MANCHESTER SCHOOLS FRAMEWORK

KING DAVID'S SCHOOL CAMPUS
CRUMPSALL, MANCHESTER

PLANNING
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ECOLOGICAL ASSESSMENT

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for

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1.0 INTRODUCTION

1.1 TEP was commissioned by Laing O'Rouke to undertake an ecological and arboricultural assessment of the buildings and grounds at King David Schools, Crumpsall, Manchester. The National Grid Reference is SD838022.

1.2 The following preliminary surveys were carried out and are described in this report:

- Desktop survey;
- Preliminary walkover survey;
- Bat assessment;
- Extended Phase 1 Habitat survey (including assessment for species of conservation concern).
- Arboricultural Survey to BS5837 (2005): Trees in Relation to Development

1.3 To identify potential ecological impacts of development proposals, the ecological planning and legislative context affecting the site is assessed in terms of the following:

- Protected sites (statutory and non-statutory);
- Species of conservation concern, including:
  - Statutorily protected species;
  - UK Biodiversity Action Plan (UKBAP) priority species; and
  - Species and habitats of local concern.
- Locally adopted wildlife strategies and natural area targets.

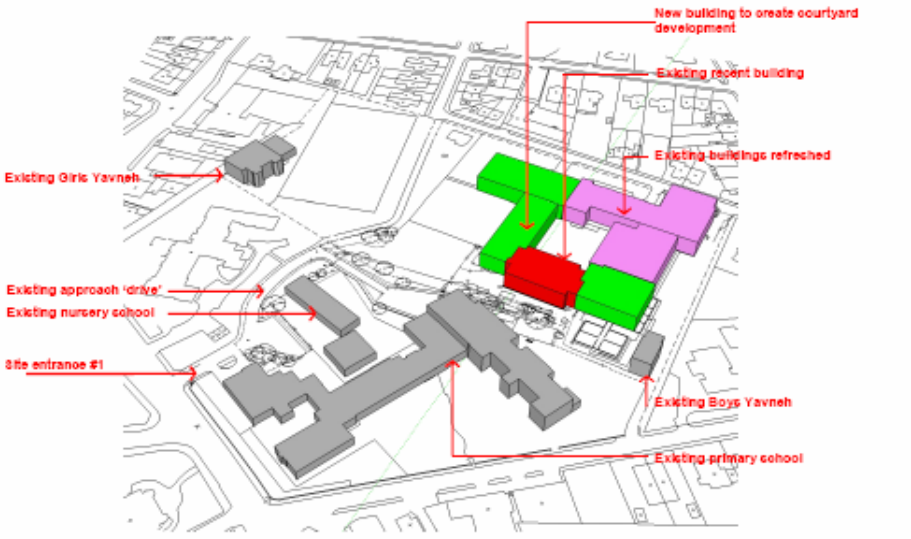
1.4 A description of the planning and legislative context of the considerations listed above is presented at Appendix A.

1.5 This report helps to:

- outline potential implications for development;
- inform recommendations for enhancing and conserving biodiversity.

1.6 The ecological survey covered the whole campus but the arboricultural survey covered only the northern part of the site where the first wave of redevelopment is to take place.

ManchesterSchoolsFramework Indicative Location Plans and Proposed Development Mix
Wave 1 King David's High



2.0 SITE DESCRIPTION

2.1 This school is in an old-established residential area north of Manchester City centre and houses several school buildings on a compact and crowded site. The school grounds are separated into two separate parts by a public footpath that provides a pedestrian link from Bury Old Road north to Eaton Road.

2.2 The site is bounded, on the south-west, by the A665 Bury Old Road, one of the major roads out of Manchester towards the north-west. The south-eastern edge is defined by Seymour Road and to the north is Eaton Road.

2.3 This area of Crumpsall was developed as a residential suburb over 100 years ago. Considering the density of the school development, including a nursery school, primary school and high school, a surprisingly high number of the Victorian era tree plantings remain, giving a mature aspect to parts of the site. The presence of large mature trees goes some way towards mitigating the deadening effect of the necessarily large areas of ground taken up by provision of buildings and outdoor paved areas for recreation, access and car parking.

2.4 After the large areas of hard surfacing and footprints of buildings, the next largest area of the site is taken up by regularly managed short grass sward. This vegetation has very limited species and structural diversity, further heightening the importance of the collection of mature trees for wildlife potentially using this school site.

3.0 METHODS

Desktop survey

3.1 Data for protected sites and species were requested from the Greater Manchester Ecology Unit (GMEU) and the South Lancashire Bat Group.

3.2 A desk based search was also undertaken utilising the following sources:

- Magicmap (Multi-Agency Geographic Information for the Countryside)
- UK Biodiversity Action Plan
- Greater Manchester Biodiversity Action Plan
- English Nature
- Nature on the map
- Planning Policy Statement 9 and ODPM circular 06/2005
- The Manchester Plan (adopted 21st July 1995)
- Aerial photograph (Google Earth)

Walkover survey

3.3 The site was walked by experienced ecologist Dr Rachel Hayward CEnv MIEEM during the daytime on the 2nd May 2006. The exteriors of the buildings were viewed, with the aid of binoculars where necessary.

Bat assessment

3.4 During the daytime walkover, an assessment of the trees and external elevations of the buildings was undertaken. Trees and building elevations were viewed from the ground, using binoculars where appropriate.

3.5 A site inspection was carried out by licensed bat ecologist Mike Freeman AIEEM, in June 2006. Most of the buildings in the north part of the site were felt to be unsuitable for bat roosting due to the lack of suitable architectural features. However, the Girls School building (in the north-east) was accessed as it had a pitched roof and thus some potential to support roosting.

3.6 Appendix B explains the basic principles of British bat ecology and describes the features of trees and buildings that provide roosting opportunities for bats.

Bird survey

3.7 All birds seen or heard on site were recorded during the May visit in 2006.

Amphibian survey

3.8 The two ponds on the site are concrete lined and largely filled with leaf litter. They were thoroughly searched by Dr Hayward during the 2nd May walkover and due to their characteristics and lack of open water, were felt to have no possible role as great crested newt habitat. Thus no further amphibian surveys were carried out.

Phase 1 Habitat survey

3.9 A field survey following Phase 1 methods (JNCC 2003) was carried out by an experienced ecologist, Peter Gateley CEnv MIEEM, in June 2006.

3.10 The school grounds were surveyed and their vegetation communities mapped. Target notes were also recorded to highlight features of greater ecological significance within the site. Details of target notes and plant species lists are

included as Appendix C. At the same time a search was made for signs of protected species throughout the site.

Japanese knotweed

3.11 The Phase 1 Habitat survey included an inspection for invasive species such as Japanese knotweed. The spread and location of any knotweed stands were recorded, and are shown on the Phase 1 Habitat survey map (D1179.005), to inform a future programme for treatment.

Tree survey

3.12 A tree survey was undertaken by experienced arborists Alistair McGregor and Jenna Higgins in July 2006. Species, height, size and spreads of trees were recorded and tree quality was assessed according to current British Standards BS5837.

4.0 RESULTS

Desktop survey

4.1 No designated sites are identified within or adjacent to the school grounds. Data provided by GMEU identified Bowker Vale Reservoirs Site of Biological Importance (SBI) and Blackly Forest Local Nature Reserve (LNR) just within 1km of the school, to the north of the railway line. (Appendix C). Redevelopment of the schools will not impact upon these designated sites.

4.2 Records from the South Lancashire Bat Group identified numerous records of bats within a 2km radius. However, no roosts have been recorded on site, with the nearest known roost being of pipistrelle, some 500m away; recorded in 1996.

4.3 No records of great crested newts were revealed within 500m of the school. No records of other protected species were identified within the 1km search area from the school.

Walkover survey and bat assessment

4.4 This complex of schools appears to have been developed across the sites of possibly three very large Victorian villas, walled and planted as mini estates in the developing suburb of Crumpsall.

4.5 Looking at the range of mature trees surviving the intensive development within the site, this area must have formerly been quite heavily planted. Particularly large beech trees are found around the middle of the site, straddling the boundary between the high school and the primary school.

4.6 Although there are three schools on site the largest area is taken up by the high school, in the north-east and north-west. In the south-east the second largest space is occupied by the primary school, with the more-recently established nursery immediately to its west. As well as the complexity resulting in fitting in all the buildings and hard standing necessary for three schools, the whole site is divided by the route of a public footpath that runs from Bury Old Road, north to Eaton Road. Within the intensively developed site it is surprising how much grassland and tree planting remains; however, by far the largest area of land is taken up by flat grey tar-paving for play grounds, sports provision, car parking and access routes.

Trees

4.7 Some of the trees within the school grounds are large enough to have potential to support roosting bats and possess suitable roosting features. These trees include T1, T14, T68 and T72 (illustrated on Drawing 1209.KD.001) which all have significant cavities. Further information on the condition of trees is provided in Appendix E.

Buildings

4.8 The daytime assessments of the site in May and June 2006 did not reveal any external evidence of a bat roost on the site and the buildings at the school campus are considered to have extremely limited potential for roosting bats.

4.9 The internal inspection of the Girls School building, carried out in June 2006 found the building to have an unlined roof void with no evidence of bats. No other buildings possessed features suitable for bats.

Bird survey

4.10 The following bird species were noted within the site during the May 2006 survey visit:

- Blackbird
- Blue tit
- Magpie
- Mistle thrush
- Dunnock
- Robin
- House sparrow
- Greenfinch
- Black headed-gull

4.11 None of the birds recorded on during the field survey are statutorily protected under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended). All are widespread in the Greater Manchester area and are generally common within an urban or semi-urban setting.

4.12 The house sparrow is on the red list for birds of conservation concern due to their rapidly declining populations in recent years. This species was observed primarily along the boundary with Eaton Road.

4.13 Only one nest was observed within the site. This was a corvid nest, suspected to be a magpie nest, located in a tree adjacent to the boundary with Bury Old Road.

Phase 1 Habitat survey

4.14 The Phase 1 Habitat survey is illustrated at Drawing D1179.005. Target notes are presented at Appendix D.

4.15 The following habitat types are present on site, brief descriptions of the key species and their relative importance are set out below:

- Broad-leaved plantation
- Continuous scrub
- Scattered broad-leaved trees
- Scattered conifers
- Standing water
- Amenity grassland
- Introduced scrub
- Species-poor hedge
- Buildings

Broad-leaved plantation

4.16 There are two areas within the school grounds where the planted tree canopies have coalesced to form blocks of plantation. In the western part of the site there is a planting of even-edged sycamore and lime that casts a dense shade over the sparse grassland below. Along the eastern boundary there is a younger and much more mixed area of planting that is more natural in appearance and is described in target note 1.

Continuous scrub

4.17 This is very rare in this intensively developed site. The only area where a bramble patch was noted to be developing is south of the hedge to the caretakers house on Eaton Road. Some bramble is also regenerating within target note 1 area.

Scattered broad-leaved trees

4.18 Some of the trees on site are large and mature, appearing to have been planted when this area of Crumpsall was developed for residential use over 100 years ago. In the south there are some particularly large specimens of beech, but there are also large sycamore, turkey oak and lime. There are also younger trees, including the trio of tall balsam poplar, half way along the public footpath that splits the site, and newer plantings along the southern and eastern edges.

Scattered conifers

4.19 Large specimens of larch and Scot's pine are among the collection of mature trees scattered mainly in the southern and western parts of the site. There are also newer plantings of conifers against the walls of the primary school in the south of the site.

Standing water

4.20 Despite the density of the built and paved environment in this site there are two small but artificial ponds present. Near the primary school main entrance there is a small pool set in a fenced garden area and surrounded by exotic ornamental species. The pond is completely covered in duckweed. In the east, east of the main high school building, there is a rectangular concrete lined pool within the plantation area of target note 1, which is completely filled with leaf litter.

Amenity grassland

4.21 Because of the need to provide structures for three schools, along with playgrounds, paths, car-parking etc, areas of amenity grassland are reduced to a series of patches and strips scattered throughout the site, mainly along internal and external boundaries. The sward is generally low and well maintained and typically species-poor. Many of the grassy patches show signs of wear along their edges and there are areas of bare ground, particularly under the shade of mature beech, and other trees. In some places, such as around the tall balsam poplars, populations of annual ruderals are developing in sparser areas.

Introduced scrub

4.22 There are plantings of exotic ornamental species around the main Eaton Road frontage to the high school, also to the entrance of the primary school. The main areas are in the south-western part of the site, associated with the southern entrance (off Bury Old Road) and around the nursery school. These hold quite a wide range of exotic species, but some plantings are now mature and may provide foraging and nesting habitat for wildlife.

Species-poor hedge

4.23 Along the Bury Old Road frontage, the amenity grassland (raised on a retaining wall along the pavement line) has a long and low privet hedge running through it, parallel to the road and turning the corner into Seymour Road. There is a shorter section of hedge south of the school-keeper's house on Eaton Road.

Buildings

4.24 Buildings are generally modern in structure, generally one or two storeys high with flat roofs. A high proportion of the brick structures possess prefabricated sections or are partly rendered. The campus also contains several prefabricated units. The large range of buildings has been assessed for bird nesting and bat roosting potential.

Japanese knotweed

4.25 There is an area of Japanese knotweed (*Fallopia japonica*) in the north-west corner of the site. This is spreading inwards from neighbouring vacant land to the west.

Tree survey

4.26 Only the northern part of the site was surveyed, as the southern part is not subject to any proposals during the first phase of development. A total of 79 individual trees and 3 groups of trees were identified within and adjacent to the school during the tree survey.

4.27 The full results of the tree survey are presented in Appendix E. This includes a tree survey plan D1209.KD.001 and survey schedules listing the relative importance of each tree, together with tree management recommendations.

5.0 CONCLUSIONS AND IMPLICATIONS

5.1 King David's School Campus has very few areas of natural or wildlife-friendly habitat. The grounds consist of buildings, hardstanding and amenity grassland. However, there are several mature trees which are of planted origin. Although most are not locally native, their maturity and size gives them visual amenity value and will provide opportunities for bird nesting and possible bat roosting.

Designated and protected sites

5.2 There are no protected sites within or adjacent to the schools and the redevelopment proposals will thus have no detrimental effect on designated biodiversity areas.

Amphibians

5.3 No records for great crested newts were identified within 500m of the site. The two small artificial ponds within the site were not considered to provide suitable great crested newt habitat, nor were they located within terrestrial habitats conducive the maintenance of a great crested newt population. No evidence of amphibians was identified in the ponds or across the site.

Bats

5.4 No evidence of bat roosting was observed during daytime survey of the site.

5.5 The mature trees on site will encourage foraging and commuting by bats based in surrounding residential property and some possess features that will provide potential to support roosting bats (e.g. trees T1, T14, T68 and T72 illustrated on Drawing 1209.KD.001).

5.6 The main school buildings have very limited potential to support roosting bats. The potential is limited to some individual features such as weatherboards or roof tiles that are considered to be suitable bat roost features for bat species such as the common pipistrelle (*Pipistrellus pipistrellus)*.

Birds

5.7 The trees and hedgerows on site provide nesting and foraging opportunities for local bird populations. Species of note observed within the site include the house sparrow, which is a nationally declining species.

5.8 Virtually all UK wild birds are protected at the nest under the *Wildlife and Countryside Act 1981 as amended*, which makes it an offence (in addition to possession, control and sale offences) to kill, injure or take any wild bird; take, damage or destroy the nest of any wild bird while it is in use or being built; and take or destroy the egg of any wild bird. Best practice interprets this legislation such that UK wild birds receive protection from the point of constructing a nest to fledging the young birds and vacating the nest. Generally this period is considered to last from March to August inclusive, although there is variation between species and latitude. There is no derogation from this legislation by means of a licence for the purpose of disturbing nesting UK wild birds in the course of a development.

Japanese knotweed

5.9 The Phase 1 habitat survey identified an area with Japanese knotweed (*Fallopia japonica*) stands (Drawing D1179.005). Japanese knotweed is a perennial plant with an extensive system of rhizomes (underground stems). The rhizome

system is particularly invasive and readily reaches depths of 2-3 metres and 7 metres laterally. Regeneration occurs vegetatively from the smallest rhizome fragments (weighing less than 1 gram) in both soil and aquatic environments. Dispersal of rhizome/regenerating material occurs by watercourse translocation and by human activity.

5.10 Japanese knotweed is classed as an invasive weed under the *Wildlife and Countryside Act 1981* (as amended). Any waste containing Japanese knotweed is classed as controlled waste under the *Environmental Protection Act (Duty of Care) Regulations 1991*, which requires all producers, carriers and disposers of waste to follow a code of practise and keep records. Under provisions made within the *Wildlife and Countryside Act 1981*, it is an offence to spread Japanese knotweed. Liability may also extend in situations where a landowner has knowingly permitted the spread of the plant onto neighbouring land. There are therefore implications for development with the regard to Japanese knotweed control and removal.

5.11 Failure to manage and dispose of Japanese knotweed in accordance with current guidelines can lead to prosecution. Due to the persistent and invasive nature of the plant, failure to manage Japanese knotweed on a development site may also result in future structural damage, especially to tarmac surfaces.

6.0 RECOMMENDATIONS

Trees

6.1 A development implications assessment should be undertaken when detailed development proposals are available. Retention and protection measures should then be identified and implemented prior to development commencing. All future tree survey and protection measures should be in accordance with British Standards.

Bats

6.2 The school buildings have limited potential to support roosting bats. No further survey of these buildings is currently recommended.

6.3 However, given the dynamic roosting nature of bats, if redevelopment works involve demolition or refurbishment of any of the buildings on site, generally best practice precautionary measures should be implemented. For example, select features of the buildings should be removed sensitively (ideally by hand) before the main destructive works commence. Such features include weatherboards at the eaves (especially any wooden weatherboards), lead flashing, roof tiles and roof felt. Damaged cladding boards (e.g. lining prefabricated sections) should also be treated with care, if any are discovered during stripping or demolition works.

6.4 In the very unlikely event that a bat is identified during these works, work should cease immediately and the advice of a licensed bat specialist should be sought.

6.5 Tree and hedgerow removal should be avoided wherever possible to maintain existing commuting routes and foraging habitats within and across the site. Other opportunities for enhancing the new school landscape are discussed below. If the mature trees on site require removal or pruning for safety or development purposes, then these should be subject to further inspection for bats prior to felling or surgery. Specific trees identified with high bat roost or bird nest potential include trees T1, T14, T68 and T72, which all possess significant cavities.

Nesting birds

6.6 Any tree felling or surgery works (e.g. removal of dead wood for health and safety reasons) should avoid the bird nesting season (March – August inclusive). If this is not possible, the trees should be reassessed for the presence of nesting birds immediately prior to any tree works commencing.

Japanese knotweed

6.7 The Japanese knotweed in the north-west of the site should be fenced off with high visibility mesh/tape to prevent further disturbance.

6.8 A management plan outlining the programme of control and eradication measures for the Japanese knotweed should be produced prior to works commencing on site.

6.9 The Environment Agency has produced guidelines for the eradication and control of Japanese knotweed and urges all organisations to be vigilant and implement control measures to prevent its spread. The Environment Agency guidelines are given in Appendix F.

Opportunities for enhancement

6.10 Trees to be retained within the new school landscape should, in future, be provided with a 0.5m radius buffer from mowing around the base of the trunk.

6.11 Examples of measures that could be designed into the new school buildings and landscape to enhance the site for wildlife, particularly for birds and bats, are presented at Appendix G.

6.12 This site is compact and there are unlikely to be many areas of land available for naturalistic landscape. However, the extensive roofscape of the new buildings offers a unique opportunity to incorporate "green roof" technology and "green walls" both as an education and as an amenity/wildlife asset. Creating further areas of wildlife-friendly habitat within this intensively developed site would have a beneficial effect on local biodiversity and the benefits of green roofs are recognised by the Building Research Establishment when it comes to assessing the effects of developments and awarding credits towards high scores in the Landuse and Ecology section. There is a wide range of green roof options that could be taken up in this situation, these are discussed further in Appendix H of this report.

BREEAM assessment

6.13 The new school at King David's campus will be assessed under the Building Research Establishment Environmental Assessment Method for Schools. This report may be used to inform the assessment performed for the Landuse and Ecology Section.

6.14 Credits can be awarded for Landuse and Ecology as follows:

- Land reuse – one credit can be awarded where at least 75% of the overall site has been previously built on or used for industrial purposes in the last 50 years. Details of previous land use (maps, reports, site photographs etc) are required to achieve this credit. In addition plans must be assessed to ensure there is no change between the design and as-built building footprint.
- Use of contaminated land – one credit can be awarded where land prior to development is defined as contaminated and where remedial steps have been taken to decontaminate the land. To achieve this credit the design team must provide documentary evidence that the land was contaminated and remedial steps were taken to decontaminate the site.
- Consultation with students and staff – one credit can awarded where the design team consults both students and staff of the school to determine the educational and social needs for the grounds and their ideas for the school grounds design AND where the design team agrees to keep staff and students informed of how there ideas are built into the design. At least two workshops should be implemented during the consultation with the staff and two with students of different ages. A workshop schedule, a framework for each workshop and a summary of key outcomes from the workshops are required to achieve this credit.
- Land of low ecological value – one credit can be awarded where the land has been defined as of low ecological value. This assessment is affected by the presence of ecological features such as trees, watercourses, hedgerows, wetlands etc. In this case, the site is of low ecological value.

- Local wildlife partnerships - one credit can be awarded where the design team set up partnership with a local group(s) with wildlife expertise (e.g. the local Wildlife Trust or local specialist wildlife group such as mammal groups or amphibian groups). The partnership should be established with the aim that the wildlife group will provide advice at the design stage and support and advice for the school to manage the grounds in the long-term. To achieve this credit, the design team must provide details on the partnership (e.g. letter from the wildlife group agreeing objectives and framework) and the wildlife group (location, membership, expertise etc). Confirmation is also required that the partnership has been maintained during the construction phase (site records, correspondence, meeting minutes, reports etc).
- Ecological enhancement – one credit can be awarded where the design team (or client) has sought and acted upon advice on enhancing a site's ecological value provided by an ecological consultant (as defined by BREEAM). To achieve this credit a copy of the ecological report(s) and written commitment that the report recommendations will be implemented is required.
- Change in ecological value – up to five credits can be awarded in this category where the ecological value of the site is not substantially harmed OR is enhanced beyond its previously existing state. The credits are awarded based upon the number of native and wildlife-friendly species present on site prior to development and the number of native species present after development. The full five credits can be only awarded if the change in ecological value is reflected by an increase of greater than nine native or wildlife-friendly plant species from the original number of species. Details on the types and areas of land use present on site prior to development and the types and areas of land use after development are required in order to assess and award these credits. Green roof technologies can be used to contribute to a positive score in this regard.
- Protection of ecological features – one credit can be awarded where the contract specification ensures that all trees over a 100mm trunk diameter, hedges, ponds streams etc are maintained and adequately protected from damage during clearing and construction works. The design team must confirm that no changes occur following the Design and Procurement assessment and the contractor must confirm by site survey pre and post construction and progress photographs that key features were protected during the works.
- Long term impact on biodiversity – one credit can be awarded where steps are taken to prevent adverse impacts on biodiversity as set out in by the BREEAM Schools assessment criteria. Mandatory requirements include written confirmation that all UK and EU legislation relating to the protection and enhancement of ecology is adhered to and a five year working management plan is produced and provided to a school working group comprising staff and students. Additional requirements are also defined for this assessment, depending on the nature of the site.

6.15 Further advice and guidance on the criteria and assessment requirements can be found in the BREEAM for Schools Training Manual © Buildings Research Establishment Ltd Department for education and skills.

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APPENDIX A

Ecological and legislative context

ECOLOGICAL PLANNING AND LEGISLATIVE CONTEXT

A1.0 GENERAL

A1.1 This is a brief summary of the ecological planning and legislative context generally applying to England. It is not a comprehensive view and does not purport to advise in relation to any specific site, species or habitat. Specific advice is provided by TEP in the main body of the report.

A1.2 Sites, species or habitats may be protected or highlighted by six broad categories of instrument:

- Statutory Instruments
- National Planning Policy Guidance
- County, District and Unitary Development Plans
- The UK Biodiversity Action Plan
- Local Biodiversity Action Plans, locally adopted Wildlife Strategies and the Natural Area profile for the area
- Other lists of species of conservation concern

A2.0 STATUTORY INSTRUMENTS

A2.1 Statutory protection is afforded to wildlife sites and to particular species by EU Directives, various international conventions to which the UK is signatory and various Acts and Regulations of Parliament, principally the *Wildlife and Countryside Act, 1981 as amended* **(WCA)**. Other relevant legislation includes the *Conservation (Habitats &c) Regulations, 1995* (usually known as the *Habitats Regulations*). These Regulations translate the EU Habitats Directive into British Law, by requiring particular protection for 'European' species and for 'European' sites of nature conservation value.

Statutory wildlife sites

A2.2 In the UK there are many designations for giving protection to sites of national or international importance. The most commonly-encountered designations are summarised below:

- ***Special Area of Conservation (SAC):*** An area of land or water of international (European) conservation importance as designated by European Member States under the EU Habitats Directive (Directive 92/43/EC). In the UK, all SACs will also be designated as Sites of Special Scientific Interest (SSSI).
- ***Special Protection Area (SPA):*** A site of international (European) conservation importance for birdlife as designated by European Member States under the Birds Directive (Directive 79/409/EC). In the UK, all SPAs will also be designated as SSSIs.
- ***Ramsar site:*** A wetland of recognised international importance designated under the Ramsar Convention 1971. In the UK, all Ramsar sites will also be designated as SSSIs.
- ***National Nature Reserve (NNR):*** A nationally important nature reserve designated by English Nature under the WCA and managed by either English Nature or an approved body. NNRs will usually be designated as SSSIs.

- ***Local Nature Reserve (LNR):*** A nature reserve on public land, established by a Local Authority under s21 of the *National Parks and Access to the Countryside Act, 1949*. LNRs may or may not be Sites of Special Scientific Interest.
- ***Site of Special Scientific Interest (SSSI):*** An area of land or water notified by English Nature under the WCA or the *National Parks and Access to the Countryside Act, 1949* as being of special nature conservation interest for its plant or animal communities, geological or landform features.

Statutorily protected species and their habitats

A2.3 In most cases relevant to planning applications, protected species are those listed in Schedule 1, 5 and 8 of the WCA (as amended), in the *Protection of Badgers Act, 1992* (PBA) and in the *Conservation (Natural Habitats &c) Regulations, 1994*. The extent of legal protection varies between species, and the protocols for development which affects such species also varies.

A2.4 It is particularly important to obtain site-specific advice before formulating an action plan when considering development affecting protected species. The following paragraphs are outlines of legal protection afforded to some of the species most frequently encountered.

A2.5 It must also be remembered that many protected species can range widely, and their presence outside the proposed development must always be considered. Many planning applications have failed because inadequate consideration was given to the terrestrial habitats of amphibians present some distance from the proposed development.

A2.6 **European protected species** include **great crested newts** and native species of British **bat**. The full list of European species is in the Habitats Regulations, 1994. The extent of legal protection covers both the species and its habitat. Any development proposal that would impact on either species or habitat is required to provide for conservation of the species and its habitat under licence from DEFRA.

A2.7 DEFRA require Local Planning Authorities to consider the impact of the proposed development on the European species and their habitat, the need for development and consideration of possible alternative development proposals before determining planning applications that could affect European protected species.

A2.8 DEFRA will also expect detailed surveys to have been carried out before granting any licences for handling the species or affecting the habitat when development is proposed.

A2.9 The conservation scheme necessary to enable any development project will depend on the size of the newt population, the locality and the impact of the proposed development. Usually an extended period of alternative habitat creation, trapping and movement of the animals is required, followed by a period of site management and monitoring.

A2.10 **Schedule 1** of the WCA lists a number of **birds** for which it is illegal to disturb or destroy the birds or nests, except by licence from English Nature. Some Schedule 1 species are relatively common (kingfishers), most are rare.

A2.11 The WCA also makes it illegal to disturb the nests of **most British birds** while at the nest. Some agricultural vermin species are excluded. There is a legal defence if the nest-destruction is the incidental result of a lawful action which could not have reasonably have been avoided. Legal advice may be needed to determine if a proposed nest destruction is lawful. In some cases it will be, in other cases it may not be.

A2.12 **Schedule 5** of the WCA lists animals which are protected. The degree of protection varies. **Water voles** receive no protection of the animal, but the habitat is protected. Site-specific licences are not required for habitat destruction. However, as the habitat is inevitably a watercourse, Environment Agency consent will be required for culverting or drainage. EA will usually consult English Nature who will object unless satisfactory habitat mitigation is provided.

A2.13 **Reptiles** are all protected. The commoner species are protected only from unlawful killing. In practice this requires a reptile protection scheme before implementing a planning permission. No specific licence is required. The rarer reptiles require a protection and conservation scheme, and English Nature may not grant such licences unless they are assured that protection and conservation is guaranteed.

A2.14 **Badgers** receive protection under the PBA. In terms of development, this means that any scheme which involves the destruction of a recently-active sett (even if an outlier) requires a licence from English Nature. English Nature will require adequate protection of the animals, which means that alternative provision is needed and disturbance will not be permitted in the hibernation or early spring period when badgers are gestating or have dependent young. English Nature will tend to object to loss of a main sett.

A2.15 **Schedule 8** of the WCA lists **plants** which are statutorily-protected. In relation to development, these plants do tend to be very rare and not frequently encountered. The **bluebell** is scheduled, but this prohibits commercial bulb-picking from the wild rather than to prohibit development.

A2.16 There is also a category of **plants** which it is an offence to introduce to the wild. These include **Japanese knotweed,** which is frequently encountered on brownfield sites. Care is needed to avoid spreading the species around the site during earthworks, and to ensure that any removal of infested soils off-site is to a licensed tip. **Giant hogweed** is also listed in this category of invasive alien plant species**.**

A3.0 NATIONAL PLANNING POLICY GUIDANCE

A3.1 National Planning Guidance is issued in the form of Planning Policy Guidance Notes (PPGs) and Planning Policy Statements (PPSs). These are issued on a topic basis. The most relevant is PPS9 Biodiversity and Geological

Conservation (2005), but PPS12 (2004) Local Development Frameworks and PPG13 (2001) Transport also refer to nature conservation interests and consideration for nature conservation and biodiversity in the planning process.

A3.2 The thrust of guidance in PPS9 is aimed at Regional Planning Bodies and Local Planning Authorities who must consider nature conservation impacts in planning policy and decision.

A3.3 The presence of a statutorily protected species is a material consideration when a planning authority is considering a development proposal that, if carried our, would likely result in the harm to the species of its habitat. PPS9 reiterates the requirement to comply with legislation in respect of such statutorily protected species.

A3.4 Government Circular ODPM06/2005 states that the effects of development upon UK or local BAP species may be a material consideration in the making of planning decisions. PPS9 introduces an obligation on local authorities to further the conservation of habitats and species of principle importance for nature conservation, which do not receive statutory protection, through their planning function.

A3.5 PPS9 also introduces an obligation for local authorities to seek maximised opportunities for building in biodiversity or geological features as part of good design. Where significant harm to biodiversity and geological interests cannot be prevented, local authorities should seek adequate mitigation and/or compensation measures, or else planning permission should be refused.

A4.0 COUNTY, DISTRICT AND UNITARY DEVELOPMENT PLANS

A4.1 PPG12 (2001) Development Plans has been replaced by PPS12 (2004) Local Development Frameworks. However, PPG12 will remain in operation for development plans still being prepared under the 1999 Development Plan Regulations

A4.2 Local, Structure and Unitary Development Plans (to be replaced by Local Development Plan Documents under the Planning and Compulsory Purchase Act 2004) will provide protection, both to sites and to certain species. The degree of protection varies according to different types of site, or different species. Policies will always be very heavily weighted against development which might affect **statutory wildlife sites** (see section 2 above).

A4.3 The development plan will allow for the designation and policy protection of **non-statutory wildlife sites**, (sometimes generically called second-tier sites, to distinguish them from statutory sites). These sites go under a variety of names such as. Site of Biological Importance (SBI), Site of Importance for Nature Conservation (SINC), Biological Heritage Site (BHS) etc. Often geological sites are grouped with ecological sites, for example Regionally Important Geological/Geomorphological Sites (RIGS), Geological Heritage Sites (GHS).

A4.4 Non-statutory sites are usually identified by a fairly rigorous system of criteria which are themselves usually adopted as supplementary planning guidance.

A4.5 Adopted development plans often provide protection for '**Wildlife Corridors**' or **'Greenways'**, which are identified on plan.

A4.6 The extent of protection to non-statutory sites is usually not absolute, but even where the importance of development is considered to outweigh ecological interests, a mitigation strategy is usually required as a condition of a planning consent.

A5.0 THE UK BIODIVERSITY ACTION PLAN

A5.1 The publication of the **UK Biodiversity Action Plan** (UKBAP) is in response to Article 6 of the Rio Biodiversity Convention, to develop national strategies for the conservation of biological diversity and the sustainable use of biological resources. The UKBAP contains action plans for over 200 '**UK Priority**' species and 30 '**UK Key Habitats**', considered to be of national importance for nature conservation.

A5.2 'UK Priority Species' are defined in the 'UK Biodiversity Group Tranche 2 Action Plans' (HMSO, 1998) as either globally threatened or rapidly declining in the UK, i.e. by more than 50% in the last 25 years. Some of the UK Priority species are statutorily protected, while others receive partial or no protection.

A5.3 The listing of a species or habitat in the UKBAP does not *per se* provide it with any statutory or planning policy protection. However, under obligations introduced by PPS9, it is likely that many planning authorities will begin to introduce policies that provide protection to UKBAP species and habitats. Many non-statutory wildlife sites are already selected by reference to populations of UKBAP species and habitats.

A5.4 UKBAP species and habitats are often cited by objectors to planning applications. The species most commonly encountered in relation to development are as follows:

- Mammals – water vole*, bats*, brown hare, badgers*
- Birds – skylark, linnet, reed bunting, grey partridge
- Amphibians – great crested newts*

**species marked by asterisk are also statutorily protected.*

A6.0 LOCAL BIODIVERSITY ACTION PLANS AND ECOLOGICAL STRATEGIES

A6.1 Many districts, counties or metropolitan areas have **adopted nature conservation strategies** that tend to set out general principles of attention to nature conservation. Most of these date from the early to mid 1990s.

A6.2 More recently, counties have prepared **Local Biodiversity Action Plans** (LBAP), in conjunction with partners such as the Wildlife Trust. These LBAPs highlight species and habitat types which are either of national concern (UKBAP species and habitats) or are endemic to the county and of local concern. LBAPs will be prepared for these species and habitats. As with the UKBAP, listing of a habitat type, a site or a species in a LBAP does not confer any new statutory or planning policy protection. However, impacts upon sites, habitats or species prioritised in LBAPs may be a material consideration in a planning application.

A6.3 On a broader level, English Nature has mapped the country into a number of discrete Natural Areas. Each Natural Area has a distinct ecological identity, e.g. the 'Cheshire Meres and Mosses' is characterised by waterbodies in peat or boulder clay. Conservation priorities are set in terms of retaining and enhancing waterbody and field hedgerow connections. By comparison, the 'Sefton Coast' Natural Area highlights the unique sand dune and mudflat systems, with conservation priorities being set accordingly.

A6.4 Natural Areas have no legislative power, and for many developments, they are described in too broad a scale to have site-specific value. Nevertheless they give an indication of which habitats are particularly valued locally.

A7.0 OTHER LISTS OF SPECIES OF CONSERVATION CONCERN

A7.1 In addition to the lists referred to above, there are other lists made of national abundance of groups of fauna, particularly the less well-documented groups. These lists do not themselves confer any statutory protection, but may often be used in Environmental Impact Assessment to establish whether or not a proposed development will have a significant impact.

A7.2 In the case of **invertebrates**, few species are statutorily protected or listed in the UK Biodiversity Action Plan, but many are thought to be rare or vulnerable. Such species are known as **Red Data Book (RDB)** species and there are various grades of ecological sensitivity, e.g. Rare/Vulnerable species, Nationally Notable (A), Nationally Notable (B) and Nationally Scarce. These gradings are based on frequency of occurrence of species in 10km^2 squares across the country e.g. Nationally Notable species occur in less than 300 10km^2 squares in the UK.

A7.3 In the case of **birds**, there are various 'species of conservation concern' **(SPoCC),** known informally amongst ornithologists, but not protected or listed in the UKBAP e.g. the lapwing has undergone substantial decline in numbers, particularly on farmland.

A7.4 Such RDB/SPoCC species are often listed in LBAPs (see Section 6, above).

APPENDIX B

British bat ecology and survey techniques

BRITISH BAT ECOLOGY AND SURVEY TECHNIQUES

B1.0 BATS IN BRITAIN

B1.1 There are 16 species of bat occurring in Britain, one of which is possibly now extinct. These species all belong to one of two families – horseshoe bats or vesper (evening) bats.

B1.2 As recently as the 1950's bats in Britain were numerous to the point that colonies of thousands of bats could be seen. Today, colonies of such numbers are extremely rare.

B1.3 The greater horseshoe bat has declined by 99% in Britain, and other species have suffered similar declines.

B1.4 Bats are highly specialised animals, being the only mammal with the ability of true flight. They are nocturnal and, in Britain, they are all insectivorous. Bats have evolved to use a specialised echolocation system by which to navigate and catch insects, even in complete darkness.

B1.5 Bats need a variety of roosts throughout the year in which to breed, hibernate and give birth.

B1.6 Six different categories of bat roost have been described (Hutson, 1993):

- Spring gathering roosts
- Maternity roosts
- Mating roosts
- Night roosts and feeding roosts
- Prehibernal roosts
- Hibernation roosts

B1.7 It is uncommon for bats to use the same roost throughout the year as they require different conditions for breeding and hibernating. Some bats can fly long distances between suitable sites, which can be remotely located. There are three main types of roost:

- Buildings: most important in the summer, but some are used throughout the year.
- Caves / mines / underground structures: most important for winter hibernation because they give stable, cold conditions.
- Trees: used throughout the year.

B1.8 Each species of bat prefers its own type of roost. Some almost always use one type of roost, while others switch between roosts during the year. Once a roosting site is established, bats are quite faithful to it and return regularly.

B2.0 BATS IN TREES

B2.1 Trees (especially native ones such as Oak, Beech, Ash and Scots Pine) and hedgerows play host to swarms of insects, which forms the primary prey item for UK bats.

B2.2 Trees also provide bats with a place to roost or rest, give birth, raise young, form groups and hibernate in natural holes, crevices and sheltered places. Such features are traditionally associated with mature trees.

B2.3 The availability of suitable holes may limit the number of these species.

B2.4 Identification of tree roosts is an area with a poor record of success. Typical sites may be old woodpecker holes, cavities and cracks in trees, crevices behind peeling-off bark, woodpiles and behind ivy or dense epicormic growth.

B2.5 Over a period in time bats will use a number of trees to optimise roosting conditions. External disturbances, an internal build up of parasites or distance from feeding area can influence the choice of tree.

B2.6 Bats also use trees, lines of trees and hedges to navigate at night. Loss or damage to such features affects the ability of bats to commute safely and economically between roosts and feeding sites. A gap in a hedge as little as 10 metres may force some bats to seek an alternative route or to change roosts.

B2.7 Bats in tree roosts may offer little or no evidence of their occupation, especially when in hibernation. Signs to look for include:

- Obvious holes, cavities and splits
- Dark staining on the tree below a hole
- Staining around a hole caused by the natural oils in bats' fur
- A maze of tiny scratch marks around the hole made by bats' claws
- Droppings below a hole – they look similar to those for rodents, but crumble to a powder of insect fragments
- Noise (squeaking or chittering) coming from a hole, especially on a hot day or at dusk
- On closer inspection a hole may contain droppings or smell of bats

B2.8 All UK bat species are dependent to some extent on trees. This dependency varies with species, season, roosting behaviour and foraging behaviour.

B2.9 Some bat species, such as noctule (*Nyctalus noctula*), Bechstein's bat (*Myotis bechsteinii*) and barbastelle (*Barbastella barbastellus*) rely almost exclusively on trees for roost sites throughout the year. A number of other species may use tree roosts for only a part of the year, including pipistrelles (*Pipistrellus* spp.) and brown long-eared bats (*Plecotus auritus*).

B3.0 BATS IN BUILDINGS

B3.1 Buildings also provide bats with a variety of places in which they can roost e.g.:

- External hanging tiles or weather boarding
- Cavity spaces
- Cracks in bricks/mortar
- At top of solid walls
- In eaves, behind fascia and barge boarding
- Beneath underfelt, tiles or slates
- Around timber joints, gable end or around chimneybreast.

B3.2 The most common time of year in which bats utilise buildings is between May and August, when the pregnant females gather in maternity roosts to give birth and raise their young.

B3.3 Females and young often remain in a favoured roost for the duration of summer or move about using several roosts.

B3.4 Most summer colonies will have dispersed by the autumn, though brown long-eared bats often appear early in the year (early April) and leave later (October or later). These bats will also occasionally roost in a single building throughout the entire year.

B3.5 Buildings may also be used as temporary or "transitional roosts" by small numbers of adult and immature bats of both sexes, particularly in spring and autumn.

B3.6 Many outbuildings are attractive to bats for temporary nighttime roosts or as sheltered feeding perches. The latter are generally indicated by the presence of a lot of insect remains, particularly of moths or large beetles and some droppings.

B3.7 Cool, undisturbed, humid places are important as hibernation sites. Most species will tuck themselves into small crevices e.g. between bricks/stonework, and can easily pass the winter there unnoticed.

B3.8 Bats are usually concealed in crevices, behind roofing felt, in cavity walls, in old timber joints or under ridge tiles and are only occasionally seen out in the open in lofts. Consequently, the key identification feature is the presence of droppings. Sometimes only a small scattering of droppings may be obvious, on other occasions the accumulation of droppings into piles beneath ridge-boards and around chimneys or gable ends is also typical of bats.

B3.9 Bats are sometimes drawn to open water tanks in lofts in search of a drink. They fall into the tank, can't get out and eventually drown. Dead bats are often found in these 'open' tanks in roof spaces where bats habituate.

B3.10 Characteristic odour will also provide evidence to the presence of bats. A polished or clean surface near a place where light enters may also indicate habitual usage by bats. Bats may sometimes be heard "chittering", but this is usually in warm summer weather or when they are about to leave the roost to forage at dusk.

B3.11 The species most commonly occurring in buildings (usually modern houses) are two pipistrelle species (*Pipistrellus pipistrellus* and *P.pygmaeus*), the former is the most common species local to the site, the latter generally less so.

B3.12 These highly gregarious small bats use roofs for breeding during the summer and, in general, the bats disperse during the autumn. The most likely place to find droppings in the roof void are at the gable end wall and along the eaves. In some cases, the bats may roost beneath ridge tiles, on top of the ridge beam or under insulation close to the eaves.

B3.13 The brown long-eared bat (*Plecotus auritus*) is the second most common species in Britain but is the one most likely to be encountered in roof voids. It may occasionally be seen clinging on to timbers near the apex of the roof. Like the pipistrelle, highest numbers may be seen on hot days between June and September when breeding colonies may be present. During the autumn and in cool weather, bats remain concealed in crevices or hollow walls but may appear on mild days or if disturbed.

B3.14 Brown long-eared bats tend to fly around in the open roof void and hang from the ridge during the night, so droppings are usually found scattered over the floor or concentrated in piles beneath favoured roosting areas, typically beneath the ridge beam. In hipped roofs, piles of droppings may also be found in the junction between two hips.

B3.15 A number of other species are more frequently recorded roosting in buildings than other types of roost site. These include Brandt's bat (*Myotis brandtii*), whiskered bat (*Myotis mystacinus*), Natterer's bat (*Myotis nattereri*), Leisler's bat (*Nyctalus leisleri*), serotine (*Eptesicus serotinus*) and the two horseshoe species (*Rhinolophus ferrumequinum* and *R.hipposideros*). Some of these species are relatively widespread while others are restricted and/or rare.

APPENDIX C
Desktop survey results

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Principal Ecologist
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WA3 7BH

Your ref : *007573/007574*
Our ref : *MJE/0999-0910-06*
Doc ref : *MJE/5-3*
Contact : *MANDY ELFORD*
Date : *5th September 2006*

Dear Liz

ECOLOGICAL SEARCH – MANCHESTER SCHOOL SITES – REFERENCE 1186 & 1179

Please find enclosed the ecological searches for the above locations. As you will see from the maps there are 11 Sites of Biological Importance (SBIs) within the areas of search and 2 Local Nature Reserves (LNRs). Should you require the citation sheets for any of these SBIs, please note that an additional charge of £25.00 plus VAT per SBI may be levied, depending on your client.

Please note that map 8 is marked Confidential because it shows sensitive information relating to badgers. This data should not be placed on the public record.

A map has not been produced for Levenshulme High School as we have no records within the search area.

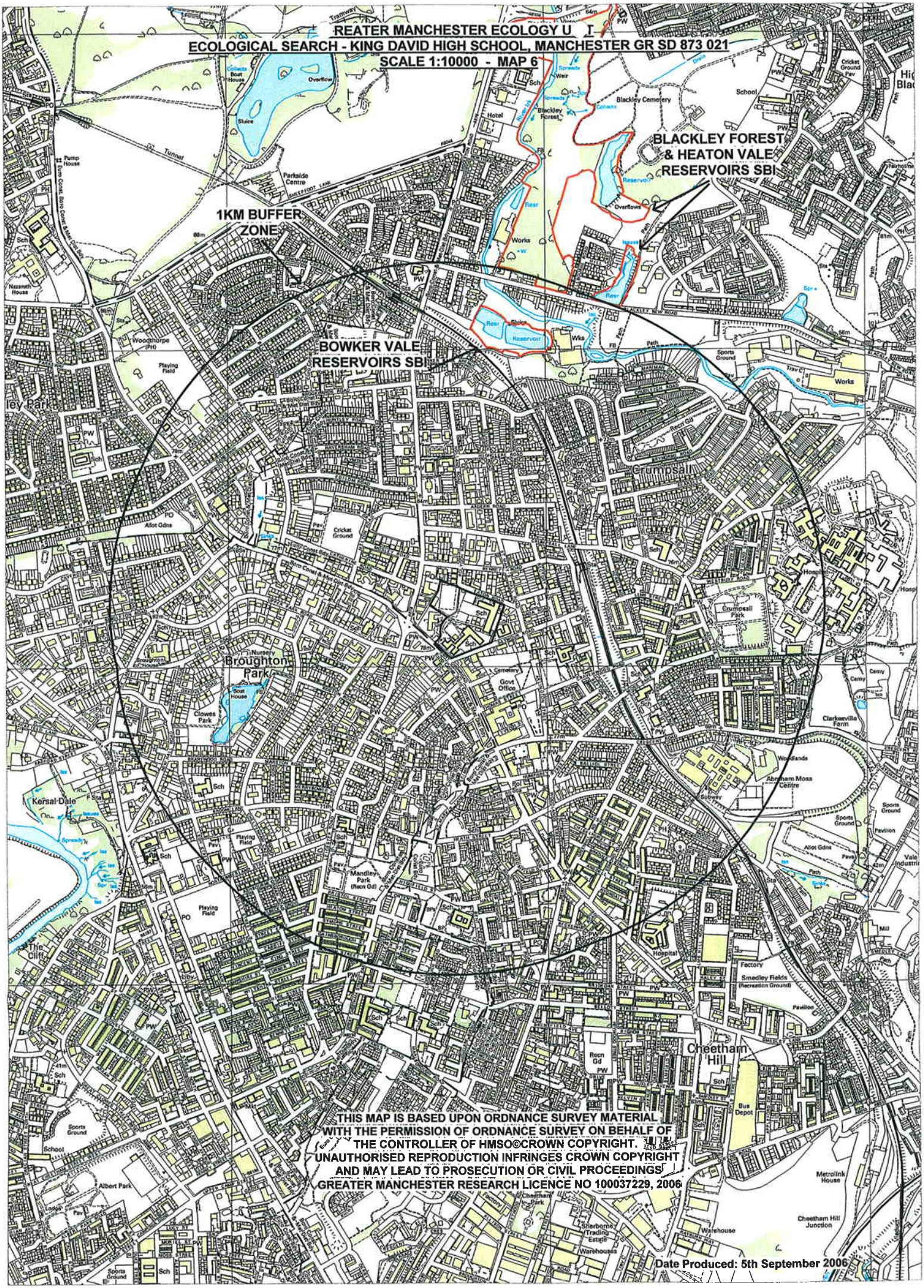
Aside from the species shown on the maps the Ecology Unit has no other records for protected species within the areas of search. You should note, however, that our records are not comprehensive and a negative result does not indicate the absence of protected species from the area of search. We advise that all suitable habitats and structures impacted by the proposals are surveyed for protected species. For detailed bat records I would suggest you contact the South Lancashire Bat Group email enquiries@slbg.org.uk and for bird records the County Bird Recorder Judith Smith (tel 01942 712615) or email judith@gmbirds.freeserve.co.uk.

An invoice for this service of £296.00 plus VAT has also been included; please pass this on to your accounts department to ensure prompt payment.

Yours sincerely

Mandy Elford
Associate Ecologist

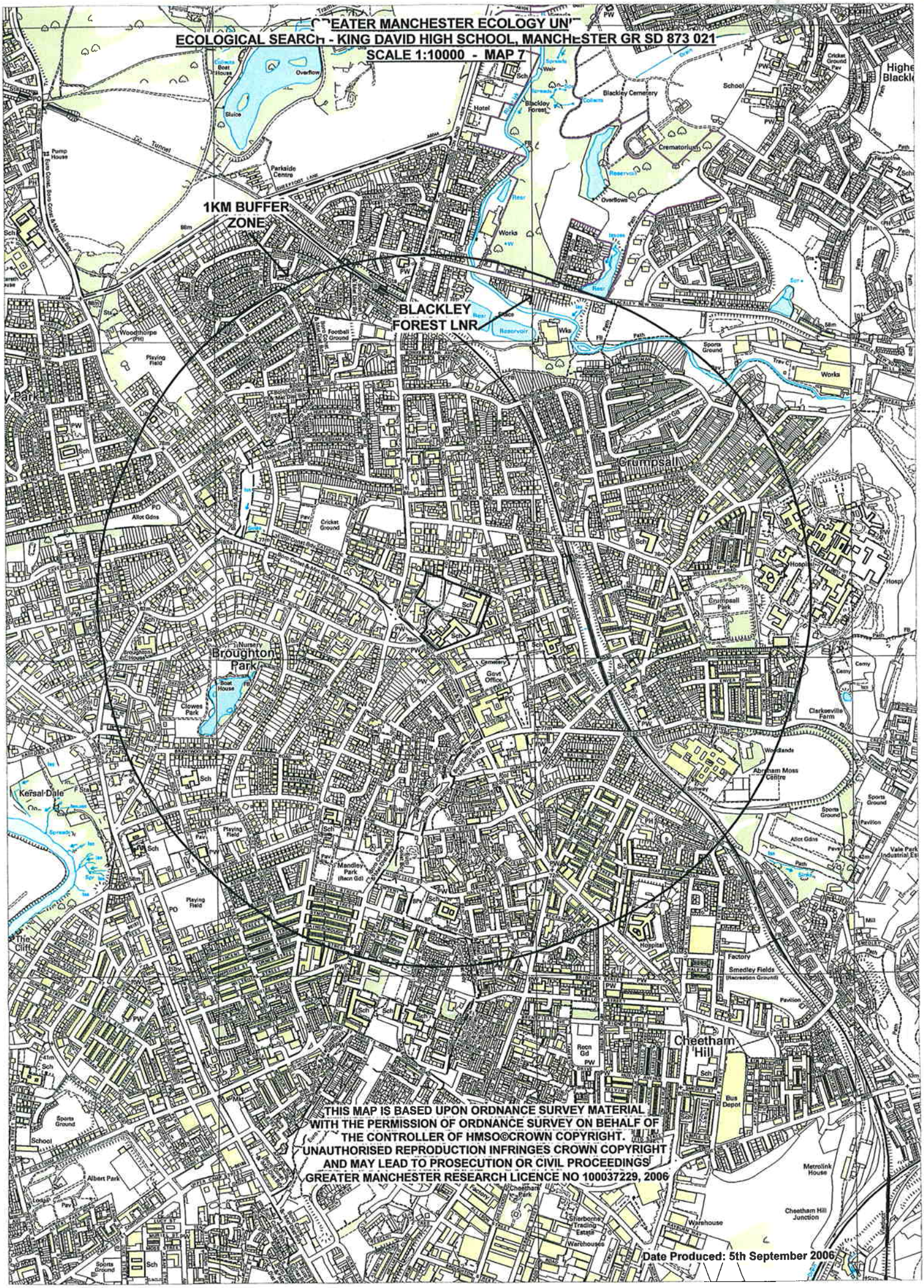
Encs


REATER MANCHESTER ECOLOGY U I
ECOLOGICAL SEARCH - KING DAVID HIGH SCHOOL, MANCHESTER GR SD 873 021
SCALE 1:10000 - MAP 6
BLACKLEY FOREST & HEATON VALE RESERVOIRS SBI
1KM BUFFER ZONE
BOWKER VALE RESERVOIRS SBI
Broughton Park
Crumpsall
Cheetham Hill
Kersal Dale
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GREATER MANCHESTER RESEARCH LICENCE NO 100037229, 2006
Date Produced: 5th September 2006

GREATER MANCHESTER ECOLOGY UNIT

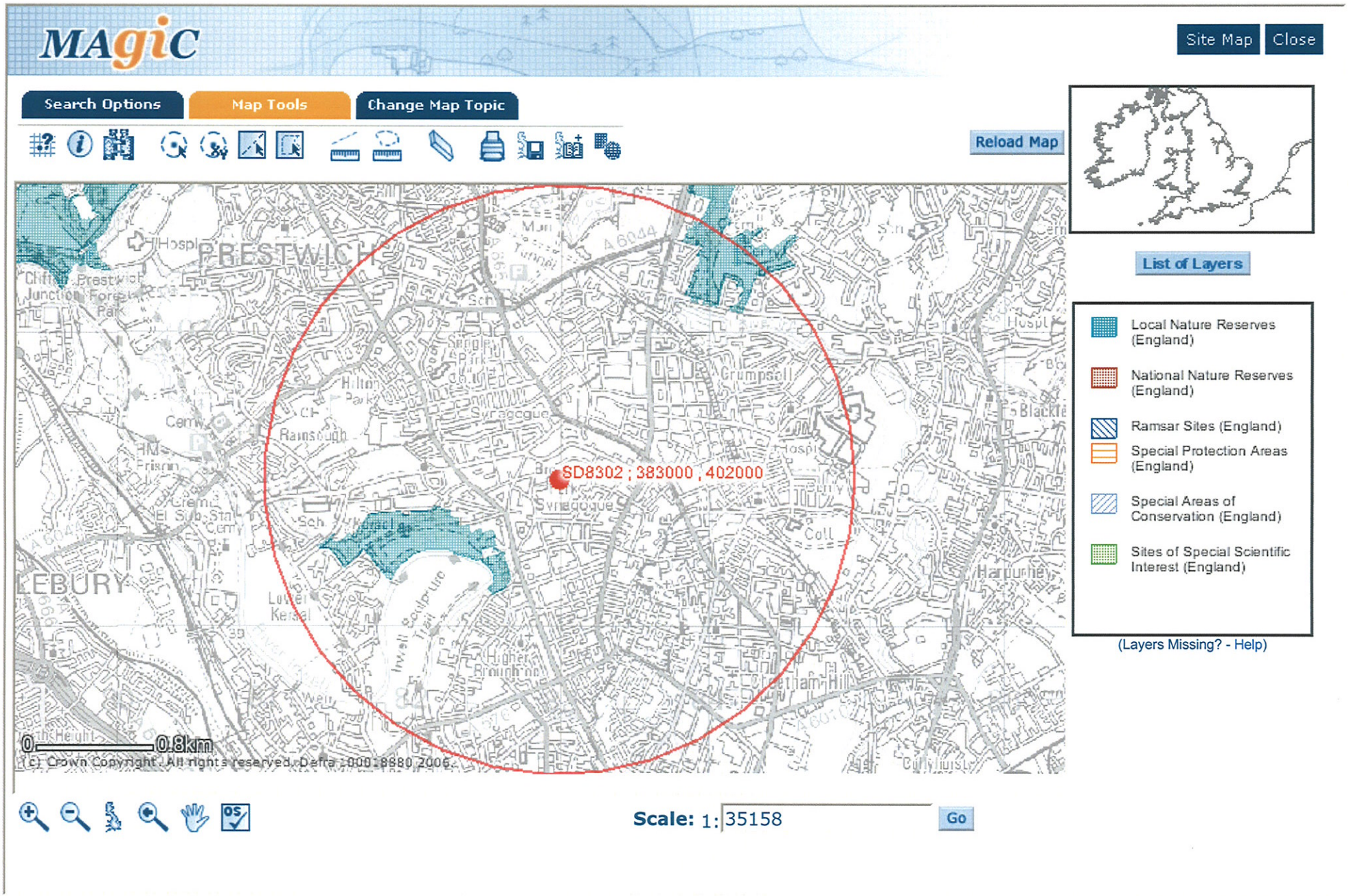
ECOLOGICAL SEARCH - KING DAVID HIGH SCHOOL, MANCHESTER GR SD 873 021

SCALE 1:10000 - MAP 7



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Date Produced: 5th September 2006


MAGIC
Site Map
Close
Search Options
Map Tools
Change Map Topic
Reload Map
List of Layers
Local Nature Reserves (England)
National Nature Reserves (England)
Ramsar Sites (England)
Special Protection Areas (England)
Special Areas of Conservation (England)
Sites of Special Scientific Interest (England)
(Layers Missing? - Help)
SD8302 ; 383000 , 402000
PRESTWICH
LEBURY
0 0.8km
(c) Crown Copyright. All rights reserved. Defra 100018880 2006.
Scale: 1: 35158
Go

South Lancashire Bat Group Records Report

SOUTH LANCASHIRE BAT GROUP

Registered Charity Number 1109519

Attn. Liz Seal
TEP
Genesis Centre
Birchwood Science Park
Warrington
WA3 7BH

SLBG Ref: TEP.3.2006

DATE: 12/05/2006

Re: Bat Record Search Manchester Schools
Purchase Orders : Ref: 1179 – PO: 007083
And Ref: 1186 – PO: 007084

Neither the general area around the site, or the site itself on your request has been surveyed for bats, however casual sightings have been found in the area around your site as detailed below.

Please Note:

- **The records are to be used only for the specific survey requested, and remain the property of South Lancashire Bat Group.**
- **Your report should indicate that these records have been obtained from South Lancashire Bat Group.**
- **Lack of records does not indicate that bats so not use the area but simply that they have not been reported to the Bat Group.**

Date	Detail	Grid Reference	Species
Newhall Green	**SJ808874**		
15/11/1988	field record	SJ798852	Pipistrelle
12/06/2001	field record	SJ813883	Pipistrelle
30/11/1988	Roost	SJ815887	Pipistrelle
13/10/2004	field record	SJ809875	Pipistrelle
12/09/2003	field record	SJ804880	Whiskered Bat
1988	Roost	SJ8287	Brown Long-Eared Bat
06/07/2001	Roost	SJ820887	Pipistrelle
06/09/2004	field record	SJ821855	Whiskered Bat
15/08/2003	field record	SJ818864	45 Khz Pipistrelle
26/04/2003	field record	SJ821855	Pipistrelle

St Paul RC SJ814874	See also records for Newhall Green		
04/04/2003	Field Record	SJ834873	Pipistrelle
16/05/2002	field record	SJ839878	45 Khz Pipistrelle
Summer 2002	Field Record	SJ834874	Pipistrelle
01/07/2003	Field Record	SJ839869	Pipistrelle

Burnage SJ865924

21/05/2003	Roost	SJ848932	Pipistrelle
21/05/2003	Roost	SJ848933	Pipistrelle
03/06/1998	field record	SJ850918	Pipistrelle
Summer 2002	field record	SJ854942	Pipistrelle
14/06/1999	field record	SJ863925	Pipistrelle
02/09/2004	field record	SJ86869087	55 Khz Pipistrelle
02/09/2004	field record	SJ86869087	Pipistrelle
18/08/2003	Roost	SJ878936	Pipistrelle
05/08/1996	field record	SJ879937	Pipistrelle
19/08/2003	Roost	SJ873936	Pipistrelle
22/05/1989	field record	SJ881959	Pipistrelle
24/05/1999	field record	SJ887930	Pipistrelle
Summer 1996	field record	SJ885936	Pipistrelle

Levenshulme SJ8709634 see also Burnage

15/01/2004	Roost	SJ868951	Pipistrelle
04/08/1988	Field Record	SJ8795	Whiskered Bat
23/03/2002	Roost	SJ856948	Pipistrelle
07/04/2002	Field Record	SJ890930	Pipistrelle

Kind David SD873021

28/06/2002	field record	SD863034	Pipistrelle
24/07/1996	field record	SD865022	Pipistrelle
15/09/2002	field record	SD865024	45 Khz Pipistrelle
13/07/1995	Roost	SD868032	Pipistrelle
15/07/1994	Roost	SD869032	Pipistrelle
09/06/1997	Roost	SD869032	Pipistrelle
26/08/2001	field record	SD874014	45 Khz Pipistrelle
10/08/2001	Roost	SD875027	Pipistrelle
25/05/1999	field record	SD875030	Pipistrelle
04/07/2003	field record	SD875027	Pipistrelle
08/08/2001	field record	SD870027	Daubenton's Bat
19/08/2003	field record	SD864015	45 Khz Pipistrelle
13/12/2002	field record	SD864016	Pipistrelle
29/05/1994	field record	SD8701	Pipistrelle
25/09/1997	field record	SD876014	Pipistrelle
1893	field record	SD8801	Daubenton's Bat
13/09/1999	Roost	SD8802	Pipistrelle
23/04/2002	field record	SD882016	45 Khz Pipistrelle
09/04/2002	Roost	SD873013	Pipistrelle
28/08/2003	field record	SD887028	Pipistrelle
10/01/1996	Roost	SD883003	Pipistrelle
23/03/2002	field record	SD887004	Pipistrelle
20/06/2000	Roost	SD887005	45 Khz Pipistrelle

14/07/1999	Roost	SD887012	Pipistrelle
20/10/2003	field record	SD888004	Pipistrelle
12/08/2001	field record	SD892006	Pipistrelle
Summer 2004	Roost	SD895012	Pipistrelle

Abram Moss SD845016 see also King David

31/10/2002	field record	SD828031	Pipistrelle	
22/06/2001	field record	SD825025	45 Khz Pipistrelle	
21/01/2004	field record	SD825025	Pipistrelle	
20/08/2002	Roost	SD826025	Pipistrelle	X
24/05/1999	Roost	SD830023	Pipistrelle	X
04/07/1995	field record	SD834013	Pipistrelle	
Summer 1995	field record	SD835022	Pipistrelle	
03/07/1996	Roost	SD836027	Pipistrelle	X close to King David
02/08/1995	field record	SD837032	Pipistrelle	
10/07/2004	field record	SD839026	45 Khz Pipistrelle	
25/04/2001	field record	SD841035	45 Khz Pipistrelle	
13/07/1995	Roost	SD868032	Pipistrelle	

St Matthews SD884025 see also King David

28/08/2002	Field Record	SD900030	45 Khz Pipistrelle
09/09/2002	Roost	SD901005	Pipistrelle

Our Lady RC SD856045 see also King David, St Matthews and Abram Moss

09/09/1997	Roost	SD846043	Pipistrelle
Summer 2002	field record	SD862042	Pipistrelle
23/08/2003	field record	SD844045	45 Khz Pipistrelle
06/07/1998	Roost	SD854054	Pipistrelle
May 1997	Roost	SD867048	Pipistrelle
06/05/1996	Roost	SD868055	Pipistrelle
06/07/1987	field record	SD859053	Pipistrelle
07/08/1988	Roost	SD862048	Pipistrelle
08/08/1988	field record	SD862048	Pipistrelle
08/08/2000	Roost	SD870043	Pipistrelle
10/07/1999	Roost	SD870053	Pipistrelle
07/06/1999	Roost	SD872049	Pipistrelle
25/06/2001	Roost	SD874062	Pipistrelle
01/09/2002	Roost	SD870065	Pipistrelle
08/07/1998	field record	SD851054	Pipistrelle
08/07/1998	field record	SD851054	Pipistrelle
21/06/2000	Roost	SD854054	Pipistrelle
21/06/2000	Roost	SD854054	Pipistrelle
26/06/2001	Roost	SD854055	Pipistrelle
01/07/2002	Roost	SD856054	Pipistrelle
19/06/2002	Roost	SD857054	45 Khz Pipistrelle
20/06/2001	field record	SD853054	Pipistrelle
30/06/2003	Roost	SD854056	45 Khz Pipistrelle

If you have any queries about this report please contact Steve Parker on 0161 764 8850 (leave a message) or e-mail enquiry@slbg.org.uk

APPENDIX D
Target Notes

Target Note 1

Along the eastern side of the school, in the narrow strip between the buildings and the boundary fence along the alley between Seymour Road and Eaton Road, There is an area of quite tall mixed plantation shading both managed and unmown grassland, patches of bramble development and a small waterbody. To the south there is some Leyland cypress planted along the fence, but there is also a large ash further north. The most characteristic species are listed.

Festuca rubra	A
Holcus lanatus	A
Fraxinus excelsior	F
Acer pseudoplatanus	O
Cupressocyparis leylandii	O
Rubus fruticosus agg.	O
Sorbus intermedia	O
Tilia x europaea	O

D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare (within the target note area).

APPENDIX E

Tree survey results

(REFER TO DRAWING D1209.KD.001)

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
Trees															
T1	Sycamore (Acer pseudoplatanus)	12.0	520.0	5.0	6.0	7.0	6.0	4.0	Mature	Fair	Epicormic growth at base. Curved base to trunk. Moderate basal wound with decay. Cavity at 3m height following previous failure. Sparse canopy. Within brick boxed area.	C,1	6.2	Retain or remove in accordance with development priorities.	Medium
T2	Sycamore (Acer pseudoplatanus)	10.0	300.0	4.0	4.0	4.0	4.0	4.0	Middle Age	Good	Girdling root. Minor epicormic growth on trunk following crown raising to 4m. Within brick boxed area.	B,1	3.6	Retain and protect prior to and during construction.	Long
T3	Sycamore (Acer pseudoplatanus)	14.0	500.0	6.0	3.0	4.0	5.0	4.0	Mature	Good	Exposed roots with damage within brick boxed area. Minor epicormic growth.	B,1	6.0	Retain and protect prior to and during construction.	Long
T4	Cherry (Prunus sp)	6.0	260.0	3.0	4.0	4.0	4.0	2.0	Middle Age	Good	Grafted. Good form.	B,1	3.1	Retain and protect prior to and during construction.	Medium
T5	Hemlock (Tsuga heterophylla)	10.0	350.0	2.0	3.0	2.0	3.0	1.5	Middle Age	Good	Minor exposed roots with mower damage.	B,1	4.2	Retain and protect prior to and during construction.	Long
T6	Cherry (Prunus sp)	6.0	340.0	4.0	5.0	4.0	4.0	2.0	Middle Age	Good	Grafted.	B,1	4.1	Retain and protect prior to and during construction.	Medium
T7	Scots Pine (Pinus sylvestris)	11.0	320.0	3.0	4.0	3.0	3.0	2.0	Middle Age	Good	Slight suppression of lower canopy from T8 and T9.	B,1	3.8	Retain and protect prior to and during construction.	Long

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T8	Laburnum (Laburnum anagyroides)	6.0	360.0	4.0	4.0	3.0	2.0	1.5	Middle Age	Good	Slight asymmetry. Crossing branch. Minor deadwood. Tight fork.	C,1	4.3	Retain or remove in accordance with development priorities. Remove crossing branch and deadwood.	Medium
T9	Laburnum (Laburnum anagyroides)	7.0	400.0	3.0	3.0	2.0	3.0	1.5	Middle Age	Good	Curve to base of trunk. Minor deadwood.	C,1	4.8	Retain or remove in accordance with development priorities. Remove deadwood.	Medium
T10	Beech (Fagus sylvatica)	16.0	580.0	8.0	2.0	6.0	6.0	5.0	Mature	Good	Asymmetry due to adjacent Beech. Severe soil compaction around base. Bifurcate at 3m height and crown raised to 5m. Good wound wood. Crossing branch.	A,1,2	7.0	Retain and protect prior to and during construction.	Long
T11	Beech (Fagus sylvatica)	16.0	720.0	4.0	8.0	5.0	6.0	3.0	Mature	Fair	Lean and asymmetry due to adjacent Beech. Severe soil compaction around base.	B,1,2	8.6	Retain and protect prior to and during construction. Monitor.	Long
T12	Weeping Willow (Salix x sepulcralis)	8.0	390.0	2.0	9.0	3.0	3.0	2.0	Middle Age	Good	Lean due to suppression.	B,1	4.7	Retain and protect prior to and during construction.	Medium
T13	Swedish Whitebeam (Sorbus x intermedia)	8.0	460.0	3.0	3.0	4.0	1.0	2.0	Mature	Good	Pronounced asymmetry. Dense canopy. Previous failure.	C,1	5.5	Retain or remove in accordance with development priorities.	Medium

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T14	Ash (Fraxinus excelsior)	22.0	880.0	9.0	10.0	8.0	9.0	6.0	Mature	Fair	Cavity at 6m height from pruning wound. Minor deadwood in canopy, some pieces with Daldinia concentrica. Slightly reduced canopy.	B,1	10.6	Retain and protect prior to and during construction. Monitor.	Medium
T15	Sycamore (Acer pseudoplatanus)	17.0	870.0	6.0	6.0	7.0	7.0	6.0	Mature	Good	Outside of fence and adjacent to public pathway. Dense crown with slightly small leaves and some epicormic growth. Minor deadwood and crossing branch. Severe soil compaction around base.	B,1	10.4	Retain and protect prior to and during construction. Crown clean. Monitor.	Medium
T16	Laburnum (Laburnum anagyroides)	4.0	210.0	1.0	1.0	1.0	1.0	2.0	Middle Age	Fair	Canopy previously reduced. Minor stem wounds. Poor form.	C,1	2.5	Retain or remove in accordance with development priorities.	Medium
T17	Poplar (Populus sp)	22.0	650.0	5.0	2.0	5.0	5.0	7.0	Mature	Good	Cankering on branches. Epicormic growth on trunks. Severe soil compaction around base. Minor buttress wound.	B,1	7.8	Retain and protect prior to and during construction. Monitor.	Medium
T18	Poplar (Populus sp)	22.0	560.0	3.0	2.0	1.0	1.0	3.0	Mature	Good	Cankering on branches. Epicormic growth on trunks. Severe soil compaction around base. Longitudinal wound from near base to height of 1.5m.	B,1	6.7	Retain and protect prior to and during construction. Monitor.	Medium

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T19	Poplar (Populus sp)	22.0	710.0	5.0	5.0	5.0	5.0	6.0	Mature	Good	Cankering on branches. Epicormic growth on trunks. Severe soil compaction around base.	B,1	8.5	Retain and protect prior to and during construction. Monitor.	Medium
T20	Larch (Larix decidua)	13.0	480.0	6.0	6.0	6.0	6.0	2.0	Mature	Good	Good form.	B,1	5.8	Retain and protect prior to and during construction. Remove dead branch.	Long
T21	Lime (Tilia sp)	14.0	670.0	5.0	6.0	6.0	5.0	2.0	Mature	Good	Dense crown. Typical epicormic growth. Minor deadwood to 10cm diameter.	B,1	8.0	Retain and protect prior to and during construction. Remove deadwood.	Long
T22	Cockspur Thorn (Crataegus crus-galli)	6.0	320.0	4.0	4.0	4.0	4.0	2.0	Middle Age	Good	Good form. Severe soil compaction around base.	B,1	3.8	Retain and protect prior to and during construction.	Long
T23	Wych Elm (Ulmus glabra)	6.0	190.0	4.0	4.0	2.0	4.0	1.5	Young	Good	Suppressed by adjacent Sycamore. Growing against concrete post.	C,1	2.3	Retain or remove in accordance with development priorities.	Long
T24	Sycamore (Acer pseudoplatanus)	12.0	530.0	6.0	6.0	6.0	6.0	2.5	Mature	Good	Good form.	B,1	6.4	Retain and protect prior to and during construction.	Long
T25	Beech (Fagus sylvatica)	17.0	710.0	6.0	6.0	3.0	6.0	6.0	Mature	Good	Base growing around concrete block. Minor dieback in one area of crown. Severe soil compaction around base. Cryptococcus (Scale insects)present on trunk.	B,1	8.5	Retain and protect prior to and during construction. Monitor.	Long

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T26	Lime (Tilia sp)	17.0	540.0	6.0	6.0	6.0	3.0	3.0	Mature	Good	Some exposed roots with minor damage. Severe soil compaction around base.	B,1	6.5	Retain and protect prior to and during construction.	Long
T27	Sycamore (Acer pseudoplatanus)	10.0	330.0	2.0	4.0	4.0	5.0	2.5	Middle Age	Fair	Poor form. Stem wound following previous pruning. Minor basal epicormic growth. Reduced crown. Possibly due to root damage during construction of nearby (1.5m) building.	C,1	4.0	Retain or remove in accordance with development priorities.	Long
T28	Weeping Willow (Salix x sepulcralis)	10.0	340.0	2.0	6.0	3.0	6.0	4.0	Middle Age	Good	Deadwood in lower crown due to suppression.	C,1	4.1	Retain or remove in accordance with development priorities.	Long
T29	Silver Birch (Betula pendula)	10.0	180.0	2.0	2.0	2.0	2.0	4.0	Young	Good	Spindly form. Minor deadwood.	C,1	2.2	Retain or remove in accordance with development priorities.	Medium
T30	Swedish Whitebeam (Sorbus x intermedia)	8.0	240.0	3.0	4.0	1.0	2.0	3.0	Middle Age	Good	Poorly crown raised to 3m height. Minor deadwood. Poor form.	C,1	2.9	Retain or remove in accordance with development priorities.	Medium
T31	Swedish Whitebeam (Sorbus x intermedia)	8.0	230.0	4.0	3.0	2.0	2.0	3.0	Middle Age	Good	Minor deadwood.	C,1	2.8	Retain or remove in accordance with development priorities.	Long
T32	Rowan (Sorbus aucuparia)	7.0	170.0	4.0	1.0	3.0	3.0	2.0	Young	Fair	Suppressed by adjacent trees.	C,1	2.0	Retain or remove in accordance with development priorities.	Long

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T33	Cherry (Prunus sp)	9.0	250.0	5.0	6.0	5.0	3.0	2.0	Middle Age	Good	Suppressed by adjacent trees.	C,1	3.0	Retain or remove in accordance with development priorities.	Medium
T34	Norway Maple (Acer platanoides 'Schwedleri')	10.0	250.0	4.0	4.0	4.0	3.0	4.0	Middle Age	Good	Stubs. Adjacent to pond.	B,1	3.0	Retain and protect prior to and during construction.	Long
T35	Whitebeam (Sorbus aria)	8.0	200.0	3.0	4.0	2.0	4.0	2.0	Middle Age	Good	Trifurcate at 1.5m height.	C,1	2.4	Retain or remove in accordance with development priorities.	Long
T36	Norway Maple (Acer platanoides 'Schwedleri')	8.0	210.0	4.0	4.0	2.0	4.0	4.0	Middle Age	Good	Stubs.	B,1	2.5	Retain and protect prior to and during construction.	Long
T37	Ash (Fraxinus excelsior)	18.0	410.0	6.0	6.0	3.0	5.0	4.0	Mature	Fair	Bifurcate at height of 2m. Major (25cm diameter) pruning wound to allow erection of fence. Moderate deadwood.	B,1	4.9	Retain and protect prior to and during construction.	Medium
T38	Norway Maple (Acer platanoides 'Schwedleri')	9.0	190.0	3.0	3.0	2.0	3.0	4.0	Middle Age	Good		B,1	2.3	Retain and protect prior to and during construction.	Long
T39	Norway Maple (Acer platanoides 'Schwedleri')	9.0	290.0	4.0	4.0	4.0	4.0	4.0	Middle Age	Good	Bifurcate at height of 0.5m.	C,1	2.9	Retain or remove in accordance with development priorities.	Long
T40	Ash (Fraxinus excelsior)	16.0	270.0	2.0	5.0	4.0	6.0	5.0	Mature	Good	Extensive deadwood in lower crown.	B,1	3.2	Retain and protect prior to and during construction.	Long

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T41	Ash (Fraxinus excelsior)	16.0	290.0	4.0	4.0	4.0	4.0	3.0	Mature	Fair	Good form. Minor deadwood.	B,1	3.5	Retain and protect prior to and during construction.	Long
T42	Ash (Fraxinus excelsior)	12.0	130.0	3.0	2.0	3.0	3.0	2.0	Young	Good		C,1	1.6	Retain or remove in accordance with development priorities.	Long
T43	Ash (Fraxinus excelsior)	12.0	180.0	3.0	1.0	3.0	3.0	3.0	Young	Good		C,1	2.2	Retain or remove in accordance with development priorities.	Long
T44	Lime (Tilia sp)	16.0	620.0	5.0	5.0	6.0	4.0	3.0	Mature	Good	Typical epicormic growth. Minor dieback of crown. A dead limb at 5m height.	B,1	7.4	Retain and protect prior to and during construction. Remove dead limb.	Long
T45	Lime (Tilia sp)	7.0	270.0	3.0	3.0	3.0	3.0	3.0	Young	Good	Suppressed by adjacent trees.	C,1	3.2	Retain or remove in accordance with development priorities.	Long
T46	Lime (Tilia sp)	16.0	700.0	8.0	8.0	7.0	6.0	4.0	Mature	Good	Minor deadwood and dieback.	B,1	8.4	Retain and protect prior to and during construction. Crown clean.	Long
T47	Lime (Tilia sp)	12.0	450.0	5.0	5.0	3.0	5.0	3.0	Mature	Good	Tight forks at 3 and 6m height. Some exposed roots with minor damage.	C,1	5.4	Retain or remove in accordance with development priorities.	Medium
T48	Lime (Tilia sp)	14.0	400.0	6.0	5.0	5.0	7.0	3.0	Mature	Good	Suppressed by adjacent trees. Branch with tight fork.	B,1	4.8	Retain and protect prior to and during construction.	Long
T49	London Plane (Platanus x hispanica)	14.0	410.0	7.0	7.0	5.0	6.0	3.0	Mature	Good	Good form.	B,1	4.9	Retain and protect prior to and during construction.	Long
T50	Holly (Ilex aquifolium)	8.0	450.0	2.0	2.0	2.0	2.0		Middle Age	Good	Good form. Bifurcate at 1.5m height.	B,1	5.4	Retain and protect prior to and during construction.	Long

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T51	Lime (Tilia sp)	10.0	330.0	5.0	6.0	5.0	3.0	2.0	Middle Age	Good	Good form. Several stubs. Crossing branch. Severe soil compaction around base.	B,1	4.0	Retain and protect prior to and during construction.	Long
T52	Lime (Tilia sp)	11.0	440.0	5.0	5.0	4.0	4.0	3.0	Mature	Good	Some exposed roots with minor damage.	B,1	5.3	Retain and protect prior to and during construction.	Long
T53	Lime (Tilia sp)	10.0	330.0	4.0	4.0	4.0	4.0	2.0	Mature	Good	Stubs with associated epicormic growth. Severe soil compaction around base.	B,1	4.0	Retain and protect prior to and during construction.	Long
T54	Hawthorn (Crataegus monogyna)	7.0	190.0	2.0	2.0	2.0	1.0	3.0		Poor		R		Remove.	
T55	Sycamore (Acer pseudoplatanus)	16.0	500.0	5.0	5.0	5.0	5.0	3.0	Mature	Good	Good form.	B,1	6.0	Retain and protect prior to and during construction.	Long
T56	Lime (Tilia sp)	16.0	430.0	2.0	5.0	3.0	4.0	5.0	Mature	Good	On third party land. Minor deadwood.	B,1	5.2	Protect prior to and during construction.	Long
T57	Lime (Tilia sp)	17.0	420.0	6.0	7.0	3.0	2.0	6.0	Mature	Good	On third party land. Minor deadwood and dieback.	B,1	5.0	Protect prior to and during construction.	Long
T58	Beech (Fagus sylvatica)	16.0	1500.0	11.0	10.0	9.0	9.0	4.0	Mature	Good	On third party land. Good form. Crossing branches. Previous large pruning wounds. Moderate basal cavity.	A,1	15.0	Protect prior to and during construction.	Long
T59	Sycamore (Acer pseudoplatanus)	12.0	390.0	6.0	3.0	3.0	2.0	5.0	Middle Age	Poor	On third party land, adjacent to fence. Reduced canopy with moderate deadwood and dieback.	C,1	4.7	Protect prior to and during construction.	Medium

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T60	Lime (Tilia sp)	18.0	560.0	6.0	6.0	6.0	6.0	7.0	Mature	Good	Minor damage to buttress root. 0.5m from building. Typical epicormic growth.	B,1	6.7	Retain and protect prior to and during construction.	Long
T61	Lime (Tilia sp)	18.0	620.0	8.0	6.0	4.0	6.0	5.0	Mature	Good		B,1	7.4	Retain and protect prior to and during construction.	Long
T62	Lime (Tilia sp)	14.0	500.0	3.0	6.0	7.0	5.0	4.0	Mature	Good	Bifurcate at height of 3m. Canopy obscures sports area floodlighting.	B,1	6.0	Retain and protect prior to and during construction.	Long
T63	Lime (Tilia sp)	14.0	500.0	6.0	3.0	6.0	6.0	4.0	Mature	Fair	Badly pruned to allow siting of Portakabin type building. Path may have caused root damage close to trunk. Stem wound. Small leaves.	C,1	6.0	Retain or remove in accordance with development priorities.	Medium
T64	Poplar (Populus sp)	24.0	750.0	5.0	5.0	5.0	5.0	6.0	Mature	Good	Good form. Minor epicormic growth at base.	B,1	9.0	Retain and protect prior to and during construction.	Medium
T65	Poplar (Populus sp)	24.0	710.0	5.0	5.0	4.0	5.0	4.0	Mature	Good	Good form. Minor deadwood.	B,1	8.5	Retain and protect prior to and during construction.	Medium
T66	Poplar (Populus sp)	24.0	790.0	7.0	7.0	7.0	7.0	5.0	Mature	Good	Good form. Minor deadwood.	B,1	9.5	Retain and protect prior to and during construction.	Medium
T67	Poplar (Populus sp)	7.0	130.0	1.0	1.0	2.0	2.0	3.0	Young	Good		C,1	1.6	Retain or remove in accordance with development priorities.	Long
T68	Lime (Tilia sp)	12.0	510.0	5.0	7.0	5.0	5.0	3.0	Mature	Good	Large basal cavity from 0-2m height. Tight fork at 4m.	C,1	6.1	Retain or remove in accordance with development priorities. Monitor.	Long

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T69	Lime (Tilia sp)	10.0	370.0	4.0	5.0	5.0	4.0	3.0	Middle Age	Good	Bifurcate at 3m height. Typical epicormic growth in response to pruning.	B,1	4.4	Retain and protect prior to and during construction.	Long
T70	Lime (Tilia sp)	13.0	440.0	2.0	5.0	4.0	4.0	2.0	Middle Age	Good	Typical epicormic growth after harsh pruning. Adjacent utility lines.	B,1	5.3	Retain and protect prior to and during construction.	Long
T71	Swedish Whitebeam (Sorbus x intermedia)	6.0	270.0	3.0	3.0	3.0	3.0	3.0	Middle Age	Good	Moderate stem wound. Crown raised to 3m.	C,1	3.2	Retain or remove in accordance with development priorities.	Medium
T72	Ash (Fraxinus excelsior)	16.0	760.0	8.0	7.0	8.0	5.0	7.0	Mature	Fair	Moderate deadwood to 12cm diameter. Previous limb failures. Hanger. Two cavities at height of 3m. Large pruning wound at 4m.	C,1	9.1	Retain or remove in accordance with development priorities. Crown clean and inspect aerially if retained. Monitor.	Medium
T73	Sycamore (Acer pseudoplatanus)	13.0	480.0	4.0	5.0	5.0	5.0	6.0	Mature	Good		B,1	5.8	Retain and protect prior to and during construction.	Long
T74	Swedish Whitebeam (Sorbus x intermedia)	7.0	270.0	3.0	3.0	3.0	3.0	4.0	Middle Age	Good	Good form. Crown raised to 4m. Stem wound.	C,1	3.2	Retain or remove in accordance with development priorities.	Medium
T75	Sycamore (Acer pseudoplatanus)	13.0	500.0	4.0	4.0	4.0	4.0	4.0	Mature	Good	Bifurcate at 4m. Minor deadwood.	C,1	6.0	Retain or remove in accordance with development priorities.	Long
T76	Lime (Tilia sp)	15.0	700.0	4.0	4.0	6.0	4.0	8.0	Mature	Good	Minor epicormics on trunk in response to pruning. Dense crown.	B,1	8.4	Retain and protect prior to and during construction.	Long

Ref	Species	Height	Stem Dia.	Crown Spread				Height of Lowest Branch	Maturity	Condition	Comments on form, condition, health and significant defects	BS5837 Tree Quality Assess.	Radius of RPA guide circle	Management Recommendations	Estimated Remaining Contribution
				N	S	E	W								
		(m)	(mm)	(m)	(m)	(m)	(m)	(m)	Young, Middle Age, Mature, Veteran	Good, Fair, Poor		A,B,C,R (1,2,3)	(m)		Long, Medium, Short
T77	Norway Maple (Acer platanoides)	11.0	360.0	4.0	3.0	4.0	4.0	6.0	Middle Age	Good	Girdling root. Bifurcate at 2m height. Few exposed roots.	B,1	4.3	Retain and protect prior to and during construction.	Long
T78	Lime (Tilia sp)	14.0	520.0	3.0	5.0	3.0	4.0	7.0	Mature	Poor	Large longitudinal wound s on leaders extending into canopy. Epicormic growth on trunk.	R			
T79	Lime (Tilia sp)	13.0	620.0	5.0	6.0	6.0	4.0	5.0	Mature	Poor	Sparse canopy with moderate dieback and deadwood. Reduced leaf size.	C,1	7.4	Retain or remove in accordance with development priorities.	Medium
Groups															
G1	Ash (Fraxinus excelsior), Sycamore (Acer pseudoplatanus)	15.0	210-330	Refer to plan				6.0	Middle Age	Fair	Self sown. Central Ash spindly and with moderate stem wounds. Condition possibly due to construction of nearby building.	C,1	1m outside canopy	Retain or remove in accordance with development priorities. Remove Ash.	Medium
G2	Lawson Cypress (Chamaecyparis lawsoniana)	9.0	100-250	Refer to plan				0.0	Middle Age	Good	Hedge.	C,2	1m outside canopy	Retain or remove in accordance with development priorities.	Long
G3	Ash (Fraxinus excelsior), Sycamore (Acer pseudoplatanus)	17.0	700.0	4.0	2.0	4.0	6.0	3.0	Mature	Good	Ash highly suppressed and within canopy of Sycamore. Sycamore basally bifurcate with tight fork.	C,1	12.1	Retain or remove in accordance with development priorities.	Medium

APPENDIX F

Environment Agency guidelines for the control and treatment of Japanese knotweed

ENVIRONMENT AGENCY
CODE OF PRACTICE FOR THE MANAGEMENT, DESTRUCTION AND DISPOSAL OF JAPANESE KNOTWEED

Managing Japanese knotweed on development sites.

Timely and appropriate management of land infected by Japanese knotweed can avoid excessive cost, potential prosecution and prevent physical damage to buildings and hard surfaces.

Early identification of Japanese knotweed on a site allows a developer to assess and cost options for disposal and management.

The most important element to knotweed management for a developer is the early application of an appropriate herbicide prior to any land disturbance.

The most effective time to apply a herbicide is from July to September (or until the first frosts cause leaf fall). Spring treatment is acceptable, but less effective. Herbicides are not effective during the winter dormant stage. Chemical control usually takes a minimum of three years to totally eradicate Japanese knotweed. Therefore, Japanese knotweed must still be regarded as infective within that three year period, or whilst regrowth still occurs during spring. Rhizome can remain dormant for a considerable period after regrowth has apparently stopped, and therefore the viability of rhizome would need to be ascertained prior to disturbance. However, treatment with an appropriate herbicide can reduce the vigour of knotweed material, even if it were only treated a few weeks prior to disturbance. If a developer is in a situation where their timescale prohibits effective chemical eradication of Japanese knotweed, the plant should still be treated, if it is in leaf, at the earliest possible convenience.

Combined treatment methods.

Site trials have shown a combined digging and spraying treatment method to be effective in reducing the time period required for chemical control. Great care is required with this method to avoid spreading plant material.

The majority of Japanese knotweed rhizome exists in the upper layers of topsoil. It has been estimated that in an infected area, 14,000 kg/ha dry weight of knotweed may exist in the top 25cm (Brock, 1994). An excavator may be used to scrape surface crowns and rhizomes into a pile. The exposed ground can then cultivated to a depth of 50cm, and the piled material re-spread over the cultivated area. This process stimulates the rhizome to produce a higher density of stems, which renders it more vulnerable to herbicide treatment. Subsequent herbicide treatment has been observed to eradicate knotweed after only two applications, which may be performed within the same growing season.

Digging can be carried out during the winter months, and regrowth treated during the spring and summer. Extreme care must be taken to ensure that all equipment used on site is free of Japanese knotweed material before leaving the site to avoid contravention of the Wildlife & Countryside Act, 1981. To reduce the risk of contaminating vehicles, excavators with caterpillar tracks should be avoided.

Soil contaminated with knotweed may also be stockpiled on an area of the site that will remain undisturbed. Knotweed regrowth should be regularly treated with herbicide to avoid

re-infestation. The upper 50cm of topsoil, which will contain all the crowns and the majority of the rhizome should be stockpiled separately from the other, less infested material. This will avoid burial of the bulk of the rhizome at the bottom of a large stockpile, where it may remain dormant and escape treatment. Regrowth, which will predominantly arise from the stockpile of topsoil can then be treated until the knotweed is killed. Larger pieces of rhizome and crowns can be isolated and burned where appropriate.

Material must not be reused until all the knotweed material has been confirmed as unviable.

Which herbicide should I use?

The most important questions regarding the selection of a herbicide are;
Is the site in or near water?
Do I wish to re-use the soil from the treated area for replanting, and if so, how long before I intend to landscape with it?

Wherever there is a risk of contamination to a watercourse, choice is limited to formulations of Glyphosate and 2,4-D Amine that are approved for use in or near water. Not all herbicides containing these active ingredients are suitable for use in or near water. Use of a herbicide in or near water requires consultation with the Environment Agency.
If the site poses no risk to a watercourse, there is a greater choice of herbicide. Where soil is intended for continued use, or immediate reuse, for landscaping purposes, a non-residual herbicide, such as Glyphosate or 2,4-D Amine would be appropriate. In the event that replanting is likely to be delayed for a period of at least six weeks, a formulation containing triclopyr may be considered. If it is the intention to cover the area in a hard surface, or delay replanting for at least two years, persistent chemicals such as picloram and imazapyr would be appropriate.

Developers are advised to seek the advice of a qualified landscape gardener or BASIS[1] registered pesticides advisor prior to commencing a spraying programme.

When using a herbicide, always adhere to the advice given on the label.

Herbicide	Affects grasses?	Approved for use in or near water?	Persistency
Glyphosate	Yes	Yes	Non-persistent
2,4-D Amine	No	Yes	1 month
Triclopyr	No	No	6 weeks
Imazapyr	Yes	No	9 months
Picloram	No	No	2 years

Under the Duty of Care[2], persistent chemicals must be included within the description of the waste if the material is being disposed of within the period of activity of that particular chemical.

[1]BASIS is an organisation committed to ensuring individuals involved in the handling and use of pesticides are competent. BASIS maintain a register of trained advisors, who need to demonstrate an annual programme of continual professional development to maintain their qualification. Details on the BASIS Professional Register are available from 34, St John Street, Ashbourne, Derbyshire DE6 1GH. Tel: 01335 343945.

[2]Section 34 of the Environmental Protection Act 1990 (EPA90) imposes a duty of care on persons concerned with controlled waste. The duty applies to any person who produces, imports, carries, keeps, treats or disposes of controlled waste, or as a broker has control of such wastes. Breach of the duty of care is an offence, with a penalty of an unlimited fine if convicted on indictment.

Stems must not be pulled, which tends to remove the highly infectious crown material with the stem. Where it is the intention to treat regrowth with a herbicide, cut material should be removed from the treatment area to allow effective spray contact with the emergent growth**.** It should be policy to chemically treat Knotweed, rather than continuously cut the regrowth.

Cut stems should be left in a situation that will encourage drying. This can be achieved by laying the cut stem on the 4 - 8" stumps of the Knotweed, thus preventing contact between the stems and the soil. Once the stems have dried to a deep brown colour they are dead. This is not the case with crown or rhizome material.

If it is intended to bury knotweed on site, it is essential that non-persistent herbicides, such as glyphosate, be used.

Burning & Burial of knotweed

CODE OF PRACTICE FOR THE DISPOSAL OF JAPANESE KNOTWEED ON THE SITE OF PRODUCTION

Where insufficient time is available to ensure complete eradication, it will be necessary to treat the remaining material in a manner that avoids further infestation. It is recommended that, wherever possible, this approach be adopted, even when a chemical control programme has been completed.

Controlled burning of stem and crown material may be used as part of the control programme. This reduces the viability of material and the volume for burial or off site disposal. Such burning must take into account any local by-laws and take account of the potential for nuisance or pollution that may occur as a result of the activity.

Burning in the open may be undertaken in accordance with a registered exemption as described in Paragraph 30 of Schedule 3 of the Waste Management Regulations 1994. The exemption also covers associated storage, which will allow for the drying of the material that is likely to be required before burning can take place. Japanese Knotweed stems can be left on site after cutting in preparation for burning if;

- The stem is of sufficient size to prevent dispersal by wind or traffic movement.
- There is no risk of dispersal into a watercourse.
- The stem has been neatly cut near its base using a cutter, hook or scythe.

Where the activity is taking place on a site other than that specified in para.30 of the 1994 Regulations, then provided all the other criteria are met (including the Relevant Objectives in schedule 4 of the 1994 Regulations) the Agency would not normally consider pursuing enforcement action.

Soil containing knotweed material and burnt remains of knotweed may be buried on site of production. Ideally, at least one application of non-persistent herbicide will have been performed to reduce the vigour of infective material. Soil to a depth of at least 3m and within a perimeter of 7m of the plant growth area should be excavated for burial. Site managers should check the periphery of the excavation for rhizome, to ensure that an adequate volume of material has been removed to account for all of the infective material.

On site burial must be performed to a depth of at least 5m The potentially viable knotweed material should then be covered with a geotextile layer (e.g. Lowtrak) or a heavy gauge polythene sheet prior to infilling.

To ensure compliance with the Wildlife and Countryside Act and reduce the risk of spreading knotweed any such on site burial and any controlled burning must be done in accordance with this code of practice. If on site burial is undertaken in accordance with this code, then enforcement action would not normally follow for not having a Waste Management Licence for those operations that would require one.

Where on site burial is undertaken it is strongly advised that to prevent potential disturbance and re-infestation the burial site location is recorded, and that any future owners are advised of its position.

The local Environment Agency Area office environment protection team must be informed at least one week prior to the burial or burning activity.

Soil contaminated with knotweed may also be stockpiled on an area of the site that will remain undisturbed. Knotweed regrowth should be regularly treated with herbicide to avoid re-infestation.

OFF SITE DISPOSAL

The option to bury material on site is not available where other contamination of the site requires compliance with waste management or other legislation unless it is done in accordance with that legislation. It is important to note that on site burial and/or burning of knotweed contaminated material is primarily an invasive weed control mechanism.

If the development cannot allow for burying or stock-piling infected soil on site, it must be disposed of at an approved disposal facility, having informed the site operator of the presence of viable knotweed within the material.

If off site disposal is used then great care must be taken to avoid loss of material on route. For small quantities this may include sealing the material in black bags. For larger quantities that are being moved in skips or trailers, this will include covering the skip etc. with sheeting.

Landfill operators dealing with material contaminated with Japanese Knotweed must ensure that:

i They are licensed to receive it, and

ii They have sufficient capacity to ensure the material can be dealt with in accordance with the following:

For material, including contaminated soils, rhizome and the crown at the base of the stem.

- Burial to a depth of at least 5 metres, (immediately cover to 1-2 metres, final depth after 2-4 weeks)
- Burial at least 7 metres from the margins of the site or any engineering features, eg drains or bunds, of the site,
- Burial at least 5 metres above the base/liner of the landfill.

Duty of Care for Hauliers

Prior to accepting waste material for transfer or disposal, it must be inspected for knotweed contamination. If knotweed material is found, the waste cannot be regarded as soil or construction material only waste, and inappropriate disposal may result in prosecution. Material containing any infestation of knotweed should be taken to a landfill site or other disposal site that is licensed to receive Japanese knotweed, and the landfill operator must be informed of the nature of the waste so that it can be disposed of appropriately within the site.

Hauliers should not accept such infested waste unless they can guarantee its appropriate disposal. If hauliers are aware of waste producers who are failing to inform their hauliers of the presence of Japanese knotweed, or of hauliers who are knowingly disposing of knotweed infested material in an inappropriate manner, they should inform their local Environment Agency Area office.

Hauliers must also ensure that during the removal of material off site, vehicles do not carry knotweed containing soils on the wheels or bodies of their vehicles and that the vehicle is suitably covered or enclosed to prevent escape during transport. Where the material is being carried to landfill sites for disposal or where vehicles are involved in movements on the site of production great care should be taken to clean off material at the point of discharge so as not to transport the knotweed elsewhere. Vehicles should be brushed down and inspected for trapped pieces of rhizome.

The use of knotweed-infested soils for exemptions under Waste Management Licensing is not appropriate and the Environment Agency would treat any use in such exemptions as not complying with either Section 33 or 34 of the Environmental Protection Act 1990.

Failure to appropriately dispose of any material containing Japanese knotweed may lead to prosecution under Sections 33 and 34 of the E P A 1990 and Section 14 of the Wildlife & Countryside Act 1981.

Remember:

Failure to manage and dispose of Japanese knotweed responsibly may lead to prosecution.

Spreading Japanese knotweed is harmful to native plants and animals.

Failure to manage Japanese knotweed on a development site may result in eventual structural damage, especially to tarmac surfaces.

APPENDIX G

Examples of habitat enhancement measures for bats and birds

SCHWEGLER BAT BOXES (LONG LIFE WOODCRETE BOXES)

Suppliers (prices correct as of Oct 2004):

Alana Ecology
The Old Primary School
Church Street
Bishop's Castle
Shropshire
SY9 5AE

Tel: +44 (0)1588 630173
Fax: +44 (0)1588 630176
Email: sales@alanaecology.com

BRICK BOXES - TO INCORPORATE INTO BUILDINGS

These bat boxes are designed to be built into buildings, or underneath bridges, arches or tunnels, where conditions are relatively humid. There are particularly useful for incorporating into new buildings or bridges to attract bats or to provide new roost sites where existing buildings with bats are being renovated.

N27



This box should be cemented into a wall. It contains a single internal wooden panel which simulates a crevice. The removable front panel allows for easy cleaning. *No painting is required, but if it is necessary, a natural breathable paint should be used*
Woodcrete (75% wood sawdust, concrete and clay mixture)
Width 18cm
Height 29cm
Depth 23.5cm

A02006 N27

No 750/6



This long box can be installed within brick masonry, beneath plasterwork or wood panelling, or incorporated into concrete structures such as factory buildings or bridges. Inside it contains a woodcrete surface, a roughened wood board, and a metal mesh, providing a choice of roosting areas depending on the weather conditions and the bats' habits. This box is maintenance-free as the entrance slit is at the bottom, allowing for self cleaning. *No painting required, but if painting is necessary a natural breathable paint should be used*

Woodcrete (75% wood sawdust, concrete and clay mixture)
Width 20cm
Height 47.5cm
Depth 12.5cm
Entrance width 15cm
Entrance depth 2cm

A02057 No 750/6

GENERAL BOXES

2F Bat Box
A popular general purpose box attractive to the smaller British bats. A simple design with a narrow entrance slit on the front.

Woodcrete (75% wood sawdust, concrete and clay mixture)
Diameter 16cm
Height 33cm

A02002 2F Bat Box



2F-DFP Bat Box
A general purpose box attractive to the smaller British bats, with a roughened wooden panel inside the box which simulates a crevice.
This box is favoured by Daubenton's bat and Nathusius' pipistrelle.

Woodcrete (75% wood sawdust, concrete and clay mixture)
Diameter 16cm
Height 33cm

A02003 2F-DFP Bat Box



2FN Bat Box
A larger box with both a wide access slit at the base and an access hole on the underside. Suitable for the larger British bat species. Particularly successful in attracting noctule and Bechstein's bats.

Woodcrete (75% wood sawdust, concrete and clay mixture)
Diameter 16cm
Height 36cm

A02004 2FN Bat Box



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

A02000 1FF Bat Box



1FD Bat Box
A large general purpose bat box, with two roughened wood panels inside the box which simulate crevices.

Woodcrete (75% wood sawdust, concrete and clay mixture)
Diameter 16cm
Height 36cm

A02058 1FD Bat Box



1FS Bat Box
A larger capacity general purpose bat box.

Woodcrete (75% wood sawdust, concrete and clay mixture)
Diameter 28cm
Height 44cm
Weight 10kg

A02005 1FS Bat Box



1FW Hibernation Box
This monster box is designed to provide a protected environment, particularly through the cold winter months when bats hibernate. It has three internal wooden panels imitating crevices. *Supplied with special fixing brackets. It is important to fit this heavy box very securely if mounting above the ground, and to site it well away from public areas.*

Woodcrete (75% wood sawdust, concrete and clay mixture)
Diameter 38cm
Height 50cm
Weight 30kg

A02001 1FW Hibernation Box



Schwegler 1FQ Bat Box
The latest model from Schwegler is an attractive box designed specifically to be fitted on the external wall of a house, barn or other building. Equally appealing to bats as a roost or a nursery, it features a special porous coating to help maintain the ideal temperature inside as well as a roughened front panel to enable the bats to land securely. Access into the box is via a step-like recess.
Inside the box, rough pieces of wood are incorporated into the back of the box which 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. *Please note that this box is designed to be fitted to a wall. Due to the weight it is unsuitable for fences or sheds.*

Woodcrete (75% wood sawdust, concrete and clay mixture)
Height 565mm; Width 350mm Depth 85mm Weight 13kg

A02092 Schwegler 1FQ Bat Box



BIRD BOX SPECIFICATIONS

Supplier:

Alana Ecology
The Old Primary School
Church Street
Bishop's Castle
Shropshire
SY9 5AE

Tel: +44 (0)1588 630173
Fax: +44 (0)1588 630176
Email: sales@alanaecology.com

Schwegler boxes have the highest occupation rates of all box types. They are carefully designed to mimic natural nest sites and provide a stable environment for chick rearing and winter roosting. They can be expected to last 25 years or more without maintenance

BOXES TO FIT ON/IN BUILDINGS

Sparrow Terrace, Stone Colour House sparrows are gregarious and prefer to nest close to each other, so this woodcrete box provides room for three families under one roof. Made from long-lasting, breathable woodcrete. Stone colour. No maintenance required. Dimensions 245 x 430 x 200 mm. Weight 13kg. Designed for fixing to walls (not suitable for fences or sheds due to the weight of the box). A02085 Sparrow Terrace, Stone Colour (also available in brown)	 .
Schwegler 9A House Martin Double Nest These woodcrete nests are durable and ready for immediate use when birds return each summer. Easily fixed under the eaves on the outside walls of buildings, at least 2 metres from the ground. The backing board may be painted to match the building. Model 9A is a double unit with two nests mounted side by side on a backing board, as shown. Model 9B is similar to the 9A above but with one single nest A02018 Schwegler 9A House Martin Double Nest A02019 Schwegler 9B Single House Martin Nest	
Schwegler No 10 Swallow Box This box should be located inside buildings such as barns, stables, sheds or outhouses, ensuring there is always access for the birds through a window or opening. A02020 Schwegler No 10 Swallow Box	
Droppings Board To avoid problems with bird droppings from house martin or swallow nests, this board can be installed where necessary, for example over a window or door. A02021 Droppings Board	

Schwegler No 16 IMF Swift Box, Double Chamber The design of this box mimics bell tower louvres. It has two removable panels for easy inspection of the two nest chambers. Designed for fixing on or within walls (not suitable for fences or sheds). Dimensions 460mm h x 430mm w x 225mm d A02088 Schwegler No 16 IMF Swift Box, Double Chamber **Schwegler No 16 Swift Box, Single Chamber** Similar to the box above but with a single chamber and single front panel. Dimensions 240mm h x 430mm w x 225mm d. A02087 Schwegler No 16 Swift Box, Single Chamber	
Nest Mould for No 16 Swift Boxes This nest mould fits inside the nest chamber of the No16 or No16 IMF boxes above, to encourage nesting. Research shows that the birds are more likely to nest if a nest mould is used. A02089 Nest Mould for No 16 Swift Boxes	
Schwegler No 17 Swift Box This box is constructed from plant-fibre based material. It should be sited 6-7m above the ground, near the roof of a building or on a steep rock face. Interior dimensions 14 x 14 cm. Outer length 34cm A02041 Schwegler No 17 Swift Box	
Schwegler No 18 Swift Box This nest box is suitable for fixing high under the eaves or under the guttering of a building. Woodcrete on board backing. Interior dimensions 14 x 34 x 15 cm. Exterior dimensions 19 x 50 x 22 cm A02041A Schwegler No 18 Swift Box	
Schwegler N24 Nest Brick Designed for installation into the fabric of a building, this box is suitable for tits and redstart etc. Woodcrete. Weight 7.3kg Entrance hole 32mm Dimensions 180w x 180d x 240h mm A02043 Schwegler N24 Nest Brick	
Schweger N25 Nest Brick Designed for installation into the fabric of a building, this box is suitable for swifts. Woodcrete Weight 8.8kg Entrance hole 55x33mm. Dimensions 260w x 220d x 180h mm A02044 Schwegler N25 Nest Brick	
Schwegler N26 Nest Brick Designed for installation into the fabric of a building, this box is suitable for pied wagtail, spotted flycatcher and black redstart etc. Woodcrete. Weight 5.4kg Entrance hole 110mm Dimensions 180w x 180d x 200h mm A02045 Schwegler N26 Nest Brick	

BOXES TO FIT FENCES, WALLS AND TREES

Schwegler 1B Bird Box, natural brown The most popular box for garden birds, the 1B appeals to a wide range of species, and is the official nest box of National Nest Box Week. The box can be nailed to the trunk of a tree, or hung from a branch. Schwegler boxes have the highest occupation rates of all box types. They are carefully designed to mimic natural nest sites and provide a stable environment for chick rearing and winter roosting. They can be expected to last 25 years or more without maintenance. Woodcrete, 23cm high x 16cm diameter. With standard 32mm diameter entrance hole	
The Bird House A decorative yet practical nest box designed for fixing to a tree trunk, wall or fence using the bracket on the back. It will attract similar species to the standard 1B box. Robust and durable Schwegler woodcrete construction A02084 The Bird House	
Gable Nest Box A substantial wooden bird box with a gable roof and 28mm entrance hole. Made of 15mm thick softwood, external dimensions 14.5cm x 14.5cm x 26cm high (to top of gable). Suitable for the smaller garden birds. A03008 Gable Nest Box	
Wooden Bird Box A simple wooden bird box with sloping roof, suitable for the smaller garden birds. Made from substantial 2cm thick softwood. 14cm w x 18cm d x 26cm h (backplate 33.5cm h). The standard model has a 32mm diameter entrance hole attractive to a wide range of smaller garden birds. A03004 Wooden Bird Box	
Roosting Pockets. These attractive roosting/nest pockets can be used by wild birds in autumn, winter and spring. The birds can save energy during the colder months by roosting in a sheltered place. These pockets also provide a warm nesting place in the spring for smaller birds such as wrens. Made from natural materials. The pockets have a wire at the back to fix onto a branch, or they can be stapled or nailed to a fence or trellis with plant cover. Pack of 3 assorted roost pockets (styles may vary). A02090 Roosting Pockets	

APPENDIX H
Green roofs and green walls

APPENDIX H: GREEN ROOFS AND GREEN WALLS

Green roofs

"Green roofs" or "living roofs" have the potential to benefit urban biodiversity and the wider environment in various ways. Green roofs have been shown to make buildings more thermally efficient, with the wider environmental benefit of reducing fuel consumption as well as running-costs. Green roofs protect the roof structure from the effects of sunlight, prolonging its life and therefore reducing the costs and environmental consequences of replacement of water-proofing membranes. A wide range of benefits have been found to accrue from use of green roofs, including:

- Providing wildlife habitat
- Attenuating rainwater run-off (contributing towards SUDS)
- Trapping and absorbing airborne particulates
- Reducing the "urban heat island" effect
- Providing extra open space, either accessible or providing visual amenity
- Protecting roof structure from UV radiation and temperature fluctuations
- Reducing construction or running costs for drainage, heating and air conditioning

In urban areas, and especially in crowded school sites, it is particularly challenging to maintain and create the natural green spaces that wildlife requires to survive. Rather than fulfil a single function, the roofs and walls of buildings can be transformed into a living skin rather than a series of sterile surfaces protecting the internal environments. Green roofs and green walls, along with nest boxes and other wildlife features, either built into or added to buildings, can support a range of plants and animals identified in biodiversity action plans; including bats, some bird species and various invertebrates including wasps and bees, spiders, and beetle species.

Green roofs have been classified into three main categories:

- Intensive green roofs
- Semi-intensive green roofs
- Extensive green roofs

Intensive green roofs

Intensive roofs can take many forms and are the roof-top equivalent of ground-level gardens or parks, with almost as much scope for variety in planting and layout. For example the landscaping around Canary Wharf station, next to the Thames in London, is all on a green roof structure and comprises large mature trees, lawns, ponds, paving and shrub beds. For intensive green roofs a strong-enough load-bearing structure is required to support the depths of soils to support trees and shrubs as well as the construction materials for paths and walls *et cetera*. These roofs provide accessible external greenspace where the ground level has been covered by paving and the building's footprint. Such schemes also require irrigation to support the large and varied planted biomass and need high levels of maintenance, like any other urban greenspace. The choice of planting treatments is extremely diverse but includes the option of development of a native roof garden, concentrating on local species of known value to local biodiversity.

The intensive green roof is built on multiple layers. Beginning with the substantial structural support, a typical profile would also include: waterproof roofing membrane, membrane protection and root barrier layer, insulation, then a multi-purpose drainage, aeration, water storage and additional root barrier layer, on top of which is the growing medium and then the vegetation.

Semi-intensive green roofs

These roofs are vegetated and still require regular maintenance, including irrigation, feeding and cutting; however, they generally do not incorporate paving or walling and are usually designed to be viewed from surrounding taller buildings rather than directly accessed. Because visual amenity is an important aspect of this type of roof they are usually densely planted, often with a mix of exotic succulent species, and watering may need to be intensive to prevent die-back during periods of drought.

Though a multi-layered structure is still required, the roof itself does not need to be of such heavy construction as roofs with regular use by people and supporting deeper layers of soil. Also each construction layer can be somewhat lighter and thinner than required for a fully intensive green roof.

Extensive green roofs

These roofs require the lightest structure and require only a thin layer of growing medium requiring little maintenance and they are usually not irrigated. There are three main ways of achieving an extensive green roof system:

- Sedum mats
- Green/brown/living roofs
- Substrate-based roofs

Sedum mats

There are now quite a few proprietary mixes of Sedum mat readily available. For this type of roof the structure is waterproofed, then a drainage layer is spread and a moisture retention blanket placed on top of that. This is then topped with a sedum mat, generally about 2cm in depth, which already has a carpet of growing plants established in the light-weight growing medium. The mats are unrolled onto the roof and secured for an instant, but long-lasting effect.



Norfolk Community Primary School, Sheffield. (extensive green sedum roof)

Green/brown/living roofs

This is quite similar to a sedum mat roof, but on top of the waterproofing and drainage layers there is generally a layer of fleece onto which is placed a varying depth (150mm - 300mm) of crushed substrate. This can be local material, brought from ground level and placed on the roof, or materials recycled from building demolition can be used. The surface can then be left to colonise naturally or be seeded with a mix of local wildflowers and grasses. This method can be used to enhance the value of provision of locally distinctive biodiversity on the roof.

Substrate-based roofs

This is very similar to the preceding treatment, but on top of the fleece a 75mm of crushed porous brick is spread, this can then be plug-planted or hydro-seeded with

sedums. Plants of this genus are used that are wind, frost and drought resistant, most of them are non-native but used as a green roof they are wildlife friendly.

Green Walls

These mainly take the form of a wall cladding system composed of self-regenerating climbing plants. Climbing plants have long been a feature of domestic gardens and self-clinging species, such as ivy and Virginia-creeper, will cover large areas of wall space with no further assistance, other than planting them close to the wall. However their growth can be aided by installation of trellises and high-tensile steel cables, allowing light and air all around the plants so that they form dense cover.

These dense layers of vegetation baffle noise reaching the buildings as well as directly provide habitat for invertebrates and nesting birds. By using cables and trellises a wider range of plants can be grown, including honeysuckles, clematis and wisteria. Such green walls will soften the appearance of otherwise blank walls and can dramatically reduce solar gain by shading walls exposed to the sun. Climbers also provide winter insulation, by retaining a pillow of air between the wall and the plants and also reducing wind chill on the wall surfaces. Evergreen species have a greater beneficial regard in this respect than deciduous ones, though these are still of some benefit. Climbers have also been found to be highly effective in trapping airborne dust and in fixing airborne contaminants in their tissues. As well as these wider environmental benefits the populations of insects and spiders they support will, in turn, provide food for bats and insect-eating birds. Green walls will also provide routes linking ground level foliage and habitats with that established on green roofs.

ENGLISH NATURE

Living roofs







working towards *Natural England*
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Living roofs

If you can see any roofs from your house or office, the chances are that they are fairly lifeless and unappealing – perhaps made of bitumen or asphalt. But roofs don't have to be dull and dead.

With effort and imagination, we could change these sterile surfaces into green oases. These would not only provide a haven for wildlife but also transform the view from upstairs windows!



A few pot plants can help to green-up a roof. Dusty Gedge/Livingroofs.org

Some greenery will naturally grow on most roofs. Many roofs are home to some very rare moss and lichen species, especially in areas of low pollution. However, in this booklet the term 'living roof' (or 'green roof') is used to describe a roof that has been intentionally covered in vegetation. These are now very common in countries such as Germany and Switzerland, where they can be found on all sorts of buildings, from factories, hospitals and schools to offices and housing developments. But it's not just large buildings that are suitable for this treatment: there are many opportunities to create living roofs on and around the house and garden – on sheds, porches, outhouses, balconies, garages and small extensions. Even in the inner city, the roofs on housing estates, multiple garages, litterbin sheds and balconies all have the potential to be greened.



Even Portakabins can be given living roofs. ZinCo GmbH

The plants suitable for living roofs are not necessarily those found in a traditional English garden, but they can help create habitats that will attract some very interesting and unusual wildlife.

This leaflet provides some guidance on how you can make a living roof. However, it is only an outline and cannot take the place of expert advice from relevant professionals such as structural engineers, roofing contractors and suppliers.



A living roof on a Norwegian boathouse. Roger Key/English Nature

The case for living roofs

Living roofs are not just good for wildlife: they make a positive contribution to the environment in a number of other ways.

- They help to cool the room below in hot weather. Conversely, in winter a living roof can provide insulation.
- Living roofs act as sponges, retaining water before allowing it to

evaporate into the atmosphere. In heavy rainfall, this can reduce the likelihood of local floods and this is one of the main reasons living roofs are now a legal requirement in Germany.

- They protect a roof's waterproofing from the effects of ultra-violet light and the weather, especially frost. This means that the roof is less likely to leak.



A living roof in Canary Wharf. Dusty Gedge/Livingroofs.org

Types of living roof

Living roofs can vary greatly in their appearance and character. They can be designed to support low-growing mosses and sedums, wildflowers and grasses and even shrubs and trees. Everything depends on the type of roof in question.

There are three basic types: extensive, semi-extensive (also known as semi-*in*tensive), and intensive. These terms relate to:

- the amount and kind of maintenance that each type may require;
- the depth of soil (more usually referred to as 'growing medium' or 'substrate') which may either be natural or manufactured; and
- the type of plants the area will support.

Extensive living roofs
These are the most lightweight and easily-maintained living roofs and are therefore also the most common. They are made using shallow soils, which often dry out. This factor, combined with wind and frost exposure, creates a very harsh environment for plants. To cope with these conditions, any plant living here needs to be tough, hardy and drought-tolerant. These are generally species that, in the wild, grow in coastal, cliff, mountain and dry meadow habitats.

Extensive living roofs tend to have a relatively low weight and are thus the most suitable choice for structures such as sheds, garages and small extensions.

Advantages:
- Light weight: 80 – 120 kg/m^2.
- Shallow soils: depths between 20 mm and 100 mm.
- Can withstand harsh weather conditions (especially lack of water).
- The drought-tolerant conditions are good for a range of species often under pressure in the wild.
- Very low maintenance.

But there are also some disadvantages:

- The most lightweight and shallow living roofs will support only a small range of vegetation.
- Simple living roofs may have limited visual appeal.
- Shallow, extensive living roofs can be very susceptible to severe drought, leading to die back and patchiness.

Semi-extensive living roofs
Also known as 'semi-intensive', these roofs have deeper soils and can support both a greater number and a wider diversity of plants, making them more decorative. However, their depth makes them heavy and they need a relatively strong structure to support them. Semi-extensive living roofs combine some of the low-maintenance and low-input benefits of extensive roofs – especially if naturalistic plantings are used. Some types, though, are effectively small gardens in their own right and need to be tended in the same way, including regular weeding and watering.



Additional supports allow this shed to bear the weight of a semi-extensive roof. Nigel Dunnet

Advantages:

- Can support a wider range of plants and other associated wildlife.
- More decorative than extensive roofs – have a longer flowering season.
- Require less water and other inputs, such as fertilisers.

Disadvantages:

- Need a strong structure to support them.
- Additional maintenance is required – the greater depth of substrate also encourages unwanted plants to grow there.

Intensive living roofs

Intensive living roofs are a third distinct type, but not one considered here. These roofs have very deep substrates, allowing the growth of lawns, shrubs and even trees. They are therefore impracticable in almost all domestic situations.





Before and after. A living roof can brighten up the dullest space. Georgina Cape

Living roof type	Soil or substrate depth	Planting possibilities
Extensive	0–5 cm	Simple sedum/moss communities.
	5–10 cm	Short wildflower meadows. Low-growing, drought-tolerant perennials, grasses and alpines, small bulbs.
Semi-extensive	10–20 cm	Mixtures of low or medium perennials, grasses, bulbs and annuals from dry habitats. Wildflower meadows. Hardy sub-shrubs.

Which roofs are suitable?

Flat roofs lend themselves most readily to being 'greened'. It is also possible to green other types such as pitched, barrel and domed roofs. In these cases, however, restraints are needed to ensure that the growing medium does not slide off. Roofs with very steep slopes are clearly not suitable!

Garages

- Garages with tiled or corrugated roofing may not be able to have a full living roof. The structure may need to be assessed. However, encouraging moss on the roof will provide habitats for invertebrates and feeding areas for birds such as blackbirds.
- Garages with flat asphalt roofs should be able to support a lightweight living roof such as a sedum blanket or, if a concrete deck has been used, a deeper substrate-based, extensive living roof that can be used to grow wildflowers.

Sheds

- As sheds are generally very lightweight structures, even putting on a sedum blanket may be inadvisable without some



A living roof prior to planting and seeding. Dusty Gedge/Livingroofs.org

structural strengthening. However, it is easy to encourage moss to grow on sheds.

- It is often reasonably easy to provide added structural support to a commercial shed, so allowing a heavier, wildflower-rich living roof to be installed.

Extensions, outhouses and balconies

It should be possible to install living roofs on small extensions, outhouses and balconies. Again, whether a sedum mat system or a heavier substrate-based system is used will depend on the structure below.



Sedum mat on the roof of an extension. Jeremy Linden

Building a living roof – the basics

While the exact choice of the type of living roof to be used will depend on the strength of the individual building concerned, it is always vital to ensure that:

- The existing waterproofing is sound and does not leak. It may be advisable to renew the roofing layer before any installation takes place.

- The structure of the building to be converted is sound and can take the load.

The need to take expert advice on these two essential matters cannot be over-emphasised.

How to do it

In some cases the cost of specialist living roof products may exceed the original cost of the building itself. However, it is possible to put together a small-scale living roof using materials available in most garden centres and hardware shops.

It is possible to encourage mosses and lichens to grow on a lightweight building without much work or expense. However, if a roof is to support flowering plants, it requires a series of layers.

The basic elements of any living roof system are these:

- **Waterproof layer.** The base layer. Added to the existing surface, this will give greater security and peace of mind even if the roof is already soundly waterproof.

- **Root membrane.** Waterproofing layers, such as asphalt and bitumen, are very susceptible to damage from plant roots and any root penetration may lead to leaks. A pond liner or butyl lining or 300 micron damp-proof polythene should be laid over the waterproof layer and, wherever possible, in one continuous sheet. Otherwise, the sheets should overlap by at least 20 cm.

- **Filter sheet.** This sheet allows water to drain off the roof but stops the escape of fine materials in the substrate.

- **Moisture blanket.** For extensive living roofs, this blanket will



Filter sheet. Dusty Gedge/livingroofs.org

ensure that the growing medium (the soil or substrate) retains enough moisture to support life. Commercial ones can be bought which do not degrade but it is possible to use cardboard or old blankets to achieve the same effect.

- **Drainage layer.** Like the moisture blanket, this helps to retain moisture while allowing excess water to drain away. Commercial systems store water and are made of plastic or geotextile materials.



Drainage layer. Dusty Gedge/Livingroofs.org



A mini living roof! Dusty Gedge/Livingroofs.org

- **Soils and substrates.** The top layer. The growing medium should be lightweight and free-draining yet of a material that retains moisture. Many people use aggregates mixed with light sub-soils such as crushed porous brick and limestone chippings.



Well-drained substrate. Dusty Gedge/Livingroofs.org

- **Seeds and plants.** Sow seeds on the substrate, or put in plug plants (small plants in individual cells) and watch them grow!

Plants and living roofs

Mosses and lichens

The lightest living roofs – and the simplest to create – are those supporting mosses and lichens.

Mosses are a group of small green plants that do not flower or fruit but produce spores. They require such small amounts of nutrients that many species are able to live in inhospitable places, clinging to walls and stone and tiles waiting for rain.

The 'moss forest' provides cover for thousands of microscopic animals, such as water bears (*Tardigrades*), and a habitat for other invertebrates which, in turn, are food for birds. Moss on buildings is often – and unfairly – associated with neglect, but it can bring many of the benefits of a living roof, such as shielding the roof from ultra-violet light, absorbing water and cooling.

Lichens are composite, symbiotic organisms made up of fungi (which dominate) and algae or cyanobacteria. Food manufactured by the vegetative element of the organism through photosynthesis is enjoyed by the host fungus. As a result, lichens are able to survive extremes of temperature and drought and can colonise surfaces too sterile for most other organisms (including metal, glass and plastic).

Look closely and you will see that these anciently-evolved plants adorn even the most urban environment. Walls often support the grey cushions of the moss *Grimmia pulvinata* or the conspicuous yellow seta (stalk-like structures) of wall screw-moss *Tortula muralis*. Where there is enough moisture, carpet-forming mosses like rough-stalked feather-moss *Brachythecium rutabulum* may be found. That yellow crust you can see on many tiled roofs is *Xanthoria* lichen.





Although it is possible to encourage or cultivate lichens and mosses, patience is required because these are relatively slow-growing organisms. Some lichens, for example, may grow less than a millimetre a year!

There is a centuries-old tradition of growing moss gardens in Japan. Self-established moss carpets can be encouraged on a layer of sandy soil 20 mm

Top: Wall screw-moss *Tortula muralis*. Ron Porley/English Nature
Bottom: The moss *Grimmia pulvinata* forms attractive cushions. Ron Porley/English Nature

deep or less and, if kept damp, moss communities will establish themselves here through airborne spores. If you can find moss which has been stripped from a building (by those who do not appreciate it!) you can replant these sods on your own roof. Even if planted sods fail, they will encourage the colonisation of other, better-suited mosses.

It's worth noting that various species of moss will flourish on the sedum-type living roofs discussed below.

A number of companies specialise in providing pre-grown moss mats and other means of speeding up moss growth.

Sedum roofs

Sedums are the most widely-used plants for living roofs as they have many advantages in terms of hardiness and drought tolerance. Being succulents, they actively store water in their tissues and have a number of ways of reducing their need for water in dry weather.

Under conditions of severe stress many sedums change colour from green through to red, purple and brown. Although they are very tough, you must remember that sedums growing on very thin substrates, or on simple moisture mats, may die back and become patchy during periods of extreme dryness.





Above: Biting stonecrop *Sedum acre* thrives on well-drained ground and has spectacular flowers.
Roger Key/English Nature
Right: Bumblebees enjoying sedum on a roof. Nigel Dunnet



Grasshopper on *Sedum album*. Native sedum species are preferred, however. Dusty Gedge/Livingroofs.org

Commonly-used species on living roofs include white stonecrop *Sedum album*, *S. hispanicum* and *S. reflexum*. These species are not native, however, so for preference use biting stonecrop *Sedum acre*, a relatively common native of rock outcrops and old walls. All sedums are evergreen and most low-growing species flower for a relatively short period in midsummer. White stonecrop and biting stonecrop have some of the most spectacular flowering displays and are very attractive to bees, butterflies and other insects.

There are three main ways to establish a sedum roof.

- **Seeding.** Although this is the cheapest option it will take time for the plants to fully cover the area.
- **Cuttings or plugs.** Place plants across the roof area.
- **Commercial pre-grown sedum blankets.** These can be rolled out on to the surface of the roof or the growing medium. A few companies now supply these mats ready-impregnated with wildflower seeds to increase the diversity of plant species.

Wildflower roofs

The conditions on a living roof (free-draining substrates with low fertility) are ideal for the creation of highly diverse and species-rich grassland plant communities. More often than not, these dry grassland 'roof

meadows' are more successful than those that people try to grow in their gardens.

Rooftop meadows have a number of advantages:

- A diversity of flowering plant species will result in a longer overall flowering season, thereby extending the period during which the roof flora acts as a nectar source for insects. Late-flowering species are particularly useful in this respect.
- If the meadow is left uncut throughout autumn and winter, the standing seed-heads will provide food sources for seed-eating birds, and the dried-out stems and stalks will provide over-wintering shelter for a range of invertebrates.
- Living roofs can support local or regional plant communities and vegetation types that might be endangered in the wild.



Above: A living roof planted with wildflowers. Dusty Gedge/Livingroofs.org. Below: Many species appreciate dry grassland as a habitat. Mathew Frith



Calcareous grassland living roofs

The use of limestone chippings and mixtures of crushed brick and concrete will allow a calcareous meadow to develop. Such meadows are very species-rich and can still be found in the wild on steep slopes and the remnants of unploughed pasture. The soils on these habitats are thin, typically between 50 mm and 100 mm – the same sort of depth as that on an extensive living roof. In the wild, these grasslands can support as many as 30 to 40 species per square metre, so even a small living roof will, potentially, be home to many different plants.

Where living roof substrate depths are relatively shallow (50–100 mm) low-growing and creeping species such as the following may be planted.

Common bird's-foot-trefoil	*Lotus corniculatus*
Cowslip	*Primula veris*
Harebell	*Campanula rotundifolia*
Hawkweeds	*Hieracium* spp
Horseshoe vetch	*Hippocrepis comosa*
Kidney vetch	*Anthyllis vulneraria*
Lady's bedstraw	*Galium verum*
Common rock-rose	*Helianthemum nummularium*
Salad burnet	*Sanguisorba minor*
Small scabious	*Scabiosa columbaria*
Thyme	*Thymus polytrichus*



The distinctive yellow flowers of common bird's-foot-trefoil *Lotus corniculatus*. Roger Key/English Nature

At greater depths (100–150 mm) these plants are suitable:

Field scabious	*Knautia arvensis*
Greater knapweed	*Centaurea scabiosa*
Wild marjoram	*Origanum vulgare*
Viper's bugloss	*Echium vulgare*

It is better not to seed a living roof with grasses as they may out-compete wildflowers. Many wildflowers will colonise your roof naturally but it is worth adding seeds of wildflower annuals as they provide an early burst of colour and many are becoming very scarce in the UK. Examples include scarlet pimpernel *Anagallis arvensis*, cornflower *Centaurea cyanus*, corn marigold *Chrysanthemum segetum*,

corncockle *Agrostemma githago*, wild pansy *Viola tricolor* and scentless mayweed *Tripleurospermum inodorum*.

Establishing rooftop wildflower meadows
Wildflower meadows can be established in a number of ways.





Top: Cornflower *Centaurea cyanus*.
Peter Wakely/English Nature
Above: Scarlet pimpernel *Anagallis arvensis*.
Paul Glendell/English Nature

Seeding is the most cost-effective method. Mixing the seed with a quantity of sand prior to sowing allows a more even spreading of seed across the surface. If you are sowing on to a sloping roof it can be beneficial to tack an open hessian or jute mat over the sown mix to protect the soil from heavy rain.

Wildflower plants can also be established using plugs or small pot-grown plants. This is more costly, but gives you greater control over the composition of the roof flora. A combination of seeding and planting can also be effective. Both seeding and planting are best done in the autumn and spring. Dry summer weather should always be avoided.

Maintenance

Most people want a living roof that is low on maintenance. As with all other types of garden and landscape, the amount of work needed will depend on the intended outcome! If a perfect, manicured green space is what's required then the area will need a lot of attention. However, extensive living roofs need relatively little maintenance. Semi-extensive areas will need more attention to keep them looking good and to maintain their diversity of species.

Sedum roofs
If a pristine green carpet of sedums is the goal, then this will mean a fair amount of weeding to control invading plants. This may have to be done two or three times a year. However, a less intensive regime will result in the development of a more mixed vegetation, as grasses and other plants invade. If a sedum living roof is left largely unmanaged it is likely to gradually develop into a more mixed community, with a greater proportion of grasses in the vegetation. However, some maintenance – even if you only intervene once a year – should be done to remove invading woody plants (such as birch tree seedlings) that have the potential to disrupt, or even puncture, the waterproof lining of the roof.



This living roof has been designed to incorporate many different habitats. ZinCo GmbH

Wildflower roofs
For extensive living roof types it should be possible to develop a wildflower meadow with little or no intervention. Low fertility substrates will give rise to short vegetation that will not need cutting back each year. Where growth is more productive or tall – as on a semi-extensive living roof – it will be necessary to cut back and remove growth every year. This will prevent the died-back remains of the previous season's growth, accumulating on the surface of the roof. Unlike conventional meadows, which are normally cut in summer, it's recommended that roof meadows are cut back in late winter. Leaving the dried and dead vegetation in place not only provides over-winter

shelter for invertebrates and food for seed-eating birds, but also a degree of protection to the plants beneath it during severe weather. It can also look attractive.



Field scabious *Knautia arvensis*, although in this case the field is on the top of a building! Mathew Frith

Bugs and living roofs

Common, widespread and highly mobile invertebrates will easily colonise living roofs. Examples found so far include many ladybird species as well as various shieldbugs, hoverflies, bees and grasshoppers. But since these species occur anyway in our well-tended and nutrient-rich gardens, living roofs offer them little extra. However, the owner of a good, dry grassland roof can hope to attract some of the more unusual and scarce insects that are linked with similar habitats in the wild.

A key feature of living roofs is that the growing medium is made up of substrates such as crushed brick with only a little soil mixed in. This means that they are nutrient-poor, sparsely vegetated, well-drained and both dry and warm, with areas of bare ground. In turn, the invertebrates they support are those that are warmth-loving (or heat-tolerating) species. These tend to be those with a rather Mediterranean distribution in Europe, and which in Britain are therefore right at the very northern and western edge of their range.

Such species are normally associated with habitats such as sandy heaths, chalk downs, coastal cliffs, dunes and brownfield sites (land that was previously developed, then left to run wild). As a result of changing land-use, many of these formerly open habitats are now in danger of becoming smothered by scrub and so losing their important floras and faunas. Many nationally scarce insect species occur on brownfield sites and some of these are now turning up on living roofs in England.



The insects found in dry, warm habitats often include the rare and the unusual, for example (from top) a squashbug *Syromastus rhombeus*, a weevil *Ceutorhynchus geographicus* and the leafhopper *Aphrodes bifasciatus*. Roger Key/English Nature

Try to imagine a living roof as a rockery, with boulders, gravel and other rough, dry substrates decoratively arranged with only a little soil. Instead of the traditional alpine and succulent garden plants, populate it with native species. Plants like kidney vetch *Anthyllis vulneraria*, horseshoe vetch *Hippocrepis comosa*, bird's-foot-trefoils *Lotus* species, salad burnet *Sanguisorba minor*, toadflax *Linaria vulgaris* and native grasses are all associated with unusual insects which feed on them. Clovers – *Trifolium* species – are valuable forage plants for bumblebees, including the declining *Bombus sylvarum* and *B. humilis*. Wild mignonette *Reseda lutea* and weld *R. luteola* are visited by tiny white-faced bees (*Hylaeus* species), many of which are very rare. Other important nectar and pollen sources for bees, wasps, hoverflies and butterflies are ox-eye daisy *Leucanthemum vulgare*, various hawkbits, *Leontodon* species and common cat's-ear *Hypochaeris radicata*.



Wild mignonette *Reseda lutea*. Roger Key/English Nature

A good living roof will also attract ground-dwelling insects such as predatory ground beetles and root- or seed-eating invertebrates. These particularly favour loose, dry soil into which they can burrow among the plant roots, or areas under larger rocks and stones. Such soil also suits a wide range of soil-nesting solitary bees and wasps. Unusual visitors you might see include the bombadier beetle *Brachinus crepitans*, the Adonis ladybird *Hippodamia variegata*, mining bees and sand wasps, such as the sand-tailed digger wasp *Cerceris arenaria* and the ornate-tailed digger wasp *C. rybyensis*.

Small logs laid across the substrate will not only provide shelter for insects but also make nesting sites for the many small bees and wasps that burrow into dead timber. Unlike logs resting in the moist humus of garden topsoil – which rot down through the actions of beetle larvae and worms – these roof logs become sun-baked and hard, providing a different but nevertheless important habitat for insects.



A mining bee *Andrena clerkella* laden with pollen. Roger Key/English Nature



The sand-tailed digger wasp *Cerceris arenaria*. Roger Key/English Nature



Sun-baked logs make a valuable habitat for many species. Dusty Gedge/Livingroofs.org

Butterflies

A living roof is a great place to encourage those butterfly and moth species not normally found in rich, lush gardens. Being both low in nutrients and well-drained, such roofs allow food plants for a number of important butterfly and moth species to flourish. Horseshoe vetch, kidney vetch and bird's-foot-trefoil, for example – all with beautiful yellow flowers – are important food plants for butterflies such as the dingy skipper and the common blue. As with other invertebrates, some of the species in the list below like bare areas of brick, shingle or gravel on which to sun themselves.

Butterflies associated with dry habitats that may use living roofs

Species	Substrates	Foodplants
Brown argus	Chalk to acid	Rock-rose, dove's-foot crane's-bill, stork's-bill species
Common blue	Chalk to acid	Mainly bird's-foot-trefoil species and black medick
Dingy skipper	Chalk, neutral species	Horseshoe vetch and bird's-foot-trefoil
Grayling	Heath, sand, chalk	Grasses
Small copper	Chalk to acid	Common and sheep's sorrel
Small heath	Chalk to acid	Fine grasses
Wall	Chalk to acid	Grasses



The common blue butterfly *Polyommatus icarus* will be attracted to bird's-foot-trefoils. Roger Key/English Nature



The grayling butterfly *Hipparchia semele* prefers grasses. Roger Key/English Nature

Birds

Even a small living roof can provide a good feeding area for common bird species such as blackbird, song thrush, robin and wren. Dry grassland roofs, with plenty of good seed plants will attract seed-eating birds such as goldfinch, linnet, greenfinch and chaffinch. If the roof is in Birmingham or London it may even attract a black redstart, a bird rare in Britain but one well known for using living roofs on the Continent.





Centre: Robins will be attracted by the invertebrate food to be found on living roofs. Chris Gibson/English Nature
Right: A Black redstart. Rare in Britain, these birds often use living roofs on the Continent. B. Borrell Casals/ FLPA

Designing living roofs for wildlife

The best design is one that provides a range of microhabitats for wildlife. Even a small roof may provide a number of miniature habitats, ranging from the bare and dry to the tall and verdant, benefiting many plants and bugs. Do, therefore, think about the following, if the structure allows:

- Try to ensure that your roof has areas of shingle, gravel and stones that will remain relatively bare. Such areas will provide a sanctuary for species that like bare, dry ground. Small geometric areas covered in gravel, or the addition of rock cairns, can also give a 'landscape' feel to a living roof. Even on a deeper semi-extensive roof, consider having some shallow, bare areas to increase the range of habitats.
- Even on shallow extensive living roofs there may be areas that can hold deeper substrates. If there is a supporting structure such as a wall or a pillar below, a mound or a ridge of deeper substrate could be applied above. This will allow taller vegetation to grow.
- Placing small boulders and dry rotting logs on the roof can provide important microhabitats for bugs, fungi and other species.
- Use a native seed mix or plug plants, preferably from a recognised supplier. A cheaper alternative is to collect your own seeds from a local meadow, wasteland or dry grassland site (assuming you have permission from the owner!)



A green oasis. Dusty Gedge/Livingroofs.org

Enjoy it

Designing and tending a living roof in the garden should be fun. If, over time, things do not develop quite as expected then add a little more substrate where possible or sow a few more seeds, or both. Get up on to the roof and have a look at the bugs and beasts that you have attracted. Above all, let other people know and help spread the word!

Please remember to seek out and follow all relevant safety advice when accessing roofs and high places.

In the construction industry around one-quarter of all deaths and serious injuries are due to falls from ladders.

If using a ladder or other equipment, please refer to and follow the manufacturer's safety instructions.

Both English Nature and Livingroofs.org are keen to hear from people who have made a living roof in or around their garden.

Please contact:
gardenroofs@livingroofs.org.uk or
steve.berry@english-nature.org.uk

Pictures courtesy of Zinco GmbH, Livingroofs.org, Nigel Dunnet, Mathew Frith, Georgina Cape, Jeremy Linden

Finding out more

For further information on living roofs and biodiversity go to www.livingroofs.org or www.greenroofs.com

Nigel Dunnet and Noel Kingsbury *Planting Green roofs and living walls*. Timber Press 2004

Green roofs: their existing status and potential for conserving biodiversity in urban areas.
English Nature Research Report No. 498. 2003

Jacklyn Johnson and John Newton. *Building green: a guide to using plants on roofs, walls and pavements*. 2004
Available from www.london.gov.uk

Useful organisations

Buglife
170A Park Road
Peterborough, PE1 2UF
Tel: 01733 201 210
www.buglife.org.uk

Royal Horticultural Society
80 Vincent Square
London, SW1 P 2PE
Tel: 020 7834 4333
info@rhs.org.uk

The Wildlife Trusts
The Kiln
Waterside
Mather Road
Newark, NG24 1WT
Tel: 01636 677711
www.wildlifetrusts.org

Plantlife
14 Rollestone Street
Salisbury
Wiltshire, SP1 1DX
Tel: 01722 342 730
enquiries@plantlife.org.uk

This English Nature leaflet is one of a series about gardening with wildlife in mind. The others are:
Wildlife-friendly gardening: a general guide
Plants for wildlife-friendly gardens
Amphibians in your garden
Reptiles in your garden
Minibeasts in your garden
Focus on bats
Composting and peat-free gardening
Meadows – how to create one in your garden
Garden ponds and boggy areas: havens for wildlife
Dragonflies and damselflies in your garden
Enjoying moths and butterflies in your garden
Mammals in your garden
Wildlife on allotments
Birds and your garden.

In preparation:
Another kingdom: fungi in your garden
Green gems: mosses and liverworts in your garden
Not all bad: slugs and snails in the garden
How does your garden grow?
Children and wildlife.

All leaflets are freely available from the English Nature Enquiry Service on 01733 455100/101/102 or e-mail enquiries@english-nature.org.uk

English Nature also produces an interactive CD: *Gardening with wildlife in mind*. This has detailed texts and photos of 500 plants and 300 of the more common garden ‘creatures’, and shows how they are ecologically linked.

Details from The Plant Press, Freepost, Lewes, BN7 2ZZ. Alternatively, call John Stockdale on 01273 476151 or e-mail john@plantpress.com

ENGLISH NATURE

English Nature, the Rural Development Service, and the Countryside Agency. Working in partnership to conserve and enhance our landscapes and natural environment, to promote countryside access and recreation as well as public well-being, now and for future generations.





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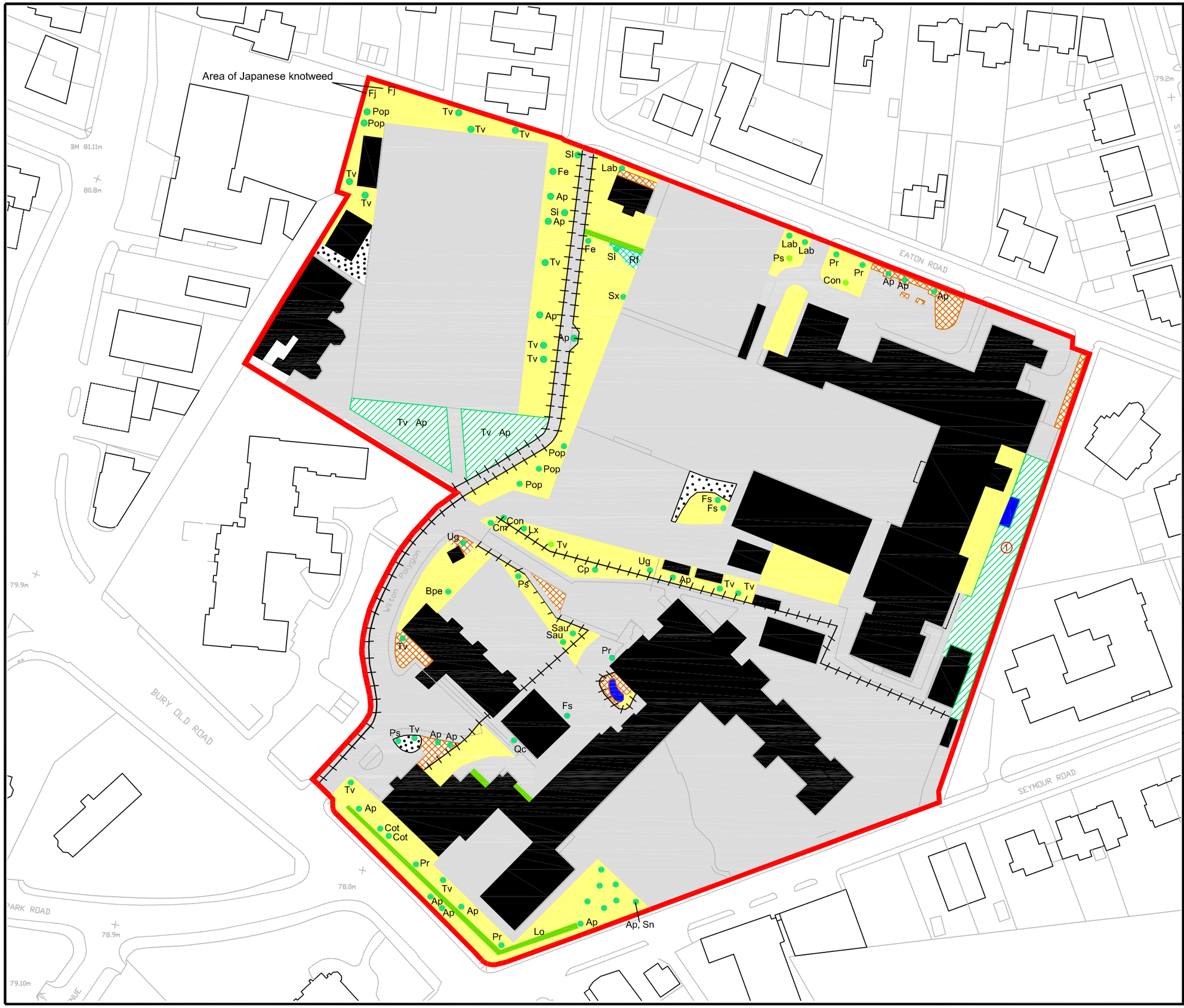
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Front cover photographs:
Main shot: A meadow on a shed. James Farrell
Top left: Thyme growing on an urban living roof. Nigel Dunnett
Bottom left: Blue butterfly *Polyommatus icarus.* Roger Key/English Nature

DRAWINGS



Key

- Site Boundary
- Broad-Leaved Plantation
- Continous Scrub
- Scattered Broad-Leaved Trees
- Scattered Coniferous Trees
- Standing Water
- Amenity Grassland
- Introduced Shrub
- Species-Poor Hedge
- Fence
- Buildings
- Bare Ground
- Hard Standing
- Target Note

Ap	Sycamore
Bpe	Silver birch
Con	Conifer
Cot	Cotoneaster sp.
Cp	Ornamental thorn
Cm	Hawthorn
Fe	Ash
Fj	Japanese knotweed
Fs	Beech
Lab	Laburnum
Lo	Privet
Lx	Larch
Pop	Balsam poplar
Pr	Cherry
Ps	Scot's pine
Qc	Turkey oak
Rf	Bramble
Sau	Mountain ash
Si	Swedish whitebeam
Sn	Elder
Sx	Weeping willow
Tv	Lime
Ug	Wych Elm

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Rev	Description	Drawn	Approved	Date

TEP
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Project

Manchester Schools Framework

Title

King David High School Phase 1 Survey

Drwg No
D1179.005

Scale	Date
1:1000 @ A3	17/07/06

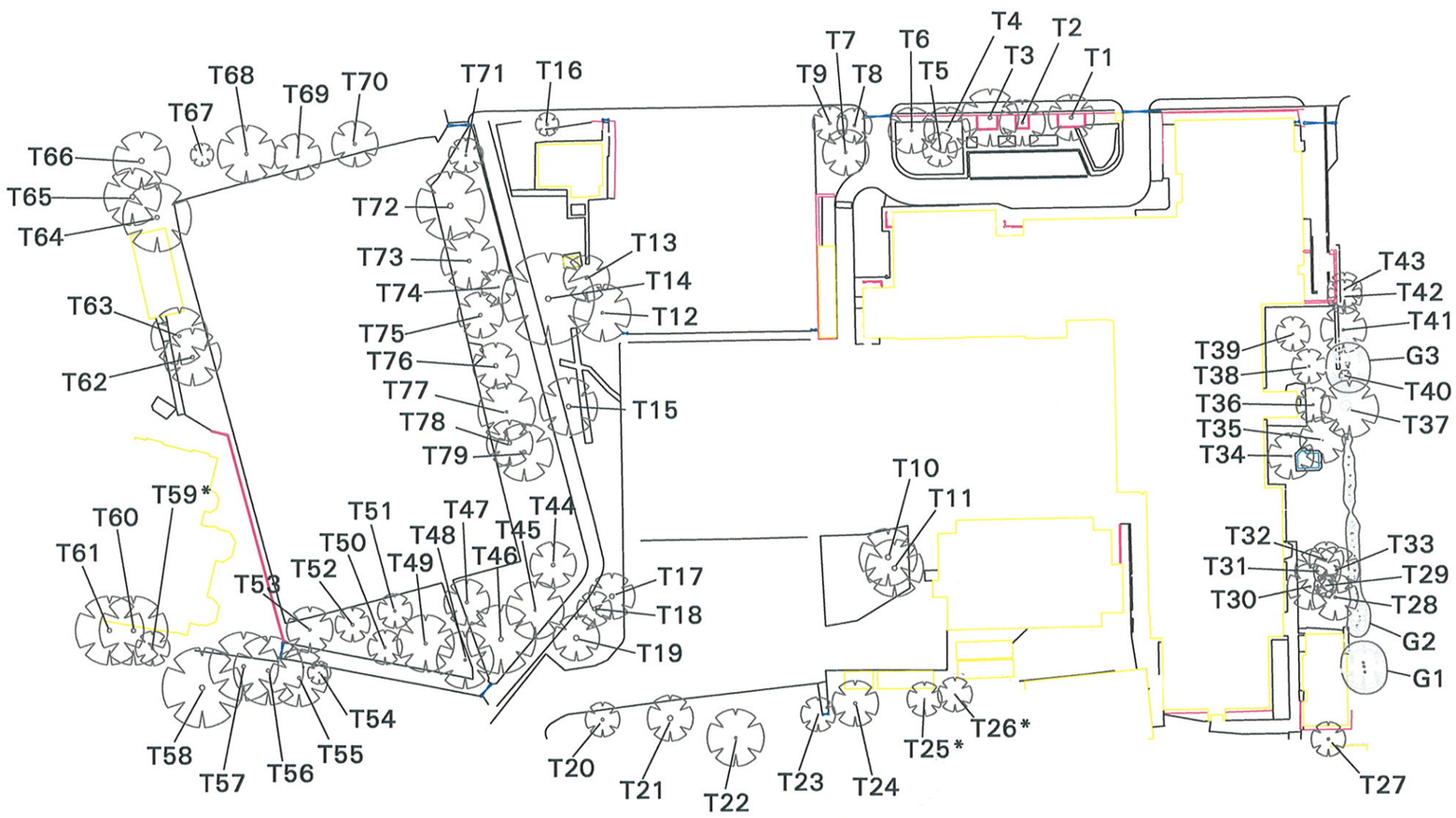
Drawn	Checked	Approved
MH	PG	FH

KEY

T — Individual Tree

G — Tree Group: Trees of similar age and condition

* — Denotes tree not marked on supplied topo so indicated position is approximate



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TEP
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Project

Manchester Schools Framework:
King David
Output Stage One

Title

Tree Location Plan

Drwg No		
D1209.KD.001		
Scale: 1:1000 @ A3		Date: 19/07/06
Drawn: AM	Checked: JH	Approved: PM

...\D1209.KD.001 Tree Location Plan.dwg 8/22/2006 16:55:43