4th June 2025

BAT FLIGHTLINE AND DARK CORRIDOR PLANS FOR LIGHTING DESIGN PROPOSALS.

RE: Bat flightline and associated dark corridor plans to inform lighting design for Hope Farm, the haven, Billingshurst, to enable discharging of planning application Condition no 6. Application ref: DC/23/0677

Collington Winter Environmental Ltd was instructed to undertake a site walkover and compile data from the site surveys to determine likely flightlines and advise on retained dark corridors for the ongoing development at Hope Farm, Billingshurst. This report has been produced in response to discharging condition no 6 for application no DC/23/0677, which states;

"No dwelling hereby permitted shall be first occupied until a lighting design scheme for biodiversity has been submitted to and approved in writing by the Local Planning Authority. The scheme shall identify those features on site that are particularly sensitive for bats and that are likely to cause disturbance along important routes used for foraging: and show how and where external lighting will be installed (through the provision of appropriate lighting contour plans, Isolux drawings and technical specifications) so that it can be clearly demonstrated that areas to be lit will not disturb or prevent bats using their territory. All external lighting shall be installed in accordance with the specifications and locations set out in the scheme and maintained thereafter in accordance with the scheme. Under no circumstances should any other external lighting be installed without prior consent from the local planning authority".

Collington Winter Environmental Ltd have undertaken a suite of bat emergence surveys over several years since 2022 and have a detailed knowledge of the site and surrounding habitats, which has enabled the following recommendations to be provided to produce a suitable lighting design for the entire site and the recently complete pool house and barn.

The author of this report is Jon Hayter- Senior ecologist at Collington Winter Environmental Ltd. Jon has over 10 years' experience working with bats and holds a Level 2 Class License (CL18- 2019 39842-CLS-CLS), along with extensive experience designing and implementing mitigation plans.

SITE CONTEXT.

The site is situated in a rural setting, bound on all sides by pastoral and arable land with connectivity to the local landscape with optimal roosting, foraging and commuting routes available. The River Arun is located 250m north of the site, at its closest point and runs around the northern and western extremities of the site before heading south

off site. Multiple deciduous woodland blocks encircle the site with mature hedgerows linking all the features and Hope Farm is located centrally within this optimal habitat mosaic (see lan 1 below for habitat connectivity features)

Plan 1 -site context and habitat connectivity.

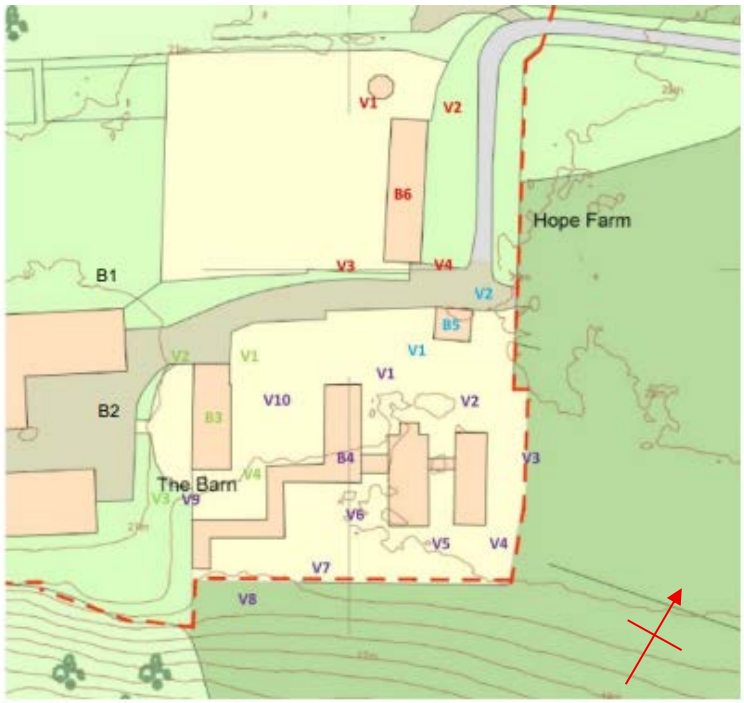


Blue shows the Riparian zone and River Arun.
Orange mature hedgerow connectivity features.
Green mature deciduous woodland blocks.
Red is area of residential and farm buildings.

BAT SURVEY DATA.

Collington Winter have conducted multiple surveys on the original buildings and more recently on some of the remaining structures and the results of these findings are detailed, along with information relating to species activity observed during the emergence surveys. Plan 2 details the building references and associated viewpoints relating to the emergence surveys.

Plan 2 -Building references and Viewpoints from surveys.



2022 surveys

Dusk and dawn surveys were undertaken on the 24th, 30th and 31st of August 2022 and further dusk and dawn surveys were completed on the 14th and 15th of September 2022, a brief overview of findings is included below.

24th August dusk survey

Bat activity was recorded consistently throughout the surveys, with common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*), noctule (*Nyctalus noctula*) and serotine (*Eptesicus serotinus*) observed foraging or commuting in proximity of several of the buildings.

- B4 recorded common pipistrelle commuting overhead in a southern direction. Activity remained constant throughout the survey with continuous foraging on the southern aspect of B4. Serotine bats were recorded by both VP4 and VP6 on building B4.
- The southern aspect of B5 had foraging activity mainly related to brown long-eared bat, common pipistrelle, and soprano pipistrelle bats.
- Three roost locations were observed throughout the survey, the first on the northwest side of B4, A single common pipistrelle emerged from the overhanging eaves relating to the main entrance porch. The second roost was recorded on B4 and was a single soprano pipistrelle emerging from under the overhanging eaves on the southern side of the building and flew southeast. The third roost was recorded on the southern side of B4, an unidentified bat emerged from the wooden fascia above the glass door panels on the southeastern aspect and flew southeast along the treeline.

30th August dusk survey

The first bat was a common pipistrelle commuting overhead in a southwestern direction. Bat activity was predominantly concentrated on the southern aspect of B4 and minimal activity recorded on B3. Foraging and commuting activity was also recorded on the eastern side of B3 involving commuting of brown long-eared bat and serotine.

One roost location was observed throughout the survey. The emergence of seven brown long-eared bats were recorded on the southeastern corner of B3 with six bats emerging from the wooden panelling and flying south towards the treeline.

31st August dawn survey

Bat activity was recorded sporadically throughout the survey, with common pipistrelle, soprano pipistrelle and brown long-eared bat observed foraging or commuting along the eastern side of B6.

One roost location was observed throughout the survey a common pipistrelle was observed re-entering B6 via the overhanging eaves on the eastern aspect of the building.

14th September dusk survey

Bat activity was recorded consistently throughout the survey, with common pipistrelle, soprano pipistrelle, brown long-eared bat and noctule bat recorded during the survey. The first bat was recorded along the eastern side of B6 and was an unidentified bat commuting overhead in a north-eastern direction. Foraging activity was continuous throughout the survey with common pipistrelle and soprano pipistrelle observed along the north and east of the building B6.

- One roost location was observed on northwest elevation of B6, a single common pipistrelle was observed emerging from the top right corner of the patio area of the building
- The second roost location was observed on the northern aspect of B4 and was an unidentified bat emerging from underneath the wooden fascia above the top right corner of the door
- Three roost locations were observed on the north and east side of building B4 where three separate soprano pipistrelles were observed emerging and flying southwest along the rear of the building.
- The fourth and fifth roost locations were located on the wooden fascia and under the overhanging eaves on the southern side of building B4, where one soprano pipistrelle was observed emerging from the wooden fascia on the east elevation of B4 and one common pipistrelle from under the overhanging eaves on the north gable end, both bats flew east and then past the southern elevations of the building.
- The final roost was observed on the eastern elevation of B6 and was a brown long-eared bat emerging from the roof tiles.

15th September dawn survey

Bat activity was recorded minimally throughout the survey, with common pipistrelle, soprano pipistrelle, brown long-eared bat recorded during the survey. The first bat was a soprano pipistrelle and was observed foraging

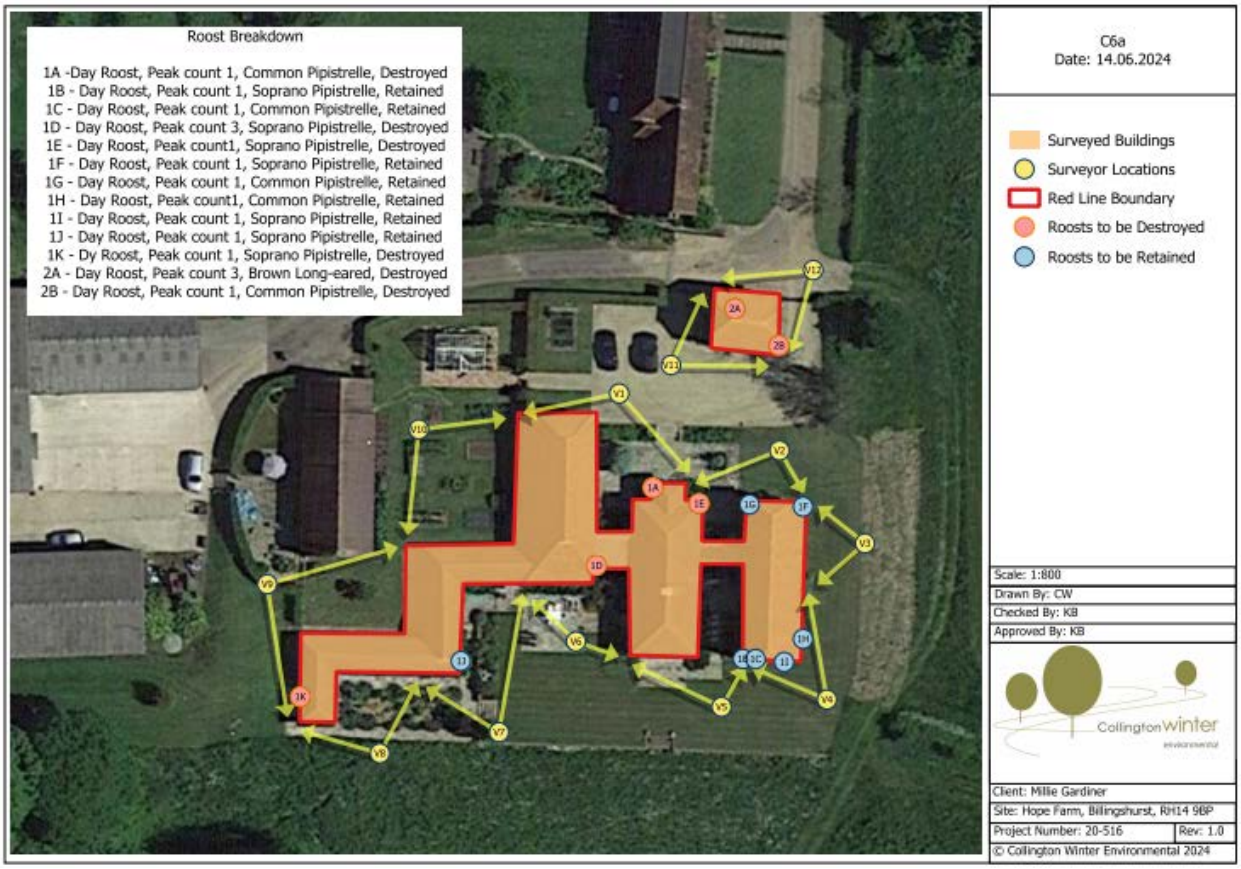
withing the southwest corner area of B4. Common pipistrelle was observed commuting east and westwards along B4 and brown long-eared bat was recorded twice along the eastern elevation of B4.

- Three roost locations were observed throughout the survey. The first roost location involved the re-entry of a single brown long eared on the northwest corner of B3.
- The second roost location was also recorded on the northern elevation of B3 and involved the re-entry of a common pipistrelle underneath the wooden fascia.
- Finally, three brown long-eared bats were observed circling B5. The bats re-entered the building on the north side.

Summary

A summary of the 2022 surveys is detailed below showing known roosts and foraging and commuting routes. Plan 3 showing roost locations which were used to apply for the EPSL to lawfully undertake the building work and Plan 4 the observed foraging and commuting routes from the dusk surveys for each species.

Plan 3 - Roost locations 2022



Plan 4. Individual bat species activity areas.

Common pipistrelle



Serotine



Soprano pipistrelle



Brown long eared



2023 surveys

Two updated back-to-back dusk and dawn surveys were undertaken on building B6 only, in the summer of 2023, following a winter hibernation survey undertaken in November 2022.

November 22nd, 2022, hibernation survey

The updated inspections in 2022 did not identify any bats within the loft structures. No additional and/or fresh bat

evidence was observed to indicate hibernation presence. A review of the static recorder data, did not identify any bat recordings during the two-week period and as such, based on the inspections and bat static records, it is deemed unlikely that bats hibernate within the loft voids of the building B6.

12/13th June dusk/dawn surveys

Bat activity was recorded consistently throughout both surveys, with common pipistrelle, soprano pipistrelle, brown long-eared bat, myotis species and noctule recorded during the survey. The first bat was recorded was a common pipistrelle to the east of the building. Common and soprano pipistrelles were recorded intermittently across the site with minimal numbers of brown long eared and myotis bat passes all located to the north and east of the building. Noctules were heard twice over the survey commuting and foraging high over the site. No emergences were recorded from the building, but several re-entries were recorded.

- Three roost locations were observed through the survey, the first was for a myotis species bat, which was observed re-entering under the clay hanging tiles on the western elevation.
- The second was for one soprano pipistrelle, which was observed re-entering under the clay hanging tiles on the eastern aspect under a window.
- The final re-entry was a soprano pipistrelle, which was observed re-entering under the clay hanging tiles on the eastern aspect under a window.

2025 surveys

An updated visit to check on the site conditions was conducted by Jon Hayter on the 10th of January 2025, to check again on the hibernation status of the building in preparation for the updated dusk survey planned for late May 2025 as per recommendations from the nocturnal bat report (ref, CW20-516 RPT 003). It was found that conditions had changed little since the previous visits and DNA evidence was collected to confirm species assemblage within building B6. The results of this confirmed the presence of brown long-eared bats within the building.

22nd May dusk survey

The results of this survey are yet to be fully confirmed but the activity levels on site matched those form previous year's survey effort, common pipistrelle, soprano pipistrelle, brown long eared, serotine and myotis species were observed actively foraging along the northern access driveway and the eastern field boundary of the site heading south initially from the building then continually foraging to the east and north of B6.

- Three emergences were observed on the eastern elevation, two for pipistrelle species in nearly identical locations to the re-entry events listed above and one brown long-eared bat emerged from the eastern elevation and flew southeast.

EPSL LICENSEABLE WORK

The work undertaken under EPSL license 2024-68660-EPS-MIT was completed in September 2024 and the following bats were found. Two common pipistrelle bats, one flew from roost within 1A on building B4 and the other was removed from 2A on building B, which was an adult male, at the time of the 2025 dusk survey works had yet

to be fully completed and mitigation installed within B4. Building B5 had been completed, and further landscaping had occurred to the western and southern extremities of the site.

SUMMARY.

The updated survey effort confirmed the original findings and have enabled a detailed activity plan to be produced. Figure 4 below shows the high activity areas and suggested dark zones along with individual species foraging areas.

The species of bats known to be present on site are utilising the site for summer day roosting purposes, there is no evidence of a maternity site within any of the building on site, which suggests that only small numbers of common and widespread species are presently roosting within the buildings. There are however records of other species locally which need to be considered within the wider landscape and some of these are particularly susceptible to high levels of artificial lighting.

Brown long-eared bat which are known to roost on site are one of these species and there are known roosts in buildings B3, B5 and B6, they are particularly affected by light at roost, in foraging and commuting corridors and at a landscape level.

Pipistrelle species are less affected by artificial lighting to some degree, however, as there are known roosts concentrated within the southern elevations of B4, and B6 It is suggested that especially to the south and east of these buildings, lighting is carefully designed to not affect the periods around dusk and dawn when the bats are leaving and re-entering roosts.

Serotine and noctule bats are not known to roost on site but have been observed during the surveys, both of these species' forage more actively in open environments so the proximity lighting of the buildings has less effect on the species. These two bat species prefer lighting is not illuminating open ground and surrounding hedgerows and treelines which are used as linear features within the landscape for orientating and foraging. However the existing lighting is likely to assist the species with food resources to some extent.

Finally, the myotis group of bats is usually associated with wooded and areas of scrub and dense cover, the records for this species are more concentrated to the northern end of the site along the access driveway which is not currently illuminated.

Please find attached summary of effect of artificial light on specific species, taken from guidance notes 08/23 BCT.

Table 1: Summary of the effect of ALAN on UK bat species.

Species	Roost	Flight Corridor	Foraging Area	Drinking Site	Migration	Landscape Level	Habitat Type
Greater Horseshoe *Rhinolophus ferrumequinum*		na	na	na	na	na	clutter
Lesser Horseshoe *Rhinolophus hipposideros*			na	na	na		clutter
Brown Long-eared *Plecotus auritus*					na		clutter
Grey Long-eared *Plecotus austriacus*	na	na	na	na	na	na	clutter
Bechstein's *Myotis bechsteinii*	na	na	na	na	na	na	clutter
Natterer's *Myotis nattereri*		na	na		na	na	clutter
Daubenton's *Myotis daubentonii*	na			na	na		edge
Whiskered *Myotis mystacinus*	na	na	na	na	na	na	edge
Brandt's *Myotis brandtii*	na	na	na	na	na	na	edge
Alcathoe *Myotis brandtii alcathoe*	na	na	na	na	na	na	edge
Western Barbastelle *Barbastella barbastellus*					na		edge
Common Pipistrelle *Pipistrellus pipistrellus*	na				na		edge
Soprano Pipistrelle *Pipistrellus pygmaeus*				na			edge
Nathusius' Pipistrelle *Pipistrellus nathusii*	na	na	na	na			edge
Common Noctule *Nyctalus noctula*	na			na	na		open
Lesser Noctule *Nyctalus leisleri*	na	na	na		na		open
Serotine *Eptesicus serotinus*	na	na	na	na	na		open

	Positive effect
	No effect
	Negative effect
na	**No data available**

Data in table is indicative only, is drawn predominantly from European studies (where data available) and shows numerous data gaps due to lack of research data, therefore bat behaviour within the UK may vary and needs assessing on a site by site basis.

Plan 5 overall high activity areas for all species across all survey indicated in red



LIGHTING SPECIFICATION CONSIDERATIONS.

It is recommended that a professional qualified lighting contractor produces a detailed lighting plan in association with this report or a suitably qualified ecologist oversees this process to confirm adherence to required specifications and suggestions contained within this report.

All associated lighting should follow the guidance outlined in the Institute for Lighting Engineers document "Guidance for the Reduction of Obtrusive Lighting" (2005) and BCT's "Bats and Artificial Lighting at Night" (2023).

Lighting plans should consider the following,

- Keep site lighting to minimum levels and only where necessary for safe ingress and egress.
- Luminaries should lack UV elements and preferably LED lighting with a warm white light should be used over cool white light (ideally <2700Kelvin) to reduce blue light component.
- Lighting should feature peak wavelengths greater than 550nm to avoid the component of artificial lighting most disturbing to bats.
- Internal lighting can be recessed where installed near windows to reduce glare and light spill form the internal spaces.
- Light placement should be downward facing to prevent excess horizontal or vertical light spill, bollard systems are not recommended as they usually lead to unacceptable glare, poor illumination and upward light output.
- Luminaires should always be mounted horizontally, with no light output above 90 degrees and no upward tilt.
- Avoid illuminating habitats of value to the north, east and most importantly the south of the site.

- Use of timed security lighting should be set on motion-sensors and using short, 1-minute timers, to minimise light use.

CONCLUSIONS.

The species assemblage on site is known to comprise of species particularly sensitive to Artificial lighting. And the data gathered from the surveys has highlighted specific areas that the bats are using for roosting, commuting and foraging around the wider landscape.

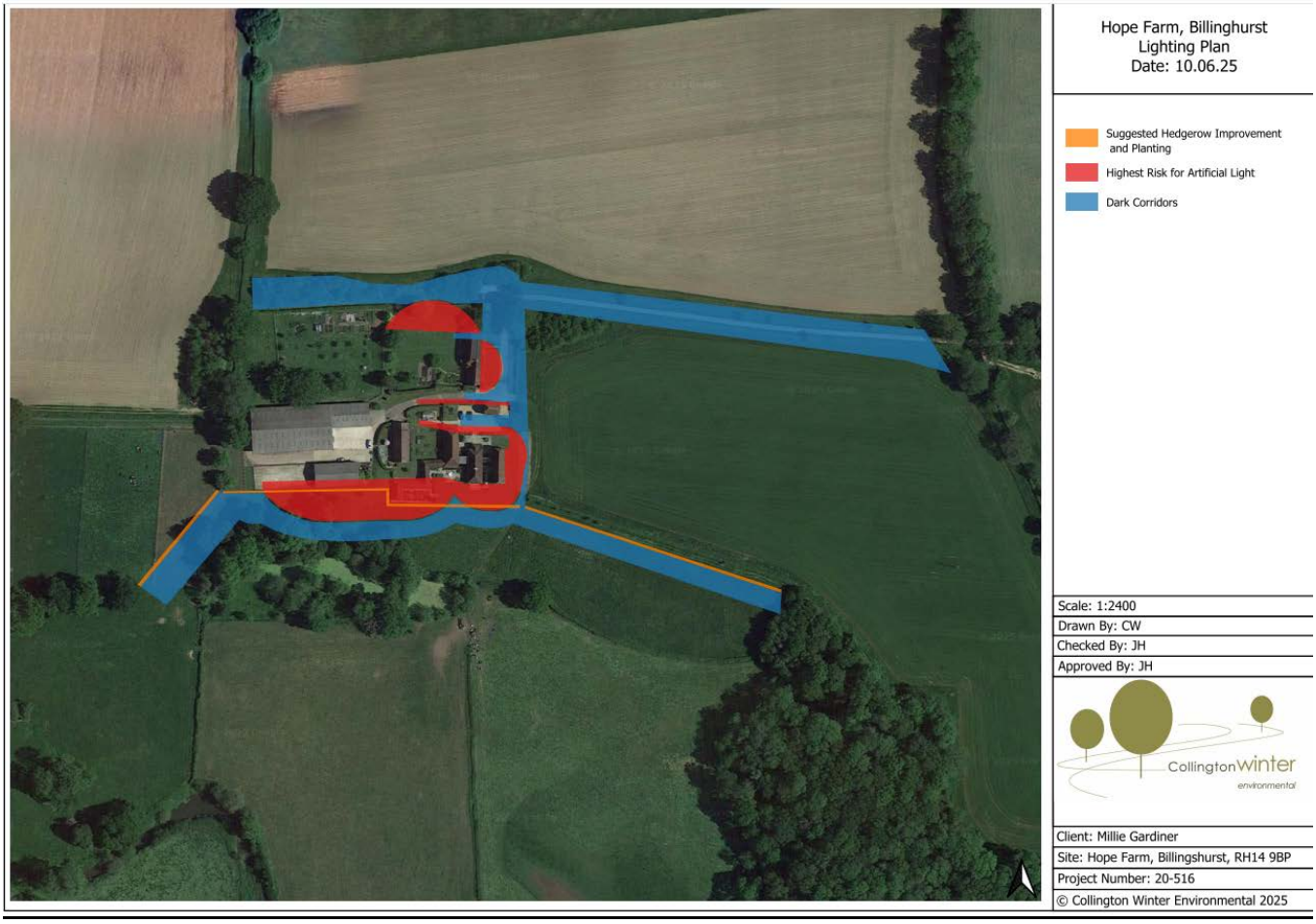
It is suggested that the following buildings have minimal additional lighting installed where possible, if not then any new lighting should be designed by a professional lighting engineer in line with the above guidance.

Due to the known roost locations (as per figure 2) within B3, B4 and B6, no external wall mounted lighting should be installed within 5m of the known roost sites, additionally, the southern and eastern extremities of the built environs should be retained as dark corridors (as per figure 5 below) as these areas are used by multiple species to commute to the foraging grounds across the wider site.
The following recommendations are also suggested.

- Consider the use of warm white light or red spectrum lighting where common and soprano pipistrelle species are known to be present especially to the east and south of building B4 where the ground falls away to a mature hedgerow and pond and along the east and north of building B6 from the hedgerow to the pastoral field due east as this is the preferred commuting corridor and foraging zone for all of the roosts present on site , identified during the emergence surveys..
- Maintain the hedgerow screening on east and north along the access driveway as this experience's high activity foraging levels for all bat species and was noted across all emergence and activity surveys, any emerging bats flew in this direction and all commuting bats utilised at least one if not both areas.
- No additional lighting should be installed if possible, to the north and south of building B5 as this is a known brown long eared roost and, activity levels are high along both sides of the building, the eastern and southern boundaries between the built environment and the open grassland and hedgerows are favoured by this species especially the pond and mature trees to the south of B4 heading west down to the riparian zone of the River Arun.
- Serotine bats area actively using the eastern side of B6 to commute into the wider site and seem to favour the southern area, it is acknowledged that they are less affected by artificial light, but the benefits achieved for other species within this area will likely also benefit them.
- Planting of hedgerow or similar soft screening on the southern elevation of B4 and using low level, low glare lighting only to maintain the dark corridor along this elevation which is very important for the bat assemblage on site, additionally the hedgerow leading east from the corner of B4 could be enhanced to allow for more efficient commuting to the woodland areas.
- The southwest corner upon completion of landscaping should include a suitable linear soft feature to maintain connectivity to the wider landscape.

- Where possible any lighting to the south of B4 should be cowled or louvered to prevent any outward light spill beyond 3m of the building and any internal lighting should be restricted from spilling out of the windows via shrouding or applicable glazing filters. External lighting where required should also be on short timers to allow for minimal periods of light spillage into the valuable habitat south of the buildings.
- The access driveway and the pastoral field to the east and south of the property appear to hold considerable importance to the site in general for commuting bats, therefore this side of the site should be subject to as minimal amount of new artificial lighting as possible.
- Where possible to the west of B6 it is suggested that the landscaping plan reflects above all retention of existing habitat and any further enhancement as it is understood that this area will be a garden and a certain level of artificial lighting is required, so adherence to the specification listed above is suggested in this area with sensitive timer lighting at low lux levels..

Figure 5



Kind regards,

Jon Hayter -Senior Ecologist
Collington Winter Environmental Ltd

PHOTOGRAPHS

Access driveway to northeast of main buildings complex, consisting of mature treeline and hedgerows which are consistently used by multiple species for commuting on and off the site and foraging closer to the buildings at southern end. View looking north.	
View looking south of access driveway to The main complex of buildings.	

View of B6 from the east note the important hedgerow in foreground between the building complex and the pastoral land to east, This area forms part of the dark corridor to be retained.	
View east from B6 showing grassland and woodland in background, this field boundary forms part of the connected foraging and commuting routes and is within suggested dark corridor.	

Hedgerow on corner of B4 leading east could be enhanced as major foraging and commuting corridor which intersects the east west dark corridor to the south of B4.	
Major foraging and commuting dark corridor to the south of B4, lighting should be carefully designed and potentially a soft barrier installed to retain the optimum habitat beyond the formal lawn	

Consideration of soft buffer and screen along south of pool and barn area to protect the foraging zone. Window tinting to prevent light spill and glare and low-level soft lighting recommended.	
Optimal habitat to the south and wider landscape.	

Continuation of habitat to southwest of new pool and barn, connectivity could be enhanced through planting and no new lighting is suggested. The River Arun runs in the background.	
Retention of mature garden and trees to maintain west side of building complex foraging opportunities.	