
**St Michael's Primary School, Reading,
Berkshire RG30 4AS**

Extended Phase 1 Habitat Survey

March 2018

on behalf of Reading Borough Council

Client	Reading Borough Council
Job name	St Michael's Primary School, Reading, Berkshire RG30 4AS
Survey date	13 th February 2018
Report date	29 th March 2018
Report title	Extended Phase 1 Habitat Survey (Update)
Reference	W2758_rep_St Michael's Primary School_29-03-18

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1 Summary

- An extended Phase 1 habitat survey of St Michael's Primary School was undertaken by Robbie Birkett MSc on 13th February 2018
- Habitats were described and evaluated with notes made on features of ecological interest.
- The school buildings were surveyed for bats and evidence of bats in accordance with good practice guidelines published by the Bat Conservation Trust (2016). The buildings were also assessed for their potential to offer shelter to roosting bats.
- The site was evaluated in accordance with the *Guidelines for Ecological Impact Assessment in UK and Ireland* (Chartered Institute of Ecology and Environmental Management 2016).
- No evidence of bats was found and the buildings are considered to have little or no potential to offer shelter to bats within an undetected roost site.
- Habitats within the site are considered to be of low ecological value overall, with buildings, hard-standing and amenity grassland evaluated as having negligible ecological value. Planted trees within amenity grassland areas, flowerbeds and shrub planting are considered to be of value within the context of the site only.
- The site is generally poor for protected/notable species although breeding birds and foraging bats may use certain habitats within the site (planted trees and shrubs).
- A log pile in the eastern corner of the site offers suitable habitat for saproxylic invertebrate species such as the stag beetle *Lucanus cervus*.
- No further ecological surveys are considered necessary.
- No significant impacts on bats or their roost sites are predicted under The Conservation of Habitats & Species Regulations 2017 and a European Protected Species (bat) Licence is not considered to be necessary for proposals to proceed.
- Recommendations are made with regard to retention and protection of planted trees and for careful work practices and habitat enhancements for stag beetles and birds.

2 Introduction

2.1 Site Description & Context

St Michael's Primary School is situated within the suburb of Tilehurst, to the south-western side of the town of Reading in Berkshire. The school is located to the south-eastern side of Dee Road, to the north of The Meadway (see Appendix 2 for a location plans). The approximate Ordnance Survey grid reference for the school is SU 680 730.

The study site comprises buildings, areas of tarmacked hard-standing (playgrounds and car parks), areas of amenity grassland (some of which are planted with shrubs and trees) and flowerbeds. The school buildings include an original mid-20th Century structure of brick construction; a very modern classroom block of brick, concrete and steel construction and two single storey prefabricated terrapin buildings. The boundaries of the site are all marked by metal and wire fences which separate the school grounds from adjacent residential gardens.

The school is surrounded by areas of built development within the suburbs of Reading, predominantly residential properties with small gardens. Although dominated by built development there are a number of remnant woodlands within the suburb of Tilehurst. Significant habitats such as extensive woodland, wetland or unimproved grassland are absent from the immediate environs of the site.

2.2 Background

St Michael's Primary School was the subject of a previous extended Phase 1 habitat survey undertaken on the 5th November 2013 by Tracy Gray BSc GradCIEEM of Windrush Ecology Ltd. The school site has subsequently undergone a number of changes, including the demolition of two buildings and the erection of a new classroom block and terrapin building.

The current report presents the updated results of an extended Phase 1 habitat survey carried out by Windrush Ecology Ltd in February 2018.

2.3 Proposed Works

There is a proposal to expand the school. The exact scale and layout of the proposals for the site were not known at the time this report was prepared.

2.4 Aims of Study

The aims of this study are to describe and evaluate the habitats present within the site and to assess the potential for protected/notable species to be present within the school and its grounds. This report discusses the findings of an extended Phase 1 habitat survey of the site and makes preliminary recommendations for further survey work in light of these results.

One specific aim of this study is to re-survey the school buildings for bats and/or evidence of bats and to re-assess the overall potential of the buildings to support roosting bats.

2.5 Bat Ecology

Bats are the only mammals to have developed the ability of true flight. At present, over 1,100 species of bat are recognised worldwide, making bats the second largest mammal group after rodents. As well as flight, bats have evolved a system of navigation and orientation using echolocation which has allowed many species to become nocturnal. There are 18 species of bat that occur within the British Isles, of which 17 are known to breed here. More species occur in the south and west of the country, with species numbers declining towards the north and into Scotland.

All bat species in the UK are nocturnal and feed exclusively on insects (they are insectivorous) which they catch in flight during their night-time activity, using echolocation to locate and home-in on their prey. Bats will roost during the daytime and seek out dark, enclosed and undisturbed places in which to do so, often using a variety of roosting sites within their home range. Different

roost sites are used for different purposes (such as mating, giving birth and hibernation) and at different periods of a bat's life cycle.

During the summer, female bats will gather together in a maternity or breeding roost. In the UK, this starts to occur towards the end of May and the females will seek out a warm and undisturbed site in which to give birth. Because maternity roosts require a particular set of environmental attributes (such as location, temperature, orientation and size), breeding bats tend to return to roost and breed in the same locations year after year. Given that bats live a relatively long time (anywhere from 10-20 years), and only give birth to one pup a year, maternity colonies are crucial to the reproduction and survival of the local population and can be very sensitive to environmental change.

Relatively little is known about hibernation roosts, as tracking and locating hibernating bats is very difficult. However, many species (particularly those within the genera *Myotis* and *Rhinolophus*) have been found within underground sites such as caves, mines and cellars, where the temperature remains constant and low throughout the winter allowing the bats to remain in a state of torpor. The spring and autumn are periods of transition and bats can use a number of different locations on a temporary basis, often moving between roosts as environmental conditions change and temperatures fluctuate. In the autumn, bats will mate and it has been shown that male and female bats will gather at particular locations (such as a building, cave or tree) to meet, socialise and mate.

Bats choose to roost in a number of different locations, depending on the species, their activity pattern and the period of their lifecycle. Certain species, such as the pipistrelles, favour crevices and small cavities for roosting and will use features such as cracks, crevices and small rot holes in the boughs and trunks of trees and within certain features of buildings such as boxed eaves, gaps under roof tiles, hanging tiles and soffit boards. Other species favour large, uncluttered roof spaces and lofts within buildings where they can hang up on the underside of the roof and use the interior space for flying prior to emergence. Hollow trees, cellars, caves, barns, churches and cavity walls can also all be used for roosting, given suitable access. Certain species, such as the noctule, favour roosting sites within trees whilst others tend to favour buildings. Roost sites may be used by only a very small number of bats, such as solitary males, or may offer shelter to tens or hundreds of bats within maternity and hibernation roost sites.

The suitability of roosting sites is also highly influenced by the location or context of a tree, building or cave. Roost sites are most often favoured when they are within close proximity to foraging habitats and where those habitats are connected to one another within the landscape by features such as hedgerows, woodlands, rivers or sunken lanes along which bats disperse and 'commute' from place to place. Suitable foraging habitats are any places where insect prey is diverse and abundant such as woodlands, ponds, lakes, rivers, scrub, hedgerows and unimproved grassland or pasture. Thus, the ecological context of a site is very important for determining if bats may be present within a roost and the potential for a roost to be present tends to be much higher within rural or village locations.

3 Methodology

3.1 Desk Study

The Thames Valley Environmental Records Centre (TVERC) was contacted to collate records that it holds for protected/notable species and non-statutory sites of nature conservation importance within a 1km radius of the site. The data request was undertaken in February 2018.

The Multi-Agency Geographic Information for the Countryside (www.magic.gov.uk) website was searched for information regarding internationally protected sites (e.g. Special Areas of Conservation) within 5km of the survey area and statutory sites of nature conservation importance (e.g. Sites of Special Scientific Interest) within a 1km radius of the site. Other Internet resources interrogated as part of the desk study include:

- Bing Maps - www.bing.com/maps
- Google Earth - www.earth.google.co.uk
- Google maps - www.google.co.uk/maps
- Where's the path - <https://wtp2.appspot.com/wheresthepath.htm>

Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 and the Reading Biodiversity Action Plan (BAP) were also consulted to gather information pertaining to priority habitats and species for conservation action at the national and local level.

Aerial photography interpretation is used to place the site into an ecological context and to provide information on the nature of the habitats beyond the site boundary. The information garnered is used to put the site into an ecological context and to provide a baseline to the habitat assessment.

3.2 Field Surveys

3.2.1 Extended Phase 1 Habitat Survey

An extended Phase 1 habitat survey was undertaken on the 13th February 2018 by Robbie Birkett MSci. A walkover of the site was conducted and a description of the habitats present was prepared using standard Phase 1 Habitat Survey methodology (JNCC 2010).

Target notes were also prepared on features of particular ecological interest and an assessment was made of the site's potential to support protected and notable species (such as species listed under Section 41 of the NERC Act).

In addition, the grounds were surveyed for the presence of badger setts and other evidence of badger activity such as faeces, latrines and feeding scrapes.

3.2.2 Bat Survey & Assessment

A bat survey (building inspection survey) was also undertaken on 13th February 2018 by Robbie Birkett MSci. A detailed internal and external survey of the buildings was undertaken using a 1 million candle-power torch and close-focusing binoculars in order to look for bats and/or evidence of bats and to assess the potential of the buildings to support roosting bats.

The internal space and external elevations of the buildings were inspected for evidence of bats including, bat droppings, urine stains, feeding remains (such as moth wings) and characteristic fur staining around access points. Notes were made on the relative freshness, shape and size of bat droppings and the location and quantity of any feeding remains. 'Clean' gaps and crevices within the structure of the buildings were looked for as this can indicate where bats may have gained access the fabric of the buildings.

The study also takes into account the structure of the buildings and ecological context of the site, including the following factors which may increase the likelihood of roosting bats being present:

- Age of the building (pre-20th Century or early 20th Century construction)
- Nature of construction; traditional brick, stone or timber construction
- Large and complicated roof void with unobstructed flying spaces
- Large (>20 cm) roof timbers with mortise joints, cracks and holes
- Entrances and gaps for bats to fly and crawl through
- Poorly maintained fabric providing ready access points for bats into roofs, walls; but at the same time not being too draughty and cool.
- Roof warmed by the sun, south-facing roofs in particular
- Weatherboarding and/or hanging tiles with gaps
- Undisturbed roof voids
- Buildings and built structures in proximity to each other providing a variety of roosting opportunities throughout the year

- Buildings or built structures close to good foraging habitat, in particular mature trees, parkland, woodland or wetland, especially in a rural setting

The criteria used as guidelines for assessing the potential suitability of buildings for bats are shown in Table 1 below.

Table 1. Criteria are used as guidelines for assessing the potential suitability of buildings for bats (Collins, 2016)

Suitability	Description of Roosting Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation).
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after the presence is confirmed).
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitats.

Confirmed presence of roosting bats is where evidence is found to show that a building or structure is used by bats, such as:

- bats seen roosting or observed flying from a roost or freely in the habitat;
- droppings, carcasses, feeding remains etc. found and/or
- bats heard 'chattering' inside a roost on a warm day or at dusk.

Where the possibility that bats are present cannot be eliminated or evidence of bats is found during the building inspection survey, then further surveys (such as winter hibernation, presence/absence and/or roost characterisation) are likely to be necessary if impacts on the roosting habitat (or the bats using it) are predicted.

In addition to the bat survey, the buildings were checked for evidence of nesting birds including old birds' nests, bird droppings, feathers and eggs.

3.2.3 Tree Assessment for Roosting Bats

A survey of the trees within the school grounds was undertaken in order to look for evidence of bats (such as droppings, staining and scratch marks) and to assess the potential of the trees to support roosting bats.

The trees were assessed from ground-level using close focusing binoculars and a 1 million candle-power torch and was assessed as either having: high, medium, low or negligible potential to shelter roosting bats according to the criteria shown in the table below.

Table 2. Criteria for the assessment of trees for roosting bats (Collins 2016)

Potential	Features of Tree
Negligible	Negligible habitat features within a tree likely to be used by roosting bats,
Low	A tree of sufficient size and age to contain potential roost features (PRFs) but with none seen from the ground or features seen with only very limited roosting potential.
Moderate	A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitats.

4 Results

4.1 Ecological Context

Please refer to Appendix 6 for the detailed results of the data search undertaken through the Thames Valley Environment Records Centre (TVERC). The following sections summarise the most pertinent data, given the nature of the habitats present within the site.

4.1.1 Sites of Nature Conservation Importance

There are no Sites of Special Scientific Interest (SSSI) within a 1km radius of the site and there are no internationally designated sites of nature conservation importance within a 5km radius of the site.

There are five different Local Wildlife Sites (LWS) within a 1km radius of the site, all of which fall within the West Reading Woodlands Conservation Target Area. This target area forms a corridor to the west of Reading's urban centre, encompassing several wooded sites in and around Tilehurst as well as the escarpments at the edge of the Pang Valley. It has been identified as supporting high concentrations of protected habitats and species. The targets within this area include: woodland management, parkland management and potential for the restoration of grassland habitats on steeper slopes.

Three of the LWS (Blundell's Copse, Lousehill Copse & Round Copse) also form part of Reading Woodlands Local Nature Reserve.

Table 3. Local Wildlife Sites within a 1km radius of the site.

Local Wildlife Site	Location (approximate)	Summary
<i>Blundell's Copse and the Moor</i>	750m north-west	A small broadleaved woodland and stream, with a canopy of alder <i>Alnus glutinosa</i> , cherry <i>Prunus</i> spp., willow <i>Salix</i> sp., hazel <i>Corylus avellana</i> and oak <i>Quercus</i> spp.. Ground flora contains a wide range of plant species characteristic of ancient woodland, including opposite leaved golden saxifrage <i>Chrysosplenium oppositifolium</i> , marsh marigold <i>Caltha palustris</i> , yellow archangel <i>Lamium galeobdolon</i> along with fools water cress <i>Apium nodiflorum</i> along the stream.
<i>Lousehill Copse</i>	200m north-east	Three parcels of broadleaved semi-natural woodland that contain areas of coppice, small streams and a pond. The canopies are dominated by oak, ash, cherry and birch <i>Betula</i> spp.. There are small patches of wet woodland, dominated alder and willow, associated with the streams.

Local Wildlife Site	Location (approximate)	Summary
Round Copse	900m north	An area of lowland mixed deciduous woodland dominated by oak and ash with hazel and field maple <i>Acer campestre</i> coppice in the understorey. The ground flora is dominated by common ruderal species but does contain some species typical of long established woodland such as wood melick <i>Melica uniflora</i> , bluebell <i>Hyacinthoides non-scripta</i> , yellow archangel and wood anemone <i>Anemone nemorosa</i> . The site also includes a grassland area on the western edge.
Meadway Fringe	70m south	Consists of a strip of lowland mixed deciduous woodland and a small section of unimproved, species rich grassland. The woodland canopy contains broadleaved species interspersed with some Scots Pine <i>Pinus sylvestris</i> and larch <i>Larix decidua</i> . The ground flora possesses a number of ancient woodland indicators. A very small section of species rich neutral grassland is present to the south of the woodland. This area has numerous ant-hills (evidence of undisturbed soils) and a diversity of herbaceous species includes cowslip <i>Primula veris</i> and bird's-foot trefoil <i>Lotus corniculatus</i> .
Prospect Park (includes the Rookery)	500m east	Prospect Park is a historic parkland of amenity grassland, mature and veteran trees, and dead wood habitats, which is bounded by hedgerows and scrub. It includes a species poor, shaded pond and a small area of grassland with a more diverse species profile to the surrounding lawn. The Rookery is an area of mixed broadleaf, possibly ancient, woodland on a small plateau raised above the surrounding park. The canopy is dominated by oak, with other species including ash, horse chestnut <i>Aesculus hippocastanum</i> , beech <i>Fagus sylvatica</i> , sycamore <i>Acer pseudoplatanus</i> and lime <i>Tilia</i> spp.. The ground flora contains numerous ancient woodland indicator species.

4.1.2 Species Records

The TVERC holds an assortment of records for protected/notable amphibian, reptile, invertebrate, bird, mammal and plant species from within a 1km radius of the site. A summary of the most pertinent species, given the nature of the habitats within the site and the surrounding landscape is provided below. Full details of protected/notable species records are presented in Appendix 6.

4.1.2.1 Amphibians

The data search returned a total of eight records pertaining to amphibians. These included two smooth newt *Lissotriton vulgaris* records, which were made in 2007 and 2011 at a location in Lousehill Copse LWS, approximately 320m to the north-east of the site.

There are six records of common frog *Rana temporaria* made between 1986 and 2010, along with one record of common toad *Bufo bufo*, made in 1986. These were predominantly recorded within LWSs including Lousehill Copse, Prospect Park and Blundell's Copse and the Moor.

4.1.2.2 Reptiles

The Records Centre holds one slow worm *Anguis fragilis* record made in 2009 at a location in Lousehill Copse LWS approximately 380m to the north of the site and one grass snake *Natrix helvetica* made in 1986 at a location approximately 715m to the south-east in Prospect Park LWS.

4.1.2.3 Invertebrates

The data search returned records for eight species of invertebrate. These include three species of bee (Hymenopteran), two species of beetle (Coleopteran), two species of moth (Lepidopteran) and one species of true bug (Hemipteran).

Records for red-girdled mining bee *Poecilandrena labiate* and red-shanked carder-bee *Bombus ruderarius* were made in 1997, at a location in Lousehill Copse LWS, approximately 430m to the north of the site. Red-girdled mining bees are predominantly found in open grassland and woodland edge habitats that are situated on sandy substrates, and are strongly associated with speedwells *Veronica*.

Red-shanked carder-bees are a scarce bumblebee species commonly found in association with large areas of open rough grassland. They build their nests within abandoned field mice and vole nests and therefore require a local abundance of these species to thrive. Preferred flowers for foraging include legumes such as red clover *Trifolium pratense* and labiates such as white dead-nettle *Lamium album*.

Of the 51 invertebrate records, 42 pertain to stag beetles *Lucanus cervus*. These were recorded between 1997 and 2009 at ten different locations. The closest location of recording was approximately 280m to the north-west of the site. This species spends the majority of its life cycle in larval form, during which it feeds on decaying wood, often underground. During its adult stage, males and females take to the wing in order to find mates and it is at this stage that the beetles are most conspicuous, and are most likely to be recorded.

The two moth species present in the records are cinnabar and sawfly. These include two records of cinnabar moth, both of which were recorded in 1997; recording took place in Lousehill Copse LWS and Prospect Park LWS. Cinnabar *Tyria jacobaeae* are a medium sized moth which are frequently found in open grassy habitats including gardens, waste ground and rabbit-grazed grassland. Caterpillars feed principally on the leaves and flowers of common ragwort *Senecio jacobaea*.

The single sawfly moth record was also logged in 1997 at a location in Blundells Copse and The Moor LWS. This species inhabit damp woodland, heathland and marsh where the larvae feed at first on *Salix* catkins, and then later on herbaceous plants.

4.1.2.4 Birds

The largest group of records returned from the data search refer to bird species. Many of these are attributed to relatively widespread species that have been classified as species of conservation concern as a consequence of documented population declines.

These include a number of passerine species which typically inhabit garden and suburban habitats, including dunnoek *Prunella modularis*, house sparrow *Passer domesticus*, starling *Sturnus Vulgaris*, swift *Apus apus*, green woodpecker *Picus viridis*, house martin *Delichon urbicum*, bullfinch *Pyrrhula pyrrhula*, mistle thrush *Turdus viscivorus* and song thrush *Turdus philomelos*.

Most of the bird records returned from the data search have been recorded at locations within one of the five LWSs within 1km of the site. The majority of bird records are relatively historical, with only seven of the 98 records made after 2001.

4.1.2.5 Bats

TVERC hold 31 records of bats from within a 1km radius of the site. These were recorded between 1985 and 2014 and refer to three specified species along with a number of bat records not differentiated to species level. The species include noctule *Nyctalus noctula*, common pipistrelle *Pipistrellus pipistrellus* and brown long eared bat *Plecotus auritus*.

The record for bats made nearest the site was that of roosting brown long eared bats at a location approximately 520 to the south-west. This record was made 2012.

4.1.2.6 Other Mammals

There are records for three other mammal species including badger *Meles meles*, hedgehog *Erinaceus europaeus* and brown hare *Lepus europaeus*.

Hedgehog records have been made at various locations within the residential districts of Tilehurst, the nearest of which is located 320m to the west of the site.

Records of badgers include that of a sett in Lousehill Copse, approximately 400m to the north of the site, which was recorded in 2009.

4.1.2.7 Plants

The Records Centre holds records for 13 species of plants, made between 1981 and 2010. A large proportion of the plant records refer to bluebells *Hyacinthoides non-scripta* which have been recorded in all five of the LWSs within the vicinity of the site.

Other species include butcher's broom *Ruscus aculeatus*, quaking grass *Briza media*, stinking hellebore *Helleborus foetidus*, lesser spearwort *Ranunculus flammula*, bur medick *Medicago minima*, wood sorrel *Oxalis acetosella* and goldenrod *Solidago vulgare*.

4.2 Habitats

Appendix 1 presents photographs of the site. Site location plans are presented in Appendix 2.

4.2.1 Buildings

4.2.1.1 Original School Building

The original school building appears to date from the mid-to-late 20th Century and is of brick construction, with flat and pitched roofs of bitumen roofing felt and concrete; there is a single loft void within a small tower section of the building. The building has both single-storey and two-storey sections and has a number of plastic and metal soffit boards around the eaves of the flat roofs. It is positioned in the north of the school grounds.

The single loft void is present within a three-storey tower section located in the eastern corner of the building as a whole. This loft void is arranged over two levels, each measuring approximately 9m². It is used to accommodate various water tanks. The tower possesses brick walls and is capped by a flat roof, supported by timber rafters and horizontal wooden boards. The two levels within the void are partially divided by a floor of wooden floorboards, but an open hatch in the eastern corner of the space allows for free movement between the two.

No bats or evidence of bats, such as droppings, were found with the tower loft void.

Both void levels are moderately cobwebbed and offer very limited open flying space for bats. The internal inspection of this space (facilitated by the simple layout and small size of the void) found the walls to be in a very good condition and identified no holes or gaps through which bats might enter the space.

4.2.1.2 New Classroom Block

The new classroom block is located directly to the south of the original school building. It is constructed of brick and is almost entirely clad in concrete render on the external elevations. The building has a two-storey and a single storey section, both of which exhibit flat roofs covered in bitumen-mineral felt panels.

There are no loft voids within the building. Tight fitting, metal boxed-eaves are present at all roof-wall junctions. The building has been very recently constructed and is in excellent condition.

4.2.1.3 Terrapin Classrooms

Two modular, terrapin classrooms are located in the east of the school grounds. These modern buildings are arranged over a single storey and are very simple in structure. Both have pitched roofs of bitumen-mineral felt supported by a simple timber frame.

A loft void is present above a suspended ceiling in each terrapin. These have a limited floor-ridge height of 1m and are entirely lined with foil-faced insulation.

No bats or evidence of bats was observed within these voids. The two terrapins' external walls and roofs are in very good condition.

4.2.1.4 Storage Buildings

There are five additional storage buildings within the school grounds, one of which is located to the west of the new classroom block, while the remaining four are clustered together to the west of the two terrapin buildings.

All five are simple, pre-cast concrete buildings with pebbledash external render and sloping roofs of corrugated asbestos. Metal bargeboards are present around the roof-wall junctions.

4.2.2 Hard-standing

To the front side of the school (north-east) there is a tarmacked driveway leading onto the site from Dee Road. This driveway opens out into a car parking area to the north-eastern side of the original school building.

Tarmacked play areas are present alongside the north-eastern boundary and to the north-west of the original school building and new classroom block. There are also a number of paths leading around the school grounds.

Areas of Astroturf are present between the original school building and modern classroom block as well as between the storage buildings and original school building.

4.2.3 Amenity Grassland with Planted Trees

Apart from buildings and hard-standing, amenity grassland is the dominant habitat within the school grounds. The largest area of amenity grassland, which occupies approximately 0.56 hectares, is a playing field situated to the south side of the school buildings. In addition to this playing field, there are smaller areas of amenity grassland with planted trees to the west of the new classroom block, along the north-western boundary and in the northern corner of the site.

All areas of amenity grassland are very similar in their species-composition and nature. The grassland is maintained as a lawn through regular mowing, and the sward is short, with low species diversity dominated by common grass species. Herbaceous species present within the sward include yarrow *Achillea millefolium*, creeping buttercup *Ranunculus repens*, daisy *Bellis perennis*, creeping cinquefoil *Potentilla reptans*, dandelion *Taraxacum officinale*, sow thistle *Sonchus arvensis*, dove's-foot crane's-bill *Geranium molle*, broad-leaved dock *Rumex obtusifolius*, stinging nettle *Urtica dioica* and greater plantain *Plantago major*.

A number of trees and shrubs are planted within the school playing field and lawns to the north-west, south-west and south-east of the school buildings. The majority of the planted trees are young; however they do range in age from young to mature. Planted tree species include cherry *Prunus* sp., ash *Fraxinus excelsior*, pine *Pinus* sp., beech *Fagus sylvatica*, apple *Malus* sp., Norway spruce *Picea abies*, lime *Tilia europaea*, silver birch *Betula pendula*, lilac *Syringa vulgaris* and conifers.

A log pile is located adjacent to the boundary fence in the site's eastern corner, beneath boundary trees. This feature is discussed in regard to stag beetles in Section 4.3.2.

A bat box (Schwegler 2F – designed for small crevice dwelling species) is mounted on a pine tree in the northern corner of the site, but was not explored for evidence of inhabitation. With the exception of this bat box, none of the trees within the school grounds exhibit features, such as rot holes or woodpecker holes that could offer potential shelter to roosting bats.

Two bird boxes (Schwegler 1MR – common garden birds) are mounted on semi-mature trees situated close to the site's south-eastern boundary.

4.2.4 Flowerbeds

A number of small flowerbeds line the school buildings and are also present along some of the site margins. These beds are primarily planted with ornamental shrubs and herbaceous species. Species observed include rose *Rosa* sp., hawthorn *Crataegus monogyna*, cherry laurel *Prunus laurocerasus*, dogwood *Cornus sanguinea*, ivy *Hedera helix*, beech, *Cotoneaster* sp., firethorn *Pyracantha* sp., oak saplings *Quercus robur*, rowan, buddleia, hazel *Corylus avellana*, Japanese rose *Kerria japonica*, snowberry *Symphoricarpos albus*, elder *Sambucus nigra*, holly *Ilex aquifolium* and *Hebe* species.

4.3 Species

4.3.1 Amphibians and Reptiles

There are no ponds or other aquatic habitats within the school grounds and the well-maintained amenity grassland areas are not considered to be suitable for amphibians during the terrestrial phase of their lifecycle.

No reptiles were observed during the survey and the site is considered to be unsuitable for reptiles.

4.3.2 Invertebrates

The log pile in the eastern corner of the site is considered suitable for saproxylic species such as stag beetles. Stag beetles lay their eggs in rotting log piles and in the roots of various rotten trees, with native woody species such as oak, apple, ash and cherry favoured. Larvae will then hatch and mature within the deadwood for three to seven years before metamorphosing into the adult form. This species is very susceptible to habitat destruction, particularly in suburban areas where piles of deadwood and dead tree stumps are often removed for aesthetic purposes.

The habitats on site are considered unsuitable for other notable invertebrate species, including those for which records were returned from the data search. Although cinnabar moths do inhabit open grasslands, the site is considered to hold no particular value for the species due to the absence of common ragwort.

4.3.3 Bats

No bats or evidence of bats was observed during the survey. In particular, no evidence of roosting bats was noted within loft voids, on the exterior of the building, or in association with any crevice features. The buildings are considered to be unsuitable for bats due to the materials of construction, the small size and inappropriateness of loft voids, and the absence of external features that could offer shelter to roosting bats.

Bats may roost within the tree-mounted bat box.

4.3.4 Birds

No active birds' nests were noted within the school grounds, but the trees and shrubs have the potential to offer nest sites to common bird species such as blue tit *Cyanistes caeruleus*, great tit *Parus major* and robin *Erithacus rubecula*.

The two mounted bird boxes showed no signs of inhabitation, but internal examinations were not carried out.

The amenity grassland on site is considered unsuitable for ground nesting species such as skylark *Alauda arvensis* due to the short sward and high levels of anthropogenic disturbance.

4.3.5 *Other Species*

There is no evidence of badgers within the site and no badger setts are located within the school grounds.

The habitats on site are considered largely unsuitable for hedgehogs given the scarcity of vegetative cover at ground level and the prominence of dispersal barriers (large roads) between the site and areas of suitable hedgehog habitat.

5 Discussion

5.1 Constraints on Study Information

There are no significant constraints to the study with all buildings and areas of the site accessed safely and thoroughly.

5.2 Assessment/Evaluation of Results

5.2.1 *Sites of Nature Conservation Importance*

The site is not considered to be ecologically linked to habitats within the five Local Wildlife Sites. This is due to the distance of such sites from the site and the nature of the separating land, which is dominated by roads and compact residential developments.

Development at St Michael's Primary School is considered unlikely to result in significant indirect impacts on local sites of conservation importance.

5.2.2 *Habitats*

The majority of the site is considered to be of low ecological value. Habitats that are considered to have negligible ecological value include areas of hard-standing, buildings and amenity grassland.

Planted trees and flowerbeds are considered to be of value within the context of the site only. This assessment is based on the prominence of non-native plant species and the fact that they have been planted for their ornamental value. The trees, shrubs and herbaceous plants do however offer nesting and foraging opportunities to birds.

None of the habitats within the site are considered to meet the criteria for priority habitats listed under Section 41 of the NERC Act 2006.

5.2.3 *Species*

5.2.3.1 *Stag Beetles*

Given the large number of stag beetle records returned from the data search and the suitability of the rotting log pile in the eastern corner of the site, it is considered a strong possibility that stag beetle larvae inhabit this habitat feature.

5.2.3.2 *Bats*

There is no evidence to suggest that bats are using the school buildings for shelter or protection and the buildings are considered to be unsuitable for roosting bats.

Exploration of the original school building's single loft void found no bat droppings or other evidence indicative of roosting bats. The building exhibited no gaps via which bats could gain access to the void. Similarly, no evidence of bats was found within the two terrapin loft voids and these spaces are comprehensively lined with a modern, foil-backed insulation, a material that is not conducive to roosting bats.

With the exception of the original school building, the structures within the site have been erected in the recent past and are consequently in a very good condition. None of the buildings possessed external features that bats could utilise as self-contained roost sites.

Bats will choose to roost within different locations within the summer and winter periods favouring dark, enclosed, humid and cool locations for hibernation such as caves and cellars. These locations must maintain a constant low temperature (2-8°C), but temperatures must also not go below freezing. In addition, bats favour places that are undisturbed and retain relatively high humidity during the winter period. The buildings of St Michael's Primary School are not considered to be suitable for hibernating bats.

The bat box mounted on a pine tree in the northern corner of the site has been designed to accommodate small numbers of crevice dwelling bats and is a highly suitable roost feature.

Aside from this bat box, none of the trees within the grounds of the school that are considered to be suitable for roosting bats as they lack suitable features for bats, such as rot holes or woodpecker holes. However, the trees that line the school playing field and the trees to the north of the school offer some limited potential foraging opportunities to common bat species.

5.2.3.3 *Birds*

The trees and shrubs within the school grounds offer potential nesting sites to common bird species. Although only species such as tit and blackbirds were noted during the survey, the trees and shrubs may offer suitable habitat to certain species of principle importance (as listed by the Natural Environment and Rural Communities Act 2006) such as dunnoek *Prunella modularis* and song thrush *Turdus philomelos*.

Although these two species are still common and widespread, recent declines in their populations have led to concern over their conservation status and the species are listed as species of principle importance as a result. Mature trees, shrubs and other habitat features such as flowerbeds offer potential foraging habitats to common and widespread species such as these.

The two bird boxes on trees in the east of the site are suitable for common garden birds such as tits and sparrows.

5.2.3.4 *Other Species*

The school grounds are considered to be unsuitable for other protected or notable species, including reptiles and amphibians due to the isolated nature of the site and the lack of suitable habitats.

There is no evidence to indicate badger activity within the site and badgers are considered to be absent from the site.

Similarly, hedgehogs are likely to be absent due to restricted dispersal avenues onto the site.

5.3 **Relevant Legislation & Policy Guidance**

5.3.1 *Nesting Birds*

Nesting birds are protected under the Wildlife and Countryside Act 1981 (as amended), which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use or being built, or take or destroy its eggs. The nesting season for most species is between March and August inclusive.

5.3.2 *Bats*

As with many animal species within the UK, declines in the abundance and distribution of many bat species have been documented through recent decades. The reasons for these declines are

various and complex but it is considered that the major factors are changes in landuse and agriculture, the loss of woodlands and hedgerows and the loss of suitable roosting sites.

Bats are particularly sensitive to human activity due to the fact that they roost within buildings, trees and underground structures such as mines, and the availability of suitable roost sites is considered to be a key factor in the conservation of bats within the UK. As a consequence, all species of bat and their roost sites are protected under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) and under The Conservation of Habitats and Species Regulations 2017. Taken together, these make it an offence to:

- (a) Deliberately capture or intentionally take a bat
- (b) Deliberately or intentionally kill or injure a bat
- (c) To be in possession or control of any live or dead wild bat or any part of, or anything derived from a wild bat
- (d) Damage or destroy a breeding site or resting place of such an animal or intentionally or recklessly damage, destroy or obstruct access to any place that a wild bat uses for shelter or protection
- (e) Intentionally or recklessly disturb any wild bat while it is occupying a structure or place that it uses for shelter or protection
- (f) Deliberately disturb any bat, in particular any disturbance which is likely
 - to impair their ability;
 - (i) to survive, breed, reproduce or to rear or nurture their young; or
 - (ii) in the case of hibernating or migratory species, to hibernate or migrate; or
 - to affect significantly the local distribution or abundance of the species to which they belong

A bat roost may be any structure a bat uses for breeding, resting, shelter or protection. It is important to note that since bats tend to re-use the same roost sites, current legal opinion is that a bat roost is protected whether or not the bats are present at the time.

Although the law provides strict protection to bats, it also allows this protection to be set aside (derogation) under The Conservation of Habitats and Species Regulations 2017 through the issuing of licences (referred to as European Protected Species Licences or EPSL). Where a lawful operation is required to be carried out but which is likely to result in one of the above offences, a licence may be obtained from Natural England (the statutory body in England with responsibility for nature conservation) to allow the operation to proceed. However, in accordance with the requirements of The Conservation of Habitats and Species Regulations 2017, a licence can only be issued where the following requirements are satisfied:

- The proposal is necessary 'to preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment';
- 'There is no satisfactory alternative';
- The proposals 'will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range'.

These three criteria are often referred to as the 'three tests' of the Regulations. All three must be satisfied in order for a licence to be granted.

5.3.3 *The Natural Environment and Rural Communities Act 2006*

Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 places a duty on the Secretary of State to publish, review and revise lists of living organisms and types of habitat in England that are of principal importance for the purpose of conserving English biodiversity. It also requires the Secretary of State to take, and promote the taking of, steps to further the conservation of the listed organisms and habitats. This is important in the context of planning decisions as the National Planning Policy Framework (paragraph 117) affords planning policy protection to the habitats of species listed by virtue of Section 41.

There are no habitats listed within Section 41 within the site.

Species listed within Section 41 of the NERC Act 2006 that are relevant to the site, or considered to be potentially relevant, include:

- Stag Beetle (pile of deadwood offers potential habitat)
- Song thrush (potential for nesting in trees/hedges)
- Dunnock (potential for nesting in shrubs/hedges)

5.3.4 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was published in March 2012 and this new document forms a key part of the Government's reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. The NPPF states that the planning system should enhance the natural and local environment by:

- protecting and enhancing valued landscapes, geological conservation interests and soils;
- recognising the wider benefits of ecosystem services;
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and
- remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity sites or landscape areas will be judged. Distinctions should be made between the hierarchy of international, national and locally designated sites, so that protection is commensurate with their status and gives appropriate weight to their importance and the contribution that they make to wider ecological networks. To minimise impacts on biodiversity and geodiversity, planning policies should:

- plan for biodiversity at a landscape-scale across local authority boundaries;
- identify and map components of the local ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them and areas identified by local partnerships for habitat restoration or creation;
- promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets, and identify suitable indicators for monitoring biodiversity in the plan;
- aim to prevent harm to geological conservation interests; and
- where Nature Improvement Areas are identified in Local Plans, consider specifying the types of development that may be appropriate in these Areas.

When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

- if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be

made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;

- development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;
- opportunities to incorporate biodiversity in and around developments should be encouraged;
- planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and
- the following wildlife sites should be given the same protection as European sites:
 - ❖ potential Special Protection Areas and possible Special Areas of Conservation;
 - ❖ listed or proposed Ramsar sites; and
 - ❖ sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites

The Government will “now embark on a new exercise to consider what underpinning guidance continues to be needed” with the outcome of this process being “an appropriate and easy to use set of guidance, focussing on issues that require national expression, to support implementation of the National Planning Policy Framework.” The Government has “not established the process or set a timetable” for this yet and “until such time as the guidance review is complete, the existing guidance where relevant can still be used.” Regarding what guidance is still relevant, “Annex 3 of the NPPF indicates that ODPM Circular 06/2005: *Biodiversity and Geological Conservation - Statutory Obligations and their Impact within the Planning System* (Circular 06/05) is still relevant. This Circular provides administrative guidance on the application of the law relating to planning and nature conservation as it applies in England.

5.3.5 Reading Borough Core Strategy

The Reading Borough Core Strategy was adopted on 29th January 2008 and amended on 27th January 2015. It sets out the overarching strategy for development in the Borough to 2026. The following policies within the Core Strategy are considered to be relevant in this instance.

Policy CS36: Biodiversity and Geology

a) Development should retain, protect and incorporate features of biodiversity or geological interest (including protected species and their habitats) found within the application site into their schemes.

On sites with recognised biodiversity or geological value, development will not be permitted where there would be a direct or indirect adverse impact on the site, unless it can be clearly demonstrated that:

- i. The need for development clearly outweighs the need to protect the value of the site; and
- ii. Appropriate compensation, impact minimisation, mitigation and compensation are provided.

b) Local Nature Reserves and Wildlife Heritage Sites will be safeguarded and where possible, enhanced. Permission will not be granted for any development that would adversely affect a designated nature reserve or Wildlife Heritage Site.

c) Any development that would sever or threaten the integrity of an established wildlife link, as indicated on an adopted proposals map, will not be permitted. Where applicable, developments should be designed to protect, consolidate, extend and enhance the network of wildlife links and corridors in and adjoining the Borough, working with neighbouring authorities where appropriate.

Policy CS38: Trees, Hedges and Woodlands

Individual trees, groups of trees, hedges and woodlands will be protected from damage or removal, and the Borough's vegetation cover will be extended.

5.3.6 The Reading Biodiversity Action Plan

The Reading Biodiversity Action Plan (BAP) sets out a methodology to protect, conserve and enhance Reading's diversity of wildlife. To achieve this aim, the Reading BAP will:

- Identify, conserve and/or enhance selected significant habitats and species within Reading Borough, or land controlled by the Council, and give appropriate protection to selected sites containing these species and habitats to ensure they are retained for the future.
- Monitor the effects of our actions and review them regularly. Reading will be seen to be leading by example by using 'best practice'.
- To inform and encourage involvement of all sections of the Reading community by raising awareness of the issues affecting biodiversity and developing partnerships for implementing the actions identified in the BAP.
- Develop a better understanding and knowledge of species and habitats within Reading and their distribution.

Under the Reading BAP, the Urban I and Urban II Habitat Action Plans list buildings and amenity/recreational areas as being of potential value to biodiversity within the Borough. The value of these habitats is recognised for roosting bats and nesting birds (within buildings), as well as other species including amphibians and reptiles (within amenity areas). Therefore, the aims of the Urban I and Urban II Habitat Action Plans are considered to be relevant in this instance.

Priority species listed under the Reading Biodiversity Action Plan that are considered to be relevant to the site include:

- Stag beetle
- Song thrush

6 Recommendations

6.1 Further Survey

No further surveys are recommended.

6.2 Mitigation and Enhancement Measures

6.2.1 Habitats

It is recommended that all the planted trees around the peripheries of the site be retained within the proposals for development. Where possible, other trees within the site should also be retained. Retained trees should be protected in accordance with British Standard 5837:2012.

If this is not possible, the loss of trees should be compensated on a like-for-like basis through the planting of new trees, preferably a native species. Native tree and shrub species which are considered suitable for the site include:

- Hornbeam *Carpinus betulus*
- Oak *Quercus robur*
- Dogwood *Cornus sanguinea*
- Field maple *Acer campestre*
- Wild cherry *Prunus avium*
- Crab apple *Malus sylvestris*
- Spindle *Euonymus europaeus*
- Dog rose *Rosa canina*

- Wayfaring tree *Viburnum lantana*
- Wild privet *Ligustrum vulgare*
- Holly *Ilex aquifolium*
- Guelder rose *Viburnum opulus*
- Silver birch *Betula pendula*
- Hazel *Corylus avellana*

Ash and sycamore should be avoided as these species tend to produce many seeds and can become over dominant. In addition, planting of ash may promote the spread of Ash Dieback, a fungal disease caused by *Chalara fraxinea*.

It is recommended that any new areas of planting are designed, planted and managed to maximise their value to wildlife. One key element of this would be the species used within the planting, which should comprise native species where possible, as well as ornamental plants of known value to wildlife. The key will be to provide a variety of flowers and fruits throughout the year in order to provide food for insects and birds, as well as providing potential nest sites through the planting of trees and shrubs. Appendix 4 recommends a number of other suitable species for landscape and garden planting schemes, including non-native species for more formal areas, although the species mix should by no means be limited to this list.

Planting should aim to provide ground cover for animals such as hedgehogs and invertebrates, and so low-growing ground cover should be encouraged. Native species such as bugle, ivy and periwinkle could be used for this purpose, or ornamental species such as lady's mantle, elephant's ears or perennial geraniums may also be suitable for formal areas of ornamental planting. A diversity of structure should also be encouraged through the planting of small trees, with shrubs and herbaceous plants below.

6.2.2 Species

6.2.2.1 Stag Beetles

It is highly recommended that the log pile in the eastern corner of the site be retained in situ in order to maintain its value for stag beetles during the larval stage of their lifecycle.

Considering stag beetles have been targeted by the Reading Biodiversity Action Plan as a priority species (see Appendix 5 for an extract from the Reading Biodiversity Action Plan, March 2006), there is the opportunity to further enhance the value of the school grounds for this species. A suitable method for enhancement in this instance is the creation of additional larval habitat, either by supplementing the existing feature or creating new deadwood piles elsewhere on site.

New sources of deadwood should either take the form of logs or untreated wood chips and mulch, sourced from any broadleaf tree. New log piles should be partially buried and located in partial shade to prevent the wood drying out and encourage decomposition. Once in place new features should be left undisturbed.

6.2.2.2 Birds

Removal of trees and woody vegetation should be undertaken outside of the bird breeding period, avoiding March to August inclusive. This will protect birds from the destruction of active nests and the killing/injury of eggs and young.

If vegetation clearance is required between March and September, an ecologist should be appointed to assess if there are any risks to breeding birds to ensure compliance with the legal protection afforded to nesting birds under the Wildlife and Countryside Act 1981. This may require a survey for nesting birds by the ecologist immediately prior to the vegetation clearance (usually recommended within 24 hours). If nesting birds were present within the site, work would need to be delayed in the vicinity of the nest to avoid disturbance until the young have fledged.

The two bird boxes currently on site should not be taken down within the bird breeding period (March-August inclusive).

As two bird boxes have already been erected on trees within the school grounds, an alternative avenue for enhancement in regard to birds is the inclusion of bird nesting features in association with new buildings. Options include:

- Nesting cups for house martins *Delichon urbicum* (such as the 9A Schwegler House Martin Nest)
- House sparrow terraces (such as 1SP Schwegler Sparrow Terrace)
- Integrated nest boxes for swifts (such as 17A Schwegler Swift Nest Box (Triple Cavity))

The inclusion of one or more of these nesting features would be seen as an enhancement.

6.2.2.3 Bats

It is recommended that the existing bat box be retained.

If the removal of this bat box were integral to the development then further survey work would be required to establish whether the bat box is being utilised by bats. This would involve an internal inspection for the presence of bats and evidence of roosting bats, followed by dusk/dawn surveys should bats or evidence of bats be found. If surveys conclude that the box is being used by bats as a roost site then a European Protected Species (bat) licence will be need to be obtained prior to the removal of the box.

If the existing bat box is to be retained within development proposals then no further survey work is considered necessary as the school buildings are not considered suitable for roosting bats and there are no foreseeable impacts on bats or the places they use for shelter and protection.

Licensing

Since no significant impacts on bats are predicted under The Conservation of Habitats and Species Regulations 2017, a European Protected Species (bat) licence will not be required. Since there are no predicted impacts on bats or their habitats, it is not necessary to consider the 'three tests' of The Conservation of Habitats and Species Regulations 2017 in this instance.

Careful Work Practices

Works should proceed in a careful and controlled manner. Contractors should be briefed with regard to the fact that individual bats can often exploit very small crevices as roost sites and that bats can move between roost sites on a regular basis. In the unlikely event that bats or significant evidence of bats (for example large accumulations of droppings) are encountered, works should stop immediately and advice sought from a qualified ecologist and/or Natural England.

If disturbance to small numbers of bats were to occur, it is unlikely to impair their ability to survive, breed, and reproduce or to rear or nurture their young or to significantly affect the local distribution or abundance of the species to which they belong. Therefore, works may be able to continue once advice has been given and the issue has been resolved. However, individual situations will have to be evaluated on a case by case basis and a European Protected Species (bat) Licence may be required to allow works to proceed if the impacts are considered to be significant under The Conservation of Habitats and Species Regulations 2017.

Lighting

External lighting should be avoided unless it is necessary for reasons of security and safety. If lighting is required, it should be kept at low level and at low intensity, with hoods and baffles used to direct the light to where it is required (Bat Conservation Trust 2008, Emery 2008). To minimise the impact on bats, the use of low pressured sodium lamps is recommended in preference to mercury or metal halide lamps which have a UV element that can affect the distribution of insects and attract bats to the area, affecting their natural behaviour (Bat Conservation Trust 2008).

7 References

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Rydell J. & Racey, P. A., 1995. *Street lamps and the feeding ecology of insectivorous bats*. Recent Advances in Bat Biology Zool Soc Lond Symposium abstracts

Stone, E.L., Jones, G., & Harris, S., 2009. *Street lighting disturbs commuting bats*. Current Biology 19:1-5.

8 Appendix 1. Photographs



Photograph 1. Eastern elevation of the original school building, showing the tower section (location of loft void).



Photograph 2. Northern elevation of the original school building.



Photograph 3. South-western elevation of the original school building.



Photograph 4. Eaves of the original school building.



Photograph 5. Loft void in tower section of the original school building (first level).



Photograph 6. Underside of roof in tower section loft void.



Photograph 7. South-eastern elevation of the new classroom block.



Photograph 8. North-western elevation of the new classroom block.



Photograph 9. Flat roof of new classroom block.



Photograph 10. Concrete rendered walls of new classroom block.



Photograph 11. Terrapin building.



Photograph 12. Roof void in terrapin building.



Photograph 13. Two precast storage buildings located to the west of the terrapin buildings.



Photograph 14. Amenity grassland in south of site.



Photograph 15. Planted tree within amenity grassland.



Photograph 16. Log pile in eastern corner of the site.



Photograph 17. Example of flowerbed alongside original school building.

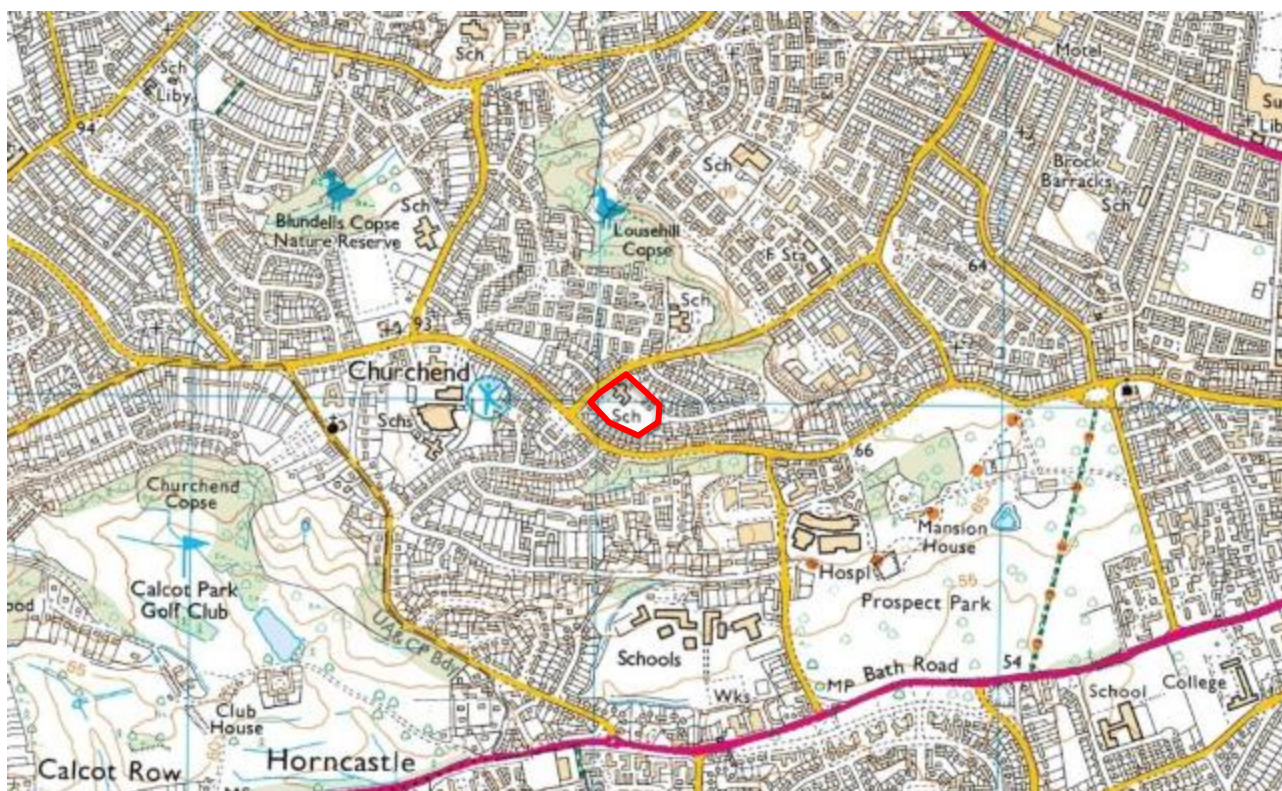


Photograph 18. Pine tree in northern corner of site with mounted bat box.

9 Appendix 2. Site Location Plans

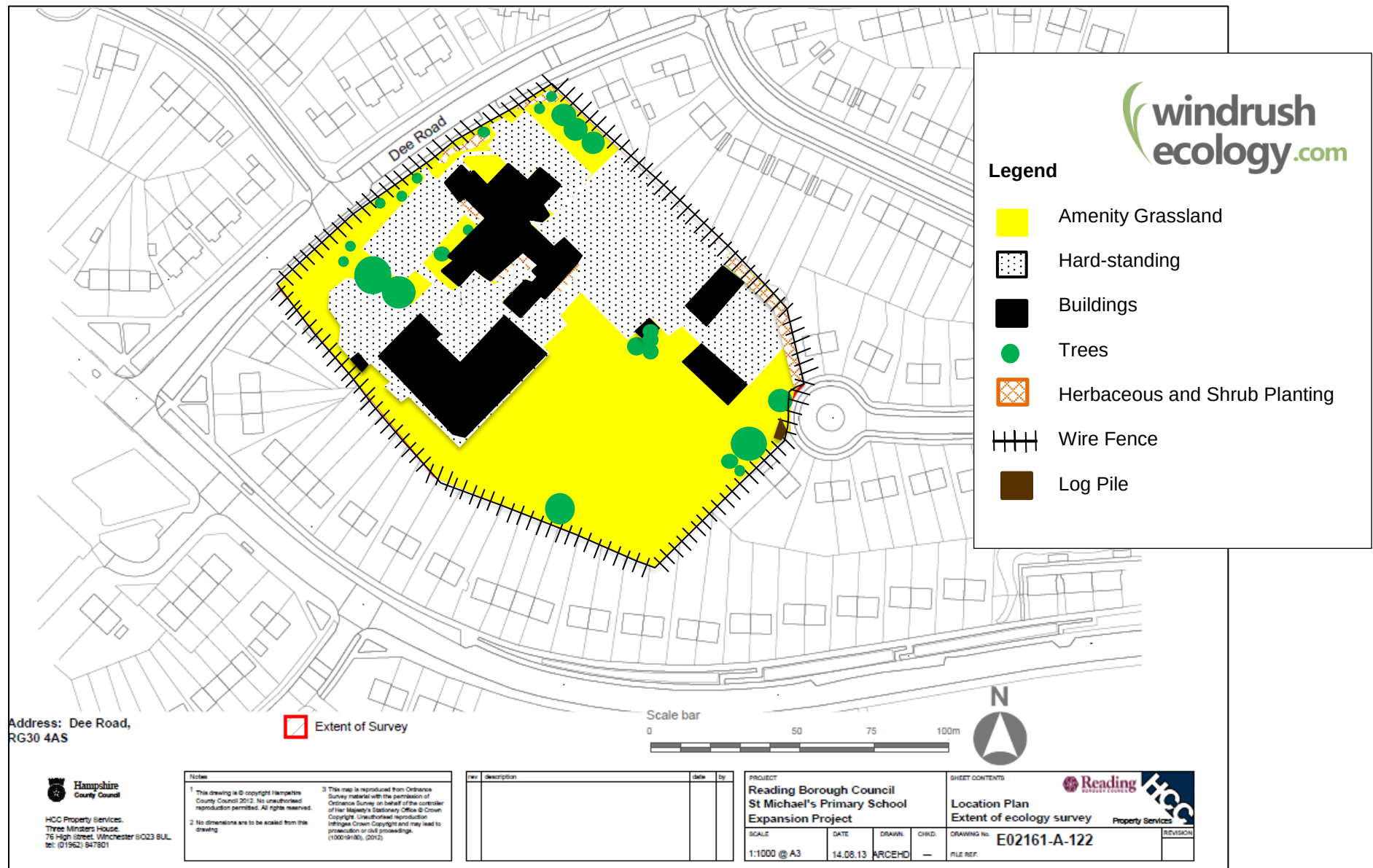


Aerial photograph showing the location of St Michael's Primary School (indicated by the red line boundary).
Source: Google earth



Ordnance Survey map showing the approximate location St Michael's Primary School (indicated by the red line boundary) within the local area. Source: <http://www.bing.com/maps/>

10 Appendix 3. Phase 1 Habitat Plan



11 Appendix 4. Species for Landscape & Ornamental Planting

Common Name	Botanical Name
Trees	
Field maple*	<i>Acer campestre</i>
Beech*	<i>Fagus sylvatica</i>
Hornbeam*	<i>Carpinus betulus</i>
Willow*	<i>Salix sp.</i>
Silver birch*	<i>Betula pendula</i>
Rowan*	<i>Sorbus aucuparia</i>
Whitebeam*	<i>Sorbus aria</i>
Alder*	<i>Alnus glutinosa</i>
Wild cherry*	<i>Prunus avium</i>
Flowering cherry	<i>Prunus sp.</i>
Flowering pear	<i>Pyrus calleryana</i>
Crab apple*	<i>Malus sylvestris</i>
Fruiting apple	<i>Malus sp.</i>
English oak*	<i>Quercus robur</i>
Elm*	<i>Ulmus sp.</i>
Small-leaved lime*	<i>Tilia cordata</i>
Shrubs	
Holly*	<i>Ilex aquifolium</i>
Hazel*	<i>Corylus avellana</i>
Wayfaring tree*	<i>Viburnum lanata</i>
Wild service tree*	<i>Sorbus torminalis</i>
Buckthorn*	<i>Rhamnus cathartica</i>
Guelder rose*	<i>Viburnum opulus</i>
Hawthorn*	<i>Crataegus monogyna</i>
Hebe	<i>Hebe sp.</i>
Rosemary	<i>Rosmarinus</i>
Ceanothus	<i>Ceanothus sp.</i>
Weigela	<i>Weigela sp.</i>
Dog rose	<i>Rosa canina</i>
Dogwood*	<i>Cornus sanguinea/alba</i>
Rose (single flowered varieties)	<i>Rosa sp.</i>
Wild privet*	<i>Ligustrum vulgare</i>
Garden privet	<i>Ligustrum ovalifolium</i>
Lilac	<i>Syringa vulgaris</i>
Escallonia	<i>Escallonia sp.</i>
Lavender	<i>Lavandula sp.</i>
Flowering currant	<i>Ribes sp.</i>
Honeysuckle*	<i>Lonicera periclymenum</i>
Mexican orange blossom	<i>Choisya sp.</i>
Spiraea	<i>Spiraea sp.</i>
Amelanchier	<i>Amelanchier lamarckii/canadensis</i>
Cotoneaster	<i>Cotoneaster sp.</i>
Yew*	<i>Taxus baccata</i>
Broom	<i>Cytisus sp.</i>
Rose of Sharon	<i>Hypericum calycinum</i>

Common Name	Botanical Name
Firethorn	<i>Pyracantha sp.</i>
Butterfly bush	<i>Buddleia davidii</i>
Clematis	<i>Clematis sp.</i>
Perennials	
Elephant's ears	<i>Bergenia cordifolia</i>
Sage	<i>Salvia sp.</i>
Lamb's ears	<i>Stachys byzantia</i>
Periwinkle*	<i>Vinca major & Vinca minor</i>
Ivy*	<i>Hedera helix</i>
Bugle*	<i>Ajuga reptans</i>
Lady's mantle	<i>Alchemilla mollis</i>
Geraniums	<i>Geranium sp.</i>
Globe thistle	<i>Echinops ritro</i>
Monk's hood	<i>Aconitum sp.</i>
Yarrow*	<i>Achillea millefolium</i>
Teasel*	<i>Dipsacus fullonum</i>
Oriental poppy	<i>Papaver orientalis</i>
Michaelmas daisy	<i>Aster sp.</i>
Bear's breeches	<i>Acanthus spinosus</i>
Montbretia	<i>Crocsmia sp.</i>
Purple coneflower	<i>Echinacea purpurea</i>
Ornamental onion	<i>Allium sp.</i>
Catmint	<i>Nepeta sp.</i>
Verbena	<i>Verbena sp., Verbena bonariensis</i>
Marjoram	<i>Origanum majorana</i>
Thyme	<i>Thymus sp.</i>
Crocus	<i>Crocus sp.</i>
Daffodil	<i>Narcissus sp.</i>
Snowdrop	<i>Galanthus nivalis</i>
Winter aconite	<i>Eranthis sp.</i>
Bluebell*	<i>Hyacinthoides non-scripta</i>
Primrose*	<i>Primula veris</i>
Forget-me-not*	<i>Myosotis sp.</i>
Grape hyacinth	<i>Muscari botryoides</i>
Hollyhock	<i>Althaea rosea</i>
Lenten rose	<i>Helleborus orientalis</i>
Foxglove*	<i>Digitalis purpurea</i>
Greater knapweed*	<i>Centaurea scabiosa</i>
Great mullein*	<i>Verbascum thapsus</i>
Toadflax*	<i>Linaria vulgaris</i>
Meadow crane's-bill*	<i>Geranium pratense</i>
<i>*indicates native species</i>	

12 Appendix 5. Stag Beetle – Reading Biodiversity Action Plan

STAG BEETLE (*Lucanus cervus*) SPECIES ACTION PLAN

ECOLOGICAL INFORMATION

The stag beetle (*Lucanus cervus*) is Britain's largest terrestrial (ground-living) beetle, between 5 and 8cm in length, and is one of three British species of a family of beetles, the Lucanidae, that numbers some 1000 species found mainly in the tropics. They are characterised by possessing large mandibles (jaws) which are often antler shaped, giving them their common name. The male stag beetle has very large mandibles; the females are smaller but more powerful.

The stage beetle requires dead wood to complete its lifecycle. The eggs are laid underground by logs, or stumps of dead trees, and the larva (or grub) will spend up to seven years inside slowly growing in size. A wide range of woods are used, especially oak, but also ash, elm, sycamore, lime, hornbeam, apple, cherry and even some garden tree varieties. An exception, however, is coniferous species such as fir, pine and cypress, which they usually avoid. The larvae do not eat the wood of live trees and shrubs, and are thus not a pest. Instead they are an important decay agent, helping to return the minerals of dead plant material to the soil.

Adults emerge from the soil beneath logs or stumps from mid-May until late July. Males emerge earlier and appear to be more active as they search for females to mate, and can often be seen flying on sultry summer evenings an hour or two before dusk. As adults they are short-lived and generally die after mating, although occasionally some may over-winter in places such as compost heaps.

CURRENT STATUS

The UK stag beetle distribution is concentrated to the south-east of Britain - its absence in the north may be climate related. In the 1940s this extended to southern Wales, the Dee, Cumbria, and across to north Yorkshire and the Wash. Recent surveys suggest that this has significantly contracted, with the predominant distribution over a broad swathe from Dorset, Hampshire, West Sussex, Surrey, Berkshire, London, north-east Essex, eastern Suffolk and northern Kent. Outlying clusters are found in bordering counties to the west, but it appears to be absent from all its former northern sites, apart from the Dee. Over 70% of records are from gardens, which makes this a very important habitat.

- **NATIONAL AND INTERNATIONAL**

The stag beetle is listed on Appendix III of the Bern Convention, on Appendix 2 of the Habitat Directive, on Schedule 5 of Wildlife & Countryside Act 1981 (as amended). It is also receives protection in a number of European countries such as Germany, Hungary, and Switzerland.

- **REGIONAL AND LOCAL**

This is a BBOWT Berkshire 100 Biodiversity Challenge Species with the aim of maintaining its present distribution. This species is believed to be present at many Reading sites and is likely to be in many private gardens in Caversham, Tilehurst, near Hospital/ University and off bath Road.

FACTORS CAUSING LOSS OR DECLINE

- ◆ The loss of habitat through the removal of tree stumps and other dead wood.
- ◆ Collection for sale may be a contributory factor.
- ◆ Drowning in uncovered water butts.

NATIONAL PLAN OBJECTIVES AND TARGETS

This is a Priority Species on the UK Biodiversity Action Plan (1995). This aims to raise awareness of the threats to, and the European importance of the species; to identify a series of key sites and monitor these to establish long term trends; to maintain strong populations at key sites and to carry out further research into its habitat requirements

NEIGHBOURING OR OTHER RELEVANT ORGANISATIONS' OBJECTIVES AND TARGETS

All neighbouring Berkshire L-BAPs have this species mentioned. Broadly they seek to identify sites where the beetles are present and to maintain and protect the habitat. Bracknell also seeks to widen its distribution in the borough.

READING OBJECTIVES AND TARGETS

The Reading objects are the same as above.

LOCAL ACTIONS

Action	Internal sections	External partners	Typical requirements	Time Scale	Action to date
Promote sympathetic management of habitat at appropriate sites to encourage increase and spread of species.e.g. the retention of tree stumps or trunks in/on the ground.	Parks Planning			2008 - 2011	
Raise awareness of the needs of this species across Reading	SU Parks		Leaflet	2008 - 2011	

LINK Habitat Action Plans

- Urban I
- Parkland and Veteran Trees
- Ancient and/or Species Rich Hedgerows
- Broad Leaved Woodland

13 Appendix 6. Protected/Notable Species Records

Please refer to separate report from the Thames Valley Environmental Records Centre.