The Ecology Consultancy

Kensington and Chelsea Parks / Mammal Surveys / **Report for Royal Borough of Kensington and Chelsea**

The Ecology Consultancy

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Mammal Surveys

Report for Royal Borough of Kensington and Chelsea

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Executive Summary

- Ecology Consultancy Ltd (ECL) was commissioned by the Royal Borough of Kensington and Chelsea to undertake mammal surveys of nine parks within the borough, comprising Holland Park, Avondale Park, Little Wormwood Scrubs, Emslie Horniman Pleasance, Athlone Gardens, Kensington Memorial Gardens, Westfield Park, Cremorne Gardens and St Luke's Garden.

- Mammal surveys were undertaken to identify the presence or absence and distribution of small mammals (including yellow necked mouse, wood mouse, bank vole, common shrew, pygmy shrew, water shrew, field vole and house mouse), hedgehog, brown rat, grey squirrel, deer, badger, fox, stoat and weasel.

- A total of four species of small mammal (house mouse, wood mouse, yellow-necked mouse and field vole) were recorded during the live capture surveys and a further four species (red fox, grey squirrel, muntjac deer and brown rat) were identified from field signs or direct observations.

- Badgers, weasels, stoats, hedgehogs, all other deer species, bank vole, common shrew, pygmy shrew and water shrew were all absent from parks surveyed within the Royal Borough of Kensington and Chelsea.

- Mammals were found at all parks surveyed except Cremorne Gardens, which had a complete absence of mammals.

- Holland Park and Little Wormwood Scrubs are the two most important sites (of the nine sites surveyed) in the borough for mammals. The other sites could be significantly improved if additional natural cover was provided and an appropriate management plan for the benefit of mammals was introduced.

- The presence of mammals at some sites and not others is undoubtedly due to the extent of habitat present, variation of habitat present and management. Appropriate recommendations for habitat improvements which can be undertaken to benefit mammal populations at each of the sites, are described.

- Distribution of small mammals within the borough rather than within individual parks should be the conservation priority, following establishment of a suitable extent of good-quality habitat and the presence of marginal habitats for species within parks.

1 Introduction

BACKGROUND

1.1 The Ecology Consultancy was commissioned by the Royal Borough of Kensington and Chelsea to undertake mammal surveys of nine parks within the borough, comprising;

- Holland Park;
- Avondale Park;
- Little Wormwood Scrubs;
- Emslie Horniman Pleasance;
- Athlone Gardens;
- Kensington Memorial Gardens;
- Westfield Park;
- Cremorne Gardens; and,
- St Luke's Garden.

1.2 Plan 1, Appendix 1 illustrates the location of these parks within the Borough.

1.3 Surveys were undertaken to identify the presence or absence and distribution of small mammals, (including yellow necked mouse *Apodemus flavicollis*, wood mouse *Apodemus sylvaticus*, bank vole *Myodes glareolus*, common shrew *Sorex araneus*, pygmy shrew *Sorex minutus*, water shrew *Neomys fodiens*, field vole *Microtus agrestis* and house mouse *Mus musculus*), hedgehog *Erinaceus europaeus*, brown rat *Rattus norvegicus*, grey squirrel *Sciurus carolinensis*, deer, badger *Meles meles*, fox *Vulpes vulpes*, stoat *Mustela erminea* and weasel *Mustela nivalis.* Surveys were undertaken in each of the nine parks listed in Section 1.6 to 1.14.

OBJECTIVES

1.4 The objectives of the study were to:

- Design a methodology for a quantified mammal survey (excluding bats) to be repeated every ten years;
- Establish the species diversity present at each site;
- Record the distribution of mammals, with the exception of bats in the borough; and,

- Make appropriate site specific recommendations for habitat improvements which may be undertaken to benefit mammal populations.

SITE CONTEXT AND STATUS

1.5 Below is a general description of each of the nine parks within the Royal Borough of Kensington and Chelsea included in the mammal surveys. The habitat maps for each park are presented in Plan 2, Appendix 1.

1.6 **Holland Park**: 22ha. The north of the park is dominated by mature woodland with an understorey and edge planting of native and non-native shrubs, intersected by paths and some grass verges. Along the eastern edge of this woodland, an amenity grassland lawn with some native grassland flowers has been created, which is shaded by mature trees. The centre of the park is dominated by numerous buildings with a large number of mature trees. Towards the south is a large improved grassland recreation ground. The east edge has a long avenue of mature trees.

1.7 **Avondale Park**: 1.4ha. North Section: The main feature is a large recreation area in the middle of this section. This is surrounded a number of trees and scrub. On the west side there is a small wildlife garden with a pond. South section: In the middle of the area there is a children's recreation facility. Surrounding this are various tree and shrub species with a dense covering of trees along the south edge.

1.8 **Little Wormwood Scrubs**: 8.8ha. North section: The main area is species-rich scrub bordered by trees and a small wooded area to the north. At the edges of the scrubland is long grass and mature trees. South section: Short-cut grass dominates the majority of the area with a few mature trees bordering it. In the southwest corner there is a large children's play area. Along the southern edge are some bushes, hedgerows and mature trees.

1.9 **Emslie Horniman Pleasance**: 1.4ha. The majority of the area is short grass or concreted areas. The middle of the site is the main section of short grass bordered to the east with a few mature trees and a bank of scrubs and bushes. Along the west side there is an ornamental water feature with some bushes running through the middle. The east edge of this area has some bushes growing here. Just south there are some mature trees including a willow tree *Salix sp*.

1.10 **Athlone Gardens**: 2.2ha. North section: Sandwiched between the three blocks of flats is an open grass covered square. The grass is kept short and is bordered by a few

mature trees. South section: This area has scattered mature trees and along the southern and eastern edges there are some beds with low vegetation and scrubs.

1.11 **Kensington Memorial Gardens**: 2.6ha. North section: The majority of this area is used for recreation with two large open short cut grass areas separated by an avenue of trees. This area is bordered some hedgerows and trees. The north edge is bordered by residential gardens. South section: This area is split into three sections: tennis courts at the east, gardens in the middle and a children's recreation area at the west end. The garden section in the middle has some plant life with scrubs, flower beds and trees. The other two sections have small amounts of vegetation bordering them. The tennis courts have mature trees bordering them.

1.12 **Westfield Park**: 1ha. East section: The majority of this section is a children's recreation area. It is bordered by grass and a variety of trees. A few bushes are present. Middle section: Mostly short grass and mature trees, a few beds with scrubs and bushes are also present. The northern edge has a small hedgerow. West section: Shortly cut grass, with numerous trees, borders the footpaths. Some of the trees are London plane *Platanus x hispanica* trees.

1.13 **Cremorne Gardens**: 1ha. East section: The majority of this area is concrete with a few beds and a jetty that extends into the River Thames. West section: Grass covers ninety percent of the site. There are some trees along the north and south edges, which stand in beds. The northeast corner is dominated by a wildflower meadow.

1.14 **St Luke's Gardens**: 1.5ha. North section: This section is dominated by the large recreation facility in the middle, with a small children's play area on the east side. The area is bordered by mature trees mostly London plane trees, scrub covers the east side and ivy *Hedera helix* grows along the fencing that encompasses the church. South section: The main feature of this area is the shortly cut grass which covers the majority of the area. The edges are bordered by mature trees again, the majority are London plane trees. Bushes cover the ground directly under the trees and a few cherry *Prunus sp.* trees are dotted across the grass area.

2 Ecology

2.1 This section gives a brief overview of the ecology of each species, including information on distribution, habitat requirements, physiology, breeding and field signs. Data has been collated from Mammals of the British Isles (Harris & Yalden, 2008). Information on the status and distribution of deer in London has been gathered from the London Wildlife Trust (2010) website.

2.2 Legislation that applies to some of these species is described in Appendix 2.

YELLOW-NECKED MOUSE

2.3 In Great Britain their range is essentially restricted to east and south England, central east Wales and the Welsh border counties. They occur mainly in mature deciduous woods, and are associated with long established and ancient woodland, and areas with high summer temperatures. In coppice woodland, the species prefers older compartments and avoids recently coppiced areas. Marginal habitats include hedges and rural gardens, and within woodland the affinity for structurally complex areas incorporating fallen dead wood may provide good areas for nests.

2.4 In Great Britain, yellow-necked mouse is recognisable by a yellow collar which is consistently complete and discernible even in juveniles as a grey band, permitting easy separation from wood mouse. Dorsally mature adults are more vivid orange-brown, and ventrally brighter white, than wood mouse. They can have litters of 2-11 young in successive pregnancies from February to October. Field signs include tracks and trails, and faeces.

WOOD MOUSE

2.5 Wood mice occur throughout the British Isles and are highly adaptable and opportunistic. They are principally a woodland species but are found in most habitats. Probably limited in urban areas by predation and habitat fragmentation, though offset by availability of suitable gardens.

2.6 Wood mice have dark brown upper fur, large protruding eyes and a long tail. Underside white with yellowish chest spot or streak, sometimes extensive, but never joining brown upper fur on either side of neck, distinguishing it from slightly larger yellow-necked mouse. This species is mainly nocturnal and can have numerous pregnancies between March-October, with most litters occurring between June and

August. Field signs involve searching for tracks and trails, faeces, nests, cached food, food remains and scent marks.

HOUSE MOUSE

2.7 The house mouse is probably the most widespread of all wild mammals. Found throughout Great Britain. House mouse is not an obligate commensal species and has become established in an enormous range of environmental conditions. In the British Isles, it is most commonly found in buildings where they use structural features such as cavity walls and cracks for nesting and runways.

2.8 House mice are dull greyish-brown dorsally, only slightly lighter ventrally. Juvenile wood and yellow-necked mice are similarly grey, but have much longer hind feet, broader head, larger eyes and ears. Litters of 5-8 are born at monthly intervals throughout the year (indoors) or during the summer months (outdoors). Field signs include faeces, runways, footprints, smears, holes, scrapes, partially eaten food particles and damage.

FIELD VOLE

2.9 Field voles occur throughout Great Britain, mainly found in rough, often damp, ungrazed grassland, including young forestry plantations with lush growth of grass. Sparse populations occur in marginal habitats such as woodlands, hedgerows, blanket bog, dunes, scree and moorland.

2.10 Field voles are a small, greyish brown vole, with small ears and eyes, blunt snout and short tail. Colour dorsally varies from greyish to yellowish brown and never shows deep chestnut colour of bank vole. Young may be confused except that the tail is longer in the bank vole. Over most of Great Britain field voles breed from March/April through to September/October. Field signs include tunnels and runways, chewed through long grass, and cut remains of long grass with droppings amongst them.

BANK VOLE

2.11 Bank voles occur throughout Great Britain and are common in mixed and deciduous mature woodland. They are also recorded in grasslands, deciduous and conifer plantations, hedgerows, fenland and road verges. Thick ground cover is important in all cases. They also occur in isolated woodlands as small as 0.1ha in area, although they may become extinct over winter in poor quality small woods.

2.12 Bank voles have small eyes and ears, blunt nose, chestnut brown back. The tail colour (bicoloured underneath) and tail length (1/2 head and body) separate it from field vole.

Over most of Great Britain bank voles breed from March/April through to September/October. Field signs include tracks and trails, faeces and dens/nests.

COMMON SHREW

2.13 The common shrew is found throughout Great Britain at all altitudes. They are found in most terrestrial habitats providing low vegetation cover is available. Most abundant in thick grass, bushy scrub, hedgerows and deciduous woodland. Rapidly colonises fallow land, roadside verges and urban habitats.

2.14 Common shrews are easily distinguished from water shrews by brown (never black) upper surface and their smaller size. More difficult to distinguish between pygmy shrew but sharp contrast between pelage cover on back and flank, and larger overall size. Breeding season for common shrews is April to September. Field signs include footprints, faeces and burrows. Their presence can also be determined through hair tube survey and bait tubes.

PYGMY SHREW

2.15 The pygmy shrew is found throughout Great Britain and Ireland at all altitudes. They are widespread in all types of habitat, with a preference for sites offering plenty of ground cover. They are generally more abundant in grassland than woodland, but less abundant than common shrew in most habitats. Fare best in very wet or very dry habitats, relative to common shrew.

2.16 Pygmy shrews are much smaller than the common shrew, but their tail is proportionally longer, thicker and more hairy. Lacks sharp contrast between colour of back and flank. Dorsal surface is never as dark as adult common shrew. Breeding season for pygmy shrews is April to October. Field signs include footprints, faeces and burrows. Their presence can also be determined through hair-tube surveys.

WATER SHREW

2.17 The water shrew is widely distributed in Great Britain. They typically inhabit the banks of clear, fast flowing, unpolluted rivers and streams, but also ponds, lakes, canals and drainage ditches, and in reed beds, fens, marshes and bogs. Often found in man-made habitats including gardens.

2.18 Water shrews are distinguished from other shrews by black dorsal fur, large size and habit of swimming and diving. Breeding season for water shrews is April to September, reaching a peak between May and June. Field signs include footprints, faeces, prey

remains and food caches, and burrows. Their presence can also be determined by scat analysis in bait tubes, but difficult to distinguish from other shrews in hair tubes.

HEDGEHOG

2.19 In Great Britain and Ireland, the hedgehog is found in all suitable habitat throughout. They are most abundant where grassland is in close proximity to woodland, scrub or hedgerow. Present in virtually all lowland habitats where there is sufficient cover for nesting. More common in suburban areas.

2.20 Hedgehogs have several thousand sharply pointed spines completely replacing hair on dorsal surface except the face and narrow median naked patch on the crown. For hedgehogs there are two peaks in pregnancies, one between May and July, and also in September. Their presence can be determined by footprints, faeces and nests, as well as torchlight surveys.

BROWN RAT

2.21 Found throughout the British Isles except in exposed mountain regions. Brown rats are highly adaptable and versatile but generally limited to habitats where competing species are few or absent or where food is augmented by human activity. Typically found associated with farm buildings, refuse tips, urban waterways and warehouse, but also occurs in hedgerows and ditches around cereals, and field margins. Prefers areas with dense ground cover associated with water.

2.22 Distinguished by large size, relatively pointed muzzle and long scaly tail, which precludes confusion with mice, voles and squirrels. In water easily confused with water voles but muzzle more pointed, ears more prominent and tail longer. Breeding season for brown rats is April to September. Their presence can be determined by footprints, faeces, burrows, runs and damage.

GREY SQUIRREL

2.23 Introduced from the USA. In Great Britain found in a wide range of habitats and most abundant in mature broadleaved forests of oak *Quercus robur*, beech *Fagus sylvatica* or sweet chestnut *Castanea sativa*, and hazel coppice *Corylus avellana*. Also found in mature/conifer mixtures, sometimes in mature conifer woodland but densities higher when broadleaves available nearby, and in hedgerows, parks, gardens and urban areas with mature trees.

2.24 Grey squirrel larger than red squirrel, body predominantly grizzled grey, never uniformly brown, though some brown on back and on the flanks and limbs. Breeding

season generally has two peaks in spring and summer. Their presence can be determined by tracks and trails, faeces, feeding signs (especially characteristically opened hazelnuts) and nests.

RED FOX

2.25 Present throughout Great Britain and particularly common in many urban areas in south of England. The fox is a highly adaptable, unspecialized, versatile species that lack specific habitat requirements. Urban foxes prefer 1930s to 1940s low-density residential suburbs. Most abundant in fragmentary habitats offering wide variety of cover and food.

2.26 Conspicuous characteristics are the erect, black-backed ears, slender muzzle, long, horizontally held, bushy tail, white muzzle, usually white bib of throat and often white tail tip, and black socks and ears. Mate between December and February, with peak births in March. Their presence can be determined by tracks and trails, faeces and dens (earths).

STOAT

2.27 Lives throughout Great Britain in a wide range of habitats. Can live in any habitat, at any altitude that offers sufficient prey and cover. Tends to avoid open spaces by travelling along hedgerows, ditches and stone walls. Foraging concentrated on rabbit warrens, early successional communities favoured by field voles and brush and timber piles that might harbour small mammals.

2.28 Stoats have a long, thin body, short legs and long tail with distinctive black tip that bristles in moments of excitement. They mate between April and July. Their presence can be determined by tracks and trails, faeces and dens.

WEASEL

2.29 Occurs throughout mainland Great Britain, although absent for Ireland. Occupies a wide range of habitats offering food and cover. On temperate farmland, strongly associated with hedgerows, stone walls and other linear features, rarely ventures into open habitat. Less common where small animals are scarce.

2.30 Smallest member of *Carnivora*. Small size, short legs and long slender body distinguish it from all other British mammals except stoat. Can be difficult to distinguish live weasels from stoats in the field, though weasels have noticeably shorter tail lacking black tip. Weasels mate between April and July. Their presence can be determined by tracks and trails, faeces and dens.

BADGER

2.31 Widespread in Great Britain. Optimal habitat includes a mixture of deciduous woodland and earthworm-rich pasture in a region with a mild wet climate. Areas of high badger density often associated with cattle farming where short grass provides ideal habitat for earthworm foraging.

2.32 Unlike any other British mammal in appearance, having a white head and conspicuous dark stripes through eyes. Mating peaks in spring with majority of births in February. Their presence can be determined by tracks and trails, faeces and dens.

DEER

2.33 Although deer are believed to be rare in London, there are growing signs that they are colonising (London Wildlife Trust, 2010). There are regular sightings in the woods of Havering, Hillingdon, Bromley and Waltham Forest, as well as Sydenham Hill Wood in Southwark and Tooting Bec Common in Wandsworth. Deer species present in London include red deer *Cervus elaphus*, roe deer *Capreolus capreolus*, Reeves'muntjac *Muniacus reevesi*, sika deer *Cervus nippon* and fallow deer *Dama dama*. The species really moving into London is the muntjac, although fallow deer appear to be in Havering. In more Central London, deer are isolated to parks such as Richmond Park, Bushy Park and Greenwich Park, all of which are home to large number of red and fallow deer.

2.34 Muntjac have probably been able to colonise the outskirts of London because they can eat a variety of food and only need very small woodlands in which to survive. Bramble *Rubus fruticosus agg*. is ideal for them to both eat and hide in. They also eat rose *Rosa sp*., ivy, honeysuckle *Lonicera periclymenum*, clematis *Clematis sp*, peas, beans and even bluebells *Hyacinthoides non-scripta*.

2.35 Both Muntjac and sika deer are listed on Schedule 9 of the Wildlife and Countryside Act, 1981. Section 14 of the Wildlife and Countryside Act prohibits the release of non-native species (those listed on Schedule 9) that may be detrimental to our native wildlife.

2.36 Holland Park is the only park large enough and with substantial cover to provide a suitable habitat for deer, in particular smaller species such as Muntjac.

3 Habitat Suitability

3.1 To enable a discussion and comparison of the distribution of mammal species (excluding bats) within each park and within the Borough, and to inform recommendations for habitat enhancements, the habitats within each site have been described following JNCC Phase 1 survey techniques (JNCC, 2010). Each habitat type has been mapped and dominant, as well as notable, floral species have been recorded. The suitability of these habitats for mammal species was also assessed and where appropriate, target notes made. A Phase 1 Habitat survey map and associated target notes has been produced for each site; see Appendix 1, Plan 2.

3.2 It must be noted that each of the parks are surrounded by highly urban areas and species are therefore thought of generally in terms of isolated populations. However, species including red foxes, grey squirrels and brown rats are highly opportunistic and will exploit urban areas, in particular urban gardens. It has been assumed that there is potential for brown rats at every site and they are therefore not discussed specifically below.

HOLLAND PARK

3.3 Holland Park is by far the largest of the sites (22 ha) and has the greatest potential to support mammals. The park is of sufficient size to support populations of badger and small deer species such as Muntjac, which are becoming more common in urban London over recent years. Species such as badger have specific habitat requirements and have large territory sizes that cannot be provided in small urban parks. Badger territory sizes range from approximately 30 ha in optimal habitat to >150 ha in marginal habitat. Due to their ability to adapt to and exploit semi-urban environments, Holland Park, is thought to be of sufficient size to sustain a viable badger population, particularly within the open residential environment comprising large gardens, residential areas and community squares.

3.4 Holland Park has a variety of habitats offering potential for a number of other mammal species. Areas of poor semi-improved grassland, rough grassland and long grass have potential for small mammals, in particular field voles, and offer foraging areas for hedgehogs. The hedgerows on site have the potential to act as commuting routes between resources and foraging areas, and provide cover for a number of species including stoats, weasels, wood mice, yellow necked mice, pygmy shrews, common shrews, bank voles, brown rats and hedgehogs. In areas of sufficient cover, hedgehogs will hibernate at the base of hedgerows. Areas of dense scrub also offer

suitable cover and shelter for small mammal species, weasels and stoats. The areas of broadleaved coniferous woodland offer potential for larger species, including sites for badger setts or fox earths as well as shelter for deer species. They also offer potential drey sites for grey squirrels.

3.5 Grey squirrels are opportunistic feeders taking advantage of anything that is available including fruit, nuts, seeds, flowers and bulbs. Species such as hawthorn *Crataegus monogyna*, *elder Sambucus sp.*, oak, sweet chestnut, beech and hazel, all of which are present at Holland Park, offer potential for small mammals, brown rats and grey squirrels. Both red fox and brown rat are also highly opportunistic and will exploit whatever habitat is available to them.

3.6 Areas of ornamental plantings, introduced shrub and amenity grassland are generally unsuitable for mammals, although amenity grassland could act as suitable foraging habitat for badgers and hedgehogs (easy access to earthworms).

AVONDALE

3.7 Avondale has two large areas of hardstanding consisting of children's play areas. The remainder of the site is dominated by amenity grassland, scattered mature trees, dense scrub, hedgerows and ornamental planting. There is also a small wildlife garden to the west of the site which consists of a small pond, log piles, tall ruderals, hedgerow and some mature scattered trees. This area offers the greatest potential for small mammal species, hedgehogs and grey squirrels.

3.8 The mature trees offer potential sites for grey squirrel dreys. The hedgerows offer some potential for common small mammal species such as house mouse, wood mouse, yellow necked mouse and bank vole, as well as hedgehogs. There is potential for hedgehog hibernation opportunities within the wildlife garden and foraging opportunities, albeit not optimal, within the amenity grassland.

3.9 The site is open and offers no opportunities for badger setts, fox earths and deer. If small mammals are present as a food source, there is some potential for stoats and weasels, but the site is small and more isolated (being situated in a more intensive urban area than Holland Park) and therefore probably unable to support viable populations of these species. Although not using the site for shelter, there is potential for foxes to use the park as foraging habitat, if present in the surrounding habitat.

LITTLE WORMWOOD SCRUBS

3.10 Little Wormwood Scrubs is a large site, with potential to support a number of mammal species. The majority of the site consists of poor semi-improved grassland, dense scrub, scattered scrub and tall ruderals. There is an area of amenity grassland, scattered trees, and a small woodland copse with tall ruderals and scrub habitat, with log piles and abundant leaf litter. The majority of the site is open and the woodland has little understorey offering no opportunities for badger setts, fox earths or deer. In addition to this Little Wormwood Scrubs is not believed to be of a large enough size to sustain a viable badger population.

3.11 Little Wormwood Scrubs has a variety of habitats. Areas of poor semi-improved grassland, rough grassland and scrub have potential for small mammals, in particular field voles, and offer foraging areas for hedgehogs. The scrub, log piles and leaf litter have the potential to act as sites for shelter and hibernation for a number of species including stoats, weasels, wood mice, yellow necked mice, pygmy shrews, common shrews, bank voles and hedgehogs.

3.12 Areas of dense scrub also offer suitable cover and shelter for small mammal species, weasels and stoats. The areas of broadleaved coniferous woodland offer potential for larger species, including sites for badger setts or fox earths as well as shelter for deer species. They also offer potential drey sites for grey squirrels. Species such as hawthorn, elder, oak, sweet chestnut, beech and hazel, all of which are present at Little Wormwood Scrubs, offer potential for small mammals, brown rats and grey squirrels. Both red fox and brown rat are also highly opportunistic and will exploit whatever habitat is available to them.

3.13 Areas of ornamental plantings, introduced shrub and amenity grassland are generally unsuitable for mammals, although amenity grassland could act as suitable foraging habitat for hedgehogs. If small mammals are present as a food source, there is some potential for stoats and weasels, but the site is relatively small and isolated within a dense urban environment and therefore unlikely to support viable populations of these species. Although not using the site for shelter, there is potential for foxes to use the site as foraging habitat, if present in the surrounding habitat.

EMSLIE HORNIMAN GARDENS

3.14 Emslie Horniman Gardens is dominated by amenity grassland, with areas of hedgerow, dense scrub, ornamental planting and scattered trees (sycamore, field maple *Acer campestre*, ash saplings and cherry saplings). The site is open and offers no opportunities for badger setts, fox earths, deer, stoats or weasels.

3.15 The mature trees offer potential sites for grey squirrel dreys. The hedgerows and dense scrub offer some potential for common small mammal species such as house mouse, wood mouse, yellow necked mouse and bank vole, as well as hedgehogs. There is potential for hedgehog hibernation opportunities amongst the scrub and hedgerows and foraging opportunities, albeit not optimal, within the amenity grassland. Although not using the site for shelter, there is potential for foxes to use the site as foraging habitat, if present in the surrounding habitat.

ATHLONE GARDENS

3.16 The habitats present at Athlone gardens consist of scattered trees (dominated by London plane, sycamore *Acer pseudoplatanus*, cherry, ash *Fraxinus excelsior* and whitebeam *Sorbus anglica*), dense scrub and amenity grassland. Large areas of hardstanding are also present. The site and habitats present offer little potential for mammals. The site is open and offers no opportunities for badger setts, fox earths, deer, stoats or weasels.

3.17 Mature trees offer potential sites for grey squirrel dreys. The dense scrub offers some potential for common small mammal species such as house mouse, wood mouse and yellow necked mouse, although this is unlikely as there is limited food availability for these species. It is unlikely that hedgehogs will be present within the site as there are no hibernation opportunities for this species, such as compost heaps or log piles. The amenity grassland offers little potential for mammals generally, but may offer some foraging opportunities for hedgehogs if they are present. Although not using the site for shelter, there is potential for foxes to use the site as foraging habitat, if present in the surrounding habitat.

KENSINGTON MEMORIAL GARDENS

3.18 Kensington Memorial Gardens is dominated by tennis courts, a children's play area and amenity grassland fields. There are areas of poor semi-improved grassland, scrub with scattered trees and hedgerows to the north. Scattered trees are dominated by horse chestnut, field maple, blackthorn *Prunus spinosa*, hawthorn, cherry and apple *Malus domestica*. The site is open and offers no opportunities for badger setts, fox earths, deer, stoats or weasels.

3.19 The mature trees offer potential sites for grey squirrel dreys. Grey squirrels are opportunistic feeders, taking advantage of whatever food sources are present. The hedgerows, dense scrub, scattered scrub and poor semi-improved grassland offer some potential for small mammal species, as well as hedgehogs. There is potential for hedgehog hibernation opportunities amongst the scrub and hedgerows and foraging

opportunities, within the poor semi-improved grassland and amenity grassland. Although not using the site for shelter, there is potential for foxes to use the site as foraging habitat, if present in the surrounding habitat.

WESTFIELD PARK

3.20 Westfield Park is dominated by scattered trees (including a number of mature London plane trees), hedgerow, amenity grassland and ornamental planting. The site also has large areas of hardstanding. The site is open and offers no opportunities for badger setts, fox earths, deer, stoats or weasels.

3.21 The mature trees offer potential sites for grey squirrel dreys. The hedgerows offer some potential for common small mammal species such as house mouse, wood mouse and yellow necked mouse, although this is unlikely as there is limited food availability for these species. It is unlikely that hedgehogs will be present within the site as there are no hibernation opportunities for this species, such as compost heaps or log piles. The amenity grassland offers little potential for mammals generally, but may offer some foraging opportunities for hedgehogs if they are present in surrounding gardens and squares.

CREMORNE GARDENS

3.22 The majority of the site is covered by amenity grassland, with some scattered trees and introduced scrub. Cremorne Gardens is the smallest of the sites at only 1 hectare in size. The site is open and of a very small size, therefore offering no opportunities for badger setts, fox earths, deer, stoats or weasels. The site is isolated by the River Thames and highly urban areas.

3.23 There are no mature trees offering potential sites for grey squirrel dreys or suitable food sources for squirrels. The ornamental plantings offer some limited potential for common small mammal species such as house mouse and wood mouse, although their presence is unlikely as there is limited food availability for these species. It is unlikely that hedgehogs will be present within the site as there are no hibernation opportunities for this species. The amenity grassland offers little potential for mammals generally, but has the potential to offer some foraging opportunities for hedgehogs.

ST LUKE'S GARDENS

3.24 St Luke's Gardens is dominated by a recreation ground, a small children's play area, amenity grassland and ornamental plantings with hedgerows and scattered trees, dominated by London plane, throughout the site. The site is open and offers no opportunities for badger setts, fox earths, deer, stoats or weasels.

3.25 The mature trees offer potential sites for grey squirrel dreys. The hedgerows and ornamental plantings offer some potential for common small mammal species such as house mouse, wood mouse and yellow necked mouse, although they are unlikely to be present as there is limited food availability for these species. It is unlikely that hedgehogs will be present within the site as there are no hibernation opportunities for this species, such as compost heaps or log piles. The amenity grassland offers little potential for mammals generally, but may offer some foraging opportunities for hedgehogs if they are present in the surrounding landscape. Although not using the site for shelter, there is potential for foxes to use the site as foraging habitat, if present in the surrounding habitat.

4 Methodology

OVERVIEW

4.1 The mammal surveys included the compilation of existing desk study records and detailed field surveys throughout 2010.

DESK STUDY

4.2 Existing records relating to the site and a surrounding 1-2km radius were compiled from the following sources:

- Greenspace Information for Greater London (GIGL); and,
- National Biodiversity Network (NBN) Gateway.

4.3 It is important to note that, even where data is held, a lack of records for a defined geographical area does not necessarily mean that there is a lack of ecological interest; the area may be simply under-recorded.

4.4 Reports detailing previous surveys for mammals and general ecology at the parks were also reviewed and have been referenced later on in this report. These include 'Mammal survey' (2007), 'Borough ecological survey' (2002) and 'Fox survey' (1998).

FIELD SURVEY

4.5 Mammal surveys to identify the presence or absence and distribution of small mammals (including yellow necked mouse, wood mouse, bank vole, field vole, house mouse, common shrew, pygmy shrew and water shrew), hedgehog, brown rat, grey squirrel, deer, badger, fox, stoat and weasel were undertaken in each of the nine parks described in Sections 1.5 to 1.14.

SMALL MAMMAL SURVEY

4.6 Small mammal surveys were undertaken between the 12th August and 22nd October 2010, to record the presence/likely absence and distribution of yellow-necked mouse, wood mouse, bank vole, field vole, house mouse, common shrew, pygmy shrew and water shrew. Repeat surveys were undertaken in sites where small mammals were identified during the first round of small mammal trapping. These were undertaken between 25th March and 1st April 2011 and included Holland Park, Little Wormwood Scrubs, Avondale and Kensington Memorial Gardens.

4.7 Line transect live-capture surveys were undertaken using Longworth traps for small mammals, to record the presence/absence and distribution across habitat types within

each site to be measured. Longworth traps were placed in transect lines, covering a range of habitat types within each site where possible, including dense woodland, scrub, grassland habitats, parkland and hedgerows. Transects were set at one trap per four hectares (or part there-of), in lines approximately 10m apart. The location of each transect is shown in Plan 4, Appendix 1.

4.8 Longworth traps are designed to trap small mammals with minimum discomfort to the trapped animal. The traps consist of two parts – a tunnel, which contains the door tripping mechanism – and a nest box, which is attached to the back of the tunnel. The nest box provides a large space for food and bedding material. When in use it is placed at an upwards angle to the trap tunnel to prevent rain entering the nest box and to provide drainage of urine or condensation.

4.9 A transect of 10 Sherman traps was installed in the 'pig pen' in Holland park. However, continuous interference by grey squirrels made it impossible to trap small mammals and the data is therefore considered invalid.

4.10 Prior to small mammal surveys commencing a licence from Natural England was obtained to take shrews for scientific or educational purposes. Any person with appropriate knowledge and experience of shrews, and the trapping and marking techniques permitted can obtain a licence.

4.11 A bedding of cotton wool to absorb moisture and a large handful of dry hay for bedding was placed in each trap, in addition to the following food; dog/cat food (for shrews), rolled oats and 3-4 pieces of fruit or vegetable with a high moisture content (carrot and apple) to prevent dehydration.

4.12 Longworth traps were pre-baited for 3 days before trapping was carried out. This allowed field voles, which are particularly timid, to become accustomed to the traps before they were set. All small mammal populations' show pronounced annual fluctuations usually resulting in a population peak during late autumn; trapping was therefore carried out twice a year (late autumn and late spring) to produce a measure of abundance of value to monitoring.

4.13 Traps were initially set on the pre-bait setting on dusk of the first day and were left on the pre-bait setting for three days. Bedding and food were replaced on a daily basis. Traps were revisited on the third day and taken off the pre-bait setting and set to close. Traps were then checked at dusk and dawn for 5 days and food and bedding

replaced where necessary. Trapping was avoided if very wet or cold weather was forecast.

4.14 Each closed trap was emptied into a polythene bag, at least 50mm deep, to identify the species. All captured animals were released at the point of capture.

4.15 Field signs were also recorded, including burrows, runways, faecal pellets, feeding signs etc. Some research has shown a correlation of field signs with trapping numbers.

Estimating population density

4.16 Although a quantitative measure of density in each park cannot be made without using mark-recapture or very high-intensity trapping effort, a small sample of the population can be assumed to have been captured enabling a comparison between sites to be undertaken. In addition, known ranges, density and habitat preferences of each species captured (Harris & Yalden, 2008) can be used to estimate likely density and distribution.

4.17 The habitats within many of the parks (with the exception of Wormwood scrubs) are generally not homogeneous on a scale sufficient for an entire transect or grid to be placed in the same habitat type. Also, the surveys aimed to assess the distribution of small mammals in different habitat types to inform management priorities (a description of the habitat type each trap was placed in is presented in Appendix 3; a discussion of findings is included in Section 6 of this report). As such, the transects were placed in all significant suitable habitat types within each park and other constants between parks include trap density (1 transect of 10 traps/4ha), trapping effort (each transect was pre-baited and checked for 5 nights over two seasons), trapping pattern and trapping procedure.

4.18 As such, we can compare density between sites by dividing total numbers of each species of small mammal captured by number of transects. If an increase in density of transects is used in future years to get a more representative figure of small mammal density, this can be factored in to this simple calculation.

4.19 In addition, the sampling methodology provides us with distribution of species across different habitat types. Using known range and density data we can predict the maximum density of each species (Harris & Yalden, 2008) according to habitats present within the parks and surrounding areas.

HEDGEHOG SURVEY

4.20 There is currently no simple, standardised field survey method either for long-term monitoring of hedgehog populations or for assessment of populations in individual sites. The survey methodology followed here is informed by the Mammal Society guidance (Poulton & Reeve, 2010) which recommends spotlight surveys are undertaken between 21.00 and 04.00 between mid-May and late-June when hedgehogs are breeding and are most active. A repeat survey was undertaken in the autumn when foraging effort is increased prior to hibernation.

4.21 Accordingly, spotlight transects coupled with field sign surveys were undertaken on 29th June and repeated on 14th October 2010. Repeat surveys were undertaken within parks that had suitable habitat for hedgehogs on 6th April 2011. These included Holland Park and Little Wormwood Scrubs. Surveys were undertaken along 1km transects (where possible within sites) through a variety of suitable habitats. Each 100m section was walked slowly, listening and looking for hedgehogs using a small handheld torch for guidance (one million candle power spotlight). Incidental observations of foxes, badgers and other mammals were also recorded.

4.22 Surveys for field signs of hedgehogs, including droppings and footprints, were incorporated into daytime surveys for brown rat, deer, fox, stoat and weasel. Incidental observations during other day and night time transects were also recorded.

BROWN RAT SURVEY

4.23 Daytime transect surveys for brown rat were undertaken on 29th June 2010 and 14th January 2011. Surveys for field signs were undertaken along 1km transects (where possible within sites) through a variety of suitable habitats. Transects were walked to search for brown rat field signs, including feeding remains, runs, burrows and droppings. Incidental observations during other day and night time transects were also recorded.

GREY SQUIRREL SURVEY

4.24 Daytime transect surveys for grey squirrels were undertaken on 29th June 2010 and 14th January 2011. Surveys for field signs were undertaken along 1km transects (where possible within sites) through a variety of suitable habitats. The method involved walking along predetermined survey lines, through or alongside parkland, recording all squirrels seen, feeding activity and dreys. These surveys were undertaken in accordance with the practical note on survey techniques produced by Gurnell et al., (2009). Incidental observations during other day and night time transects were also recorded.

Estimating population density

4.25 The presence of active dreys can be used to give a crude indication of squirrel numbers. Dreys tend to be semi-permanent when squirrels are resident, and thus the number of dreys tends to reflect squirrel numbers over a season. To get an estimation of squirrel numbers within each park, the total number of dreys was related to the area of woodland searched. It must be noted that this survey methodology is designed for broadleaf woodland and not parkland, and therefore will give an underestimation of the number of squirrels present within each park.

4.26 Squirrels use several dreys at any one time, so it is necessary to know the average number of dreys per squirrel before density estimates can be calculated. To calculate the number of squirrels per hectare = number of dreys per ha x 0.74. This is taken from a variety of broadleaf woodlands in southern England (Don, 1985).

DEER SURVEY

4.27 Daytime transect surveys for deer were undertaken on 29th June 2010 and 14th January 2011. Surveys for field signs were undertaken along 1km transects (where possible within sites) through a variety of suitable habitats. Transects were walked to search for droppings and footprints. Incidental observations during other day and night time transects were also recorded.

FOX SURVEY

4.28 Daytime transect surveys for foxes were undertaken on 29th June 2010 and 14th January 2011. Surveys for field signs were undertaken along 1km transects (where possible within sites) through a variety of suitable habitats. Transects were walked to search for field signs including paths, scenting, feeding remains and scats. Incidental observations during other day and night time transects were also recorded.

STOATS AND WEASEL SURVEY

4.29 Daytime transect surveys for small mustelids, including stoats and weasels, were undertaken on 29th June and 14th October 2010. Surveys for field signs were undertaken along 1km transects (where possible within sites) through a variety of suitable habitats. Transects were walked to search for field signs including paths, scenting, feeding remains and scats. Incidental observations during other day and night time transects were also recorded.

BADGER SURVEY

4.30 A survey of badger activity was undertaken on 29th June. During the survey all areas of suitable habitat were systematically examined for evidence of badger activity. The surveyor recorded all badger field signs, including:

- *Setts*: several sett types may be present within a social group territory, ranging from a single hole to numerous interconnecting tunnels. These have been categorised according to Table 1 (below) into main, annexe, subsidiary and outlier (Wilson *et al*, 1997);
- *Dung pits and latrine sites*: badgers characteristically deposit dung in pits, which may be located along the boundaries and within the social group territory. These sites serve as means of inter- and intra-group communication. Several dung pits create a latrine. Dung pits and latrines are often used to mark setts or territorial boundaries;
- *Paths and runs*: well used routes between setts and/or foraging areas. Often used by generations of badgers;
- *Snuffle holes and foraging signs*: areas of disturbed vegetation often formed by badgers foraging for ground dwelling invertebrates such as earthworms and larvae and subterranean roots and tubers. Snuffle holes are sometimes re-used as dung pits on territorial boundaries;
- *Hair*: often found among spoil and bedding outside sett entrances or snagged on fences, etc, alongside well-used runs; and,
- *Footprints*: easily distinguishable from other large mammal species, such as the fox and domestic dog *Canis familiaris*. Often found along paths and runs or in spoil outside sett entrances.

4.31 Particular attention was paid to areas where the vegetation and/or the topography offered suitable sett sites. Where dense scrub precluded a thorough search of the area, a targeted examination of the perimeter of the scrub was made for runs or pathways, which may indicate the presence of a sett within the vegetation. Dense vegetation may require resurvey during the winter months.

4.32 Holes attributed to badger were classified as well used, partially used or disused in line with the methodology given in the National Badger Survey (Cresswell et al., 1990; Wilson et al., 1997), as described in Table 1. The location and classification of setts and field signs were recorded and are presented on the Badger Activity Map (Appendix 1).

Table 1 - Conventions used in classifying badger setts (Wilson *et al.*, 1997)

Sett Type	Definition
Main	Several holes (average of 15) with large spoil heaps and obvious paths leading to and from the sett and between sett entrances. Normally the breeding sett and in continuous use.
Annexe	Normally less than 150m from main sett and connected by well used pathways. May comprise several holes (6 holes on average), may not be in use all the time even if the main sett is very active.
Subsidiary	Usually at least 50m from main sett with no obvious paths connecting to main sett. Fewer holes (5 on average) and may only be used intermittently. 'Ownership' can often only be determined by bait-marking.
Outlier	Usually comprising one or two holes with little spoil at the entrance(s). No obvious paths connecting to other setts and may only be used sporadically. Often used by foxes and rabbits *Oryctolagus cuniculus* when not in use by badgers.

LIMITATIONS

4.33 Field surveys for hedgehog, brown rat, grey squirrel, deer, fox, stoat and weasel were undertaken during June 2010 and repeated in either October 2010 or January 2011. Surveys for hedgehogs should ideally be undertaken between mid-May and late-June when hedgehogs are breeding and most active or in late autumn when they are building their reserves for winter. The most active period for small mustelids is April to July, foxes March to September and brown rat May to September. Surveys for deer and grey squirrels should ideally be undertaken over the winter months, but can be undertaken all year round.

4.34 Surveys undertaken in October 2010 or January 2011 were outside the optimal survey period for brown rat, fox, stoat and weasel. However it is still believed that the objectives of the surveys have been met, as surveys were initially carried out in June 2010 during the optimal survey period for these species.

4.35 Four of the Longworth traps used for surveying small mammals were lost or stolen in 2010. This would have a minimal effect on data collection however as they comprised a small proportion of traps over limited periods of time.

4.36 During surveys of Little Wormwood Scrubs, Avondale and Kensington Memorial Gardens between 25th March and 1st April 2011, a number of small mammal traps were stolen. Further surveys in these parks were stopped immediately to prevent the loss of any further small mammal traps. Small mammal surveys in 2011 were therefore only undertaken for Holland Park.

4.37 Badger surveys were undertaken in June 2010 which is not an ideal time of the year to undertake badger surveys, as the vegetation is dense, making setts harder to locate. However, many of the park habitats are relatively open and badgers are more active during the summer months, actively foraging and scent marking their territories. Therefore, when this survey was undertaken there were plenty of field signs to help identify the main areas of activity and the main routes of travel. Where areas of the survey sites exhibited impenetrable dense bramble scrub, making it difficult to access and therefore accurately survey, signs of badgers entering and exiting these areas were searched for (e.g. hairs snagged on thorns, runs entering the stands) to enable conclusions about their likely usage of and whether they possibly harboured a sett. Overall it is believed that the objectives of the survey have been met.

4.38 The grey squirrel population surveys were impeded in Holland Park as the surveyors could not access much of the woodland areas, although visual signs could be recorded from a distance.

5 Results

DESK STUDY

5.1 The GIGL data search revealed the presence of yellow necked mouse, wood mouse, bank vole, field vole, house mouse, hedgehog, brown rat, grey squirrel red fox and weasel within the Royal Borough of Kensington and Chelsea as a whole.

SUMMARY TABLE

5.2 Table 2 provides a summary of species were found within each of nine parks, including the method of detection e.g. field signs, Longworth traps and sightings.

Table 2 – Summary table of field survey results

		Site								
		Holland Park	Avondale	Little Wormwood Scrubs	Emslie Horniman Pleasance	Athlone Gardens	Kensington Memorial Gardens	Westfield Park	Cremorne Gardens	St Luke's Gardens
Species	Yellow necked mouse	Longworth traps	x	x	x	x	x	x	x	x
	Wood mouse	Longworth traps	x	Longworth traps	x	x	x	x	x	x
	House mouse	x	Longworth traps	Longworth traps	x	x	Longworth traps	x	x	x
	Field vole	x	x	Longworth traps	x	x	x	x	x	x
	Bank vole	x	x	x	x	x	x	x	x	x
	Common Shrew	x	x	x	x	x	x	x	x	x
	Pygmy shrew	x	x	x	x	x	x	x	x	x
	Water shrew	x	x	x	x	x	x	x	x	x
	Hedgehog	x	x	x	x	x	x	x	x	x
	Brown rat	x	sighting	x	x	field signs	x	x	x	field signs

	Grey squirrel	sighting and field signs	sighting and field signs	sighting and field signs	field signs	field signs	x	x	x	sighting and field signs
	Red fox	field signs	field signs	x	field signs	field signs	field signs	field signs	x	field signs
	Stoat	x	x	x	x	x	x	x	x	x
	Weasel	x	x	x	x	x	x	x	x	x
	Badger	field signs	x	x	x	x	x	x	x	x
	Deer	(muntjac) – field signs	x	x	x	x	x	x	x	x

SMALL MAMMAL SURVEY

5.3 The locations of Longworth traps at each site where small mammal presence was confirmed can be found in Appendix 1. No evidence of small mammals, (including yellow-necked mouse, wood mouse, bank vole, field vole, house mouse, common shrew, pygmy shrew and water shrew), was found at any of the following parks within the Royal Borough of Kensington and Chelsea;

- Emslie Horniman Pleasance;
- Athlone Gardens;
- Westfield Park;
- Cremorne Gardens; and,
- St Luke's Garden.

5.4 Evidence of small mammals was found at Holland Park, Little Wormwood Scrubs, Kensington Memorial Park and Avondale. A summary of the survey results can be found below in Table 2, detailed survey results are presented in Appendix 3.

Table 3 – Overview of small mammal trapping survey results

Park	Species	Habitat
Holland Park	Wood mouse	Wildlife area: Dense and open woodland habitats, tall ruderals, dense scrub and hedgerow in edge habitats bordering open grassland.
		Gardens: In shrub and herbaceous planting
	Yellow-necked mouse	Wildlife area: Dense woodland and dense scrub/hedgerow bordering grassland
Little Wormwood Scrubs	Field vole	In grassy clearing surrounded by patches of dense scrub and in open site on edge of woodland
	Wood mouse	In grassy clearing surrounded by patches of scattered scrub, in dense scrub, in clearing in woodland, in dense woodland.
	House mouse	In grassy clearing surrounded by patches of scattered scrub, close to housing on edge of park.
Kensington Memorial Park	House mouse	Planted shrub and herbaceous borders, close to housing
Avondale	House mouse	Planted shrub and herbaceous borders, close to housing

Distribution and population density

5.5 Summary of capture numbers and a representative figure for density is provided in Table 3. The density of small mammals typically reaches maximum in late autumn/early winter (at the end of the breeding season). As previously described, capture number/ha cannot be used as any indication of actual density; merely for comparison between parks.

5.6 Wood mouse is the most common small mammal species recorded in the Borough, with greatest numbers and density recorded in Holland Park; the largest park comprising approximately 50% woodland (the most suitable habitat for this species). However, wood mouse was found in all habitat types within the park, including sub-optimal types also found in parks where the species was absent; they are a highly adaptable and opportunistic species occupying a wide variety of habitats including as a pioneer species (Harris & Yalden, 2008). Holland Park was the only park supporting yellow-necked mouse, albeit in lower densities, within the woodland/wildlife area only, possibly due to their preference for deciduous woodlands and occupying marginal habitats in rural/natural areas only.

5.7 The greatest diversity of small mammal species was recorded in Little Wormwood Scrubs, where a diverse structure of rough grassland and scattered scrub bordered by deciduous woodland dominate. Again, wood mouse was found in all habitat types surveyed. Field vole and house mouse were found in more open habitats only, the former species found in relatively high densities (1.6/ha with only 50% of the park supporting suitable habitats) and the latter species being captured in low densities close to the edges of the park adjacent to housing. Field vole is mainly found in rough grassland and habitats with a lush growth of grass; only sparse populations are found in marginal habitats including woodland (Harris & Yalden, 2008).

5.8 House mouse was captured in good densities in Kensington Memorial Gardens and Avondale. Both these parks are small and situated adjacent to relatively dense urban areas.

Table 4 – Summary of capture numbers and an indicative density of each species

Park	Area (Ha)	Species	Capture numbers*	Capture number/100m transects* & Ha
Holland Park	22	Wood mouse	106	26.5 & 4.8
		Yellow-necked mouse	8	2 & 0.4
Little Wormwood Scrubs	8.8	Field vole	14	7 & 1.6
		Wood mouse	20	10 & 2.3
		House mouse	5	2.5 & 0.6
Kensington Memorial Park	2.6	House mouse	8	8 & 3.1
Avondale	1.4	House mouse	3	3 & 2.1

* based on 1 transect (10 traps)/4 hectares

HEDGEHOG

5.9 The locations of transects walked during spotlight surveys at each site can be found in Appendix 1. No evidence of hedgehogs was found at any of the parks surveyed within the Royal Borough of Kensington and Chelsea.

BROWN RAT

5.10 The locations of transects walked during daytime surveys and the locations of brown rat field signs at each site can be found in Appendix 1. Evidence of brown rats was found in Avondale where a dead brown rat was observed. Evidence of brown rats in the form of feeding signs was found in Athlone Gardens. Further to this anecdotal evidence of brown rat was noted at St Luke's Gardens by the gardener who has observed a brown rat in early 2010. It is assumed however, that brown rat is present in all the parks surveyed.

GREY SQUIRREL

5.11 The locations of transects walked during daytime surveys and the locations of grey squirrel field signs at each site can be found in Appendix 1. Grey squirrels and dreys were observed in St Luke's Gardens, Avondale, Holland Park and Little Wormwood Scrubs. Grey squirrel feeding signs and a squirrel drey was recorded in Athlone Gardens. A squirrel drey was also observed in Emslie Horniman Garden.

5.12 A standardised estimation of the grey squirrel population at Holland Park, the largest area and best quality habitat, has been undertaken based on the number of dreys counted during the survey on 14th January 2011. The number of squirrels per ha =

number of dreys per ha x 0.74, in this case 17 (number of dreys observed)/15 (area of site surveyed in ha) x 0.74 = 0.83.

5.13 However, the results of this calculation show a large underestimation of the number of squirrels within Holland Park; this method is clearly unsuitable for this site. A total of 10 individual grey squirrels were observed during the survey alone. Limitations are described in sections 6.9 to 6.11.

5.14 Although Holland Park is 22ha in size, many of the woodland areas (the best quality habitat for this species and for dreys in particular) had been blocked off for the winter and could not be surveyed, reducing the survey area to approximately 15ha. Further to this, the calculation is based on broadleaf woodland and not parkland, which is more difficult to survey and would support a far greater number of dreys. No methodology has been produced to date to calculate the density of grey squirrels in urban park habitats.

5.15 There are further problems in assessing the relationship between drey density and squirrel density. Firstly, some dreys in an area of woodland may be missed during a count; secondly dreys can be confused with birds' nests, such as crows, magpies and some raptors (Gurnell et al, 2001).

5.16 During the survey it was noted that squirrels at Holland Park were regularly being fed by members of the public. Monkey nuts and walnut shells, opened by squirrels, were found near a number of benches located around the park. Numerous squirrels were observed within the woodland at the north of the park, where access was not possible. Based on all the information available, an estimate of grey squirrel numbers between 50-100 individuals is more realistic.

5.17 Estimations of squirrel numbers at other parks have not been made due to the small size of the parks, and movement of squirrels between the parks and adjacent residential properties. Due to the close association of urban parks and residential gardens, it is assumed that territory sizes extend out of these parks and therefore estimations of squirrel numbers based on drey counts is not possible.

DEER

5.18 The locations of transects walked during daytime surveys for field signs of deer at each site can be found in Appendix 1. No evidence of deer was found at any of the smaller parks surveyed within the Royal Borough of Kensington and Chelsea. Muntjac footprints were observed at Holland Park.

FOX

5.19 The locations of transects walked during daytime surveys and the locations of fox field signs at each site can be found in Appendix 1. Fox scats were observed at Westfield Park, Avondale and Kensington Memorial Gardens. Fox footprints were observed in a sand box at Emslie Horniman Gardens and a strong smell of foxes was present at Athlone Gardens indicating presence. A fox earth, footprints and scats were observed at Holland Park. Further to this anecdotal evidence of foxes was noted at St Luke's Gardens by the gardener who has observed foxes on numerous occasions in 2010. Although no evidence of foxes was observed at Little Wormwood Scrubs, they are presumed to be present due to the size of park and dense nature of the habitats.

STOATS AND WEASELS

5.20 The locations of transects walked during daytime surveys for field signs of stoats and weasels at each site can be found in Appendix 1. No evidence of stoats and weasels was found at any of the parks.

BADGER

5.21 No current evidence of badgers was found at any of the parks surveyed within the Royal Borough of Kensington and Chelsea. However, a disused badger sett was recorded in Holland Park.

6 Conclusions and Recommendations

MAMMAL DISTRIBUTION AND COMPARISON OF DENSITY

Overview and comparison with historical surveys

6.1 A total of four species of small mammal (house mouse, wood mouse, yellow-necked mouse and field vole) were recorded during the live capture surveys and a further four species (red fox, grey squirrel, muntjac and brown rat) were identified from field signs or direct observations. Previous surveys of Emslie Horniman Gardens in 1997 did not identify the presence of any mammal species. However, surveys in 2010/11 have identified the presence of both red fox and grey squirrel. Further to this previous surveys of Avondale in 1997 identified the presence of grey squirrels only, but surveys in 2010/11 have also identified the presence of red fox and brown rat.

6.2 Badgers, weasels, stoats, hedgehogs, deer (other than muntjac), bank vole, common shrew, pygmy shrew and water shrew were all absent from parks surveyed within the Royal Borough of Kensington and Chelsea in 2010/11. However, mammals were found at all parks surveyed except Cremorne Gardens.

6.3 Holland Park and Little Wormwood Scrubs are the two most important sites (of the nine sites surveyed) in the borough for mammals. The other sites could be significantly improved if additional natural cover was provided and an appropriate management plan for the benefit of mammals was introduced. Habitats within these two parks only are suitable Muntjac deer, which are shy animals requiring dense year-round overgrown and undisturbed cover. However, Little Wormwood Scrubs is likely to be too small for this species.

6.4 The presence of small mammals at some sites and not others is undoubtedly due to the extent of suitable habitat present, variation of habitat present and management. Of note, in parks where suitable extent and quality of habitat is present for wood mouse (deciduous woodlands), field vole (grassland) and house mouse (residential areas), these species are also found in all sub-optimal habitats including in shrub and herbaceous garden planting. In addition, the two smaller parks supporting small mammal species are situated between Holland Park and Little Wormwood Scrubs in less dense urban environments than many of the other parks.

Park specific recommendations

6.5 Appropriate site specific recommendations for habitat improvements which can be undertaken to benefit mammal populations at each of the sites, are described below.

Holland Park

6.6 Holland Park has a variety of habitats suitable for mammals, offering a diversity of habitat types and structures, and ground level cover of particular importance to red foxes, hedgehogs, grey squirrels and small mammals. Notably, the woodland habitats in Holland Park support a relatively high density of wood mouse. The creation of rough grassland clearings in the dense woodland habitats (or elsewhere) would increase structural and species diversity and provide improved habitat for field vole in particular (as well as other mammal species). House mouse and brown rat are extraordinarily adaptable to a wide variety of habitat types and are likely to be found in all parks within the borough. The lack of capture records for house mouse and signs for brown rat in Holland Park, however, may be attributable to its large size and the dense nature of many of the habitats present, providing only marginal habitats for the former species and making recording of field signs more difficult for the latter.

6.7 Holland Park, the largest of the sites is 22ha in size which is believed to be of sufficient size to sustain a viable badger population. Badgers have specific habitat requirements and have large territory sizes that cannot be provided in these small urban parks. Badger territory sizes range from approximately 30ha in optimal habitat to >150ha in marginal habitat.

6.8 General recommendations and habitat improvements below can be implemented at Holland Park to encourage mammals;

- Plant or encourage trees, shrubs and hedges to provide shelter, and food supplies, for small mammals in particular. Blackthorn, hawthorn, crab apple, holly and field maple are a few examples of particularly wildlife friendly native species. Broadleaved and conifer trees will benefit squirrels, in particular seeds such as acorns, beechnuts, chestnuts and hazelnuts. Weasels, voles, hedgehogs and other small mammals will often prefer to nest in areas at the bottom of a hedgerow.
- Creating spaces for wildlife to live and nest, and creating variety helps provide habitats for different species. Hedgehogs prefer thick dense undergrowth and a variety of lengths of grass. Hedgehog boxes can be provided as alternative nest sites, if adequate natural nesting sites are not available. The box should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation, such as the woodland or dense scrub habitats to the north of the site, or behind or under a shed.

- Rotting logs and compost heaps can provide suitable nesting sites for hedgehogs. It is important that these habitats are not disturbed over winter when hedgehogs may be hibernating. Cuttings and leaves can be used to produce compost heaps, providing not only shelter for hedgehogs but compost which can then be used within the parks. Compost heaps and log piles will aid in increasing invertebrate diversity, such as snails and slugs, beetles, caterpillars and worms, on which hedgehogs feed. Rotting logs and compost heaps should be located to the north of Holland Park within the woodland and dense scrub habitats, which are least likely to be disturbed over winter.
- Foxes are highly opportunistic and have adapted to living in urban environments, where they feed largely on mice, rats and feral pigeon. Holland Park provides suitable sites for fox earths, however foxes have adapted and taken advantage of the food and shelter provided in urban gardens.
- Management should be tailored for the benefit of mammals as per the recommendations listed above. Ornamental planting and non-native species are not beneficial to our native mammal fauna or native floral gene pools and should be avoided in preference for native species.
- Bird nesting boxes can be erected on the trees to increase the availability of bird nesting habitat, which could benefit a variety of common breeding birds. Boxes should be located out of direct sunlight, at least 2m or so above ground, facing south-east if possible, away from bird feeders and a discrete distance away from other nest boxes. Woodcrete bird boxes (Schwegler. 2010) are recommended as they include a broad range of designs, are long lasting compared to wooden boxes and insulate occupants from extremes of temperature and condensation. This will help contribute towards the Greater London Biodiversity Action Plans for the house martin *Delichon urbicum*, house sparrow *Passer domesticus* and swift *Apus apus*. Bird nesting boxes can be located on trees within the woodland to the north of the site, or on parkland trees located in the central and southern extents of Holland Park.
- Woodland management could be introduced to Holland Park through a coppicing regime, to allow light back to the woodland floor prompting the flowering of many woodland plants and increasing biodiversity. Coppice management favours a range of wildlife. After cutting, the increased light allows existing woodland-floor vegetation such as bluebell, anemone and primrose to grow vigorously. Often brambles grow around the stools, encouraging insects, or various small mammals that can use the brambles as protection from larger predators. Log

piles, retained following coppice, encourage insects such as beetles to come into an area.

- As the stands grow, the canopy closes and the habitat becomes unsuitable for these animals, therefore active coppice management is required to prevent over-shading.
- Due to the large size and habitats present within Holland Park, there is the potential to reintroduce some species of smaller mammal including bank vole, house mouse, common shrew and pygmy shrew. Wood mouse and yellow necked mouse, both predominantly woodland species, are already present within Holland Park. Reintroductions of these species should only be undertaken following the habitat enhancements and management outlined above, to ensure that suitable habitat, cover and food is available for the species prior to reintroductions. Particular care should be taken when reintroducing shrews as they have a very high metabolism and need to eat regularly, therefore sufficient food availability for these species should be a priority. Both species of shrew are predominantly found in deciduous woodland and thick grassland, both of which are present within Holland Park.

Avondale

6.9 General recommendations and habitat improvements below can be implemented at Avondale to encourage mammals;

- Plant or encourage trees, shrubs and hedges to provide shelter, and food supplies, for small mammals in particular. Blackthorn, hawthorn, crab apple, holly and field maple are a few examples of particularly wildlife friendly native species. Broadleaved and conifer trees will benefit squirrels, in particular seeds such as acorns, beechnuts, chestnuts and hazelnuts. It is important to maintain and enhance the wildlife area located to the north-west of the site.
- Creating spaces for wildlife to live and nest, and creating variety helps provide habitats for different species. Hedgehogs prefer thick dense undergrowth and a variety of lengths of grass. Hedgehog boxes can be provided as alternative nest sites, if adequate natural nesting sites are not available. The box should be sited out of direct sunlight with the entrance facing away from prevailing winds, preferably located within the wildlife area under the western hedgerow.
- Rotting logs and compost heaps can provide suitable nesting sites for hedgehogs. It is important that these habitats are not disturbed over winter when hedgehogs may be hibernating. Cuttings and leaves can be used to produce

compost heaps, providing not only shelter for hedgehogs but compost which can then be used within the parks. Compost heaps and log piles will aid in increasing invertebrate diversity, such as snails and slugs, beetles, caterpillars and worms, on which hedgehogs feed. There is already one log pile within the wildlife area, however additional log piles and compost heap within this area will encourage small mammals in particular.

- At present Avondale (except for the wildlife area) is heavily managed. Management should be tailored for the benefit of mammals as per the recommendations listed above. Ornamental planting and non-native species are not beneficial to our native mammal fauna and should be avoided in preference for native species.
- Bird nesting boxes can be erected on the trees to increase the availability of bird nesting habitat, which could benefit a variety of common breeding birds. Boxes should be located out of direct sunlight, at least 2m or so above ground, facing south-east if possible, away from bird feeders and a discrete distance away from other nest boxes. Woodcrete bird boxes (Schwegler. 2010) are recommended as they include a broad range of designs, are long lasting compared to wooden boxes and insulate occupants from extremes of temperature and condensation. This will help contribute towards the Greater London Biodiversity Action Plans for the house martin *Delichon urbicum*, house sparrow *Passer domesticus* and swift *Apus apus*. Bird nesting boxes can be placed on scattered trees located throughout the site, in particular within the wildlife area.
- Although Avondale is only a small park at 1.4ha in size, suitable habitat for small mammals, including dense scrub and hedgerows, are present. The house mouse is already present at Avondale and there is the potential to reintroduce some common species of smaller mammal including bank vole, wood mouse and yellow necked mouse. Reintroductions of these species should only be undertaken following the habitat enhancements and management outlined above, to ensure that suitable habitat, cover and food is available for the species prior to reintroductions. Bank vole, wood mouse and yellow necked mouse are predominantly found in deciduous woodland, hedgerows and thick grassland, and are generalists without specific habitat or food requirements.

Little Wormwood Scrubs

6.10 Little Wormwood Scrubs has a variety of habitats suitable for mammals, offering a diversity of habitat types and structures, and ground level cover of particular importance to red foxes, hedgehogs, grey squirrels and small mammals. Notably, the

open rough grassland with scattered scrub in Little Wormwood Scrubs supports a relatively high density of field vole.

6.11 Weasels and stoats also have very specific habitat requirements which may not be able to be recreated at these sites. Weasels and stoats feed on rabbits and small mammals and the lack of these species in many of the boroughs parks will undoubtedly have an effect upon the presence of these species. Weasels in particular are heavily dependent on hedgerows as commuting routes and are less common where small mammals are scarce (Harris & Yalden, 2008). However, the presence of field vole in Little Wormwood scrubs in particular provides a valuable foraging resource for these species.

6.12 General recommendations and habitat improvements below can be implemented at Little Wormwood Scrubs to encourage mammals;

- Plant or encourage trees, shrubs and hedges to provide shelter, and food supplies, for small mammals in particular. Blackthorn, hawthorn, crab apple, holly and field maple are a few examples of particularly wildlife friendly native species. Broadleaved and conifer trees will benefit squirrels, in particular seeds such as acorns, beechnuts, chestnuts and hazelnuts. Weasels, voles, hedgehogs and other small mammals will often prefer to nest in areas at the bottom of a hedgerow. There are already areas of woodland around the western and northern boundaries that provide opportunities for small mammals and hedgehogs, however there is little ground cover and woodland management could be beneficial.
- Woodland management could be introduced to Little Wormwood Scrubs through a coppicing regime, to allow light back to the woodland floor prompting the flowering of many woodland plants and increasing biodiversity. Coppice management favours a range of wildlife. After cutting, the increased light allows existing woodland-floor vegetation such as bluebell, anemone and primrose to grow vigorously. Often brambles grow around the stools, encouraging insects, or various small mammals that can use the brambles as protection from larger predators. Log piles, retained following coppice, encourage insects such as beetles to come into an area.
- As the stands grow, the canopy closes and it becomes unsuitable for these animals again, therefore active coppice management is required to prevent over-shading.

- There are currently some brash piles and log piles within the woodland habitats which create spaces for wildlife to live and nest, however these are very exposed. Creating variety helps provide habitats for different species. Hedgehogs prefer thick dense undergrowth and a variety of lengths of grass. Hedgehog boxes can be provided as alternative nest sites and should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation for example dense scrub or woodland habitats.
- Rotting logs and compost heaps can provide suitable nesting sites for hedgehogs, and should be located within the woodland habitats along the western and northern extents of the park. It is important that these habitats are not disturbed over winter when hedgehogs may be hibernating. Cuttings and leaves can be used to produce compost heaps, providing not only shelter for hedgehogs but compost which can then be used within the parks. Compost heaps and log piles will aid in increasing invertebrate diversity, such as snails and slugs, beetles, caterpillars and worms, on which hedgehogs feed.
- Bird nesting boxes can be erected on the trees to increase the availability of bird nesting habitat, which could benefit a variety of common breeding birds. Boxes should be located out of direct sunlight, at least 2m or so above ground, facing south-east if possible, away from bird feeders and a discrete distance away from other nest boxes. Woodcrete bird boxes (Schwegler. 2010) are recommended as they include a broad range of designs, are long lasting compared to wooden boxes and insulate occupants from extremes of temperature and condensation. This will help contribute towards the Greater London Biodiversity Action Plans for the house martin *Delichon urbicum*, house sparrow *Passer domesticus* and swift *Apus apus*. Bird nesting boxes can be placed on scattered trees located throughout the park, or on trees within the woodland habitat.
- Due to the large size and habitats present within Little Wormwood Scrubs, there is the potential to reintroduce some species of smaller mammal including bank vole, house mouse, common shrew and pygmy shrew. Wood mouse, yellow necked mouse and field vole are already present within Little Wormwood Scrubs. Reintroductions of these species should only be undertaken following the habitat enhancements and management outlined above, to ensure that suitable habitat, cover and food is available for the species prior to reintroductions. Particular care should be taken when reintroducing shrews as they have a very high metabolism and need to eat regularly, therefore sufficient food availability for these species should be a priority. Both species of shrew are predominantly found in deciduous

woodland and thick grassland, both of which are present within Little Wormwood Scrubs.

Emslie Horniman Pleasance

6.13 General recommendations and habitat improvements below can be implemented at Emslie Horniman Pleasance to encourage mammals;

- Plant or encourage trees, shrubs and hedges to provide shelter, and food supplies, for small mammals in particular. Blackthorn, hawthorn, crab apple, holly and field maple are a few examples of particularly wildlife friendly native species. Broadleaved and conifer trees will benefit squirrels, in particular seeds such as acorns, beechnuts, chestnuts and hazelnuts. Weasels, voles, hedgehogs and other small mammals will often prefer to nest in areas at the bottom of a hedgerow.
- Creating spaces for wildlife to live and nest, and creating variety helps provide habitats for different species. Hedgehogs prefer thick dense undergrowth and a variety of lengths of grass. Hedgehog boxes can be provided as alternative nest sites, if adequate natural nesting sites are not available. The box should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation, preferably within the dense scrub habitats.
- Rotting logs and compost heaps can provide suitable nesting sites for hedgehogs. It is important that these habitats are not disturbed over winter when hedgehogs may be hibernating. Cuttings and leaves can be used to produce compost heaps, providing not only shelter for hedgehogs but compost which can then be used within the parks. Compost heaps and log piles will aid in increasing invertebrate diversity, such as snails and slugs, beetles, caterpillars and worms, on which hedgehogs feed, and should be located within the dense scrub habitats scattered throughout the park.
- At present, Emslie Horniman Pleasance is heavily managed. Management should be tailored for the benefit of mammals as per the recommendations listed above. Ornamental planting and non-native species are not beneficial to our native mammal fauna and should be avoided in preference for native species.
- Bird nesting boxes can be erected on the trees to increase the availability of bird nesting habitat, which could benefit a variety of common breeding birds. Boxes should be located out of direct sunlight, at least 2m or so above ground, facing south-east if possible, away from bird feeders and a discrete distance away from

other nest boxes. Woodcrete bird boxes (Schwegler. 2010) are recommended as they include a broad range of designs, are long lasting compared to wooden boxes and insulate occupants from extremes of temperature and condensation. This will help contribute towards the Greater London Biodiversity Action Plans for the house martin *Delichon urbicum*, house sparrow *Passer domesticus* and swift *Apus apus*. Bird nesting boxes can be placed on scattered trees located throughout the site.

- Emslie Horniman Gardens is a small park at 1.4 hectares in size, dominated by hard standing and amenity grassland, with some areas of dense scrub and ornamental plantings. It is not believed that the park is of a suitable size or habitat to support small mammals and therefore a reintroduction of even the common species is not recommended.

Athlone Gardens

6.14 General recommendations and habitat improvements below can be implemented at Athlone Gardens to encourage mammals;

- Plant or encourage trees, shrubs and hedges to provide shelter, and food supplies, for small mammals in particular. Blackthorn, hawthorn, crab apple, holly and field maple are a few examples of particularly wildlife friendly native species. Broadleaved and conifer trees will benefit squirrels, in particular seeds such as acorns, beechnuts, chestnuts and hazelnuts. Weasels, voles, hedgehogs and other small mammals will often prefer to nest in areas at the bottom of a hedgerow.
- Creating spaces for wildlife to live and nest, and creating variety helps provide habitats for different species. Hedgehogs prefer thick dense undergrowth and a variety of lengths of grass. Hedgehog boxes can be provided as alternative nest sites, if adequate natural nesting sites are not available. The box should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation, preferably located within the dense scrub habitats.
- Rotting logs and compost heaps can provide suitable nesting sites for hedgehogs. It is important that these habitats are not disturbed over winter when hedgehogs may be hibernating. Cuttings and leaves can be used to produce compost heaps, providing not only shelter for hedgehogs but compost which can then be used within the parks. Compost heaps and log piles will aid in increasing invertebrate diversity, such as snails and slugs, beetles, caterpillars and worms, on which hedgehogs feed, and located within the dense scrub habitats.

- At present Athlone Gardens is heavily managed. Management should be tailored for the benefit of mammals as per the recommendations listed above. Ornamental planting and non-native species are not beneficial to our native mammal fauna or native flora gene pools and should be avoided in preference for native species.
- Bird nesting boxes can be erected on the trees to increase the availability of bird nesting habitat, which could benefit a variety of common breeding birds. Boxes should be located out of direct sunlight, at least 2m or so above ground, facing south-east if possible, away from bird feeders and a discrete distance away from other nest boxes. Woodcrete bird boxes (Schwegler. 2010) are recommended as they include a broad range of designs, are long lasting compared to wooden boxes and insulate occupants from extremes of temperature and condensation. This will help contribute towards the Greater London Biodiversity Action Plans for the house martin *Delichon urbicum*, house sparrow *Passer domesticus* and swift *Apus apus*. Bird nesting boxes can be placed on scattered trees located throughout the park.
- Although Athlone Gardens is a relatively small park at 2.2 hectares in size, suitable habitat for small mammals, including dense scrub is present. There is the potential to reintroduce some common species of smaller mammal including bank vole, wood mouse, house mouse and yellow necked mouse. Reintroductions of these species should only be undertaken following the habitat enhancements and management outlined above, to ensure that suitable habitat, cover and food is available for the species prior to reintroductions. Bank vole, wood mouse, house mouse and yellow necked mouse are predominantly found in deciduous woodland, hedgerows and thick grassland, and are generalists without specific habitat or food requirements.

Kensington Memorial Gardens

6.15 General recommendations and habitat improvements below can be implemented at Kensington Memorial Gardens to encourage mammals;

- Plant or encourage trees, shrubs and hedges to provide shelter, and food supplies, for small mammals in particular. Blackthorn, hawthorn, crab apple, holly and field maple are a few examples of particularly wildlife friendly native species. Broadleaved and conifer trees will benefit squirrels, in particular seeds such as acorns, beechnuts, chestnuts and hazelnuts. Weasels, voles, hedgehogs and

other small mammals will often prefer to nest in areas at the bottom of a hedgerow.

- Creating spaces for wildlife to live and nest, and creating variety helps provide habitats for different species. Hedgehogs prefer thick dense undergrowth and a variety of lengths of grass. Hedgehog boxes can be provided as alternative nest sites, if adequate natural nesting sites are not available. The box should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation, preferably within dense scrub habitat.
- Rotting logs and compost heaps can provide suitable nesting sites for hedgehogs. It is important that these habitats are not disturbed over winter when hedgehogs may be hibernating. Cuttings and leaves can be used to produce compost heaps, providing not only shelter for hedgehogs but compost which can then be used within the parks. Compost heaps and log piles will aid in increasing invertebrate diversity, such as snails and slugs, beetles, caterpillars and worms, on which hedgehogs feed, and located within the dense scrub habitat.
- At present Kensington Memorial Gardens is heavily managed. Management should be tailored for the benefit of mammals as per the recommendations listed above. Ornamental planting and non-native species are not beneficial to our native mammal fauna or native flora gene pool and should be avoided in preference for native species.
- Bird nesting boxes can be erected on the trees to increase the availability of bird nesting habitat, which could benefit a variety of common breeding birds. Boxes should be located out of direct sunlight, at least 2m or so above ground, facing south-east if possible, away from bird feeders and a discrete distance away from other nest boxes. Woodcrete bird boxes (Schwegler. 2010) are recommended as they include a broad range of designs, are long lasting compared to wooden boxes and insulate occupants from extremes of temperature and condensation. This will help contribute towards the Greater London Biodiversity Action Plans for the house martin *Delichon urbicum*, house sparrow *Passer domesticus* and swift *Apus apus*. Bird nesting boxes can be placed on scattered trees located throughout the park.
- Although Kensington Memorial Gardens is a relatively small park at 2.6ha in size, suitable habitat for small mammals, including dense scrub and hedgerows, are present. The house mouse is already present at Kensington Memorial Gardens and there is the potential to reintroduce some common species of smaller mammal including bank vole, wood mouse and yellow necked mouse.

Reintroductions of these species should only be undertaken following the habitat enhancements and management outlined above, to ensure that suitable habitat, cover and food is available for the species prior to reintroductions. Bank vole, wood mouse and yellow necked mouse are predominantly found in deciduous woodland, hedgerows and thick grassland, and are generalists without specific habitat or food requirements.

Westfield Park

6.16 General recommendations and habitat improvements below can be implemented at Westfield Park to encourage mammals;

- Plant or encourage trees, shrubs and hedges to provide shelter, and food supplies, for small mammals in particular. Blackthorn, hawthorn, crab apple, holly and field maple are a few examples of particularly wildlife friendly native species. Broadleaved and conifer trees will benefit squirrels, in particular seeds such as acorns, beechnuts, chestnuts and hazelnuts. Weasels, voles, hedgehogs and other small mammals will often prefer to nest in areas at the bottom of a hedgerow.
- Creating spaces for wildlife to live and nest, and creating variety helps provide habitats for different species. Hedgehogs prefer thick dense undergrowth and a variety of lengths of grass. Hedgehog boxes can be provided as alternative nest sites, if adequate natural nesting sites are not available. The box should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation, preferably located within areas of ornamental planting to the north of the site.
- Rotting logs and compost heaps can provide suitable nesting sites for hedgehogs. It is important that these habitats are not disturbed over winter when hedgehogs may be hibernating. Cuttings and leaves can be used to produce compost heaps, providing not only shelter for hedgehogs but compost which can then be used within the parks. Compost heaps and log piles will aid in increasing invertebrate diversity, such as snails and slugs, beetles, caterpillars and worms, on which hedgehogs feed, and located within areas of ornamental planting to the north of the site.
- At present Westfield Park is heavily managed. Management should be tailored for the benefit of mammals as per the recommendations listed above. Ornamental planting and non-native species are not beneficial to our native mammal fauna

and native flora gene pool and should be avoided in preference for native species.

- Bird nesting boxes can be erected on the trees to increase the availability of bird nesting habitat, which could benefit a variety of common breeding birds. Boxes should be located out of direct sunlight, at least 2m or so above ground, facing south-east if possible, away from bird feeders and a discrete distance away from other nest boxes. Woodcrete bird boxes (Schwegler. 2010) are recommended as they include a broad range of designs, are long lasting compared to wooden boxes and insulate occupants from extremes of temperature and condensation. This will help contribute towards the Greater London Biodiversity Action Plans for the house martin *Delichon urbicum*, house sparrow *Passer domesticus* and swift *Apus apus*. Bird nesting boxes should be placed on scattered trees located throughout the park.
- Westfield Park is a small park at 1ha in size, dominated by hard standing and amenity grassland, with some areas of hedgerow, scattered trees and ornamental plantings. It is not believed that the park is of a suitable size or habitat to support small mammals and therefore a reintroduction of even the common species is not recommended.

Cremorne Gardens

6.17 General recommendations and habitat improvements below can be implemented at Cremorne Gardens to encourage mammals;

- Plant or encourage trees, shrubs and hedges to provide shelter, and food supplies, for small mammals in particular. Blackthorn, hawthorn, crab apple, holly and field maple are a few examples of particularly wildlife friendly native species. Broadleaved and conifer trees will benefit squirrels, in particular seeds such as acorns, beechnuts, chestnuts and hazelnuts. Weasels, voles, hedgehogs and other small mammals will often prefer to nest in areas at the bottom of a hedgerow.
- Creating spaces for wildlife to live and nest, and creating variety helps provide habitats for different species. Hedgehogs prefer thick dense undergrowth and a variety of lengths of grass. Hedgehog boxes can be provided as alternative nest sites, if adequate natural nesting sites are not available. The box should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation, preferably located within areas of ornamental planting.

- Rotting logs and compost heaps can provide suitable nesting sites for hedgehogs. It is important that these habitats are not disturbed over winter when hedgehogs may be hibernating. Cuttings and leaves can be used to produce compost heaps, providing not only shelter for hedgehogs but compost which can then be used within the parks. Compost heaps and log piles will aid in increasing invertebrate diversity, such as snails and slugs, beetles, caterpillars and worms, on which hedgehogs feed, and located within areas of ornamental planting.
- At present Cremorne Gardens is heavily managed. Management should be tailored for the benefit of mammals as per the recommendations listed above. Ornamental planting and non-native species are not beneficial to our native mammal fauna and should be avoided in preference for native species.
- Bird nesting boxes can be erected on the trees to increase the availability of bird nesting habitat, which could benefit a variety of common breeding birds. Boxes should be located out of direct sunlight, at least 2m or so above ground, facing south-east if possible, away from bird feeders and a discrete distance away from other nest boxes. Woodcrete bird boxes (Schwegler. 2010) are recommended as they include a broad range of designs, are long lasting compared to wooden boxes and insulate occupants from extremes of temperature and condensation. This will help contribute towards the Greater London Biodiversity Action Plans for the house martin *Delichon urbicum*, house sparrow *Passer domesticus* and swift *Apus apus*. Bird nesting boxes can be placed on scattered trees located throughout the park.
- Cremorne Gardens is a small park at 1ha in size, dominated by hard standing and amenity grassland, with some areas of scattered trees and ornamental plantings. It is not believed that the park is of a suitable size or habitat to support small mammals and therefore a reintroduction of even the common species is not recommended.

St Luke's Gardens

6.18 General recommendations and habitat improvements below can be implemented at St Luke's Gardens to encourage mammals;

- Plant or encourage trees, shrubs and hedges to provide shelter, and food supplies, for small mammals in particular. Blackthorn, hawthorn, crab apple, holly and field maple are a few examples of particularly wildlife friendly native species. Broadleaved and conifer trees will benefit squirrels, in particular seeds such as acorns, beechnuts, chestnuts and hazelnuts. Weasels, voles, hedgehogs and

other small mammals will often prefer to nest in areas at the bottom of a hedgerow.

- Creating spaces for wildlife to live and nest, and creating variety helps provide habitats for different species. Hedgehogs prefer thick dense undergrowth and a variety of lengths of grass. Hedgehog boxes can be provided as alternative nest sites, if adequate natural nesting sites are not available. The box should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation, preferably within areas of ornamental planting or under hedgerows.
- Rotting logs and compost heaps can provide suitable nesting sites for hedgehogs. It is important that these habitats are not disturbed over winter when hedgehogs may be hibernating. Cuttings and leaves can be used to produce compost heaps, providing not only shelter for hedgehogs but compost which can then be used within the parks. Compost heaps and log piles will aid in increasing invertebrate diversity, such as snails and slugs, beetles, caterpillars and worms, on which hedgehogs feed, and located within areas of ornamental planting or under hedgerows.
- At present St Luke's Garden is heavily managed. Management should be tailored for the benefit of mammals as per the recommendations listed above. Ornamental planting and non-native species are not beneficial to our native mammal fauna and should be avoided in preference for native species.
- Bird nesting boxes can be erected on the trees to increase the availability of bird nesting habitat, which could benefit a variety of common breeding birds. Boxes should be located out of direct sunlight, at least 2m or so above ground, facing south-east if possible, away from bird feeders and a discrete distance away from other nest boxes. Woodcrete bird boxes (Schwegler. 2010) are recommended as they include a broad range of designs, are long lasting compared to wooden boxes and insulate occupants from extremes of temperature and condensation. This will help contribute towards the Greater London Biodiversity Action Plans for the house martin *Delichon urbicum*, house sparrow *Passer domesticus* and swift *Apus apus*. Bird nesting boxes can be placed on scattered trees located throughout the park.
- Although St Luke's Gardens is only a small park at 1.5ha in size, suitable habitat for small mammals, including ornamental plantings, scattered trees and hedgerows, are present. There is the potential to reintroduce some common species of smaller mammal including bank vole, wood mouse, house mouse and

yellow necked mouse. Reintroductions of these species should only be undertaken following the habitat enhancements and management outlined above, to ensure that suitable habitat, cover and food is available for the species prior to reintroductions. Bank vole, wood mouse, house mouse and yellow necked mouse are predominantly found in deciduous woodland, hedgerows and thick grassland, and are generalists without specific habitat or food requirements.

6.19 Due to the presence of small mammals in all sub-optimal/marginal habitats within parks where optimal habitat is present for the species, distribution within the borough (rather than within individual parks) should be the conservation priority. Once good-quality habitat is provided for individual species within parks, animals will occupy sub-optimal habitats; provision of green corridors between parks and other green spaces may aid colonisation between optimal and marginal habitats. It must be noted however, that once some species are no longer found within the parks surveyed, it may be impossible to encourage mammals back to these areas without undertaking a reintroduction program. This is particularly the case in urban areas where parks are often isolated from other green spaces.

CONCLUSIONS AND RECOMMENDATIONS

Grey squirrel control measures

6.20 Grey squirrels frequently cause damage to woodlands by stripping bark from the main stem and branches of trees. It is not practical to exterminate grey squirrels from areas where they are already established. However, targeted control is often necessary to reduce or prevent damage (Mayle *et al*, 2007). Bark stripping and damage usually starts at the end of April and continues until the end of July. Grey squirrels do not strip bark at any other time of year. Control measures should be implemented at Holland Park.

6.21 Warfarin poisoning and live trapping using baited cages, are the most effective methods of reducing grey squirrel populations. The live-trapping method was developed to provide a more effective alternative to shooting or tunnel trapping, and is easier for relatively inexperienced operators to use. The use of warfarin poison has been favoured in most commercial woodland situations because it is less time consuming and hence a less expensive operation while being at least as, if not more, effective than live trapping. Shooting is generally ineffective at reducing squirrel numbers to the level required to prevent summer bark stripping and spring traps are only a short term control solution.

6.22 Live trapping involves attracting squirrels to traps using bait. Live capture traps generally consist of a wire mesh cage with sprung, drop or lift doors. The mesh size of a wire cage must be no greater than 25 mm x 25 mm and the wire diameter must not be less than 1.6 mm. Wood and plastic are unsuitable materials because a confined grey squirrel will gnaw its way out. A successful trapping session can remove at least 90% of the resident grey squirrels in the wood at the time. It is possible to achieve this by simply setting out the traps and visiting them daily to check the catch. To achieve this, a period of prebaiting is essential to give the squirrels a chance to find the traps and become used to feeding from within them.

6.23 Warfarin poison may only be deployed outdoors against grey squirrels for tree protection and only between 15th March and 15th August. A successful poisoning operation will be at least as effective as cage trapping, even though few, if any, dead squirrels will be found. Selective access hoppers should be used to prevent animals larger or smaller than grey squirrels from entering the traps.

6.24 It must be noted that it is illegal to release a grey squirrel into the wild and therefore all trapped individuals must be humanly killed. Full details of grey squirrel control measures for live trapping and warfarin poisoning can be found in Mayle *et al*, 2007.

BROWN RAT CONTROL MEASURES

6.25 There are a number of options for rat control, all of which have varying levels of effectiveness and include rodenticides, lethal traps, live capture traps, electronic kill traps and electronic deterrents. Rodenticides are the only control method that is effective on an established colony of rats.

6.26 In order to protect the bait from being eaten by a non-target animal only a properly designed rat bait station should be used. A lethal does normally consists of between two and four feeds and will take 10-14 days to eliminate an entire colony. Due to a rats feeding habits, it is essential to have several bait points in the rat territory so the rats will move from one bait point to another bait point, rather than one bait point to some other natural food, which results in a longer period before they have taken a lethal dose.

6.27 Rodenticides are humane and work by thinning the blood and reducing its ability to clot. Rats do not feel any pain or discomfort.

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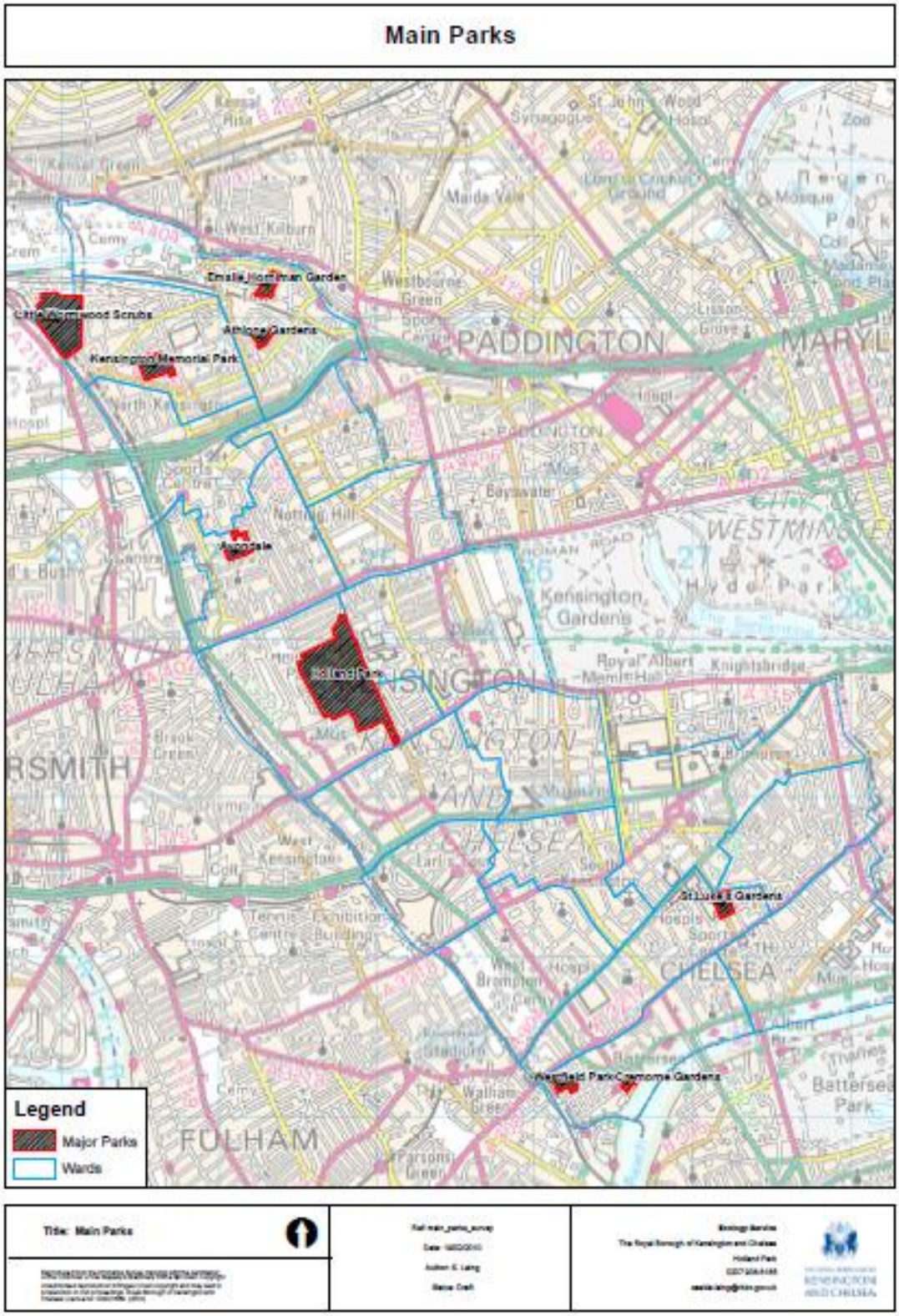
Appendix 1: Maps

Plan 1: Parks surveyed within the Royal Borough of Kensington and Chelsea



Plan 2: Phase 1 Habitat Maps of all parks surveyed within the Royal Borough of Kensington and Chelsea
Holland Park

Westfield Park

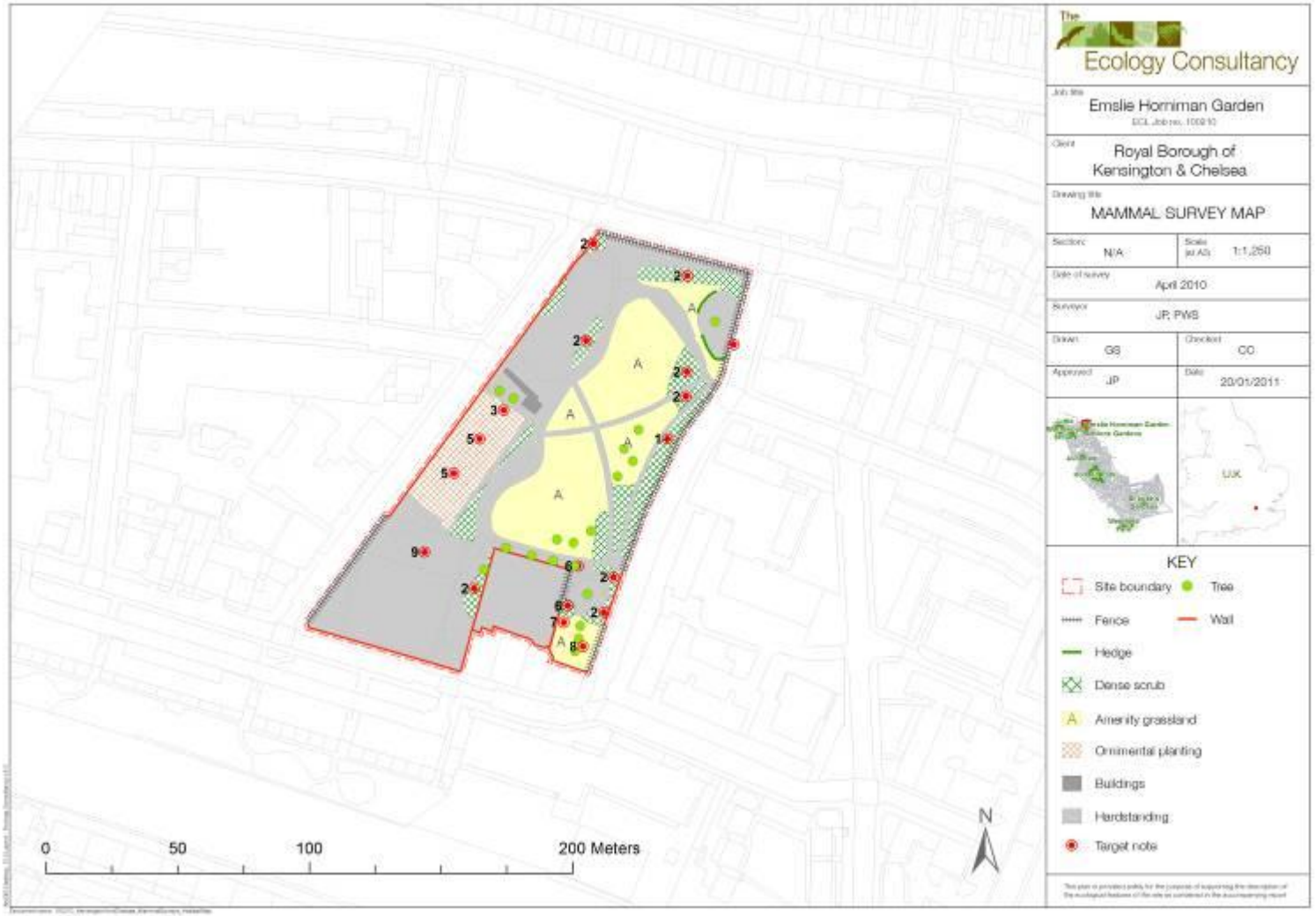
Avondale


The Ecology Consultancy
Avondale
Royal Borough of Kensington & Chelsea
MAMMAL SURVEY MAP
N/A
1:1,200
April 2010
JP PWS
GS/OC
OC
JP
25/01/2011
U.K
KEY
Site boundary
Tree
Fence
Hedge
Tall ruderals
Pond
Dense scrub
Amenity grassland
Ornamental planting
Buildings
Hardstanding
Target note
A
0 15 30 60 Meters
N

Athlone Gardens

St Luke's Gardens

Emslie Horniman Gardens



Kensington Memorial Park

Little Wormwood Scrubs

Cremorne Gardens

Phase 1 Habitat Survey Target Notes

Holland Park

1. Parkland with several tree species including ash, horse chestnut, pine *Pinus sp.,* apple, red maple *Acer rubrum*, lime *Tilia x europaea*, tree of heaven *Ailanthus altissima*, cherry laurel *Prunus laurocerasus* and sycamore. Amenity grassland dominated by annual meadow grass *Poa annua* with some daisy *Bellis perennis*.
2. Enclosed by panel fence but included apple, yew *Taxus baccata*, pear *Pyrus sp*, variegated privet *Ligustrum ovalifolium*, cherry laurel and lilac *Syringa vulgaris*.
3. Dense, thorny, 2m high hedge along fence line. Bare soil/ephemeral understory with nettle *Urtica dioica*, dandelion *Taraxacum officinale*, common chickweed *Stellaria media* and blue alkanet *Anchusa azurea*. Potential for brown rats.
4. Wooden fencing around cricket green, with amenity grassland. Posts 10cm apart which would allow hedgehogs to pass through but not badgers.
5. Young trees including rhododendron *Rhododendron ponticum*, hawthorn and ash.
6. Fence with holly hedge. Large sycamore trees. Potential for hedgehog.
7. Poor semi-improved grassland including daisy, common chickweed, nettle and white dead nettle *Lamium album*. Hawthorn hedge with elder and sycamore saplings, and some mature trees including field maple, hawthorn, cherry, downy birch *Betula pubescens* and young rowan *Sorbus aucuparia*. Poor understory/bare earth but some hedge parsley *Torilis arvensis*, germander speedwell *Veronica chamaedrys*, garlic mustard *Alliaria petiolata*, broadleaved dock *Rumex obtusifolius*, bluebells and ornamental vine *Vitis vinifera*.
8. London plane trees.
9. Wall (with moss community on top) with trellis and ornamental vine.
10. Parkland with young trees (cultivated species including field maple, cherry, birch *Betula sp.*, crab apple, ash, rowan and hawthorn.
11. Parkland with amenity understory, including the same species as those already listed. Concrete paths and very busy.
12. Planted species rich hedge with rowan, hawthorn, hornbeam *Carpinus betulus*, wayfaring tree *Viburnum lantana*, dogwood *Cornus sanguinea*, honeysuckle, elder, guelder rose *Viburnum opulus*, apple, pear, field maple and cherry. Leaf littler and ephemerals including French cranesbill *Geranium endressii.*
13. As 11 but with turkey oak *Q.cerris*, field maple, lime, London plane and ash.
14. Well worn earth areas/paths.
15. Poor semi improved grassland. Longer grass has some potential for small mammals. Raised area with wall in front. Species include rank annual meadow grass, Yorkshire

fog *Holcus lanatus*, common chickweed, daisy, red campion *Silene dioica*, broadleaved plantain *Plantago major*, nettle, spearthistle *Cirsium vulgare*, burdock *Arctium sp.*, bluebells, dandelion and herb bennet *Geum urbanum*. Some scattered trees present.

16. Introduced scrub and cherry laurel, including ground elder and nettles. Hedge surrounding site.
17. Patches of bramble, tree of heaven, yew, holly, cherry laurel, elder and bramble understory. Dense ivy, red campion, blue alkanet, and bluebells. Quite quiet offering potential for mammals.
18. Garden, including mini-vegetable patch. Rotten standing trunk. Concrete pond with koi carp present. Short amenity grassland. Garden shrubs and ornamental plantings. Dense cover and moorhen seen on the lawn. Potential for hedgehogs and all small mammals.
19. Very dense, mature scrub including ash and yew. Possible mammal path.
20. Broadleaved plantation woodland. Likely to be mature parkland trees where understory has been allowed to develop. Species included mature horse chestnut, hornbeam, yew, ash and poplar *Populus sp*. Understory including holly and ornamentals, red campion, gorse *Ulex europaeus*, nettle, ivy, bramble, cherry laurel, privet *Ligustrum vulgare*, lilac. Some bare ground and openings with dense ivy.
21. Amenity grassland bordered by planting with very mature lilac, horse chestnut and London plane trees.
22. Low level ornamental planting. Flower beds and concrete pond/fountain. Vegetation with paths and walls.
23. Dense yew hedge surrounding garden with amenity grassland lawn and ornamental planting.
24. Dense amenity shrub planting around playground.
25. Rose garden.
26. Hard landscaping with ornamental planting.
27. Dense parkland planting and bare ground around poor semi-improved grassland.
28. Mosaic of habitats comprising poor semi-improved grassland with nettle, bluebells and broadleaved plantain. Open area of bare ground with newly planted hazel and an area of dense scrub with holly and acacia *Robinia pseudacacia*. Three large horse chestnut *Aesculus hippocastanum* trees and semi-mature sycamore. Potential for hedgehogs.
29. Mosaic of habitats as 28, surrounded by amenity grassland. Two semi-mature oaks in the centre.

30. Bank of rough grassland with bluebells. Good for small mammals. Bordered by bamboo, camellia *Camellia sp.* and one tulip tree *Liriodendron tulipifera*.
31. Continuation of 28 including holly, rhododendron, acacia, Japanese maple *Acer palmatum* and elder. Various ornamental trees. Some areas of dense rhododendron, nettle and holly. Scrub with ruderals and scattered trees. Sparse ground.
32. As 31 but woodland. Holly and horse chestnut dominated with bluebell/ivy ground flora. Good location for small mammal trapping.
33. Dense broadleaved woodland with very few conifers. Some areas with very dense ground flora dominated by wild garlic *Allium ursinum*. Trees include yew, sycamore, oak, beech, holly understory and bramble. Thick leaf litter. Sparse ivy/nettle ground flora with occasional ferns. Large spoil heaps, identified as an old badger sett currently used by foxes.
34. Area of rank grassland and tall ruderals including Yorkshire fog, foxgloves *Digitalis purpurea*, blue alkanet, common chickweed, bluebells, daisy, cleavers *Galium aparine*, curled dock *Rumex crispus*, cocks foot *Dactylis glomerata* and burdock.
35. As 34 with thyme leaf speedwell *Veronica oltensis*, bluebells and daffodils *Narcissus sp*.
36. Patch of dense bamboo and broadleaved woodland with cherry laurel, privet, sycamore and some ornamental species. Possible mammal path.
37. Deciduous woodland dominated by sycamore, horse chestnut, elm *Ulmus procera*, ash and oak. Understory consisting of holly, ivy, elm saplings, hawthorn, privet, hazel and field maple. Good ground flora consisting of ivy and bramble.
38. Clearing with newly planted trees. Several wood refugia piles suitable for small mammals.
39. Holly and oak dominated with sparse ground flora. Log pile present.
40. Tall ruderals including nettle, red dead nettle *Lamium purpureum*, white dead nettle, blue alkanet, burdock and bramble. Very mature poplar and oak to the south of the park.
41. Holly understory opens up to create clearing with hazel and field maple under mature oaks. Bluebell ground flora.
42. Artificial wildlife pond. Some emergent bank vegetation consisting of hairy willowherb *Epilobium hirsutum*, yellow flag iris *Iris pseudacorus*, cuckoo flower *Cardamine pratensis*, soft rush *Juncus effusus*, water mint *Mentha aquatica*, marsh marigold *Caltha palustris*, dewberry *Rubus caesius*, ribwort plantain *Plantago lanceolata*, yarrow *Achillea millefolium*, oxeye daisy *Leucanthemum vulgare*, burdock, cuckoo flower, broadleaved plantain, water avens *Geum rivale*, horsetail *Equisetum arvense*,

water speedwell *Veronica Anagallis-aquatica*, red clover *Trifolium pratense*, coltsfoot *Tussilago farfara* and garlic mustard. Island in the centre. Green algae but clear water.

43. Weeping willow *S. babylonica*, grey willow *S. cinerea* and alder *Alnus glutinosa* saplings.
44. Neutral semi-improved long grass bank, including Yorkshire fog, crested dogstail *Cynosurus cristatus*, sweet vernal grass *Anthoxanthum odoratum*, common bent *Agrostis capillaris*, common sorrel *Rumex acetosa*, hop trefoil *Trifolium campestre*, creeping buttercup *Ranunculus repens*, white campion *Silene latifolia*, red campion, oxeye daisy, bush vetch *Vicia sepium*, red clover, hawkbit *Leontodon sp*., ribwort plantain, yarrow, common field speedwell *Veronica persica*, broadleaved dock and meadow buttercup *Ranunculus acris*.
45. Newly created pond with sparse planted vegetation on banks.
46. Dense ivy.
47. Amenity planting, some creeping bent *Agrostis stolonifera*, grass and moss.
48. Woodland with hornbeam, yew and oak. Understory consists of honeysuckle saplings, ivy and ornamental plantings.
49. Dense holly in small patches. Mature horse chestnut. Open understory in many places. Good leaf litter and bluebells.
50. Dense holly scrub.
51. Rank ruderals, herb bennet *Herba benedicta*, garlic mustard, herb Robert and buttercup sp. Log piles and brash.
52. Pig field, areas of tall ruderals, including umbellifers and bluebells. Parkland trees and some wood piles.
53. Rank patch of grassland with bluebells.
54. Ruderals including nettles and bramble.
55. Dense ruderals with bramble, rhododendron, bamboo and holly, turkey oak, hazel, sycamore, holly and apple/pear.
56. Parkland trees with ruderal ground flora consisting of nettles, bramble and bluebells. Trees include turkey oak, ash, holly, copper beech and red maple.
57. Ornamental planting.
58. Rank concrete water body with poor water quality. No submerged or emergent vegetation. Unlikely to be used for drinking and brickwork surrounding pond higher than water level. Ducks present and one water lily. Rhododendrons and azaleas around the pond as well as acacia and other ornamental species.

59. Beech, pine, lime, hornbeam, conifers and cherry. Creeping laurel, bluebells in clearings, garlic mustard on edges, ground ivy. Holly saplings and patches of bramble.
60. Private land.
61. Playground.
62. No access.

Avondale

1. Play area.
2. Tennis court.
3. Wildlife area with pond and log piles.

Athlone Gardens

1. London plane, sycamore, cherry, ash and whitebeam on amenity grassland.
2. Ornamental grasses and scattered planted shrub. Ornamental flower beds including guelder rose, forget-me-not *Myosotis sp*. and pendulous sedge *Carex pendula*. Some patches of bare earth with patchy ephemerals. Raised beds on little walls.
3. Very small patches of ruderals and planted shrubs.

St Luke's Gardens

1. Hardstanding, football pitch.

Emslie Horniman Gardens

1. Planted shrubs with immature sycamore and field maple trees.
2. Planted shrubs including field maple, *Mahonia sp.*, ash saplings, cherry saplings and *Cotoneaster sp.*
3. Ivy covered wall.
4. Raised concrete sided bed.
5. Concentric areas of ornamental planting, water filled concrete channels and hardstanding with wooden rose-arbour and bridge. Very small strips of amenity grassland.
6. Flower beds.
7. Ivy covered wall along playground.
8. Line of *Sorbus sp*. trees through amenity grassland and in centre of hard standing.
9. Private property.

Kensington Memorial Gardens

1. Line of poplars.
2. Ornamental shrub planting with some ornamental trees including field maple, cherry and apple. Understory of privet, lilac, honeysuckle, sparse ground flora, ground elder, forget-me-not and ivy.
3. Line of horse chestnuts.
4. Field maple trees with scattered blackthorn of hawthorn along fence. Fence covered in ivy and clematis in places.

Little Wormwood Scrubs

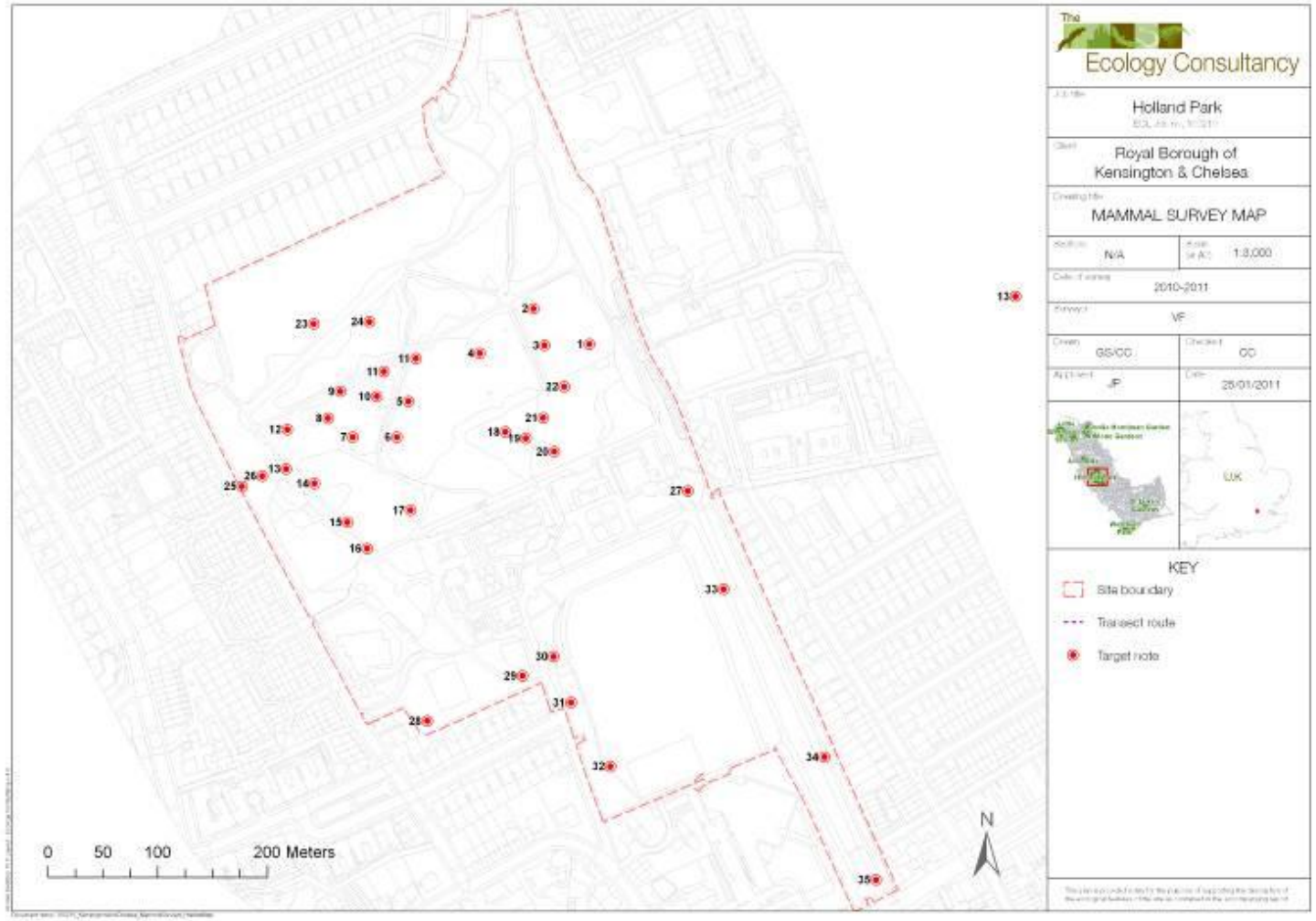
1. Wall along western boundary covered in clematis. Scattered ornamental planting on bare earth, including blackthorn, rose, small ash tree and *Viburnum sp.*
2. Playground and mosaic of poor semi-improved grassland, hardstanding and ornamentals. Surrounded by wall/fence.
3. Very sparsely planted ornamental bed with cotoneaster and rose. Strip of poor semi-improved grassland with daisy, dandelion, broad leaved plantain, annual meadow grass and perennial ryegrass *Lolium perenne.*
4. Line of horse chestnut trees (avenue).
5. Weeping willow trees.
6. Adult playground in amenity/poor semi-improved grassland with scattered willow trees.
7. Strip of ruderals including bramble, cleavers, garlic mustard, umbeliffers, hedge parsley, dead nettles, nettle, cocks foot, hogweed, blue alkanet, bush vetch, bedstraw. Suitable for small mammal trapping.
8. Poor semi-improved rank grassland. Meadow foxtail, annual meadow grass, clover, plantain, dandelion, meadow buttercup, yarrow, Yorkshire fog, soft brome *Bromus hordeaceus* and cocks foot.
9. Taller tussocky rank poor semi-improved grassland. Scattered scrub including hawthorn, blackthorn and the odd fruit tree. False oat-grass *Arrhenatherum elatius*, sow thistle *Sonchus sp.*, very infrequent prickly lettuce *Lactuca serriola*, false oat grass, soft brome, cocks foot, *Poa sp.*, Yorkshire fog, foxtail, meadow buttercup and cranesbill. Good habitat for small mammals.
10. Dense scrub comprising bramble.
11. Large area of dense scrub, bramble understory with frequent hawthorn. Some dog rose.

12. Ruderals including cocks foot, thistle, dock, plantain, cleavers, bramble, cow parsley, Yorkshire fog, nettles and hogweed *Heracleum sp.*
13. Embankment covered in bare ground with scattered trees, mostly sycamore. Some scattered ruderals. Species list as 12.
14. Large and immature scattered London plane trees.
15. Hawthorn and acacia woodland. Some blackthorn and hazel. Herb bennet, garlic mustard, cow parsley, nettle, bristly oxtongue and creeping cinquefoil ruderals ground flora.
16. As 12 with mallow, wayfaring tree, guelder rose, field maple, birch, willowherb, spindle *Euonymus europaeus*, bindweed, nettles, creeping thistle, elder, bramble, groundsel *Senecio vulgaris*, woody nightshade *Solanum dulcamara,* bush honeysuckle *Diervilla sp*, white campion, black mustard *Brassica nigra*, hogweed and smooth sowthistle *S.oleraceus*.
17. Broadleaved plantation woodland with ruderals ground flora dominated by hazel, lime, hawthorn, hornbeam, birch, sycamore. Understory similar to 16, dominated by umbellifers, burdock and garlic mustard.
18. Dense hawthorn on woodchip.
19. Grass dominated ruderals. Same species list as 16 but more open to sunlight. Scattered scrub, hawthorn, elder, oak saplings and bramble. Good habitat for small mammals. Good for invertebrates with log piles. Scrub including field rose.
20. Clearing with woodchip and planted trees. Japanese knotweed *Fallopia japonica* present and dense bramble in the corner. Tall ruderals and grass along edges in patches. Mosaic of habitats including burdock and thistles.
21. Large wood pile.
22. Mature pollarded trees on amenity grassland.
23. Native scrub planting and wildflower seed/plug planting. Thin line of ruderals at back along wall. Species as in 16.

Cremorne Gardens

1. Dense introduced scrub with largely non-native species. Many bird boxes on trees within park.

Plan 3: Small Mammal survey maps of all parks surveyed within the Royal Borough of Kensington and Chelsea
Holland Park



Westfield Park

Avondale


The
Ecology Consultancy
Avondale
Royal Borough of
Kensington & Chelsea
MAMMAL SURVEY MAP
N/A
1:1,200
2010-2011
VF
GS
CC
JP
21/01/2011
UK
KEY
Site boundary
Transect route
Target note
1
2
3
4
5
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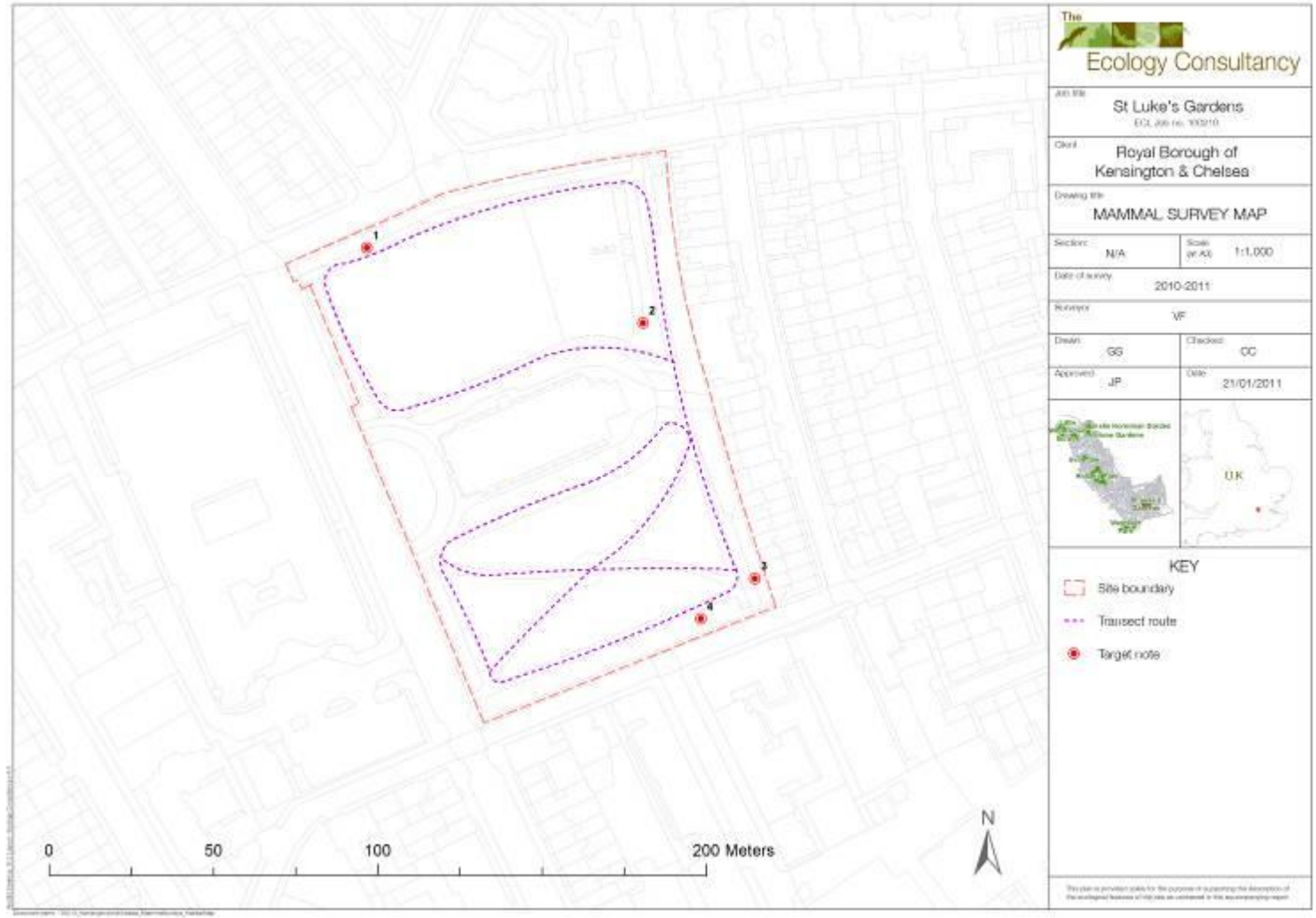
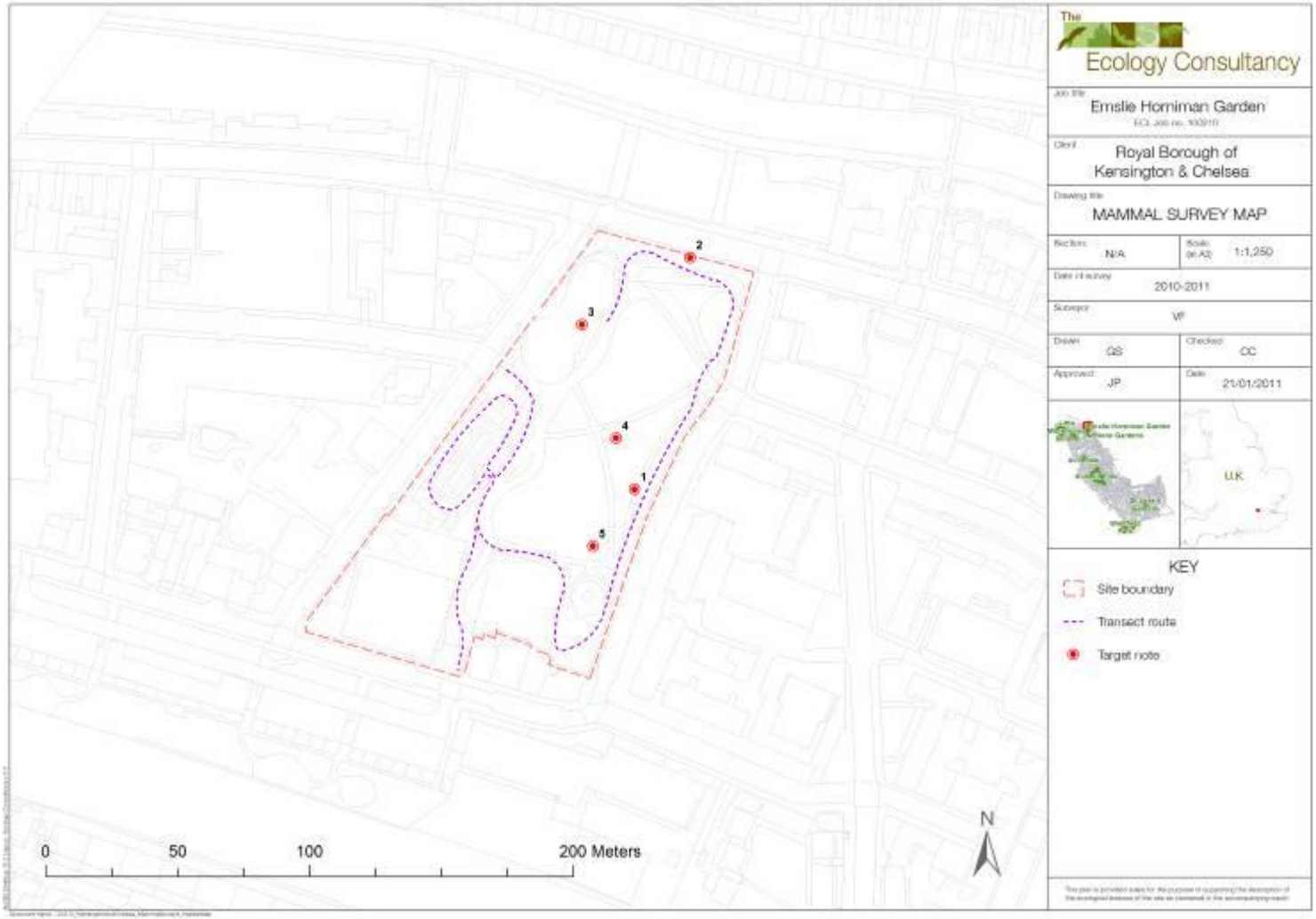
50
100
200 Meters
N

Athlone Gardens

St Luke's Gardens



Emslie Horniman Gardens



Kensington Memorial Park

Little Wormwood Scrubs

Cremorne Gardens

Mammal Surveys Target Notes

Holland Park

1. 3 squirrel dreys
2. 2 squirrel dreys
3. 2 squirrel dreys
4. Squirrel drey
5. Peanut shells (from people feeding squirrels) and 2 squirrels around benches
6. 2 dreys
7. Squirrel observed
8. 3 paths under fence with peanut shells
9. Peanut shells along fence boundary
10. 3 paths under fence with peanut shells
11. Fox scat
12. 2 squirrel dreys
13. Squirrel drey
14. Possible mammal run
15. Possible mammal run
16. Evidence of snuffling in leaf litter (could be dog). 3 squirrels observed.
17. 3 squirrels observed
18. Evidence of snuffling (could be dog)
19. 2 squirrel dreys
20. Potential badger footprint
21. Squirrel observed
22. Potential fox footprints
23. Hair (could be dog). Five squirrels observed.
24. Squirrel drey
25. Mammal path along fence
26. Disused burrow, probably rabbit
27. Fox earth in fenced area, strong fox smell
28. Squirrel drey
29. Small mammal feeding signs, potentially rat
30. Muntjac prints
31. Mammal pathway in hedge
32. Squirrel drey
33. Squirrel drey

Westfield Park

1. Fox scat

Avondale

1. Squirrel observed
2. Squirrel drey
3. Fox scat
4. Squirrel drey
5. Dead brown rat

Athlone Gardens

1. Possible brown rat feeding signs
2. Squirrel drey
3. Strong fox odour around edge of housing
4. Squirrel feeding signs

St Luke's Gardens

1. Squirrel drey
2. Squirrel observed
3. Squirrel observed
4. Squirrel drey

Emslie Horniman Gardens

1. Possible small mammal run into hedge
2. Mammal run (possibly dog)
3. Large mammal run
4. Squirrel drey
5. Fox print in sand box

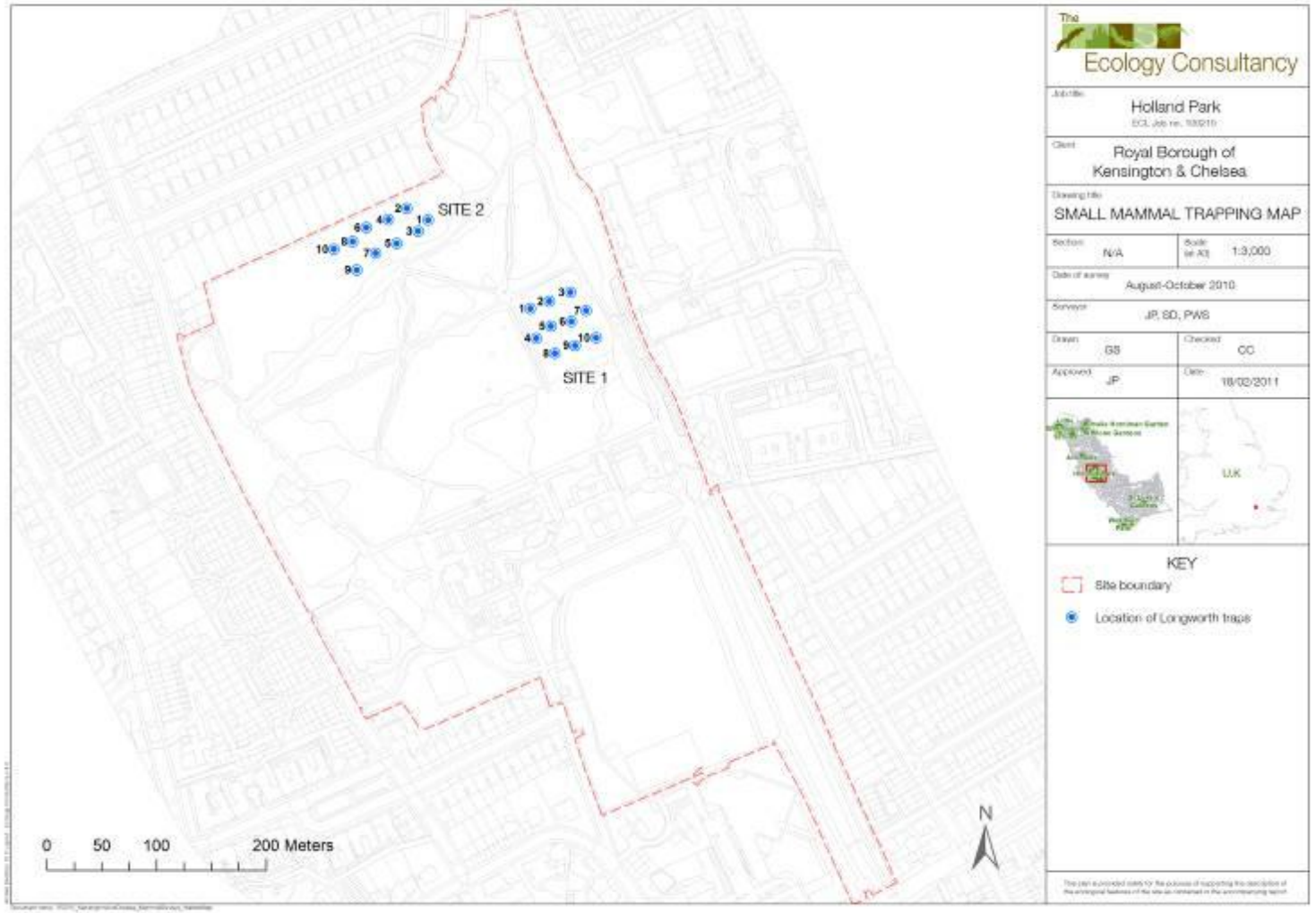
Kensington Memorial Park

1. Fox scat
2. Strong fox odour

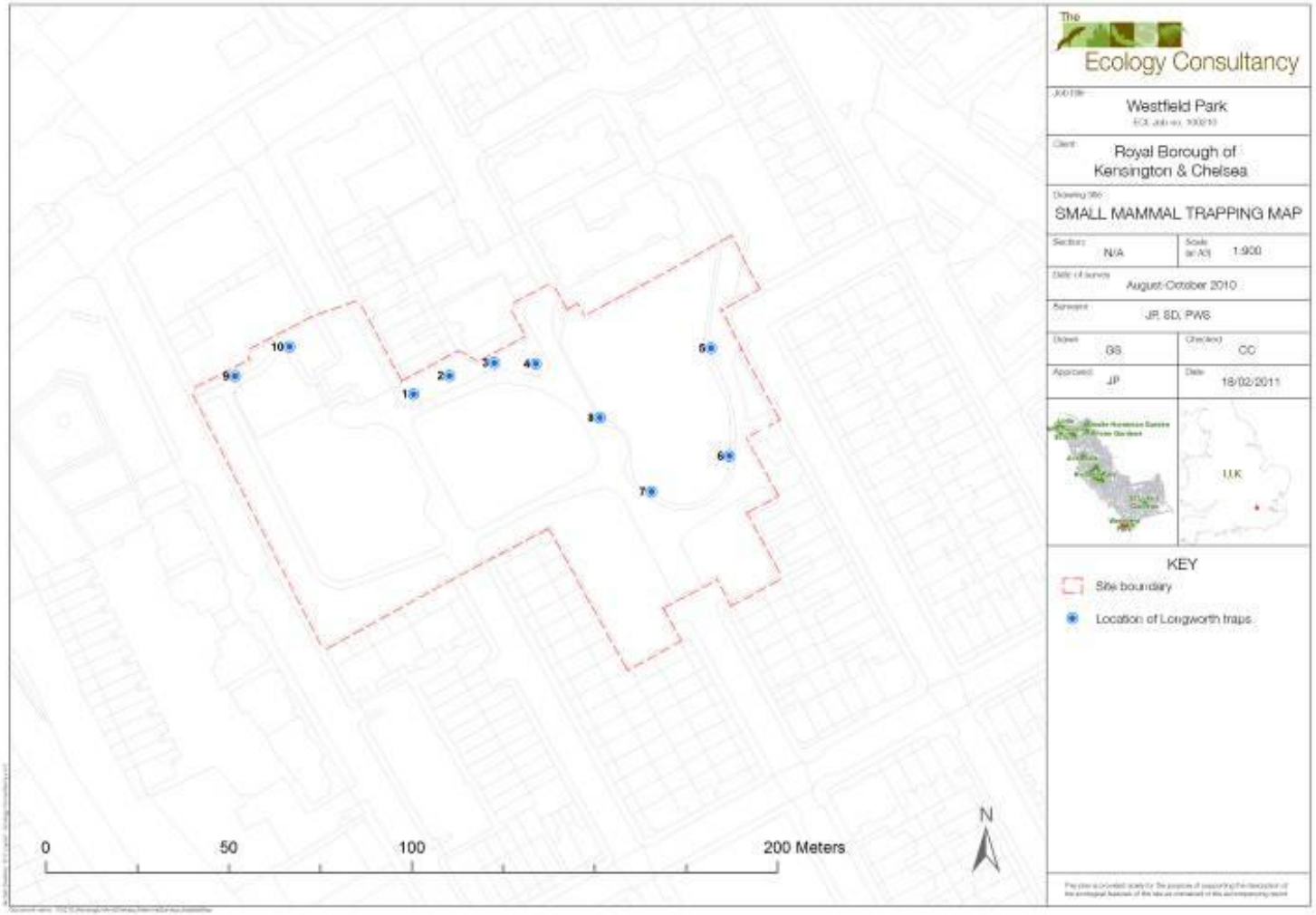
Little Wormwood Scrubs

1. Squirrel dreys
2. Squirrel observed

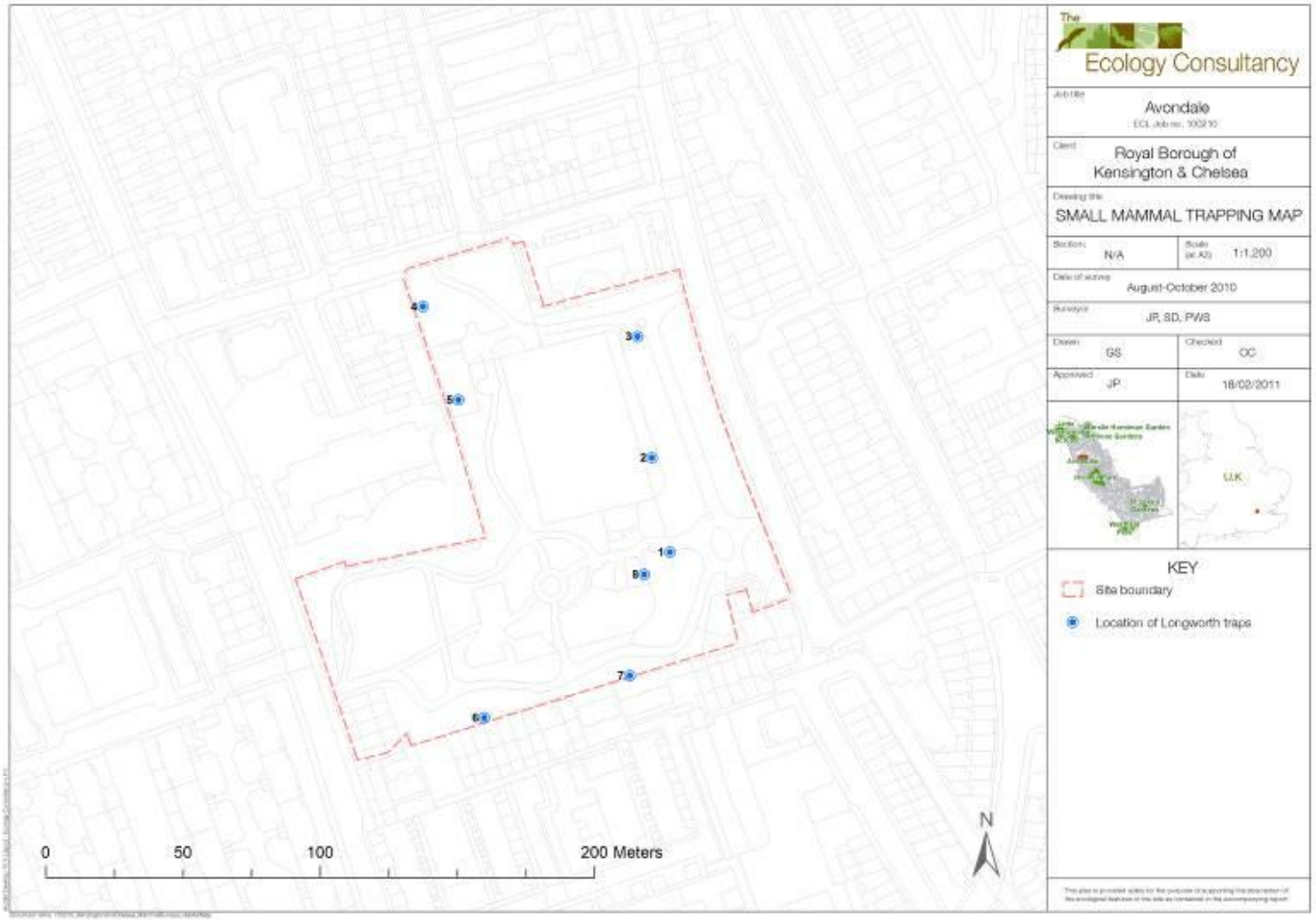
Plan 4: Small mammal trapping maps of all parks surveyed within the Royal Borough of Kensington and Chelsea
Holland Park



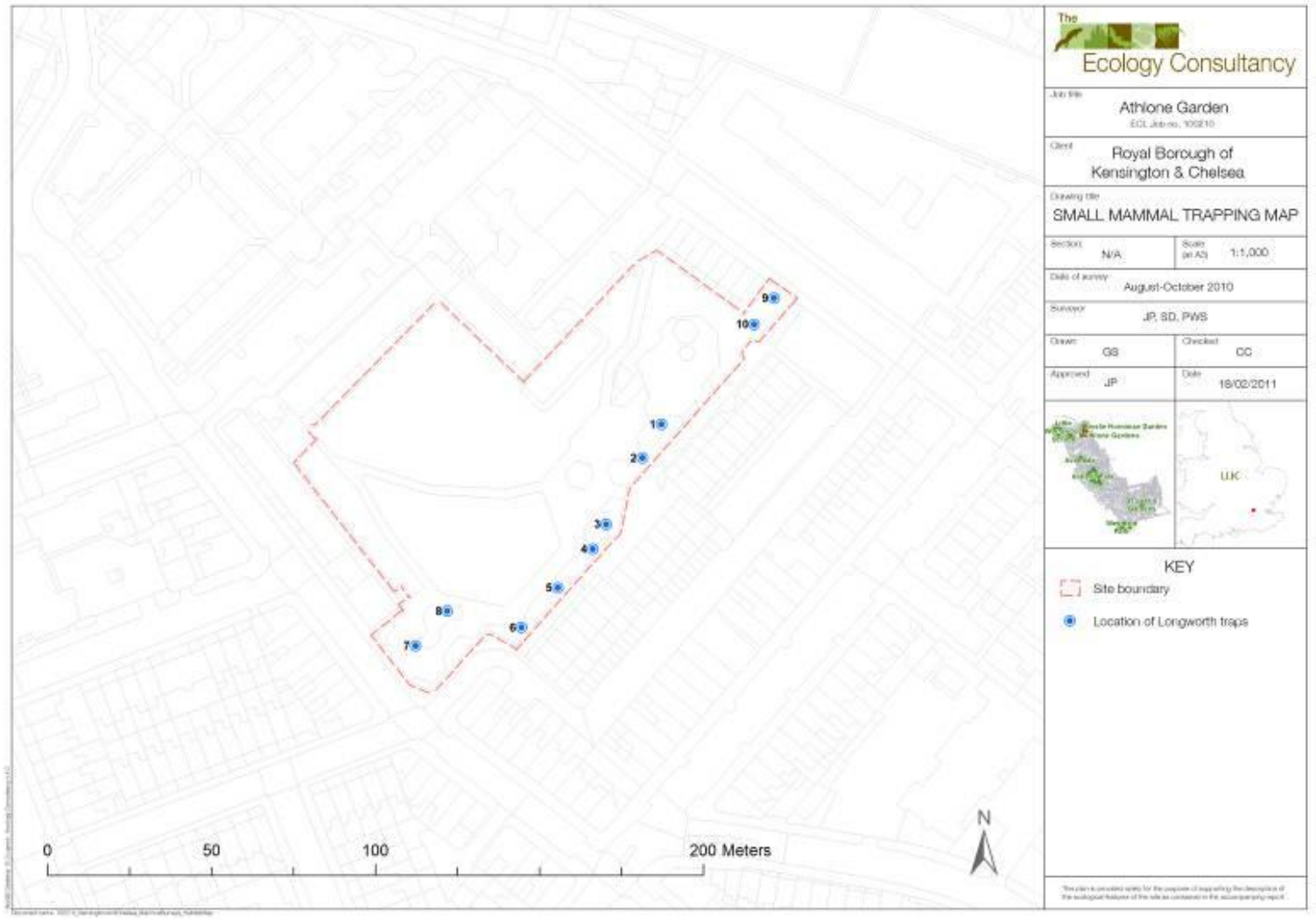
Westfield Park



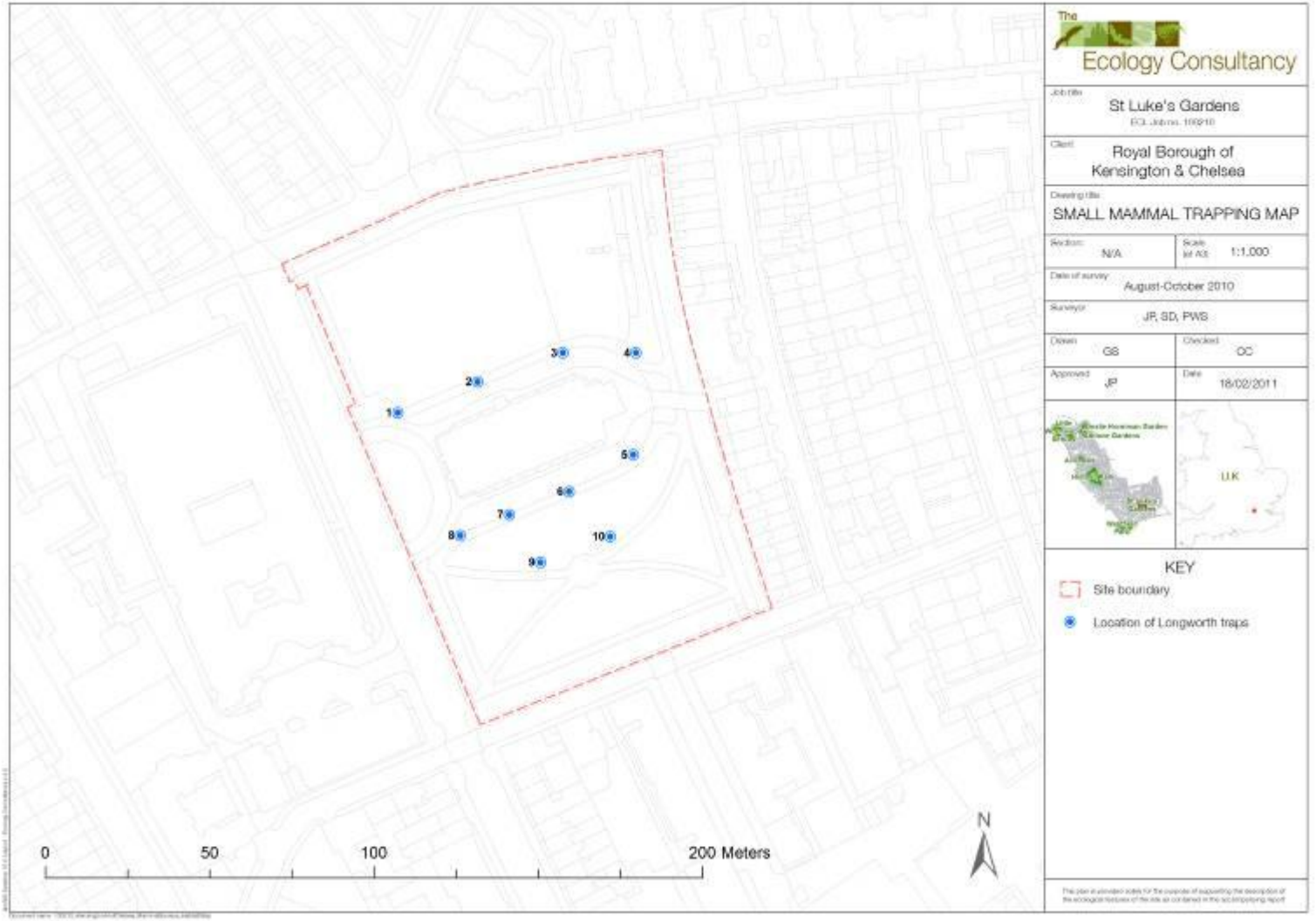
Avondale


The Ecology Consultancy
Job title
Avondale
Client
Royal Borough of Kensington & Chelsea
Drawing title
SMALL MAMMAL TRAPPING MAP
Section: N/A
Scale (at A3): 1:1,200
Date of survey: August-October 2010
Surveyor: JP, SD, PWS
Drawn: GS
Checked: OC
Approved: JP
Date: 18/02/2011
UK
KEY
Site boundary
Location of Longworth traps
1
2
3
4
5
6
7
8
0
50
100
200 Meters
N

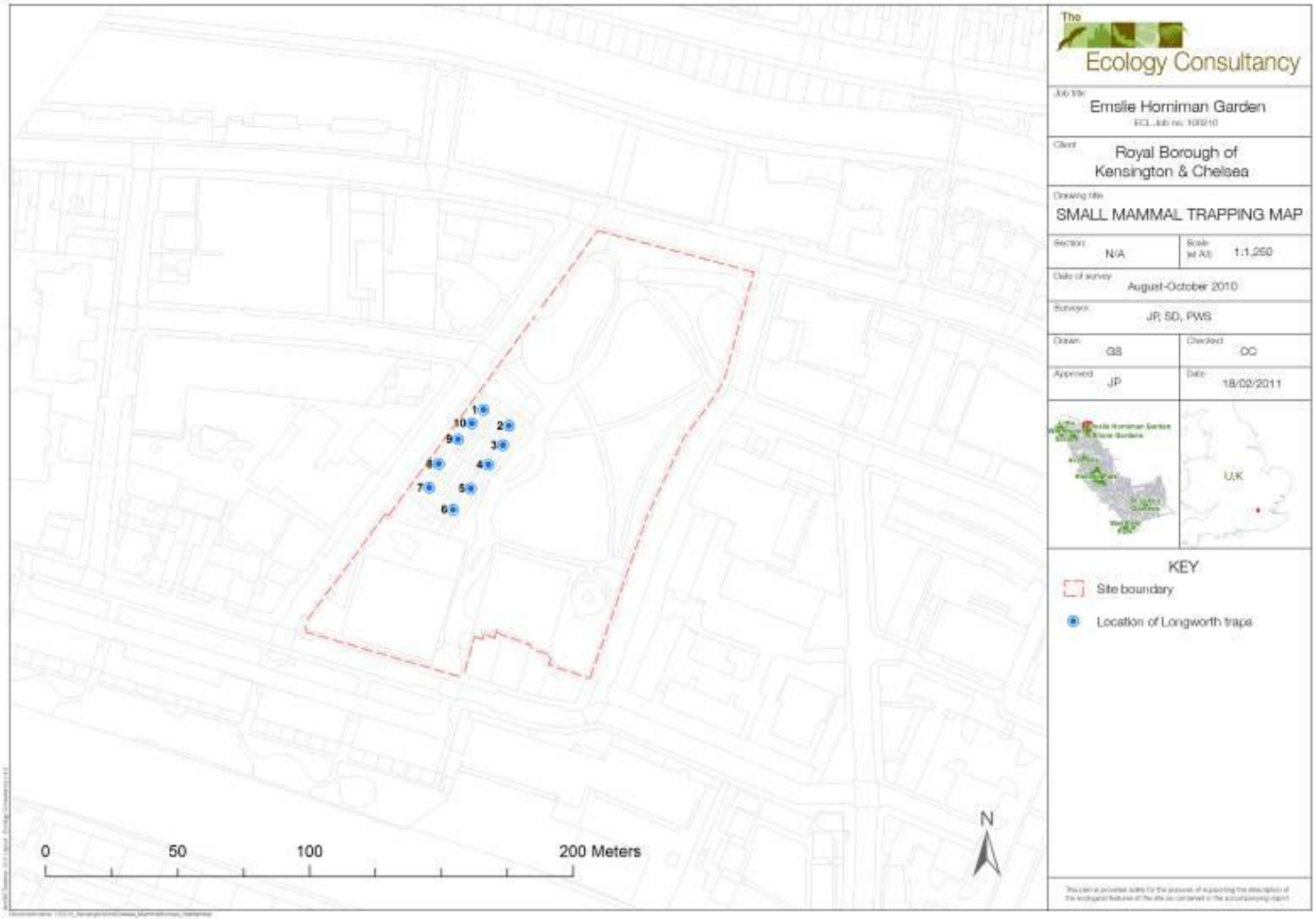
Athlone Gardens



St Luke's Gardens

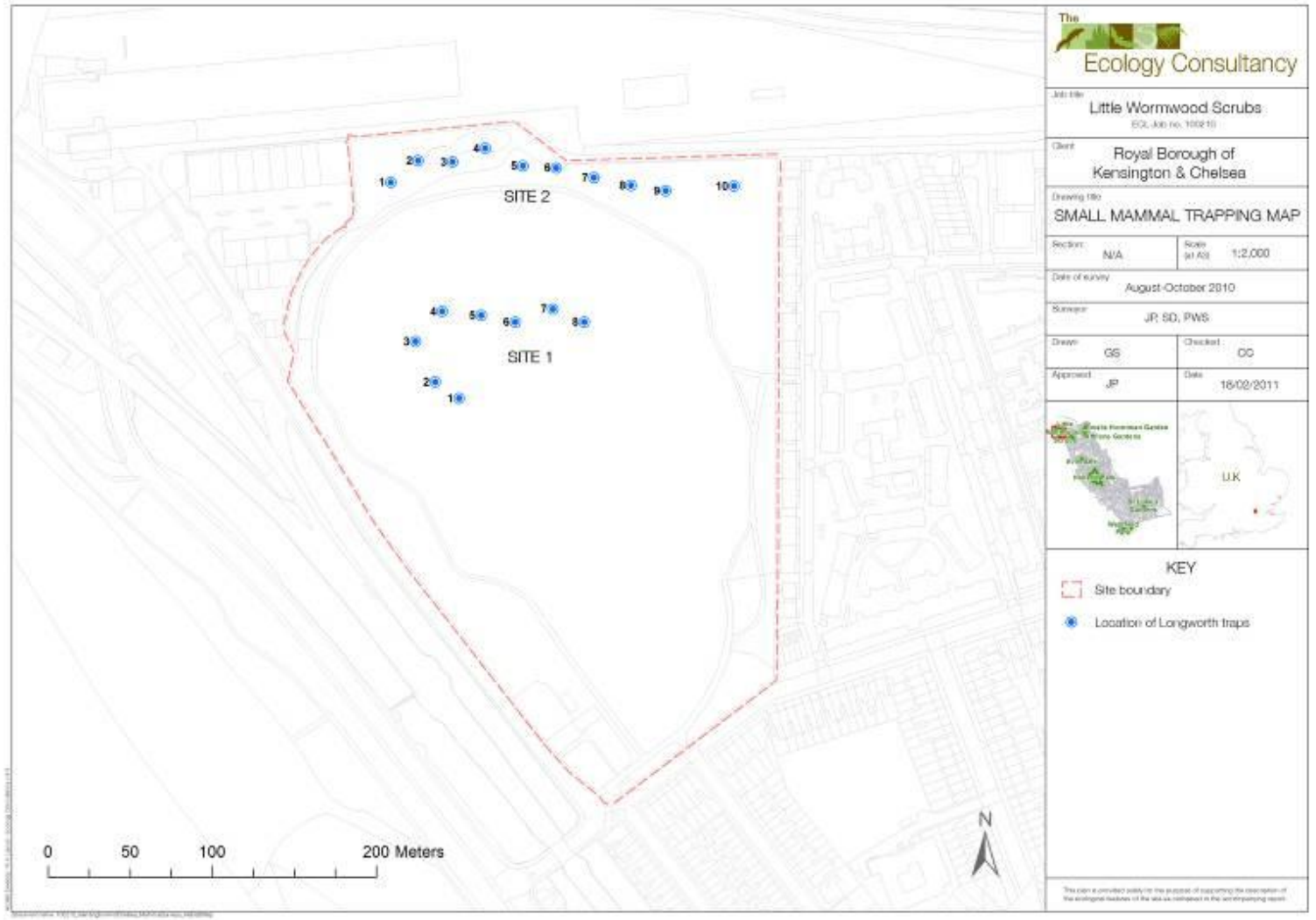


Emslie Horniman Gardens

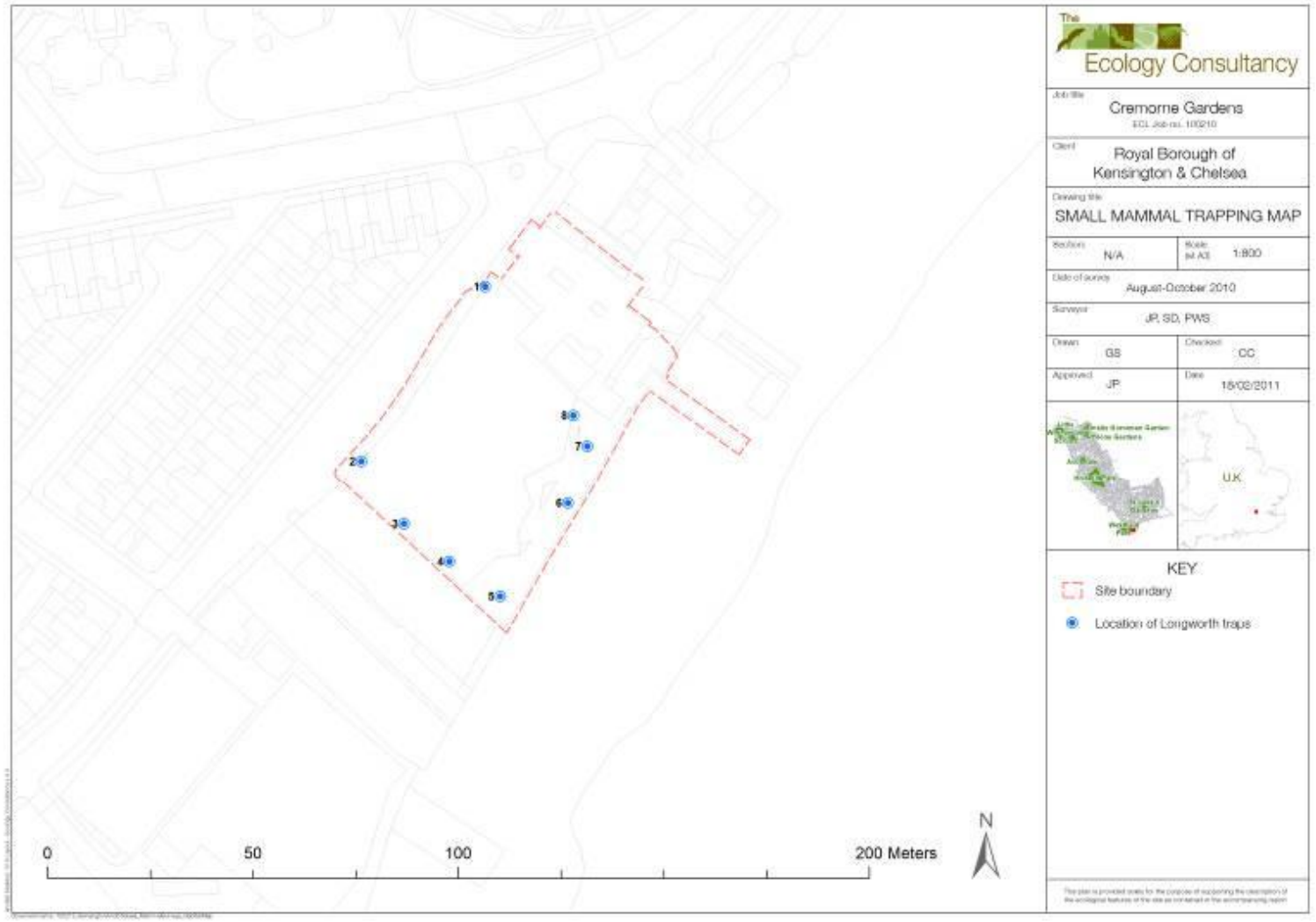


Kensington Memorial Park

Little Wormwood Scrubs



Cremorne Gardens



Appendix 2: Legislation

LEGISLATION

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

NATIONAL LEGISLATION AFFORDED TO SPECIES

The objective of the EC Habitats Directive[1] is to conserve the various species of plant and animal which are considered rare across Europe. The Directive is transposed into UK law by The Conservation of Habitats and Species Regulations 2010 (formerly The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)) and The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended).

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

Since the passing of the Wildlife & Countryside Act 1981, various amendments have been made, details of which can be found on www.opsi.gov.uk. Key amendments have been made through the Countryside and Rights of Way (CRoW) Act (2000) and Nature Conservation (Scotland) Act 2004.

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

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

Species and species groups that are protected or otherwise regulated under the aforementioned domestic and European legislation, and that are most likely to be affected

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

by development activities, include herpetofauna (amphibians and reptiles), badger, bats, birds, dormouse, invasive plant species, otter, plants, red squirrel, water vole and white clawed crayfish.

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

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

BADGERS

Badgers *Meles meles* receive protection under The Protection of Badgers Act 1992 which consolidates the previous Badger Acts of 1973 and 1991. The Act makes it an offence to:

- Wilfully kill, injure, take, or attempt to kill, injure or take a badger
- Cruelly ill-treat a badger, including use of tongs and digging
- Possess or control a dead badger or any part thereof

- Intentionally or recklessly damage, destroy or obstruct access to a badger sett[2] or any part thereof
- Intentionally or recklessly disturb[3] a badger when it is occupying a badger sett
- Intentionally or recklessly cause a dog to enter a badger sett
- Sell or offers for sale, possesses or has under his control, a live badger

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

A Development Licence[4] will be required from the relevant countryside agency (e.g. Natural England) for any development works liable to affect an active badger sett, or to disturb badgers whilst in the sett. Depending on the nature of the works and the specifics of the sett and its environs, badgers could be disturbed by work near the sett even if there is no direct interference or damage to the sett itself. The countryside agencies have issued guidelines on what constitutes a licensable activity. N.B. there is no provision in law for the capture of badgers for development purposes and therefore it is not possible to obtain a licence to translocate badgers from one area to another.

WILD MAMMALS (PROTECTION) ACT 1996

All wild mammals are protected against intentional acts of cruelty under the above legislation. This makes it an offence to:

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[2] A badger sett is defined in the legislation as *"any structure or place which displays signs indicating current use by a badger"*. This includes seasonally used setts. Natural England (2009) have issued guidance on what is likely to constitute current use of a badger sett: www.naturalengland.org.uk/Images/WMLG17_tcm6-11815.pdf

[3] For guidance on what constitutes disturbance and other licensing queries, see Natural England (2007) Badgers & Development: A Guide to Best Practice and Licensing. www.naturalengland.org.uk/Images/badgers-dev-guidance_tcm6-4057.pdf, Natural England (2009) Interpretation of 'Disturbance' in relation to badgers occupying a sett www.naturalengland.org.uk/Images/WMLG16_tcm6-11814.pdf, Scottish Natural Heritage (2002) Badgers & Development. www.snh.org.uk/publications/online/wildlife/badgersanddevelopment/default.asp and Countryside Council for Wales (undated) Badgers: A Guide for Developers. www.ccw.gov.uk.

[3] Natural England will only consider issuing a licence where detailed planning permission (if applicable to operation) has already been granted

[4] Natural England will only considnning permission (if applicable to operation) has already been granted

- Mutilate, kick, beat, nail or otherwise impale, stab, burn, stone, crush, drown, drag or asphyxiate any wild mammal with intent to inflict unnecessary suffering.

To avoid possible contravention, due care and attention should be taken when carrying out works (for example operations near burrows or nests) with the potential to affect any wild mammal in this way, regardless of whether they are legally protected through other conservation legislation or not.

DEER ACT 1991

Under the Deer Act 1991 (as amended), all wild deer with the exception of Muntjac are protected by a close season. This makes it an offence to:

- Poach deer by entering any land without the consent of the owner or occupier or other lawful authority in search or pursuit of any deer with the intention of taking, killing or injuring it;
- Take or kill certain deer in the close season;
- Take or kill deer at night; and,
- Use prohibited weapons and other articles including traps, snares or poisoned bait.

Five deer species are protected by close seasons, related to the breeding cycle. The Muntjac has no specified close season because of their ability to breed at any time of year. Chinese water deer do have a breeding season, but the sexes are very hard to tell apart. The British Association for Shooting and Conservation (BASC) recommend that Muntjac females are not shot unless obviously heavily pregnant or immature with no fawn at heel to avoid orphaning dependent young.

Appendix 3: Small Mammal Trapping Data

Holland Park Site 1						
Date	Time	Location	Species	Age	Sex	Comments
17/08/10	AM	Trap 1	Wood mouse	Adult	Not sexed	In dense scrub in woodland
		Trap 3	Wood mouse	Adult	Male	In ivy in woodland
		Trap 4	Wood mouse	Adult	Not sexed	In open woodland
		Trap 5	Yellow necked mouse	Adult	Not sexed	In dense bramble scrub on edge of grassy bank
		Trap 6	Wood mouse	Juvenile	Not sexed	In dense bramble scrub next to fallen deadwood on edge of grassy bank
		Trap 7	Wood mouse	Juvenile	Not sexed	In tall ruderals on edge of pond
		Trap 9	Wood mouse	Adult	Male	In hedgerow on edge of open grassland clearing
		Trap 10	Wood mouse	Adult	Not sexed	Possibly yellow necked mouse. In dense woodland.
	PM	Trap 5	Wood mouse	Adult	Female	19g, obvious nipples
		Trap 6	Wood mouse	Adult	Female	24g, obvious nipples
18/08/10	AM	Trap 1	Wood mouse	Adult	Female	
		Trap 2	Wood mouse	Adult	Male	In small clearing next to fallen deadwood in dense woodland.
		Trap 5	Yellow necked mouse	Adult	Not sexed	
		Trap 7	Wood mouse	Adult	Not sexed	
		Trap 10	Wood mouse	Adult	Not sexed	
	PM	Trap 5	Wood mouse	Adult	Female	19g, obvious nipples
		Trap 10	Wood mouse	Adult	Male	27.5g
19/08/10	AM	Trap 1	Wood mouse	Adult	Not sexed	Possibly yellow necked mouse
		Trap 4	Wood mouse	Adult	Not sexed	
		Trap 5	Wood mouse	Adult	Not sexed	
		Trap 6	Wood mouse	Juvenile	Not	Missing tail tip

					sexed	
		Trap 7	Wood mouse	Adult	Female	
		Trap 10	Wood mouse	Adult	Not sexed	
	PM	Trap 6	Wood mouse	Adult	Female	
20/08/10	AM	Trap 1	Wood Mouse	Adult	Female	
		Trap 3	Wood mouse	Adult	Male	
		Trap 8	Yellow-necked mouse	Juvenile		In tall ruderals on edge of pond
		Trap 9	Yellow-necked mouse	Adult	Male	
	PM	Trap 5	Wood mouse	Adult	Female	29g, obvious nipples
		Trap 6	Wood mouse	Adult	Female	23.5g
21/08/10	AM	Trap 1	Wood mouse	Adult	Female	18.5g, obvious nipples
		Trap 2	Wood mouse	Adult	Male	25g
		Trap 4	Wood mouse	Adult	Female	15.5g
		Trap 5	Wood mouse	Adult	Female	20g, obvious nipples
		Trap 8	Wood mouse	Adult	Female	
		Trap 9	Wood mouse	Juvenile	Female	8.5g
		Trap 10	Wood mouse	Adult	Male	33g
	PM	Trap 6	Wood Mouse	Adult	Male	
Holland Park Site 2						
Date	Time	Location	Species	Age	Sex	Comments
01/09/10	AM	Trap 2	Wood mouse	Adult	Female	
		Trap 3	Wood mouse	Adult	Female	
		Trap 4	Wood mouse	Adult	Female	
	PM	Trap 2	Wood mouse	Adult	Female	
		Trap 6	Wood mouse	Juvenile	male	
		Trap 7	Wood mouse	Adult	Male	
		Trap 10	Wood mouse	Adult	Male	
02/09/10	AM	Trap 1	Wood mouse	Adult	Female	
		Trap 2	Wood mouse	Adult	Male	
		Trap 3	Wood mouse	Adult	Female	
		Trap 4	Wood mouse	Adult	Female	
		Trap 6	Wood mouse	Adult	Male	
		Trap 8	Wood mouse	Adult	Male	
	PM	Trap 3	Wood mouse	Adult	Male	
03/09/10	AM	Trap 2	Wood mouse	Adult	Female	
		Trap 3	Wood mouse	Adult	Male	
		Trap 4	Wood mouse	Adult	Male	
		Trap 8	Wood mouse	Adult	Female	
	PM	Trap 2	Wood mouse	Adult	Male	
04/09/10	PM	Trap 2	Wood mouse	Adult	Male	
Holland Park Site 2						
Date	Time	Location	Species	Age	Sex	Comments
30/03/11	AM	Trap 8	Wood mouse	Adult	Male	23g
		Trap 10	Wood mouse	Adult	Male	23.5g
31/03/11	AM	Trap 8	Wood mouse	Adult	Female	21g
		Trap 9	Wood mouse	Adult	Female	18g, breeding male
01/04/11	AM	Trap 8	Wood mouse	Juvenile	Not	

					sexed	
Kensington Memorial Park						
Date	Time	Location	Species	Age	Sex	Comments
09/10/10	AM	Trap 3	House mouse	Adult	Female	
		Trap 9	House mouse	Adult	Male	
11/10/10	AM	Trap 3	House mouse	Adult	Male	
	PM	Trap 3	House mouse	Adult	Female	
12/10/10	AM	Trap 1	House mouse	Adult	Male	
		Trap 2	House mouse	Adult	Male	
		Trap 7	House mouse	Adult	Female	
	PM	Trap 3	House mouse	Adult	Male	
Avondale						
Date	Time	Location	Species	Age	Sex	Comments
20/10/10	PM	Trap 4	House mouse	Adult	Male	
22/10/10	AM	Trap 6	House mouse	Adult	Male	
23/10/10	AM	Trap 4	House mouse	Adult	Male	
Little Wormwood Scrubs Site 1						
Date	Time	Location	Species	Age	Sex	Comments
18/09/10	PM	Trap 10	Field vole	Adult	Female	In grassy clearing surrounded by patches of dense scrub
19/09/10	PM	Trap 7	Wood mouse	Adult	Male	In grassy clearing surrounded by scattered scrub
		Trap 9	Wood mouse	Adult	Male	Dense scrub
		Trap 10	Field vole	Adult	Male	
20/09/10	AM	Trap 1	House mouse	Adult	Male	In grassy clearing surrounded by scattered scrub
		Trap 6	Wood mouse	Adult	Not sexed	In grassy clearing surrounded by scattered scrub
		Trap 7	House mouse	Adult	Male	
		Trap 9	Wood mouse	Adult	Male	
		Trap 10	Field vole	Adult	Female	
21/09/10	AM	Trap 1	House mouse	Adult	Male	
		Trap 10	House mouse	Adult	Male	
	PM	Trap 1	House mouse	Adult	Male	
22/09/10	AM	Trap 1	Wood mouse	Adult	Female	
		Trap 9	Wood mouse	Adult	Male	
		Trap 10	Wood mouse	Adult	Female	
	PM	Trap 1	Field vole	Adult	Male	
Little Wormwood Scrubs Site 2						
Date	Time	Location	Species	Age	Sex	Comments
06/10/10	PM	Trap 1	Wood mouse	Adult	Male	Dense woodland
		Trap 8	Wood mouse	Adult	Male	In clearing in woodland
		Trap 9	Field vole	Adult	Male	Open site on

						edge of woodland
08/10/10	AM	Trap 3	Field vole	Adult	Male	Dense woodland
		Trap 8	Wood mouse	Adult	Male	
		Trap 9	Field vole	Adult	Female	
	PM	Trap 9	Field vole	Adult	Male	
09/10/10	AM	Trap 1	Wood mouse	Adult	Male	
		Trap 5	Wood mouse	Adult	Female	Dense woodland
		Trap 6	Wood mouse	Adult	Male	Dense woodland
		Trap 7	Wood mouse	Adult	Female	Dense woodland
		Trap 8	Wood mouse	Adult	Female	
		Trap 9	Field vole	Adult	Male	
10/10/10	AM	Trap 6	Wood mouse	Adult	Male	
		Trap 8	Field vole	Adult	Male	
		Trap 9	Field vole	Adult	Female	
	PM	Trap 9	Field vole	Adult	Male	
11/10/10	AM	Trap 1	Wood mouse	Adult	Male	
		Trap 4	Wood mouse	Adult	Female	Dense woodland
		Trap 6	Wood mouse	Adult	Male	
		Trap 8	Wood mouse	Adult	Female	
		Trap 9	Field vole	Adult	Male	
	PM	Trap 9	Field vole	Adult	Male	

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