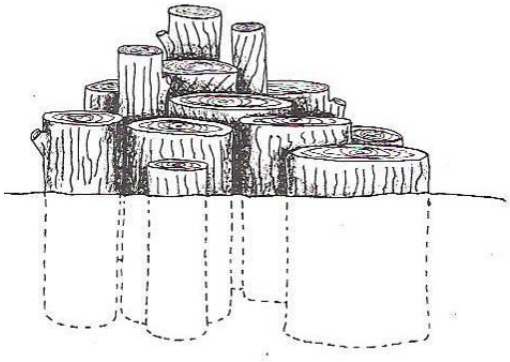
- With exception to orientating the box due south, the direction that it faces makes little difference provided that it is sheltered from prevailing wind, rain and strong sunlight. The sector from north through east to south-east is possibly the most favourable.
- Boxes should not be positioned on the wet side of a tree trunk where the rain water flows down heavily. It is usually possible to see where the rain water runs down the trunk from the growth of green algae.
- Small boxes should be angled forwards to give additional shelter to the entrance. Larger open boxes should be mounted tilted slightly upwards so that the nest rests naturally in the rearmost part of the box.

- For many common songbird species the height of the box is not important and may range from 1m upwards.
- It is preferable to site nest boxes in locations that are accessible for maintenance, away from bird feeders, a discrete distance away from other nest boxes (unless targeting a colonial species) and so that they provide some protection from predators and vandalism.
- Standard hole and open fronted boxes can be attached at varying heights using either standard hanging devises or bespoke attachments to suitable structures.

3.18 On-site buildings should include specially designed features within their structure, for example to attract house sparrows (a UK BAP species) or swift. House sparrow boxes are usually erected on buildings in locations such as under eaves. Swift boxes are located in similar open locations on building facades, but require an uninterrupted drop of at least 3-5m below them. Areas on or adjacent to green roofs, including roof plant/structures should also receive nesting boxes.

ADDITIONAL INVERTEBRATE HABITAT

3.19 The proposed landscape planting and biodiverse green roofs will provide a well-structured scheme comprising native and non-native species of known wildlife value. In addition to this foraging and nesting five dead wood habitat (log-piles) will be provided in discrete locations such as the woodland edge; ideally the log pile should include some partially buried timbers to improve their suitability for stag beetles. It is also recommended that a series of deadwood habitat piles are added to each biodiverse green roof.



Log stack sunk into the ground to provide rotting wood of value to stag beetle. (Photo: Ben Kimpton, The Ecology Consultancy)

Log pile in discrete location under shrub planting (Photo: Ben Kimpton, The Ecology Consultancy)

ROOSTING BATS AND ASSOCIATED LICENSING REQUIREMENTS

3.20 Owing to the disturbance arising from the refurbishment of 25 Kidderpore Avenue, and the duration of these works, a European Protected Species Mitigation (EPSM) licence would be required in order to lawfully permit these works to proceed.

3.21 An EPSM licence would include:

- details of interim roosts for bats to use while works are in progress;
- the timing of works;
- the Method Statement that the works would be carried out under (including that these would be supervised by a licensed bat ecologist);
- the materials to be used in any roof works;
- on-going monitoring for an appropriate duration (usually annually for 3 years post-works);
- the maintenance of the roost and the creation of additional roost sites by way of enhancing the site;
- input into lighting schemes to ensure habitats used by foraging / commuting bats are not lit (see below); and,
- planting schemes to support foraging bats (see below).

3.22 Further details regarding EPSM licensing information at this stage can be found in The Bat Survey Report, 2012, The Ecology Consultancy. Planning permission is required before an EPSM licence application can be submitted to Natural England.

3.23 When local authorities or Natural England review information in support of an EPSM licence, they are obliged to assess how the proposals satisfy three derogation tests. These tests are as follows:

- Test 1: The purpose of the actions authorised must be for "preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment"; and,
- Test 2: There must be "no satisfactory alternative" to the actions authorised; and,
- Test 3: The actions authorised "will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range".

3.24 Information to support cases to satisfy these three tests are provided below:

Test 1: The purpose of the action is (in this case) for imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment"

3.25 The overall site once comprised the King's College London Hampstead Campus South Site however only the north-west of the site, comprising 2 – 6 Platt's Lane and 27 – 29 Kidderpore Avenue, remain under the ownership by KCL and in continuing use. The majority of the remainder of the site is un-occupied.

3.26 The Caroline Skeel Library was occupied by KCL Library Book Services until January 2006, with upper floors occasionally used as examination space and summer vacation classroom uses through this period. Since 2006, it has been unoccupied and intermittently subject to squatting.

3.27 Along Kidderpore Avenue (17a, 19-21, 23 and 25) and at 328 – 338 Finchley Road, early twentieth century two-three storey houses remain. However, all have been converted and/or extended to provide student accommodation or administrative uses in association with KCL. They are all currently unoccupied except for numbers 19 and 21 that currently house the Hampstead School of Art.

3.28 House numbers 328–338 Finchley Road were closed as student halls in approximately 2001, whilst those along Kidderpore Avenue were in occupation, at least intermittently, until between 2004 and 2008.

3.29 Much of the site therefore comprises unoccupied buildings which would, in the absence of development, fall into disrepair.

3.30 The proposals involve high quality residential redevelopment of the former KCL campus, regenerating the site and bringing vacant buildings back into active use.

3.31 The scheme proposes 128 apartments, including affordable housing, across a range of unit sizes. The proposed new residential units will make an important contribution to Camden's supply of housing on an underused, and partially vacant, site.

3.32 It also proposes a dedicated community facility of approximately 400m^2 (GEA) within a new a pavilion building in the centre of the site.

3.33 The proposed development incorporates a total of approximately 6,500m^2 private and communal amenity space across the site, including soft-landscape gardens and hard landscape areas and paths.

3.34 Over 1000m^2 of dedicated communal open space is provided in the centre of the site, including informal playspace for children. The existing pedestrian route from Finchley Road to Kidderpore Avenue would be opened up and enhanced.

3.35 The proposed design has sought to respond to the surrounding environment, in particular the heritage significance of the Reddington and Frognal Conservation Area.

3.36 Properties along Kidderpore Avenue, identified as contributing positively to the Conservation Area, are proposed to be retained and sensitively refurbished. Impact upon the external fabric is minimised.

3.37 The proposals would therefore develop an otherwise unused site and provide a range of housing, including affordable housing and contribute to local authority targets, as well as enhancing the landscape for amenity and conservation value

Test 2: There must be "no satisfactory alternative" to the actions authorised

3.38 The requirement to determine that there is no 'satisfactory alternative' relates to the impact on the bat roost. In the case of this development, the roost will be retained. The licence is required to enable otherwise unlawful disturbance to roosting bats over the duration of the works and to ensure that the roost would be monitored and maintained.

3.39 The works are too extensive to be contained within periods when bats are unlikely to be present (April and/or September-October) and therefore some disturbance to roosting bats is likely. This impact would be minimised by timing works where possible, as closely to these preferred periods as possible. Works would be supervised and carried out in accordance to the Method Statement in the licence to negate the risk of bats being killed or injured during works.

3.40 The alternative to renovating this building would be demolishing the building or to allow the building to fall into disrepair. Both of these options would result in the loss of the roost. The works proposed, and the resulting (albeit minimised) disturbance to the roost, therefore constitute the optimal choice for the bat roost.

Test 3: The actions authorised "will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range".

3.41 The works that would impact the bat roost would be carried out under a Method Statement and supervised by a licensed bat ecologist to ensure that bats would not be killed or injured as a result of the proposals. Interim roosts for bats to be moved to during this process would be provided, and would remain as permanent enhancement measures post works.

3.42 The retained and created roosts would be monitored in line with the licence documents, usually for a minimum of two years, with measures taken where necessary to increase likelihood of their success.

3.43 Landscaping for the proposed development has taken into account the foraging habitat used by bats (see below) and has ensured that these habitats would be retained and enhanced through appropriate planting, which would both encourage greater invertebrate diversity (offering a rich food resource for bats) and would strengthen the habitat connectivity through the site to the landscape beyond (improving links to commuting corridors used by bats).

3.44 Lighting, which can deter some bat species, will also be designed with input from an ecologist to ensure that foraging and roosting habitat is not excessively lit.

3.45 These elements in combination would very effectively ensure that the favourable conservation status of the bat species would be maintained as a result of the proposed development. Further, the proposed development would ensure that existing roosts are not lost and that existing habitat is enhanced for the bat species present.

NEW ROOSTING FEATURES FOR BATS

3.46 Further roosting features can comprise bat boxes (although emerging research suggests that boxes on buildings are seldom effective, Bat Conservation Trust, *pers. comm.*). Roosting features are therefore preferably incorporated into building design. This can be simply achieved by including hanging tiles, weather boarding, fascia boards, barge boards and soffit boxes within building design and providing access points for bats.

3.47 Roosting features could additionally be fitted with a motion-sensor night-filming camera. If appropriately located, this could capture bat activity inside a roost. Cameras could be fitted inside the known, existing roost where practicable or inside a newly created roost. The resulting footage could be made available as a community resource, and may be of particular interest for local schools. This would enable the relevant roosting features to be remotely monitored and may enable post-works monitoring effort to be reduced as a consequence.

FORAGING BATS / GREEN CORRIDORS

3.48 In the current landscape proposals by Neil Tulley Associates Softworks (Drawing Number D0159_005), the two key foraging / commuting routes used by bats would be strengthened, with additional trees and landscape planting positioned along these routes.

3.49 As well as improving the habitat connectivity across the site to the landscape beyond, the plant species diversity of the site would be considerably increased through planting at ground and roof level and this is likely to encourage greater invertebrate diversity, thereby augmenting the available food resource for bats within the site.

LIGHTING

3.50 The impacts of lighting on bats will be considered at the detailed design stage. The lighting scheme will be designed in co-ordination with an ecologist to minimise the impact of lighting on artificial roosts and key commuting/foraging corridors. The following guidelines will be followed:

- Research has found that some bat species are sensitive to artificial lighting and that excessive lighting can delay bats from emerging, thus shortening the time available for foraging, as well as causing bats to move away from suitable foraging grounds or roost sites (Jones, 2000).
- Lighting that is required for security or safety reasons should use a lamp of no greater than 2000 lumes (150 Watts) (BCT, 2008) and should comprise sensor activated low UV lamps (Jones, 2000; BCT, 2008).
- Lighting should be directed to where it is needed with minimal 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 or hood that directs the light below the horizontal plane (Jones, 2000; BCT, 2008).

- Artificial lighting should not directly illuminate any bat roosting features that are included within the proposed development.

SUSTAINABLE HORTICULTURE

3.51 In addition to the above enhancements, it also recommended that sustainable horticultural practices are employed in any landscaped areas including:

- The use of peat-free composts, mulches and soil conditioners. In this way off-site ecological impacts (for example, the loss of important peat bogs) are minimised.
- Minimising the use of pesticides (herbicides, insecticides, fungicides and slug pellets etc.) to prevent cumulative effects to animals via the food chain. Any pesticides used should be non-residual.
- Feeding of plants using organic based fertilisers and improving the soil structure by incorporating organic material, preferably composted waste.

4 References

Bat Conservation Trust (2008). *Bats and lighting in the UK – Bats and the built environment series*. http://www.bats.org.uk/publications_download.php/243/BATSANDLIGHTINGINTHEUKJan08.pdf

Jones, J (2000). *Impact of Lighting on Bats*. Bat Conservation Trust, London.

Appendix 1: Site Plan

Plan 1: Aerial Photo of the Site and the Surrounding Area