London Wildlife Trust
Dean Bradley House
52 Horseferry Road
London
SW1P 2AF
Tel: 020 7803 4284
khall@wildlondon.org.uk

Camberwell Old Cemetery, London Borough of Southwark SE22 0PG

Preliminary Bat Survey Report

Prepared by: Huma Pearce BSc MSc MCIEEM
(Class 2 licence; Registration No. 2015-10493-CLS-CLS)

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CONTENT

EXECUTIVE SUMMARY

Eighteen mature trees are scheduled for removal at Camberwell Old Cemetery in the London Borough of Southwark SE22 0PG, as part of landscaping proposals for the site. Southwark Council commissioned a Preliminary Bat Assessment in April 2015 to evaluate the potential for roosts to occur on site and the likely impacts of the proposals on these European Protected Species.

The key findings of the survey were:

- 27 summer roosts and 2 hibernation roosts occur within a 4 x 4km square centred on the site. Two bat casualty records and 346 bat flight records for common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P.pygmaeus*, Nathusius' pipistrelle *P.nathusii*, noctule *Nyctalus noctula*, Leisler's bat *N. Leisleri,* serotine *Eptesicus serotinus,* brown long-eared bat *Plecotus auritus* and Daubenton's bat *Myotis daubentonii* have also been noted. The nearest records were 300m from the site.
- Of the 18 trees identified for removal, 2 trees had HIGH and MEDIUM roost potential and 13 were considered to have LOW value as a roost site.
- Common pipistrelle, soprano pipistrelle, Leisler's bat, serotine and long-eared bat were recorded at the site. No bats were seen to emerge from the trees surveyed, but records obtained during the emergence period suggest that roost sites are likely to occur within and/or close to the site.

Ideally trees with HIGH and MEDIUM roost potential should be retained. Where this is not possible:

- Tree works should be carried out between mid-September and the 1st November to avoid adverse impacts to breeding and hibernating bats and nesting birds.
- Further Phase 2 bat surveys (dusk emergence, dawn re-entry and/or endoscope inspections) and bird nest searches should be carried out in August/September and immediately prior to the commencement works. Tree works should only be carried out if no evidence of a roost or active nest is discovered.
- If a roost is discovered, works can only be legally carried out under licence from Natural England.
- Any notable cavities features should be retained and ratchet strapped to a surrogate tree close by.

Mitigation and enhancement measures to be considered within the landscaping proposals include:

- Retaining 'wild' low management habitat areas (including deadwood) as wildlife refuges;
- The provision of artificial bat roosting and bird nesting habitat;
- The planting of native tree and shrub species to include boundary hedges/climbers;
- The creation of species-rich grassland;
- The inclusion of graded marginal habitat to include trees, shrubs, tall herbs and grasses; and,

1. INTRODUCTION

1.1 BACKGROUND

1.1.1 Planning permission is being sought for landscaping works in the north-western part of Camberwell Old Cemetery, in the London Borough of Southwark SE22 0PG. A Preliminary Bat Assessment was commissioned by Southwark Council in April 2015 to assess the value of the site for bats and the potential impacts of the proposals on these European Protected Species (refer to Appendix A1 for wildlife legislation).

1.2 DESCRIPTION OF SITE

1.2.1 Camberwell Old Cemetery is situated on the western side of Forest Hill Road in the London Borough of Southwark, SE22 0PG. The National Grid Reference for the centre of the cemetery is TQ348741. The cemetery dates back to the 1850's and is approximately 12 hectares (ha) in size.

1.2.2 The boundary of the cemetery is fenced or walled and access to the site is via an entrance gate on Forest Hill Road; the eastern boundary. The northern, western and southern boundaries are demarcated by Ryedale (north), Underhill Road (west), and Langton Rise and Wood Vale (south).

1.2.3 The southern part of the site is occupied by frequently mown grassland (with burial plots) and mature scattered trees. Dense stands of matures tree, have developed into secondary woodland habitat (with an understory of brambles and tall herbs) in the northern part of the cemetery (see Appendix A2, Plan 1).

1.2.4 Camberwell Old Cemetery is situated in an urbanised area of south-east London and the surrounding land use is dominated by residential properties and small scale commercial premises. There are several areas of open space within the surrounding landscape (see Table 1 below) and these sites support a diversity of habitats including secondary and ancient woodland; meadows; acid, neutral and amenity grassland; ornamental planting; scrub; scattered mature trees; veteran trees; and, open water habitats. Connectivity between the cemetery and these sites is provided by private gardens, mature tree lines and the tree-lined Southern Railway and London Overground railway sidings.

1.2.5 No national statutory conservation designations apply to the site but Camberwell Old Cemetery is designated a Site of Borough Grade I Importance for Nature Conservation.

1.2.6 Statutory and non-statutory sites that occur within 2km's of the Cemetery are listed in Table 1. These include: three Local Nature Reserves (LNR),(the nearest is One Tree Hill LNR, 565m east of the site); five Borough Grade I; and, three Borough Grade II Sites of Importance for Nature Conservation. Metropolitan sites are of regional importance (to the whole of Greater London) and Borough Grade I and II sites are important in a borough-wide context.

0Table 1: Areas of open space within 2km of the site

Site	Habitat	Distance and orientation
Local Nature Reserves		
One Tree Hill	Secondary woodland, Acid grassland, Common lizard, Stag beetle, Owls.	565m, E
Sydenham Hill Wood and Fern Bank	Ancient woodland, Ponds, Veteran trees, Dead wood, Owls, Hobby, Kestrel, Sparrow hawk, Bats.	1.3km S
Nunhead Cemetery	Secondary woodland, Grassland, Tawny owl, Greater spotted woodpecker.	1.4km NE
Sites of Metropolitan Importance		
Nunhead Cemetery	As above	
Dulwich and Sydenham Hill Wood	As above	
Forest Hill to New Cross Gate Railway Cutting	Woodland, Acid & Neutral grassland, Reed bed, Scrub.	1.4km, SE
Sites of Borough Grade I Importance		
One Tree Hill		
Dulwich and Sydenham Hill Golf Course	Woodland, Pond, Oak pollards, Scrub, Acid grassland.	1.2km SW
Peckham Rye Park and Common	Standing & running water, Veteran trees, Woodland, Parkland, Wildflower meadows, Stag beetle, Watercress, Water figwort, Lamprey, Kingfisher, Bats, House sparrow.	410m N
Dulwich Park	Standing water, Parkland, Waterfowl, Bats, Veteran trees, Stag beetle, Woodland birds.	910m, SW
Centre for Wildlife Gardening	Ponds, Wildflower plots, Meadow, Common frog, Smooth newt, Stag beetle.	1.6km, NW
Sites of Borough Grade II Importance for Nature Conservation		
Camberwell New Cemetery, Honour Oak Crematorium, Sports ground.	Secondary woodland, Hedges, Mature trees, Common lizard.	850m, E
Belair Park	Standing water, Wet woodland, Veteran trees, Gipsywort, Lesser pond sedge, Waterfowl. Bats, Stag beetle.	1.95km, SW
Brenchley Gardens	Woodland, Grassland, Pollarded ash, Cowslip, Stag beetle.	1.1km, NE
Registered Park and Garden Grade II		
Horniman Gardens		780m, S

1.3 LANDSCAPING PROPOSALS

1.3.1 Landscaping works are planned within a 1ha area in the north-western part of the cemetery (TQ346741) (see Appendix A2, Plan 1). This part of the site is fenced off, currently unmanaged and not open to the public.

1.3.2 The landscaping works will include:

- The removal of 18 mature trees;
- The removal of fly-tipped materials to make the site safe for public use;
- The creation of a new pathway to provide safe access to the site; and
- Topographical works to provide approximately 1000 new burial plots.

1.3.3 Fifty-three significant mature trees will be retained, specifically mature trees and shrub vegetation that occurs at the boundary with Ryedale and Underhill Road. Biodiversity enhancements would comprise additional native tree and shrub planting.

1.4 THE ECOLOGICAL SURVEY

1.4.1 A preliminary bat assessment site was completed by a Class 2 Natural England Bat Licensee (Registration No. 2015-10493-CLS-CLS). The survey followed the methodology outlined in the Bat Conservation Trust (2012) Bat Surveys – Good Practice Guidelines.

1.5 LIMITATIONS

1.5.1 It was difficult to accurately determine which trees are planned for removal from the plans provided. However, surveys focused on groups of trees within the vicinity of trees that are likely to be removed.

1.5.2 There were period of heavy rain during the first static detector survey, which will affect bat activity such as later emergence times and reduced activity. To compensate for this, a longer survey period was completed for these locations.

2. METHODOLOGY

2.1 DESK STUDY

2.1.1 A data search of all known bat records within a 4 x 4km square centred on the application site was requested from the London Bat Group in April 2015. The purpose of the study was to determine whether there was any historical evidence of a roost within or near to the site and to ascertain the species of bat known to be present within the immediate surrounding area.

2.2 SITE ASSESSMENT

2.2.1 A daytime survey of the application site was carried out on the 30th April 2015.

2.2.2 A ground level inspection of all mature trees identified for removal within the proposal plan (Plan 2, Appendix A2) was completed to assess their value to bats as a roost. Features such as natural holes, cracks/splits in major limbs, loose bark, the presence of dense epicormic growth and/or ivy, were identified. Bat field signs, notably droppings, scratch marks and urine and fur oil staining around suitable crevices were also search for. The survey was carried out using close focusing binoculars and a high power torch. The assessment was based on methodology outlined in the Bat Conservation Trust Bat Survey Guidelines (2012) and Andrew Cowan, ArborEcology, 2003.

2.2.3 The suitability of the site and immediate surrounding area to provide foraging and commuting opportunities for bats was assessed based on observations during the site assessment, from aerial photographs (Google Earth) and direct observations during the evening bat emergence and activity survey (see Section 2.3 below). The value of the habitat to foraging bats was assessed according to the occurrence of vegetation that typically supports high insect biomass such as edge and mosaic habitats, sheltered habitat features, broadleaved trees and aquatic habitats. Aerial photographs were used to determine connectivity of the site to the surrounding area.

2.3 BAT EMERGENCE AND ACTIVITY SURVEY

2.3.1 One bat emergence and activity survey was carried out at the site on the 11th May 2015 by four surveyors. The survey commenced at 15 minutes before sunset and lasted for two hours.

2.3.2 Surveyors were equipped with Bat Box Duet Heterodyne and Frequency Division bat detectors and hand held recording devices. Survey locations were in the northern part of the site near to trees found to support features of HIGH and MEDIUM roost potential (identified from the site assessment; Section 2.2), to monitor any bat emergence. One unmanned (EM3+) detector was also placed in the clearing in the southern part of the site to monitor bat foraging and commuting activity.

2.3.3 All bat calls were recorded and later analysed using Bat Sound (Petterssen Elektroniks; Bat Sound 4.1) and AnalookW (Titley Electronics; Version 4.1) software to verify the species. Bat activity observed during the survey was mapped.

2.4 STATIC DETECTOR SURVEYS

2.4.1 Four automated static detectors (SongMeter2; Acoustic Monitoring) were deployed at the site between the 30th April and 11th May to monitor bat activity within the vicinity of the trees identified for removal. The locations of detectors are shown on Plan 2. The detectors were programmed to be active between sunset–30 minutes and sunrise+30 minutes.

2.4.2 Bat activity was monitored for 8 nights at locations 1 and 2 and for 3 nights at locations 3 and 4. All bat calls recorded were analysed using Bat Sound (Petterssen Elektroniks; Bat Sound 4.1) and AnalookW (Titley Electronics; Version 4.1) software to verify the species.

3. RESULTS

3.1 DESK STUDY

3.1.1 Twenty-seven summer roosts for: unconfirmed *Pipistrellus sp* (No.6), common pipistrelle *P.pipistrellus* (No.1), soprano pipistrelle *P.pygmaeus* (No. 8), noctule *Nyctalus noctula* (No. 1), Leisler's bat *N. Leislerii* (No.6), brown long-eared bat *Plecotus auritus* (No.2) and unidentified vesper bat Vespertilionidae (No.3); were returned from the data search. Twenty-three of the summer roosts and two hibernation roosts (for common pipistrelle and brown long-eared bat) were noted from Sydenham Hill Woods which is 1.7km south of the site. The nearest roost site was for *Pipistrellus* species 1.2km south.

3.1.2 Six bat casualty records: unidentified bat (No.1), unconfirmed *Pipistrellus species* (No.2), common pipistrelle (No.1) and Nathusius' pipistrelle *P.nathusii* (No.2), which are often indicative of a roost occurring nearby, were also noted. The nearest record was 1.6km from the site.

3.1.3 Three hundred and forty-six bat flight records were returned from the data search. These included: common pipistrelle (No.), soprano pipistrelle *P.pygmaeus* (No. 16), Nathusius' pipistrelle (No.1), unidentified *Pipistrellus* species (No. 17), noctule *Nyctalus noctula* (No.1), Leisler's bat *N.leislerii* (No. 2), serotine (No. 1), Daubenton's bat *Myotis daubentonii* (No.3) and unidentified vesper bats (No. 2). The nearest records were 300m from the site and included common pipistrelle and soprano pipistrelle bats.

3.2 SITE ASSESSMENT

3.2.1 The weather conditions during the site assessment were 15°C and dry with sunny intervals.

3.2.2 The habitats occurring within the survey area include species poor grassland (at the centre of the survey area) that has become encroached by bramble, butterfly bush and tall herbs dominated by cow parsley and common hogweed. Mature scattered trees (dominated by sycamore with frequent ash, occasional oak and lower numbers of beech) were present throughout the site but with higher concentrations occurring at the boundary.

3.2.3 Eighteen trees identified for removal in the proposals plan (Appendix A2, Plan 2) were surveyed. Notable features that offered potential value to bats as a roost site are described in Table 2 below. Photographs are provided to support the descriptive text. The location of trees is provided in Appendix A2, Plan 2.

3.2.4 In summary: two trees were classified as having HIGH and MEDIUM roost potential. Thirteen trees were assessed as having features of LOW value to bats as a roost site. No bat evidence was found to confirm the presence of an active roost site but nesting parakeets were present in T1.

Table 2: Results of the ground level tree assessment.

Tree Number	Species	Description of potential roost features & roost potential	Photograph
T1	Sycamore	Four woodpecker holes/cavity features at 5-6 m, east and east-north-east facing associated with eastern stem. Western stem clad with ivy up to 7-8m. Parakeets were nesting within the cavity features. **HIGH roost potential**	
T2	Sycamore	Sparse ivy cover at 2m. Minor boss holes that are upward facing and impacted by rain water ingress. At 10m, signs of significant deadwood and rot. **LOW roost potential**	

Tree Number	Species	Description of potential roost features & roost potential	Photograph
T3	Sycamore	Ivy cover up to 10m (almost to crown). Opportunities for bats to roost between the ivy and the main stem. Cavities may be present under the ivy. Ivy clad trees are common at the site. **LOW roost potential**	
T4	Poplar	No cavity features identified. **NEGLIGIBLE roost potential**	

Tree Number	Species	Description of potential roost features & roost potential	Photograph
T5	Sycamore	Ivy clad to crown providing opportunities for bats to roost between the ivy and the main stem. Cavities may be present under the ivy. Ivy clad trees are common at the site. **LOW roost potential**	
T6	Sycamore	Clad with ivy and cavity at c.10m, south-west facing. **MEDIUM roost potential**	
T7	Sycamore	Two stemmed tree that is ivy clad to 6-7m. Some deadwood towards the crown but no significant cavity features identified. **LOW roost potential**	

Tree Number	Species	Description of potential roost features & roost potential	Photograph
T8	Ash	Ivy clad almost to crown Close to oak that likely offers high foraging opportunities. **LOW roost potential**	
T9	Sycamore	Multiple stemmed (No.5). Small south facing cavity and callus growth at c.8m **MEDIUM roost potential**	

Tree Number	Species	Description of potential roost features & roost potential	Photograph
T10	Sycamore	Two stemmed with ivy clad to crown providing opportunities for bats to roost between the ivy and the main stem. Cavities may be present under the ivy. **LOW roost potential**	
T11	Sycamore	Dead tree partially clad with ivy, Significant deadwood and lose bark at the crown. Cavity features and fissures south-west facing at 5-7m. **HIGH roost potential**	

Tree Number	Species	Description of potential roost features & roost potential	Photograph
T12	Sycamore	Ivy clad sycamore next to dead tree (T11). Opportunities for bats to roost between the ivy and the main stem. Cavities may be present under the ivy. **LOW Roost Potential**	
T13	Ash	Only shallow fissured/ cavity features identified. **LOW roost potential**	
T14	Sycamore	Clad with dense ivy which provides opportunities for bats to roost between the ivy and the main stem. Cavities may be present under the ivy. **LOW roost potential**	

Tree Number	Species	Description of potential roost features & roost potential	Photograph
T13	Sycamore	Single stemmed. Clad with ivy almost to crown. Opportunities for bats to roost between the ivy and the main stem. Cavities may be present under the ivy. **LOW roost potential**	
T14	Sycamore	Multi-stemmed. Clad with ivy to crown. Opportunities for bats to roost between the ivy and the main stem. Cavities may be present under the ivy. **LOW roost potential**	

Tree Number	Species	Description of potential roost features & roost potential	Photograph
T15	Sycamore	Dead tree. View were obstructed by adjacent vegetation but cavity features are likely. **LOW roost potential**	
T16	Sycamore	Ivy clad almost to crown provides opportunities for bats to roost between the ivy and the main stem. Cavities may also be present under the ivy. **LOW roost potential**	

3.2.5 Ivy clad sycamores were a dominant habitat feature within site and offer potential roost habitat as well as potentially good quality bat foraging habitat together with the understory of bramble scrub and tall herbs.

3.2.6 Trees that occurred at the boundary of the site offer a potential flight line for commuting bats as well as suitable foraging habitat and screening of light spill from the adjacent street lighting on Underhill Road and Ryedale.

3.2.7 Although the surrounding land use is urbanised, areas of open space occur within 2km of Camberwell Old Cemetery; i.e. Camberwell New Cemetery, Peckham Rye Park, Sydenham Hill Wood, Dulwich Wood, Dulwich Park, Horniman Museum and Gardens, and Dulwich and Sydenham Golfcourse. Many of these sites were confirmed to provide suitable habitat for bats, from the London Bat Group data search, and connectivity with the cemetery is provided by the Southern Railway and London Overground railway sidings, which support mature trees and scrub (secondary woodland), and private gardens.

3.3 EVENING BAT EMERGENCE AND ACTIVITY SURVEY

3.3.1 Full details of the evening bat emergence and activity survey are provided in Appendix 3. This includes details on the weather conditions, a timeline of all bat contacts and a map of bat activity observed during the survey.

3.3.2 In summary:

- Common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P.pygmaeus*, serotine *Eptesicus serotinus*, Leisler's bat *Nyctalus leislerii* and long-eared bat were recorded.
- No bats were seen to emerge from the trees surveyed but all species were noted during their typical emergence period to suggest that bat roosts occur within or close to the site.
- The earliest bat record was of a soprano pipistrelle bats at 5 minutes after sunset.
- Several common pipistrelle and soprano pipistrelle bats and a single long-eared bat were seen to arrive on site from the west. One serotine arrived on site from the north.
- Pipistrelle bats were observed feeding within the site, around ivy covered trees and over areas of bramble scrub.

3.4 STATIC DETECTOR SURVEYS

3.4.1 Full details of the static detector surveys are presented in Appendix A2. In summary:

- Common pipistrelle was recorded most often. Soprano pipistrelle were also frequently noted. Few serotine contacts were recorded.
- Both common and soprano pipistrelle bats were recorded during the emergence period to suggest that bat roosts occur at or near to the site.
- High numbers of feeding records for common pipistrelle and soprano pipistrelle bats suggest that the site offers a good quality foraging resource for these species.

4. CONCLUSIONS

4.1.1 The landscape works will result in the loss of two trees with HIGH and MEDIUM bat roost potential. A further 13 trees with LOW potential to support a bat roost will also be lost.

4.1.2 Common pipistrelle, soprano pipistrelle, serotine, Leisler's bat and long-eared bat were recorded during their typical emergence period, but no bats were observed to emerge from any of the trees surveyed. Although no roost sites were identified, it is likely that they occur at or near to the site.

4.1.3 The protocol for landscaping works must follow an appropriate mitigation strategy to ensure compliance with the bat legislation (see Section 5.1). Furthermore, new roost features should be provided to compensate for any loss of potential roost habitat (Section 5.2).

4.1.4 Birds were confirmed to be nesting within some of the trees identified for removal. Appropriate mitigation measures are required to ensure compliance with the bird legislation (Section 5.3)

4.1.5 The habitat on site offers foraging opportunities for bats (and birds). The landscaping works should seek to maintain high quality foraging habitat for these species through appropriate planting (see Section 5.4).

5. RECOMMENDATIONS

5.1 MITIGATION STRATEGY FOR TREE REMOVAL

5.1.1 Hollows in trees are used by a wide variety of bat species and natural cavities can be used by bats as a gathering site in spring, a maternity roost in summer, a mating place in autumn and a hibernation site during the winter. Tree roost sites are a limited resource and generally habitat features of high value to roosting bats are formed over a long period of time. Consequently, they cannot be readily replaced.

5.1.2 Although the surveys did not confirm the presence of a roost site, bats are highly mobile animals that use and move between a number of roost sites throughout the year and therefore the possibility of bats being discovered at other times of the year cannot be entirely discounted.

5.1.3 Where possible, the landscaping proposals should avoid the loss of mature trees that support features of HIGH (T1 and T10) and MEDIUM (T6 and T8) potential to support a bat roost.

5.1.4 If removal of these trees is unavoidable, in accordance with the BCT Bat Survey Guidelines, a minimum of one further evening bat emergence and/or dawn re-entry survey should be completed by suitably qualified bat ecologists prior to their removal. Trees are occupied most often during late August/September, providing mating roosts, and it is therefore recommended that surveys are undertaken at this time to better assess the use of potential roost features by bats. If bats are discovered, tree management works would have to be postponed and a European Protected Species Licence would need to be obtained from Natural

England.

5.1.5 Where the removal of trees with suitable roost features cannot be avoided, the following procedures should be followed to avoid impacts to bats and to ensure compliance with the wildlife legislation:

- Tree works should ideally be carried between mid-September and the 1st November or during the month of April to avoid the bat breeding and hibernation seasons. Works should only proceed under dry conditions and when day and night time temperatures are 8°C or above.
- Tree surgeons should be briefed on bats and their field signs, features that offer possible bat habitat and the bat legislation prior to the commencement of works. The contact details of a licensed bat ecologist should be made available.
- Any trees that support loose bark, splits, fissures and cavities associated with stems >10cm diameter should be climbed or reached by a suitable working platform to allow all potential roost features to be inspected by endoscope either by or under the supervision of a Class 2 licensed bat ecologist. Dusk and dawn surveys should be completed where roost sites are confirmed or suspected. Any works to trees that are confirmed to support a bat roost and which are likely to adversely impact bats or their roost sites, can only be legally carried out under licence from Natural England. Works to trees that support features of HIGH and MEDIUM value to bats as a roost, but where roost sites have not been confirmed, should be carried out under the advice of a licensed bat ecologist.
- If ivy is present this should be cut at the base and the tree should be inspected following die back. If this is not possible (e.g. due to time constraints), a finger tip search should be carried out during climbed inspections to assess the occurrence of crevice/cavity features behind the ivy. If any significant cavity features are discovered (i.e. which are not exposed to rainwater ingress and so offer potential shelter to bats), the option to retain the tree should be considered. Works must only proceed if no bats are discovered.
- Trunks or stems that have cavity features should be sectioned at least 500mm above and below the cavity so that it remains intact. Sections should be lowered to the ground, rather than clear felled, and left on site in an upright position for at least 48 hours with the cavity unobstructed so that any bats can escape at dusk unharmed. Ideally, a tree within the immediate vicinity that will not be affected by the works should be selected as a surrogate roost site and the section should be ratchet strapped on to this tree at approximately the same height and altitude to how it was originally found.
- Split limbs that are under tension should be wedged open during works to prevent their closure when pressure is released.
- Removed branches should ideally be left on site to provide deadwood habitat for invertebrates.

- Minor stems <10cm diameter are unlikely to be of value to bats and the overall impacts associated with their removal are considered negligible.
- If bats are discovered during works, further works to the tree must stop immediately and advice sought from a licensed bat ecologist on how best to proceed.

5.1.6 Birds were confirmed to be nesting on site. To ensure compliance with the bird legislation and avoid impacts to nesting birds, any vegetation clearance works should be completed during the period of September to February, which is outside the main bird nesting season. Some bird species may nest outside this core period and therefore due care and attention should be given when undertaking potentially damaging works at any time of year. It is therefore recommended that all potential nesting habitat should be checked by a suitably qualified ecologist prior to the commencement of landscaping activities. If nesting birds are found, works within a 5m radius would need to be postponed until the young have fledged.

5.2 COMPENSATORY ROOST AND NEST FEATURES

5.2.1 10 Bat boxes (Schwegler 2FN, 2F and 2FS boxes) should be installed onto mature trees within the application site to compensate for the loss of potential roost habitat. Boxes should be positioned three metres or higher above ground in a place where there is a clear flight path for bats entering and leaving the box. The aspect of the box should capture the sun for part of the day and therefore be south (or southeast/southwest) facing (JNCC 2004; BCT 2003). Bird nest boxes should also be provided and installed on the same tree as the bat boxes to minimise competition of bat boxes by nesting birds (Meddings et al 2011).

5.2.2 Nest boxes suitable for hole/cavity roosting boxes (e.g. 1B nest box, Avianex and/or 'The Bird House (www.livingbirds.com)) should be be installed on to mature trees to compensate for the loss of potential bird nest sites. Woodcrete bird boxes 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.

5.2.3 Where possible, it would be beneficial if bat (and bird) boxes could be provided throughout the whole cemetery site (e.g. a total of 40 bat and bird boxes) to enhance the value of the cemetery for bats and birds in the long term. These should be surveyed (and cleaned out) annually by a suitably qualified ecologist and all data sent to the local records centre.

5.3 HABITAT MANAGEMENT AND ENHANCEMENTS

5.3.1 The landscaping proposals will include the clearance of significant areas of bramble scrub and tall ruderal vegetation which likely supports a high insect biomass and potential food resource for bats (and birds). There was also a good amount of deadwood on site which will provide habitat for larger invertebrate

species such as beetles, a foraging resource for larger bat species such as noctule, Leisler's bats and serotine. The landscaping proposals should seek to ensure no net loss in suitable habitat through appropriate planting and the creation of habitat refuge. For example:

- Some areas of existing bramble scrub, tall herbs and deadwood habitat should be retained in undisturbed areas of the site to provide habitat refuges for a variety of wildlife and continued foraging opportunities for bats. Ideally, these habitat features should be well connected to provide a network of undisturbed areas throughout the site.

- To compensate for the loss of tree and shrub vegetation, replacement planting with native tree and shrub species of local provenance that support a high insect biomass, pollen, nectar and berries is recommended to provide high quality foraging opportunities for birds, bats and invertebrates e.g. hawthorn *Crataegus monogyna*, hazel *Corylus avellena*, dogwood *Cornus sanguine*, field maple *Acer campestris* rowan *Sorbus* aucuparia, alder buckthorn *Frangula alnus*, elder *Sambucus nigra*, crab apple *Malus sylvestris,* silver birch *Betula pendula,* English yew *Taxus baccata*, wild plum *Prunus domestica*, dogwood, guelder rose *Viburnum opulus*, box *Buxus sempervirens*, native privet *Ligustrum vulgare* and butcher's-broom *Ruscus aculeatus.* Where space is a constraint, planting could be restricted to the boundary to create native hedges and/or trellises or wires could be used on the boundary fences or walls and planted with wildlife attracting climbing plants (i.e. vertical gardening) such as Honeysuckle *Lonicera periclymenum*, Ivy *Hedera helix*, Traveller's-joy *Clematis vitalba* and hops *Humulus lupulus.* Boundary planting should have sufficient height and planted at an appropriate density so as to reduce light spill onto the site from the adjacent column street lights located on Underhill Road and Ryedale.

- Areas of scrub that will be cleared and replaced with lawn should be laid with a species-rich turf in preference to regular turf to maximise the biodiversity value of this habitat (http://www.wildflowerturf.co.uk/species-rich-lawn-turf/). The biodiverse lawn is treated in the same way as a conventional lawn but the flowering species included in the mix are able to survive and thrive under a regular mowing regime and provide habitat for invertebrates and feeding opportunities for bats and birds. Alternatively, the existing grassland could be enhanced by seeding with night pollinated plants that attract moths and other nocturnal insects such as campions (*Silene sp*), pinks (*Dianthus sp*), and knapweeds (*Centaurea sp*) and low-growing wildflowers such as birds-foot-trefoil *Lotus corniculatus*, selfheal *Prunella vulgaris*, ladies bedstraw *Galium verum* and hawkbits *Leontodon spp*..

- Buffer strips of extensively managed vegetation (c. 3m) should be provided at the boundary to enhance the invertebrate interest of at the site for foraging bats (and birds). The result should be the creation of a gradation of vegetation types that includes trees and shrubs and tall grasses and herbs.

- As much of the dead wood (logs, wind-blown trees and stumps) already present on site should be retained. As much of the longs and rounds collected from tree management activities should also be kept on site to provide additional habitat refuges for invertebrates and other wildlife (e.g. hedgehogs). Priority Species: Stag beetle are known to occur in the London Borough of Southwark and therefore some logs should be placed in an upright position and partially buried within a shallow excavation of approximately 60 cm depth to provide suitable habitat for this species.

5.3.2 Japanese knotweed was identified within the application site. Under Schedule 9 of the Wildlife and Countryside Act, 1981, it is an offence to plant or otherwise cause Japanese knotweed to grow in the wild. Advice should be sought from a specialist with regards to a suitable eradication and control programme to preclude the possibility of Japanese knotweed being disturbed and spread during the course of works. Information on the correct disposal of Japanese Knotweed is available from Property Care Association at http://www.property-care.org/.

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(http://wildseed.co.uk/mixtures/view/57)

A1: LEGISLATION

BAT LEGISLATION

All bat species in the UK are fully protected under The Conservation (Natural Habitats, &c.) Regulations 2010 (as amended) through their inclusion on Schedule 2. Regulation 41 prohibits:

- Deliberate killing, injuring or taking (capture) of bats
- Deliberate disturbance of bats in such a way as to:
    - impair their the ability to survive, breed, or rear or nurture their young; or
    - affect significantly the local distribution or abundance of bat species; or
- impair their ability to hibernate or migrate
- Damage or destruction of a bat breeding site or resting place i.e. roost
- Keeping, transporting, selling, exchanging or offering for sale whether live or dead or of any part thereof.

All bat species in the UK are also protected under the Wildlife and Countryside Act 1981 (as amended) through their inclusion on Schedule 5. Under this Act, it is an offence to:

- Intentionally or recklessly disturb any bat while it is occupying a structure or place which it uses for shelter or protection
- Intentionally or recklessly obstruct the access to any place of shelter or protection used by bat(s)
- Sell, offer or expose for sale, possess or transport a bat(s) for the purpose of sale.

A European Protected Species Mitigation (EPSM) Licence issued by the relevant countryside agency (e.g. Natural England) will need to be applied for to allow derogation from the relevant legislation i.e. for works liable to affect a bat roost or for operations likely to result in a level of disturbance which might impair their ability to undertake those activities mentioned above (e.g. survive, breed, rear young, hibernate, migrate). In certain circumstances, important foraging areas and/or commuting routes can be regarded as being afforded *de facto* protection, for example, where it can be proven that the continued usage of such areas is crucial to maintaining the integrity and long-term viability of a bat roost.

BIRD LEGISLATION

All birds, their nests and eggs are protected under Sections 1-8 of the Wildlife and Countryside Act 1981 (as amended). It is an offence to kill, injure or take any wild bird, or to take or destroy their eggs. It is also an offence to take, damage or destroy the nest of any wild bird while it is in use or being built. Certain species receive additional special protection under Schedule 1 of the Act.

- Intentional or reckless disturbance while it is building a nest or is in, on or near a nest containing eggs or young;
- Intentional or reckless disturbance of dependent young of such a bird.

Species listed under Annex 1 of the European Community Directive on the conservation of Wild Birds (79/409/EEC) qualify sites for designation as a Special Protection Area (SPA) if certain selection criteria are met, such as a site supports internationally important populations of an Annex 1 species.

CONSERVATION (NATURAL HABITATS ETC) REGULATIONS 2010

The species protection provision of the EC Habitats Directive 1992, as implemented by the Conservation of Habitats and Species Regulations 2010, comprises three "derogation tests" which must be applied by the Local Planning Authority when deciding whether to grant planning permission for a development that could harm a European Protective Species. The three tests are that:

- The activity to be licensed must be for imperative reasons of overriding public interest or for public health and safety
- There must be no satisfactory alternative; and
- Favourable Conservation Status (FCS) of the species must be maintained.

It is the responsibility of the applicant to submit sufficient information to address these tests when applying for planning permission. For development activities, an EPSM Licence application can only be obtained after planning permission has been granted. However, the granting of planning permission does not guarantee that a licence will be issued by the relevant countryside agency.

NATIONAL PLANNING POLICY FRAMEWORK (2012)

The National Planning Policy Framework (NPPF) (2012) sets out the Government's national policies on different aspects of planning in England. Section 10 paragraphs 109 to 125 details planning policies on the conservation and enhancement of the natural environment. Circular 06/2005 provides further guidance in respect of statutory obligations for biodiversity and geological conservation and their impact within the planning system.

In summary:

The planning system should contribute to and enhance the natural and local environment by: 'minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.' (NPPF Section 10, para 109)

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

- If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused (Section 10, para 118).
- Proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted (Section 10, para 118).
- Development proposals where the primary objective is to conserve or enhance biodiversity should be permitted (Section 10, para 118).
- Opportunities to incorporate biodiversity in and around developments should be encouraged (Section 10, para 118).
- Planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside

ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss (Section 10, para 118).

- Potential Special Protection Areas and possible Special Areas of Conservation, listed or proposed Ramsar sites and sites identified or required as compensatory measures for adverse effects on European sites, should be given the same protection as European sites (Section 10, para 118).
- The presumption in favour of sustainable development (para 14) does not apply where development requiring appropriate assessment under the Birds or Habitats Directives is being considered, planned or determined (Section 10, para 119).
- Planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation (Section 10, para 125).

Local planning authorities must take account of the conservation of protected species when determining planning applications. The presence of protected species is a material consideration when assessing a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. This requirement has important implications for bat surveys as it means that, where there is reasonable likelihood of bats being present and being affected by the development, surveys must be carried out before planning permission is considered' (BCR 2012). In order for the Local Planning Authority to adequately assess a development proposal against National and Local Planning Policy, full comprehensive ecological surveys need to be carried out and suitable mitigation strategies compiled prior to the submission of any planning application. This information will be reviewed by the Local Planning Authority in consultation with the relevant countryside agency and other conservation bodies.

Any developer should, in the first instance, consult the relevant Local Plans to assess the suitability of their proposal (refer to NPPF Section 10 paras 113 to 117).

NATURAL ENVIRONMENT AND RURAL COMMUNITIES ACT 2006 (NERC)

Part 3, Section 40 of the NERC Act 2006 states that 'every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity', otherwise known as the Biodiversity Duty. Under Section 41 of the Act, the Secretary of State must publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity. This list is based on those species listed in the UK Biodiversity Action Plan (BAP) as priority species. The S41 list replaces the list published under Section 74 of the Countryside and Rights of Way (CRoW) Act 2000.

BIODIVERSITY ACTION PLAN

In 1994 the UK Government published its response to the Convention on Biological Diversity that it signed along with over 150 other nations at the Rio Earth Summit in 1992. Biodiversity – the UK Action Plan (HM Government 1994) and subsequent publications (e.g. UK Steering Group 1995) set out a programme for the national Biodiversity Action Plan (BAP), including the development of targets for biodiversity, and the techniques and actions necessary to achieve them. UK BAP priority habitats were those that were identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (UK BAP). The UP BAP priority species were those that are of conservation concern, either because they are rare in an international or national context or have undergone serious declines in their populations in recent years. The original lists of UK BAP priority habitats and UK BAP priority species was created between 1995 and 1999, and was revised in 2007, following publication of the Species and Habitats Review Report. Following this

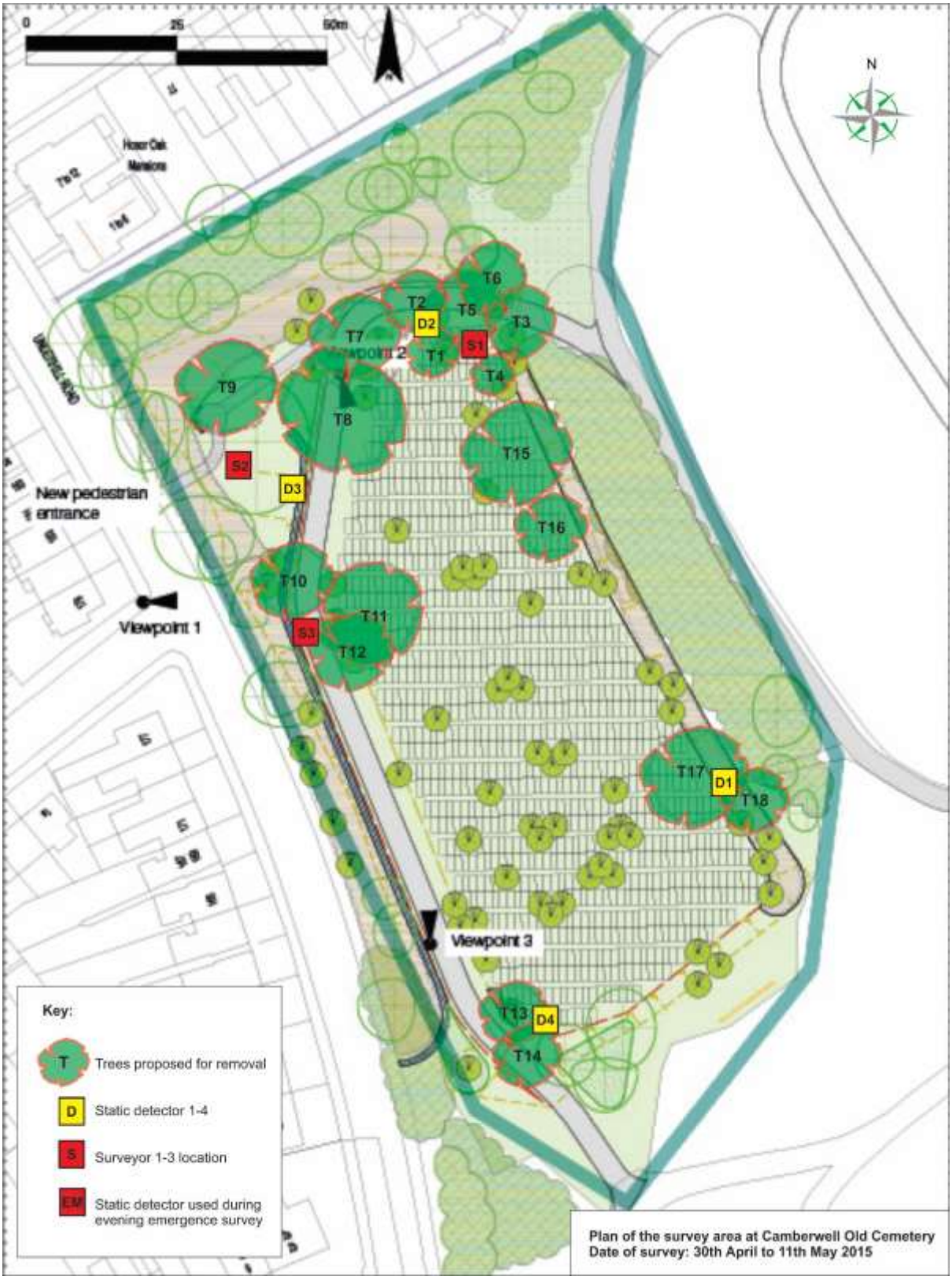
review, the list of UK BAP priority habitats increased from 49 to 65 and the list of UK BAP priority species increased from 600 to 1150.

Biodiversity Action Plans (BAPs) set out actions for the conservation and enhancement of biological diversity at national, regional and local level. They consist of both Habitat Action Plans (HAPs) and Species Action Plans (SAPs) and species and habitats listed within these are defined as being of Principal Importance for the Conservation of Biodiversity under Section 41 of the NERC Act 2006. Local authorities must consider these species and habitats when determining planning applications.

A2: PLANS

Plan 1: Aerial view of Camberwell Old Cemetery showing the location of the proposed landscaping works.

Plan 2: Proposal for the site showing trees to be removed and survey locations



A3: BAT SURVEY DATA

KEY:

Species code	Common name	Scientific name
p45	Common pipistrelle	*Pipistrellus pipistrellus*
p55	Soprano pipistrelle	*P. pygmaeus*
Es	Serotine	*Eptesicus serotinus*
Nl	Leisler's bat	*Nyctalus leislerii*
LE	Long-eared bat	*Plecotus sp.*

Evening bat emergence and activity survey 11th May 2015.

Start time: 20:15 Sunset: 20:38 End time: 22:15

18.1-15.1°C, 73% humidity, 5% cloud cover, gusty breeze.

Surveyor 1: by T1-T5

Time	Species	Comments
20:47	Soprano pipistrelle	**9 minutes after sunset**. Very faint pass, not seen
20:58	Common pipistrelle	**20 minutes after sunset**. Bat pass, not seen.
21:03	Serotine	**25 minutes after sunset**. Bat pass from the north, commuting south.
21:06	Common pipistrelle	Very faint record, not seen.
21:07-21:09	Common pipistrelle Soprano pipistrelle	Common pipistrelle feeding between the trees, joined briefly by a soprano pipistrelle
21:13-21:14	Common pipistrelle	2 bats arrived from south-west and fed briefly by ivy clad sycamores
21:17	Soprano pipistrelle	Feeding pass, not seen
21:34	Common pipistrelle	Bat pass, not seen and brief feeding episode
21:36	Common pipistrelle	Bat feeding
21:53	Common pipistrelle	Bat feeding
21:56	Common pipistrelle	Bat feeding
21:58	Common pipistrelle	Bat pass not seen
22:03	Common pipistrelle	Bat pas not seen
22:10	Common pipistrelle	very faint pass

Surveyor 2: by T7-8

Time	Species	Comments
20:43-20:46	Soprano pipistrelle	**5 minutes after sunset**. Bat feeding by sycamore, arrived from south-west
20:56	Common pipistrelle	**18 minutes after sunset**. Bat pass from north-east and fed briefly
21:12	Common pipistrelle	Bat pass from east and fed briefly
21:15	Soprano pipistrelle	Bat pass
21:31	Common pipistrelle	Bat pass, not seen
21:33	Common pipistrelle	2 bat passes, not seen
21:35	Common pipistrelle	bat pass, not seen
21:41	Common pipistrelle	Very faint brief pass
21:51	Common pipistrelle	Not seen
22:02	Common pipistrelle	Faint pass, not seen
22:06	Common pipistrelle	Bat pass, not seen.

Surveyor 3: by T9-10

Time	Species	Comments
21:43	Soprano pipistrelle	**5 minutes after sunset.** Bat pass, not seen – likely from the south-west
20:59	Serotine	**21 minutes after sunset**. Bat pass, not seen
21:02	Leisler's bat	**24 minutes after sunset.** Faint brief pass, not seen
21:05	Common pipistrelle	Very faint brief record
21:07	Soprano pipistrelle	Brief pass, not seen
21:13-21:22	Common pipistrelle	bat feeding in clearing dominated by brambles at the centre of the northern part of site
21:16	Soprano pipistrelle	2 bats pass into site from south-west
21:32-21:40	Common pipistrelle	Bat pass from south-west (road) into the site and fed over brambles
21:33	long-eared?	**55 minutes after sunset**. Bat pass into site from west, no echolocation calls
21:33	Soprano pipistrelle	bat feeding pass
21:34	common pipistrelle	bat feeding in clearing
21:41	Common pipistrelle	bat feeding in clearing at north-centre of site
21:43	Common pipistrelle	bat feeding in clearing at north-centre of site
21:52	Common pipistrelle	Bat pass not seen
22:06	Common pipistrelle	Bat pass east towards the road

Static detector: at centre of clearing in the southern part of site

Time	Species
20:58:52	**21 minutes after sunset**. Serotine
21:01:57	**24 minutes after sunset**. Leisler's bat
21:21:32	Common pipistrelle
21:32:01	Common pipistrelle
22:15:51	Soprano pipistrelle

Static Detector 1: South-east Corner, by TN15 and TN16

Night	Time	Species	Sunset	Sunrise	Time after sunset
30/04/2015	21:25:17	p45	20:21	05:33	1 hour and 4 minutes
	21:36:58	p45			
	21:37:07	p45			
	21:46:25	p45			
	21:46:44	p45			
	21:46:48	p45			
	21:47:02	p45			
	21:47:21	p45			
	21:47:48	p45			
	21:48:06	p45			
	21:49:06	p45			
	21:49:08	p45			
	21:49:56	p45			
	21:50:05	p45,p45			
	21:50:08	p45			
	21:50:25	p45			
	21:50:36	p45			
	21:50:41	p45			
	21:50:44	p45			
	21:50:51	p45			
	21:50:55	p45			
	21:50:59	p45			
	21:51:02	p45			
	21:51:04	p45,p45			
	21:51:06	p45			
	21:51:12	p45			
	21:51:17	p45			
	21:51:18	p45			
	21:51:27	p45			
	21:51:35	p45			
	21:51:45	p45			
	21:51:47	p45			
	21:51:54	p45			
	21:52:09	p45			
	21:52:22	p45			
	21:52:27	p45			
	21:52:44	p45			
	21:52:46	p45			
	21:53:17	p45			
	21:53:58	p45			
	21:54:18	p45			
	21:54:21	p45			
	21:54:24	p45			
	21:57:07	p45			
	21:57:10	p45			
	21:58:32	p45			
	21:58:35	p45			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	21:58:45	p45			
	22:00:14	p45			
	22:00:18	p45			
	22:02:35	p45			
	22:08:01	p55			
	22:26:48	p45			
	22:45:08	p45			N/A
01/05/2015	20:49:35	p45	20:23	05:31	**26 minutes after sunset**
	20:56:42	p45			
	22:52:31	p45			
	23:00:35	p45			
	23:01:10	p45			
	01:06:56	p45			
	01:07:05	p45			
	01:07:38	p45			N/A
02/05/2015	20:44:53	p45	20:25	05:29	**19 minutes after sunset**
	20:44:54	p45			
	20:44:58	p45			
	20:58:41	p55			
	21:15:07	p55			
	21:16:08	p45			
	21:20:23	p45			
	21:22:24	p55			
	21:22:36	p55			
	21:24:57	p55			
	21:25:42	p55			
	21:28:46	p55			
	22:26:22	p45			N/A
03/05/2015	21:44:01	p45	20:26	05:28	**18 minutes after sunset**
	22:27:28	p45			
	23:07:44	p55			
	02:00:02	p45			
	02:17:10	p45			
	02:59:14	p45			
	03:44:52	p45			
	03:50:56	p45			
	04:13:41	p45			N/A
04/05/2015	21:14:29	p45	20:28	05:26	46 minutes after sunset
	21:45:29	p45			
05/05/2015	20:58:19	p45	20:30	05:24	28 minutes after sunset
	21:03:47	p45			N/A
06/05/2015	04:16:50	p45	20:31	05:22	N/A
	04:25:11	p45			57 minutes before sunrise
07/05/2015	21:19:31	p45	20:33	05:21	46 minutes after sunset
	21:24:12	p45			
	21:35:24	p45			
	21:56:17	p55			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	23:35:17	p45			
	00:32:05	p45			N/A

Location 2 – NE Corner (T1)

Night	Time	Species	Sunset	Sunrise	Time after sunset
30/04/2015	20:49:59	p55	20:21	05:33	28 minutes
	20:56:51	p45			
	21:03:11	p55			
	21:03:15	p55			
	21:03:20	p55			
	21:03:28	p55			
	21:09:09	p55			
	21:09:49	p45			
	21:10:14	p45			
	21:10:16	p45			
	21:22:03	p45			
	21:22:04	p45			
	21:22:13	p45			
	21:22:16	p45			
	21:37:21	p45			
	21:44:47	p45			
	21:46:04	p45			
	21:46:08	p45			
	21:46:10	p45			
	21:46:14	p45,p45			
	21:56:10	p45			
	21:57:13	p45			
	21:57:18	p45			
	22:00:35	p45			
	22:28:01	p45			
	22:28:08	p45			N/A
01/05/2015	20:59:40	p45	20:23	05:31	36 minutes
	21:10:33	p45			
	21:12:56	p45			
	21:13:22	p45			
	21:13:25	p45			
	22:25:22	p45			
	22:25:46	p45			
	22:52:49	p45			
	22:55:33	p45			
	22:55:46	p45			
	22:56:16	p45			
	22:57:39	p45			
	22:59:37	p45			
	23:00:27	p45			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	23:00:52	p45			
	23:02:24	p45			
	23:02:52	p45			
	23:14:31	p45			
	23:15:12	p45			
	01:04:53	p45			
	01:06:51	p45			
	01:07:15	p45			
	04:51:46	p45			38 minutes before sunrise
02/05/2015	20:57:33	p45	20:25	05:29	32 minutes
	21:01:48	p45			
	21:02:09	p45			
	21:04:51	p45			
	21:04:55	p45			
	21:04:58	p45			
	21:04:59	p45			
	21:08:12	p55,p45			
	21:10:59	p45			
	21:11:49	p45			
	21:12:53	p45			
	21:13:48	p45			
	21:19:21	p45			
	21:20:35	p45			
	21:20:38	p45			
	21:26:06	p45			
	21:31:28	p45			
	21:36:21	p45			
	21:36:26	p45			
	22:00:00	p45			
	22:42:51	p45			
	22:43:17	p45			
	22:54:45	p45			
	22:55:09	p45			N/A
03/05/2015	20:49:20	p45,p45	20:26	05:28	**23 minutes**
	20:49:25	p45,p45			
	20:51:41	p45,p45			
	20:51:49	p45			
	20:51:53	p45,p45			
	20:51:58	p45			
	20:52:01	p45			
	20:52:04	p45,p45			
	20:52:11	p45			
	20:52:16	p45			
	20:52:21	p45			
	20:52:24	p45			
	20:52:27	p45			
	20:52:35	p45			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	20:53:47	p45			
	20:53:53	p45			
	20:54:35	p55			
	20:55:00	p45			
	20:55:18	p45			
	20:58:50	p55			
	20:59:27	p55			
	20:59:32	p55			
	21:08:04	p45			
	21:08:07	p45			
	21:08:10	p45			
	21:09:11	p45			
	21:09:51	p45			
	21:09:53	p45			
	21:09:56	p45,p45			
	21:10:01	p45,p45			
	21:10:03	p45,p45			
	21:10:06	p45,p45			
	21:10:10	p45,p45			
	21:10:15	p45,p45			
	21:10:20	p45			
	21:10:23	p45,p45			
	21:10:35	p45			
	21:10:39	p45,p45			
	21:10:43	p45			
	21:10:48	p45			
	21:10:54	p45			
	21:10:57	p45			
	21:11:05	p45			
	21:11:06	p45			
	21:11:13	p45			
	21:11:22	p45			
	21:11:35	p45			
	21:12:02	p45			
	21:12:05	p45			
	21:12:13	p45			
	21:12:15	p45			
	21:12:19	p45,p45			
	21:12:21	p45			
	21:12:23	p45			
	21:12:29	p45,p45			
	21:12:31	p45			
	21:12:36	p45			
	21:12:40	p45			
	21:12:42	p45			
	21:12:45	p45,p45			
	21:12:52	p45			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	21:12:59	p45,p45			
	21:14:13	p45,p45			
	21:14:18	p45			
	21:14:24	p45			
	21:15:23	p45			
	21:15:24	p45			
	21:22:36	p45			
	21:23:27	p45			
	21:24:02	p45			
	21:24:07	p45			
	21:26:20	p45			
	21:31:33	p45			
	21:31:38	p45			
	21:39:03	p45			
	21:39:08	p45			
	21:39:10	p45			
	21:41:22	p45			
	21:41:41	p45			
	22:08:02	p45			
	22:27:40	p45			
	22:27:46	p45			
	22:33:58	p45			
	22:34:03	p45			
	22:34:05	p45			
	22:59:52	p45			
	22:59:58	p45			
	23:21:41	p45			
	00:02:07	p45			
	00:09:17	p45			
	00:09:22	p45			
	00:17:29	p45			
	00:17:44	p45			
	00:50:41	p45			
	00:51:08	p45			
	01:50:30	p45			
	02:01:17	p45			
	02:01:22	p45			
	02:01:28	p45			
	02:01:30	p45			
	02:16:07	p45			
	02:25:02	p45			
	02:34:48	p45			
	04:08:41	p45			
	04:13:11	p45			
	04:28:24	p45			
	04:28:31	p45			
	04:28:38	p45			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	04:28:45	p45			
	04:28:48	p45			
	04:29:13	p45			
	04:29:45	p45			
	04:34:47	p45			
	04:34:52	p45			
	04:34:55	p45			51 minutes before sunrise
					17 minutes
04/05/2015	20:45:28	p45	20:28	05:26	
	20:45:43	p45			
	20:58:13	p45			
	21:14:51	p45			
	21:14:57	p45			
	21:14:59	p45			
	21:15:15	p45			
	21:45:34	p45			
	21:47:41	p45			
	21:49:20	p45			
	21:52:32	p45			
	22:01:10	p45			
	22:01:12	p45			
	22:02:23	p45			
	22:02:47	p45			
	22:12:25	p45			
	22:32:39	p45			
	22:37:59	p45			
	02:33:58	p45			
	04:37:47	p45			
	04:38:37	p45			45 minutes before sunrise
05/05/2015	20:48:56	p45	20:30	05:24	**18 minutes**
	20:49:05	p45			
	20:49:12	p45			
	20:49:21	p45			
	21:02:45	p55			
	21:15:16	p55			
	22:51:03	p45			
	22:51:08	p45			
	22:54:00	p45			
	23:13:31	p55			
	00:50:00	p45			
	00:50:05	p45			
	00:50:09	p45			
	00:51:11	p55			
	02:34:11	p55			N/A
06/05/2015	20:57:28	p45	20:31	05:22	26 minutes
	21:06:37	p45			
	21:08:54	p45			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	21:08:59	p45,p45			
	21:09:03	p45			
	21:09:07	p45			
	21:19:18	p45			
	21:19:21	p45			
	21:19:24	p45			
	21:19:32	p45			
	21:19:44	p45			
	21:19:54	p45			
	21:20:05	p55,p45			
	21:20:38	p45			
	21:20:47	p45			
	21:20:53	p45			
	22:41:14	p45			
	22:41:25	p45			
	22:42:31	p45			
	22:42:34	p45			
	22:42:39	p45			
	22:42:41	p55,p45			
	22:42:45	p45			
	22:42:49	p45			
	22:42:55	p45			
	22:42:59	p45			
	22:43:03	p45			
	22:43:04	p45			
	22:44:10	p45			
	22:44:19	p45,p45			
	22:44:22	p45			
	22:44:24	p45			
	22:44:29	p45			
	22:44:29	p45			
	22:44:36	p45			
	00:03:15	p45			
	00:03:16	p45			
	00:34:08	p55			
	03:12:57	p45			
	03:18:00	p45			
	03:18:02	p45			
	03:18:05	p45			
	03:38:19	p55			
	04:08:06	p45			
	04:08:40	p45			
	04:09:46	p45			
	04:09:49	p45			
	04:11:28	p45			
	04:12:15	p45			
	04:12:17	p45			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	04:12:47	p45			
	04:13:27	p45			
	04:13:29	p45,p45			
	04:14:15	p45			
	04:14:54	p45			
	04:18:31	p45			
	04:19:04	p45			
	04:22:35	p45			58 minutes before sunrise
07/05/2015	20:54:55	p45	20:33	05:21	**21 minutes**
	20:54:58	p45			
	20:56:45	p45			
	20:56:49	p45,p45			
	20:56:57	p45			
	21:00:28	p45			
	21:02:10	p55			
	21:02:13	p55			
	21:06:20	p55			
	21:20:47	p45			
	21:31:15	p45			
	21:34:39	p45			
	21:42:02	p45			
	22:08:36	p55			
	22:15:59	p55			
	22:16:04	p55			
	22:16:06	p55			
	22:16:26	p55			
	22:21:09	p55			
	22:24:37	p55			
	22:28:16	p55			
	22:28:41	p55			
	22:28:42	p55			
	22:28:46	p55			
	22:31:30	p55			
	22:31:32	p55			
	22:31:34	p55			
	22:32:08	p55			
	22:32:16	p55			
	22:32:22	p55			
	22:32:32	p55			
	22:33:15	p55			
	22:34:10	p55			
	22:35:13	p45			
	22:36:37	p55			
	22:49:00	p55			
	22:49:08	p55			
	22:50:15	p55			
	22:51:11	p55			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	22:56:46	p45			
	22:58:44	p45			
	22:58:45	p45			
	23:02:08	p45			
	23:02:09	p45			
	23:03:16	p45			
	23:04:18	p45			
	23:05:06	p45			
	23:10:51	p45			
	23:13:15	p55			
	23:14:56	p45			
	23:14:58	p45			
	23:15:18	p45			
	23:15:19	p45			
	23:15:26	p45			
	23:15:55	p45			
	23:15:57	p45			
	23:15:59	p45			
	23:16:02	p45			
	23:16:23	p45			
	23:16:45	p45			
	23:17:30	p45			
	23:18:22	p45			
	23:21:28	p55			
	23:22:07	p45			
	23:27:03	p45			
	23:42:24	p45			
	23:42:30	p45			
	23:43:41	p45			
	23:44:08	p45			
	23:53:17	p45			
	23:53:19	p45			
	23:56:20	p45			
	23:56:47	p45			
	00:03:26	p45			
	00:03:30	p45			
	00:22:03	p45			
	00:30:07	p45			
	00:37:30	p45			
	00:37:41	p45			
	00:37:42	p45			
	00:37:58	p45			
	00:38:05	p45			
	00:44:47	p45			
	00:47:28	p45			
	01:04:34	p45			
	01:20:00	p45			

Night	Time	Species	Sunset	Sunrise	Time after sunset
	01:26:21	p55			
	01:26:24	p55			
	02:16:52	p45			
	03:01:53	p45			
	03:01:56	p45			
	03:01:59	p45			
	04:10:27	p55			
	04:10:29	p55			
	04:25:52	p55			
	04:26:02	p55			
	04:57:18	p45			
	04:57:22	p45			21 minutesbefore sunrise

Location 3 – North-west part of the site

Night	Time	Species	Sunset	Sunrise	Comment
08/05/2015	20:41:30	p55	20:34	05:16	7 minutes after sunset
	20:47:41	p55			
	20:50:59	p45			
	20:51:02	p45			
	20:55:10	p45			
	21:09:41	p45			
	21:10:46	p45			
	21:10:56	p45			
	21:11:06	p45			
	21:12:48	p45			
	21:12:56	p45			
	21:13:00	p55,p45			
	21:13:05	p55			
	21:13:54	p45			
	21:14:00	p45			
	21:14:49	p45			
	21:14:50	p45			
	21:15:01	p45			
	21:15:40	p55			
	21:15:51	p55			
	21:15:54	p45			
	21:16:09	p45			
	21:16:14	p45			
	21:17:00	p45			
	21:19:15	p45			
	21:19:23	p45			
	21:19:28	p45			
	21:22:03	p45			
	21:23:03	p45			
	21:23:13	p45			
	21:23:16	p45			
	21:23:21	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	21:23:25	p45			
	21:23:28	p45			
	21:23:43	p45			
	21:24:20	p45			
	21:24:21	p45			
	21:24:26	p45			
	21:24:33	p45			
	21:24:44	p45			
	21:24:47	p45			
	21:25:01	p45			
	21:25:16	p45			
	21:25:19	p45			
	21:26:54	p45			
	21:26:57	p45			
	21:27:01	p45			
	21:27:07	p45			
	21:27:14	p45			
	21:27:17	p45			
	21:40:38	p45			
	22:08:26	p45			
	22:08:32	p45			
	22:08:37	p45			
	22:19:24	p45			
	22:19:59	p45			
	22:20:11	p45			
	22:20:14	p45			
	22:20:50	p45			
	22:21:32	p45			
	22:22:00	p45			
	22:22:04	p45			
	22:31:48	p45			
	22:43:29	p45			
	22:47:45	p45			
	23:06:13	p45			
	23:06:24	p45			
	23:06:26	p45			
	23:06:30	p45			
	23:06:32	p45			
	23:06:34	p45			
	23:06:40	p45			
	23:06:45	p45			
	23:06:50	p45			
	23:06:54	p45			
	23:07:19	p45			
	23:12:29	p55			
	23:19:49	p45			
	23:19:51	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	23:19:53	p45			
	23:21:15	p45			
	23:21:18	p45			
	23:21:19	p45			
	23:58:40	p45			
	23:59:11	p45			
	23:59:19	p45			
	23:59:22	p45			
	00:00:35	p45			
	00:00:38	p45			
	00:01:09	p45			
	00:02:24	p45			
	00:04:00	p45			
	00:04:06	p45			
	00:04:31	p45			
	00:04:35	p45			
	00:04:37	p45			
	00:28:37	p45			
	00:28:40	p45			
	02:18:43	p45			
	02:37:00	p55			
	04:26:35	p45			
	04:26:37	p45			
	04:38:44	p45			
	04:43:05	p45			
	04:46:00	p45			30 minutes before sunrise
09/05/2015	20:51:39	p45	20:36	05:15	15 minutes after sunset
	20:51:46	p45			
	20:51:58	p45			
	20:53:55	p45			
	20:54:02	p45			
	20:55:17	p45			
	20:55:40	p45			
	20:57:18	p45			
	21:01:29	p45			
	21:27:45	p45			
	21:33:13	p45			
	21:33:15	p45			
	21:33:21	p45			
	21:33:51	p45			
	21:33:53	p45			
	21:36:25	p45			
	21:38:01	p45			
	21:38:56	p45			
	21:41:47	p55			
	21:55:59	p45			
	21:56:04	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	21:56:22	p45			
	21:56:28	p45			
	21:56:30	p45			
	22:17:16	p45			
	22:21:33	p45			
	22:21:37	p45			
	22:26:11	p55			
	22:28:38	p45,p55			
	22:28:41	p55			
	22:35:20	p45			
	22:44:45	p45			
	22:44:47	p45			
	22:44:49	p45			
	22:44:50	p45			
	22:55:37	p45			
	22:55:56	p45			
	22:58:55	p45			
	22:58:59	p45			
	22:59:09	p45			
	22:59:14	p45			
	22:59:21	p45			
	22:59:27	p45			
	22:59:41	p45			
	22:59:46	p45			
	23:00:11	p45			
	23:00:14	p45			
	23:00:17	p45			
	23:00:21	p45			
	23:00:26	p45			
	23:00:40	p45			
	23:00:46	p45			
	23:00:58	p45			
	23:01:01	p45			
	23:01:10	p45			
	23:01:12	p45			
	23:01:27	p45			
	23:01:30	p45			
	23:01:37	p45			
	23:01:42	p45			
	23:01:57	p45			
	23:02:04	p45			
	23:02:48	p45			
	23:03:24	p45			
	23:03:27	p45			
	23:06:01	p45			
	23:06:07	p45			
	23:06:13	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	23:06:32	p55			
	23:12:20	p45			
	23:12:25	p45			
	23:12:32	p45			
	23:12:34	p45			
	23:12:36	p45			
	23:12:42	p45			
	23:12:55	p45			
	23:13:44	p45			
	23:13:58	p45			
	23:14:02	p45			
	23:16:25	p45			
	23:16:32	p45			
	23:17:45	p45			
	23:17:49	p45			
	23:18:10	p45			
	23:24:02	p45			
	23:25:59	p55			
	23:28:31	p45			
	23:28:36	p45			
	23:28:38	p45			
	23:28:45	p45			
	23:29:10	p55			
	23:31:03	p45			
	23:31:09	p45			
	23:31:47	p55			
	23:31:56	p55			
	23:36:01	p45			
	23:36:07	p45			
	23:36:10	p45			
	23:36:22	p45			
	23:36:29	p45			
	23:37:03	p45			
	23:37:56	p45			
	23:40:36	p45			
	23:40:57	p45			
	23:41:40	p45			
	23:41:52	p45			
	23:41:55	p45			
	23:42:07	p45			
	23:42:09	p45			
	23:42:19	p45			
	23:42:29	p45			
	23:42:33	p45			
	23:42:34	p45			
	23:42:48	p45			
	23:42:49	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	23:43:12	p45			
	23:51:31	p45			
	23:52:26	p45			
	23:58:20	p45			
	23:58:32	p45			
	00:04:40	p45			
	00:04:49	p45			
	00:04:51	p45			
	00:10:11	p45			
	00:10:21	p45			
	00:11:13	p45			
	00:14:05	p45			
	00:15:26	p45			
	00:17:16	p45			
	00:20:48	p45			
	00:30:15	p45			
	00:32:58	p45			
	00:33:08	p45			
	00:33:27	p45			
	00:36:17	p45			
	00:45:55	p45			
	01:19:58	p55			
	01:36:08	p55			
	02:11:37	p55			
	02:11:42	p55			
	02:11:50	p55			
	03:01:56	p55			
	03:20:09	p55			
	03:20:13	p55			
	03:20:20	p55			
	03:20:31	p55			
	03:20:39	p55			
	03:58:21	p55			
	04:20:28	p45,p55			
	04:20:36	p45			
	04:20:44	p45			
	04:22:10	p55			
	04:23:01	p45			
	04:23:10	p45			
	04:24:13	p45			
	04:30:47	p55			
	04:54:39	p45			
	04:54:47	p45			
	04:54:57	p45			
	04:55:05	p45			20 minutes before sunrise
10/05/2015	21:04:15	p45	20:37	05:13	27 minutes after sunset
	21:04:18	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	21:09:37	p45			
	21:50:29	p45			
	21:50:40	p45			
	22:35:41	p55			
	22:43:00	p45			
	22:55:57	p45			
	23:07:08	p55			
	23:23:34	p45			
	23:30:07	p45			
	23:30:16	p45			
	23:31:02	p45			
	23:35:56	p45			
	23:39:32	p45			
	23:39:35	p45			
	23:39:36	p45			
	23:40:43	p45			
	23:40:59	p45			
	23:46:20	p45			
	23:47:04	**Es**			
	23:47:57	p45			
	23:48:04	p45			
	00:00:55	p45			
	00:00:59	p45			
	00:01:22	p45			
	00:01:35	p45			
	00:01:46	p45			
	00:01:48	p45			
	00:02:00	p45			
	00:02:12	p45			
	00:02:19	p45			
	00:02:20	p45			
	00:02:37	p45			
	00:02:57	p45			
	00:03:13	p45			
	00:05:28	p45			
	00:05:33	p45			
	00:06:19	p45			
	00:06:21	p45			
	00:06:33	p45			
	00:06:37	p45			
	00:06:59	p45			
	00:08:59	p45			
	00:09:00	p45			
	00:09:11	p45			
	00:09:20	p45			
	00:09:35	p45			
	00:09:47	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	00:10:00	p45			
	00:13:13	p45			
	00:13:16	p45			
	00:13:58	p45			
	00:14:07	p45			
	00:14:31	p45			
	00:14:43	p45			
	00:15:52	p45			
	00:16:23	p45			
	00:21:56	p45			
	00:22:08	p45			
	00:22:18	p45			
	00:22:29	p45			
	00:22:31	p45			
	00:22:39	p45			
	00:25:44	p45			
	00:25:50	p45			
	00:26:26	p45			
	00:26:35	p45			
	00:27:48	p45			
	00:28:08	p45			
	00:28:49	p45			
	00:31:45	p45			
	00:31:55	p45			
	00:33:05	p45			
	00:33:11	p45			
	00:33:17	p45			
	00:33:24	p45			
	00:33:41	p45			
	00:33:52	p45			
	00:34:13	p55			
	00:34:33	p45			
	00:40:35	p45			
	00:40:53	p45			
	00:41:02	p45			
	00:41:11	p45			
	00:41:32	p45			
	00:41:40	p45			
	00:41:42	p45			
	00:41:49	p45			
	00:41:59	p45			
	00:42:01	p45			
	00:42:08	p45			
	00:42:16	p45			
	00:42:28	p45			
	00:44:33	p45			
	00:45:00	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	00:45:38	p45			
	00:46:06	p45			
	00:46:13	p45			
	00:46:19	p55			
	00:46:24	p45,p55			
	00:46:28	p55			
	00:46:30	p45,p55			
	00:46:38	p45			
	00:50:48	p45			
	00:51:17	p45			
	00:51:20	p45			
	00:51:34	p45			
	00:52:04	p45			
	00:52:12	p45			
	00:52:18	p45			
	00:52:26	p45			
	00:52:34	p45			
	00:52:48	p45			
	00:52:55	p45			
	00:53:04	p45			
	00:53:17	p45			
	00:53:34	p45			
	00:54:20	p45			
	00:54:39	p45			
	00:54:53	p45			
	00:55:24	p45			
	00:55:42	p45			
	00:55:44	p45			
	00:55:58	p45			
	00:56:33	p45			
	00:56:49	p45			
	00:57:09	p45			
	00:57:19	p45			
	00:57:28	p45			
	00:58:05	p45			
	00:58:20	p45			
	00:58:25	p45			
	00:58:33	p55			
	00:58:38	p55			
	00:58:39	p55			
	00:59:03	p45			
	00:59:17	p45			
	00:59:55	p45			
	01:00:16	p45			
	01:00:17	p45			
	01:00:47	p45			
	01:00:49	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	01:01:03	p45			
	01:01:26	p45			
	01:01:29	p45			
	01:01:51	p45			
	01:02:02	p45			
	01:02:23	p45			
	01:02:37	p45			
	01:02:45	p45			
	01:03:09	p45			
	01:03:21	p45			
	01:03:31	p45			
	01:04:09	p45			
	01:04:21	p45			
	01:04:35	p45			
	01:04:53	p45			
	01:05:34	p45			
	01:05:37	p45			
	01:05:51	p45			
	01:05:53	p45			
	01:05:59	p45			
	01:07:15	p45			
	01:07:20	p45			
	01:07:36	p45			
	01:07:41	p45			
	01:07:45	p45			
	01:07:57	p45			
	01:08:06	p45			
	01:08:37	p45			
	01:08:40	p45			
	01:08:51	p45			
	01:08:58	p45			
	01:09:05	p45			
	01:09:12	p45			
	01:09:26	p45			
	01:09:49	p45			
	01:09:53	p45			
	01:10:19	p45			
	01:10:29	p45			
	01:10:31	p45			
	01:11:16	p45			
	01:11:18	p45			
	01:11:52	p45			
	01:12:02	p45			
	01:13:23	p45			
	01:13:37	p45			
	01:14:19	p45			
	01:14:26	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	01:14:39	p45			
	01:14:53	p45			
	01:15:03	p45			
	01:15:36	p45			
	01:15:49	p45			
	01:16:19	p45			
	01:16:36	p45			
	01:16:43	p45			
	01:17:41	p45			
	01:17:42	p45			
	01:20:49	p45			
	01:21:04	p45			
	01:21:12	p45			
	01:21:46	p45			
	01:21:55	p45			
	01:22:26	p45			
	01:22:27	p45			
	01:22:31	p45			
	01:22:35	p45			
	01:22:54	p45			
	01:23:14	p45			
	01:24:12	p45			
	01:24:44	p45			
	01:24:59	p45			
	01:25:21	p45			
	01:26:02	p45			
	01:26:04	p45			
	01:26:19	p45			
	01:26:23	p45			
	01:26:25	p45			
	01:26:39	p45			
	01:27:27	p55,p45			
	01:27:43	p45			
	01:28:03	p45			
	01:28:07	p45			
	01:28:20	p45			
	01:28:31	p45			
	01:28:41	p45			
	01:29:05	p45			
	01:29:06	p45			
	01:29:09	p45			
	01:29:17	p45			
	01:29:20	p45			
	01:29:52	p45			
	01:30:04	p45			
	01:30:22	p45			
	01:30:43	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	01:30:46	p45			
	01:30:59	p45			
	01:31:07	p45			
	01:31:11	p45			
	01:31:27	p45			
	01:31:39	p45			
	01:31:52	p45			
	01:32:03	p45,p45			
	01:32:07	p45,p45			
	01:32:10	p45			
	01:32:18	p45			
	01:32:20	p45			
	01:32:25	p45,p45			
	01:32:28	p45			
	01:32:49	p45			
	01:33:09	p45			
	01:33:22	p45			
	01:33:30	p45			
	01:33:34	p45			
	01:33:43	p45			
	01:33:53	p45			
	01:34:34	p45			
	01:34:41	p45			
	01:35:10	p45			
	01:35:12	p45			
	01:35:20	p45			
	01:35:39	p45			
	01:35:59	p45			
	01:36:27	p45			
	01:36:57	p45			
	01:37:00	p45			
	01:37:06	p45			
	01:37:37	p45			
	01:37:46	p45			
	01:37:57	p45			
	01:38:17	p45			
	01:38:28	p45			
	01:38:33	p45			
	01:38:53	p45			
	01:39:42	p45			
	01:39:48	p45			
	01:42:43	p45			
	01:42:45	p45			
	01:46:55	p45			
	01:47:03	p45			
	01:47:18	p45			
	01:49:08	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	01:49:24	p45			
	01:49:32	p45			
	01:49:40	p45			
	01:49:57	p45			
	01:50:05	p45			
	01:56:27	p45			
	01:56:38	p45			
	01:56:49	p45			
	01:57:55	p45			
	01:58:02	p45			
	01:58:09	p45			
	02:02:24	p45			
	02:06:31	p45			
	02:06:40	p45			
	02:12:01	p45			
	02:12:08	p45			
	02:12:15	p45			
	02:16:39	p45			
	02:20:31	p45			
	02:20:39	p45			
	02:20:48	p45			
	02:21:53	p55			
	02:22:04	p55			
	02:28:26	p45			
	02:29:27	p45			
	02:29:34	p45			
	02:29:37	p45			
	02:31:09	p45			
	02:31:22	p45			
	02:32:10	p55			
	02:35:15	p55			
	02:35:16	p45,p55			
	02:35:25	p45			
	02:36:06	p45			
	02:36:23	p45			
	02:36:44	p55			
	02:36:52	p55			
	02:37:03	p55			
	02:37:11	p55			
	02:43:00	p45			
	02:46:23	p55			
	02:46:45	p45			
	02:46:52	p45			
	02:48:21	p45			
	03:04:48	p45			
	03:07:02	p55			
	03:07:08	p55			

Night	Time	Species	Sunset	Sunrise	Comment
	03:07:11	p55			
	03:07:15	p55			
	03:12:06	p45			
	03:12:49	p45			
	03:13:03	p45			
	03:13:07	p45			
	03:13:13	p45			
	03:13:41	p45			
	03:13:46	p45			
	03:14:02	p45			
	03:14:10	p45			
	03:14:18	p45			
	03:14:36	p45			
	03:14:47	p45			
	03:16:05	p45			
	03:16:12	p45			
	03:16:49	p45			
	03:17:01	p45			
	03:17:24	p45			
	03:17:34	p45			
	03:17:36	p45			
	03:18:07	p45			
	03:18:08	p45			
	03:18:24	p45			
	03:18:34	p45			
	03:19:25	p45			
	03:19:27	p45			
	03:19:32	p45			
	03:19:59	p45			
	03:20:09	p45			
	03:20:16	p45			
	03:20:18	p45			
	03:20:28	p45			
	03:20:49	p45			
	03:20:52	p45			
	03:20:58	p45			
	03:21:02	p45			
	03:21:26	p45			
	03:21:33	p45			
	03:21:42	p45			
	03:22:55	p45			
	03:22:57	p45			
	03:23:05	p45			
	03:23:18	p45			
	03:24:45	p45			
	03:24:52	p45			
	03:26:34	**Es**			

Night	Time	Species	Sunset	Sunrise	Comment
	03:29:42	p45			
	03:29:49	p45			
	03:29:57	p45			
	03:30:04	p45			
	03:32:16	p45			
	03:32:59	p45			
	03:33:09	p45			
	03:33:20	p45			
	03:34:01	p45			
	03:34:11	p45			
	03:34:34	p45			
	03:34:49	p45			
	03:35:39	p45			
	03:35:45	p45			
	03:35:54	p45			
	03:36:14	p45			
	03:36:32	p45			
	03:36:45	p45			
	03:36:46	p45			
	03:40:36	p45			
	03:40:48	p45			
	03:40:50	p45			
	03:40:59	p45			
	03:41:29	p45			
	03:41:38	p45			
	03:41:53	p45			
	03:42:20	p45			
	03:42:30	p45			
	03:42:44	p45			
	03:43:02	p45			
	03:43:12	p45			
	03:49:49	p45			
	03:49:59	p45			
	03:50:09	p45			
	03:51:42	p45			
	03:52:45	p45			
	03:53:12	p45			
	03:53:20	p45			
	03:53:35	p45			
	04:00:19	p45			
	04:00:37	p45			
	04:01:08	p45			
	04:01:56	p45			
	04:03:32	p45			
	04:03:49	p45			
	04:06:02	p45			
	04:06:09	p45			

Night	Time	Species	Sunset	Sunrise	Comment
	04:06:22	p45			
	04:06:37	p45			
	04:06:39	p45			
	04:06:55	p45			
	04:12:40	p45			
	04:12:47	p45			
	04:12:56	p45			
	04:13:14	p45			
	04:14:59	p45			
	04:15:10	p45			
	04:15:19	p45			
	04:24:03	p45			
	04:24:20	p45			
	04:24:21	p45			
	04:24:32	p45			
	04:46:22	p45			27 minutes before sunrise

Location 4: South-western corner of the site

Night	Time	Species	Sunset	Sunrise	Comments
08/05/15	20:46:32	p45	20:34	05:16	12 minutes after sunset
	20:46:40	p45			
	20:46:49	p45			
	20:47:03	p45			
	20:47:13	p45			
	20:56:37	p45			
	20:56:44	p45			
	20:59:08	p55			
	21:04:59	p55			
	21:34:19	p45			
	22:03:23	p45			
	22:43:41	p45			
	22:43:43	p45			
	22:43:52	p45			
	22:43:54	p45			
	22:43:56	p45			
	22:43:58	p45			
	22:44:02	p45			
	22:44:13	p45			
	22:44:15	p45			
	22:44:26	p45			
	22:44:45	p45			
	22:49:32	p45			
	22:56:45	p45			
	22:56:58	p45			
	23:05:31	p45			

Night	Time	Species	Sunset	Sunrise	Comments
	23:05:41	p45			
	23:07:27	p45			
	23:46:48	p45			
	23:59:08	p45			
	00:29:57	p45			
	01:23:29	p45			
	02:19:56	p45			
	02:38:14	p55			
	04:18:16	p45			
	04:30:29	p45			
	04:31:06	p45			
	04:31:35	p45			
	04:31:44	p45			
	04:31:52	p45			
	04:32:04	p45			
	04:32:21	p45			
	04:32:24	p45			
	04:35:43	p45,p45			
	04:58:14	p45			18 minutes before sunrise
09/05/15	20:57:15	p45	20:36	05:15	21 minutes after sunset
	21:00:21	p45			
	21:03:19	p55			
	21:09:43	p55			
	21:28:14	p45			
	21:58:26	p55			
	22:19:37	p55			
	22:22:58	p45			
	22:30:05	p55			
	22:46:08	p45			
	22:56:02	p45			
	23:07:40	p45			
	23:14:38	p45			
	23:15:33	p45			
	23:15:39	p45			
	23:15:52	p45			
	23:15:54	p45			
	23:16:10	p45			
	23:16:12	p45			
	23:16:24	p45			
	23:16:27	p45			
	23:16:39	p45			
	23:16:51	p45			
	23:17:06	p45			
	23:17:09	p45			
	23:17:20	p45			
	23:18:12	p45			
	23:18:23	p45			

Night	Time	Species	Sunset	Sunrise	Comments
	23:20:55	p45			
	23:21:01	p45			
	23:21:11	p45			
	23:21:23	p45			
	23:27:12	p45			
	23:48:38	p55			
	23:59:35	p45			
	00:15:49	p45			
	00:17:20	p45			
	00:23:06	p45			
	02:25:28	p55			
	03:20:39	p55			
	03:45:26	p55			
	04:21:44	p45			
	04:21:59	p45			
	04:23:23	p45			
	04:25:38	p45			
	04:41:15	p45			
	04:42:40	p45			33 minutes before sunrise
10/05/15	21:01:15	p55	20:37	05:13	24 minutes after sunset
	21:04:43	p45			
	21:13:57	p55			
	22:37:11	p45			
	23:43:33	p45			
	23:43:35	p45			
	00:40:58	p45			
	00:43:49	p45			
	01:21:09	p45			
	01:22:25	p45			
	01:22:45	p45			
	01:22:48	p45			
	01:24:57	p45			
	01:31:31	p45			
	01:33:59	p45			
	01:38:56	p45			
	01:57:24	p45			
	01:58:48	p45			
	03:13:17	p45			
	03:21:45	p45			
	03:30:25	p45			
	03:32:25	p45			
	03:33:11	p45			
	03:38:19	p45			
	04:07:06	p45			
	04:14:36	p45			
	04:47:39	p45			26 minutes before sunset

Plan 3: Results of the bat detector surveys