BRYMBO METHODIST CHURCH & ENGEDI CHAPEL

BAT MITIGATION STRATEGY

DATE	ECOLOGIST	APPROVED	VERSION	COMMENTS
28/02/2024	Lucy Boyett	Rhian Hughes	1	
24/04/2024	Lucy Boyett	Rhian Hughes	2	Addition of lighting plan information
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1.0 Introduction

1.1 Enfys Ecology Limited were commissioned by Wales & West Housing to produce a bat mitigation strategy for the proposed development at Brymbo Methodist Church and the adjacent Engedi Chapel.

1.2 This mitigation strategy, builds upon the findings of surveys by Greenscape, 2017, Greenscape, 2021 and a PRA and further emergence surveys by Enfys Ecology in 2023, which are detailed in the survey report Enfys Ecology, 2023, which this mitigation strategy must be read alongside.

1.3 The surveys found that the Brymbo Methodist Church had historically been used by a crevice dwelling bat on one or a small number of occasions and was unlikely to return. Engedi Chapel was found to be a non-breeding day and night roost for lesser horseshoe (LHS) (15) and a low number of common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared (BLE) (*Plecotus auratus*) and *Myotis* sp.

1.4 The proposed works are for the full demolition of both Brymbo Methodist Church and Engedi Chapel, which are to be replaced with two apartment blocks, parking areas, access road and landscaping (Figure 1.1).

1.5 **As the buildings have known bat roosts, no works to the buildings must commence until a licence has been obtained from NRW. A licence can only be applied for following the granting of planning permission and the discharge of any ecology related conditions. Once submitted the licence application takes 40 working days to be processed (or more if any there are any queries).**

1.6 To reduce the scale of impact, mitigation, compensation and enhancement measures will need to be in place, as well as specific working methods, which are included within this mitigation strategy. These will also be provided in detail within the licence method statement, that will be required due to the destruction of a known bat roost.

1.7 In line with Planning Policy Wales Edition 12 issued in February 2024, and following the Environment (Wales) Act 2016, there is a requirement for all development to deliver a **net benefit** for biodiversity and ecosystem resilience from the baseline state.

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FIGURE 1.1. PROPOSED SITE PLAN. BASE IMAGE © CREU ARCHITECTURE DRAWING C484 006 REVH

2.0 Mitigation: Destructive Works

2.1 *Timing of Works*

2.1.1 To reduce the impact of the works on bats using the site, destructive works and the implementation of mitigation and compensatory measures, will be completed at an appropriate time of year.

2.1.2 *Brymbo Methodist Church*

Destructive works to Brymbo Methodist Church can be undertaken at any time of the year, however, April to October (inclusive) would be preferable, to avoid the risk of disturbing a hibernating bat.

2.1.3 *Engedi Chapel*

Due to size of the building and structural safety concerns, it will not be possible to thoroughly search for and discount hibernating bats during the winter period. As this is the case, destructive works will be undertaken April to October (inclusive). Within this timeframe September, October or April would be preferable.

2.1.4 A temporary roost will be completed and approved by the licenced ecologist prior to the start of any destructive works on site. See Section 2.3 for further detail on the location and design.

2.1.5 Works will be planned so the completion of the two compensatory roosts within the apartment buildings, will be made a priority during the final phases of the construction.

2.2 *Destructive Works*

2.2.1 Prior to the start of works, a toolbox talk will be given to everyone involved in the project and a log of this will be retained. The toolbox talk will also be incorporated into the site induction for all contractors.

2.2.2 During destructive works, whilst there is potential for bats still to be present within Engedi Chapel, the licenced ecologist will carry out a daily inspection of the potential roosting areas prior to the start of any works, using an endoscope and high-powered torch where necessary. If it can be determined that no bats are present within the area of the proposed works, then the works can continue in these areas without supervision. If there are any areas that cannot be inspected fully, or bats are found, then works to these areas will be carried out under supervision.

2.2.3 There may be bats active and present in small numbers during the works period. To reduce the impact of disturbance on the bats (if present), the works to all of the following structures **will be carried out by hand** and inspected prior to works by/supervised by a licensed

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ecologist who is named on and authorised to act under the specific licence granted by NRW for this works.

Brymbo Methodist Church

- Removal of the roof of the toilet block section.

Engedi Chapel

- Any internal works which may cause disturbance. Ecologist to be consulted prior to the start of any works inside the building.

- Removal of all roof structures, including the roofline. Supervision required following pre-works checks (where possible to check from the scaffold). All works to the roofs must be undertaken by hand. Slates will be carefully turned over in order to check beneath for resting bats and then slid down the roof.

- Removal of boarding covering the windows.

- Any areas of wall where cracks or crevices that are potential roosting features are identified.

2.2.4 If a bat is found (that is not a LHS) and accessible it should be captured by a licenced ecologist and placed in one of the temporary roosts on site, which is appropriate for that species. No LHS bats will be captured and moved as part of the works.

2.2.5 If bats are present within the area of works, passive exclusion may be required such as stripping roof tiles away from sensitive areas to encourage bats to leave as a result of altered conditions and indirect disturbance. It is important that this is not so great as to force bats to emerge in daylight or in unsuitable conditions (Reason, 2023).

2.2.6 If an active crevice dwelling bat is found and is not accessible, works will start from the furthest point from the bat and continue in a directional manner to encourage the bat to move away from the area of works. If this is not possible without the possibility of causing harm, work will stop until the bat has left. A check will be carried out the following day and if the bat is gone, the works can then proceed under supervision.

2.2.7 If LHS are present within the works area, a sheet/tarpaulin will be put up to act as a screen to isolate the bats from the working area. As the working area moves, the bats will be encouraged into a different area of the building and again screened off with a sheet/tarpaulin so they can remain within the familiar space. No LHS will be captured or encourage to fly out into daylight.

2.2.8 If, when carrying out the pre-works checks and supervision works, it becomes apparent that more bats or different species of bats are to be affected by the works than first thought,

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works will be stopped until the working method and type/scale of compensation measures can be reviewed and agreed with NRW.

2.2.9 Biosecurity measures, as detailed in Section 6, will be in place throughout the of the works.

2.3 *Pre-construction - Temporary Roosts*

2.3.1 Due to the species and number of bats presents, it would have been best practice to have built at least one of the two proposed compensatory bats roosts prior to the destruction of the existing roosts. This will have required the southern-most apartment block to be completed prior to the demolition of Engedi Chapel. Due to the small size of the site in relation to the size of the development, it is not logistically possible or economically viable to do this. As a 'option of last resort' a temporary bat roost will be built at the southern end of the site prior to the demolition of the buildings and destruction of the roosts (Figure 2.1). This temporary roost will then be removed following the completion of the two compensatory roosts.

2.3.2 The temporary bat roost will be based on a 'tower' design by Vincent Wildlife Trust (VWT), specifically for lesser horseshoe bats (Figure 2.2). Roosting opportunities within the 'tower structure' and bat boxes will also be provided for crevice dwelling bats.

2.3.3 As the roost will be temporary, until the compensatory roosts within the apartment blocks are completed, the main structure will be of wooden construction. The temporary roost will meet the following minimum requirements:

- At least 1.5m x 1.5m and 3m in height.
- Roof to be slate and lined with bitumen felt.
- Internally, the walls will be lined with thick insulating board with OSB board on top.
- Externally the structure will be covered by feather-edged boarding. On each elevation, four boards will be slightly raised to create a small gap underneath, creating roosting potential for crevice dwelling bats.
- Entrance for lesser horseshoe bats to be created on the on western elevation, so the bats have direct and unrestricted access to the woodland. The entrance will measure 300 x 200 mm and be at least 1m from the ground. An external shield will be put over the entrance to prevent access by predators (Figure 2.3).
- An L-shaped baffle, will be installed at the roost entrance to reduce light and draughts. This will be painted matt black.

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- The tower will have two 'floors' installed creating three spaces within the tower. Each floor will have a gap of 400m x 400mm to allow access for bats to the next level. The floors/ceilings will have OSB boarding and rough timber batterns for perching.

- An access hatch/door will be provided measuring no more than 0.7m x 0.5m to allow access for monitoring purposes by licenced persons only. The hatch will be kept locked with a high quality combination lock.

- Only pre-treated timbers must be used or if timber treatment is needed, only timber treatments listed on Natural England Technical Information Note TIN092 will be used.

- Four bat access slates, to allow crevice dwelling bats access behind the slates and against the bitumen (not into the structure) will be installed, with one on each elevation.

- Two bat boxes will be erected, one on the western and one on the southern elevation of the bat tower.

- A pole will also be erected with either a rocket box bat box design or with two pole mounted boxes installed, these will be at least 4m in height.

- The bat entrance to the tower on the western elevation and any other bat boxes must not be lit and no lighting will be directed towards the bat tower. Screening may need to be installed to ensure the bat tower and the western boundary of the site remains as dark as possible throughout the period of works.

- The bat tower will be fenced off from the rest of the site and made inaccessible to members of the public.

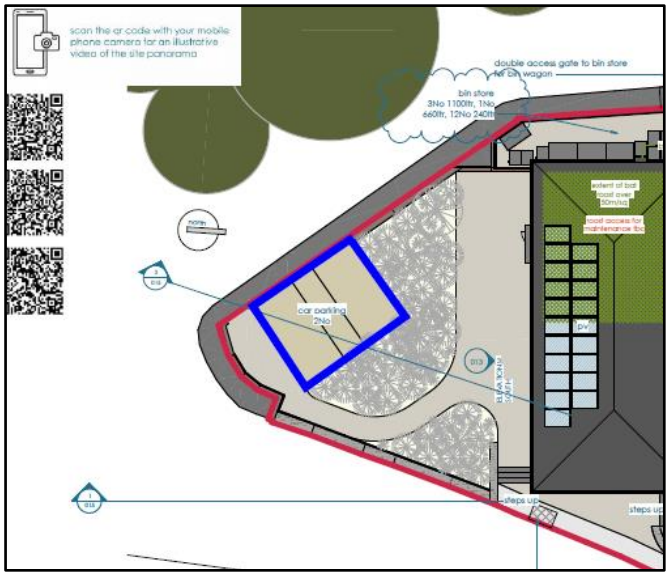


FIGURE 2.1. LOCATION OF TEMPORARY WOODEN 'BAT TOWER' SHOWN BY BLUE BOX
BASE IMAGE © CREU ARCHITECTURE

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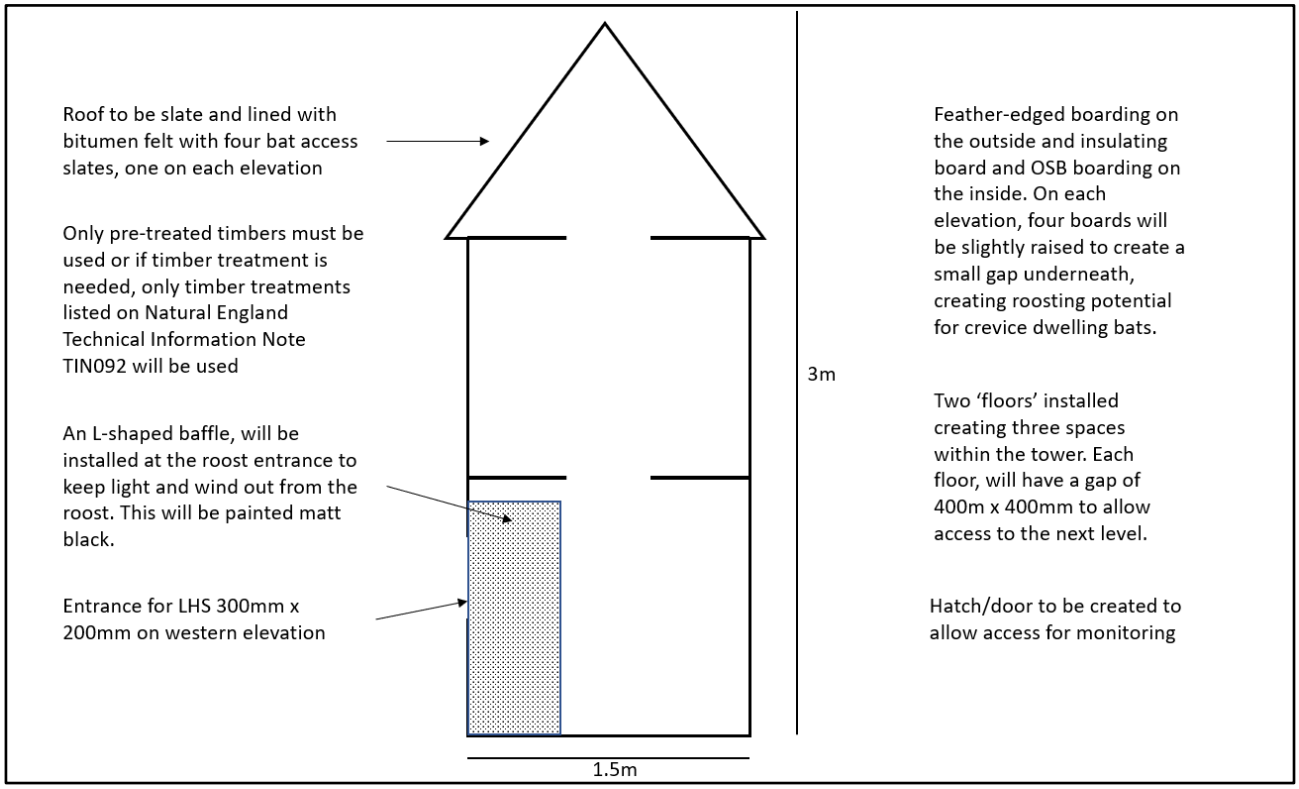


Figure 2.2. Design of temporary 'bat tower'. Based on the tower design by Vincent Wildlife Trust



Figure 2.3. Example of a shielded letter-box access for lesser horseshoe bats to prevent draughts and access by birds (Reason, 2023)

2.4 *Birds*

No evidence of nesting birds was found during the works; however, the site is suitable. If the area of works has potential for nesting birds, a nesting bird check must be carried out no less than 48 hours before works commence. If birds are found nesting in the buildings or vegetation during any point in the works, all works to that area must **stop** and only continue once the chicks have fledged.

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2.5 *General Reasonable Avoidance Measures*

2.5.1 Suitable Reasonable Avoidance Measures (RAMS) will be implemented to reduce the potential impact to bats, nesting birds and other species that may be found on site.

The following measures should be implemented at all times during the works:

- Working areas should be kept to the minimum required.
- Works should be avoided within 1 hour of dawn and dusk where possible to avoid disturbance to nocturnal animals. If works outside this time are needed, all lighting should be directional and be directed away from the woodland areas, i.e. onto the site from the perimeter.
- Should it be necessary to have any excavation left open overnight a suitable ramp (such as a plank or branch) must be provided to allow badgers, and other animals to escape the pit. Ramps could be created by grading the slope at the edges or using scaffold boards.
- If at any point in the works a reptile or amphibian is found all works in the vicinity of the sighting must immediately cease; if a common species is found it can be picked up (with gloves) and moved to a safe area off the site.
- Any terrestrial mammals, for example badgers or otters, seen must be allowed to leave the area on their own. If this is not possible e.g. the animal is injured or trapped then an ecologist must be called.

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3.0 Compensation and Enhancement: Roost Replacement

3.1 To compensate for the loss of day and night roosts for common pipistrelle, soprano pipistrelle, LHS, BLE and *Myotis* sp. and to enhance the site for these species, new roosting opportunities will be created and a scheme of planting will enhance the site for foraging.

3.2 In line with Planning Policy Wales Edition 12 issued in February 2024, and following the Environment (Wales) Act 2016, there is a requirement for all development to deliver a **net benefit** for biodiversity and ecosystem resilience from the baseline state.

3.3 *Compensatory Roosts*

3.3.1 Two large compensatory roosts will be created within the roof voids of the two apartment blocks (one within each apartment block), that will be designed to meet the needs of a wide variety of bat species present in the area (Figure 3.7).

3.3.3 The compenstory roosts will comprise the following specifications:

- Each roost will measure 50m^2 and 3m in height (to the apex).
- The roof within the roost will be pitched, slate and lined with a non-breathable membrane (Bitumen 1F felt) and constructed using a truss that provides a large open void, with a minimal number of struts/ties.
- As there are several species using the existing building, each bat roost will be separated by a stud wall down the centre, from apex to the floor to create two separate halves. One half will provide a suitable roosting area for LHS and the other half will be enhanced to encourage roosting from BLE and other crevice dwelling bats, a hole will be created within the stud wall to allow access between the areas, this will be 300 x 200mm. An access hatch will also be created to allow for inspection by a licenced ecologist in both sections.
- Rough timbers such as battens or Oriented Strand Boards (OSB), fastened close to the roof apex (placed carefully to avoid reducing or blocking solar heat gain), provides something for bats to hang from or roost against.
- A triple ridge board will be created with 25mm gaps in between to create more roosting opportunites.
- Only pre-treated timbers must be used or if timber treatment is needed, only timber treatments listed on Natural England Technical Information Note TIN092 will be used.
- The BLE/other species roost section will further be enhanced with three panel boxes (Figure 3.1). This will comprise a piece of plywood board fitted to 1inch x 1inch timbers with a gap on the underside only so bats can access the space from underneath. They

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should be 300mm high by 450 - 600mm long and 30mm deep. The top and sides should be closed.

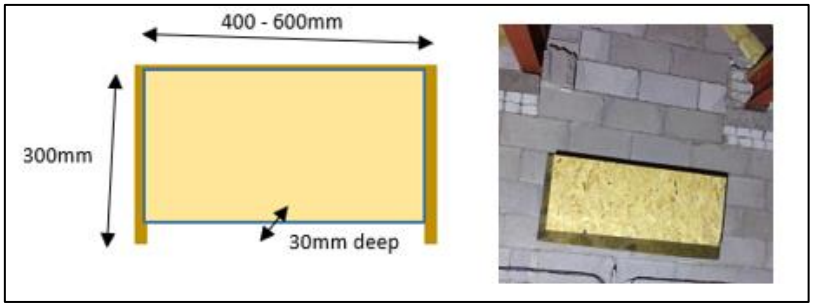
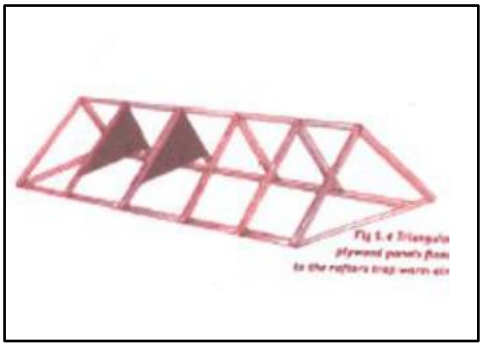


FIGURE 3.1. EXAMPLES OF PANEL BOXES

- Two hot boxes, one in each section of the roost, will be created by installing two triangular plywood panels attached to the rafters (Figures 3.2). There must be at least 900mm between the joists and the bottom of the plywood to provide adequate flight room with a minimum thickness of 6.5mm plywood.



FIGURES 3.2. HOT BOX EXAMPLE VINCENT WILDLIFE TRUST (2013)

- An access door will be provided measuring no more than 0.7m x 0.5m to allow access to both sections of the roost for monitoring purposes by licenced persons only.

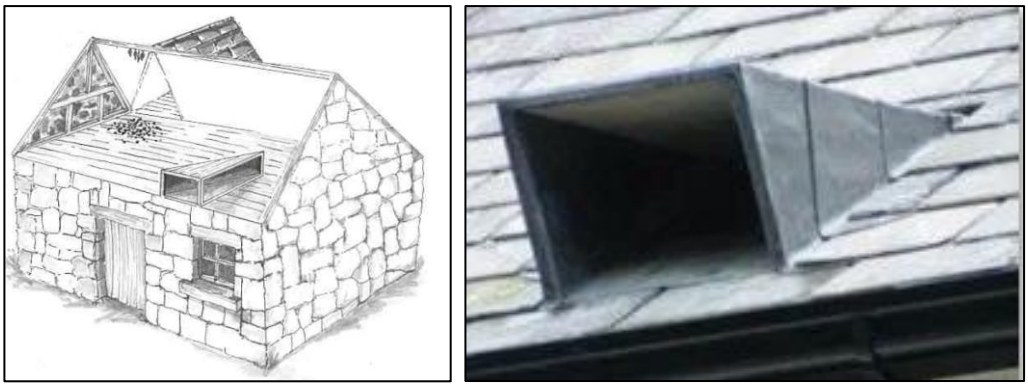
- The roof space will sound insulated (particularly across the loft floor) so as to prevent disturbance from the inhabited dwelling once works are complete.

Roost Entrances – LHS Roost Half

- Access to the LHS half of the roosts, will be by access at the roof/eaves AND a low-level chute on the western elevations.

- The eaves access will measure 300mm x 200mm and will be at floor level (of the roost). This can be achieved with either a dormer style entrance (painted matt black on the inside) or with a gap cut at the eaves (see Figure 3.3, 3.4 & 3.5). The access point will be baffled internally (without reducing the access point area) to limit airflow within the space.

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FIGURES 3.3 & 3.4. EXAMPLES OF LHS DORMER STYLE ENTRANCES

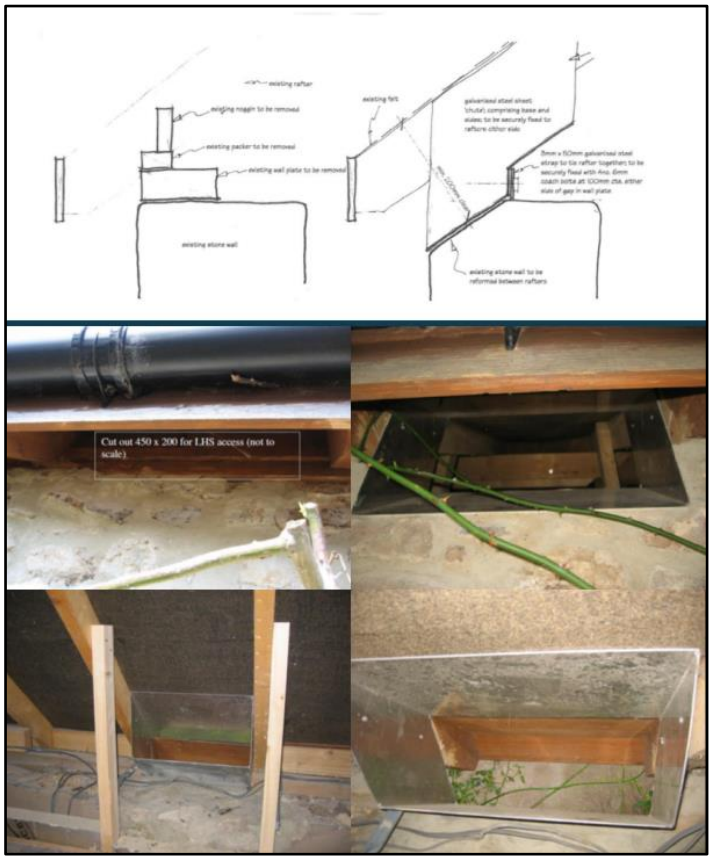


FIGURE 3.5. EXAMPLES OF LHS ACCESS AT EAVES

- The low level 'chute' will comprise an opening into the wall (approximately 2m high above the ground) and access into the loft through an enlarged cavity wall (Figure 3.6). The entrance point will be a horizontal hole, at a minimum size of 300mm x 200mm. The entry point will be low down, with the top of the entry point set at 2m above ground level. This entrance point would lead to an internal tunnel created within an adapted cavity wall, that leads up to the loft space. The cavity tunnel for the bats needs to be 300mm x 200mm minimum, the entire length of the tunnel up to the loft space. The entrance point into the loft space will comprise an opening from the tunnel with no obstructions.

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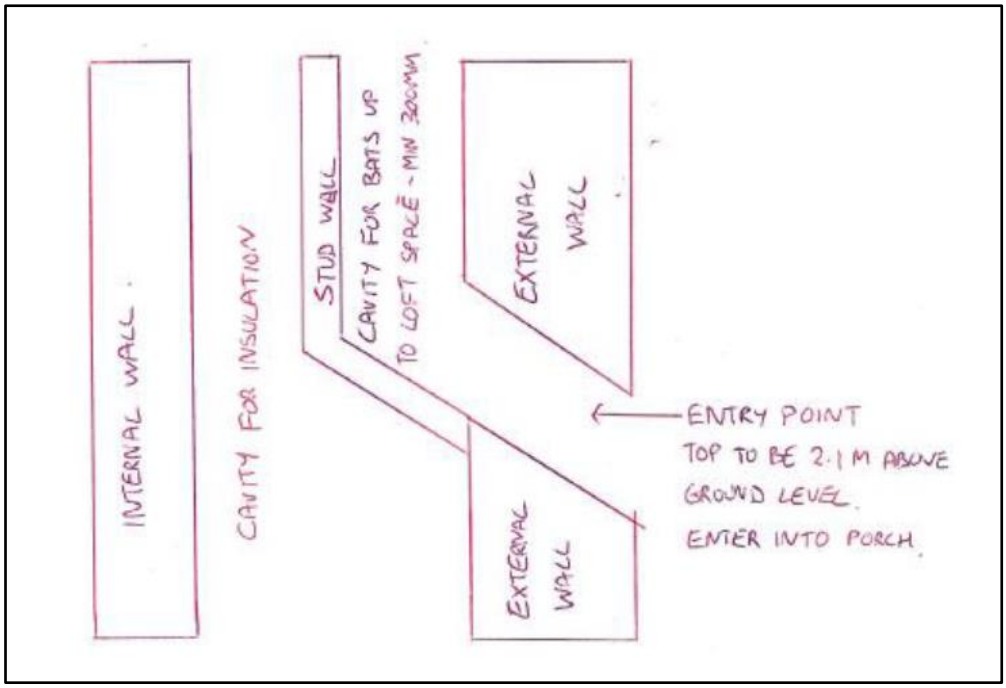


FIGURE 3.6. CAVITY WALL ENTRANCE POINT AND CHUTE FOR LHS BATS

Roost Entrances – Other Bat Species Half

- Access into the other side of the roost, designed for BLE's and other species will be through two gaps at the eaves (20mm x 50mm) on the western elevation and two raised ridge tiles that provides access into the roost at the apex of the roof.

- The roost entrances will be located away from light sources such as windows and security lighting.

Other Roosting Opportunites

- External roosting opportunities for other crevice dwelling species will be provided by four access slates on the roof pitch. The slates will not give access into the roof but will provide roosting opportunities against the roofing felt (non-breathable only).

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FIGURE 3.7. PROPOSED SITE PLAN WITH THE TWO ROOF VOID ROOSTS SHOWN IN GREEN *© CREU ARCHITECTURE DRAWING C484 006 REVH*

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FIGURE 3.8. PROPOSED SITE PLAN WITH THE LOCATION OF THE LHS LOW-LEVEL CHUTE AND EAVES/ROOF ACCESS POINTS INTO THE TWO ROOSTS SHOWN BY THE RED BOXES. © CREU ARCHITECTURE C484 008 REVI

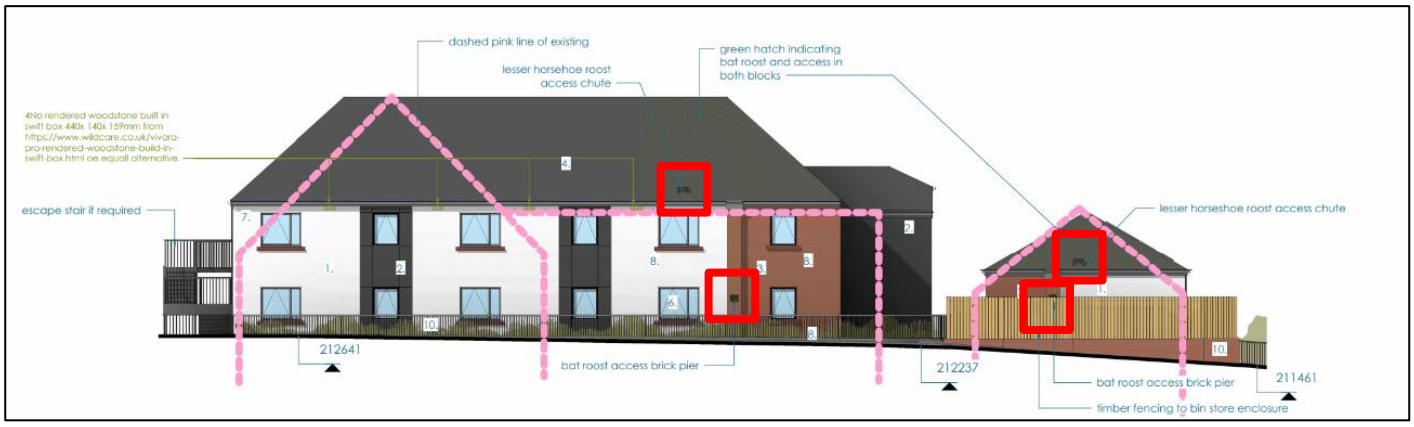


FIGURE 3.9. PROPOSED SITE PLAN WITH THE LOCATION OF THE LHS LOW-LEVEL CHUTE AND EAVES/ROOF ACCESS POINTS INTO THE TWO ROOSTS SHOWN BY THE RED BOXES. © CREU ARCHITECTURE C484 013 REVJ

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3.4 *Nesting Birds*

3.4.1 There is a number of records of swifts within the area. To compensate for the loss of potential bird nesting habitat and enhance the site for birds; eight inbuilt swift bricks will be incorporated into the apartment blocks. Four swift bricks will be inbuilt on the western elevation of the larger block and four on the eastern elevation.

3.5 *Planting*

3.5.1 There will be planting across the site to provide cover and foraging opportunities for bats. Currently, the vegetation along the western and southern sides of Engedi Chapel has been shown to be very important to LHS in particular, who used it to light sample, forage and it also provided cover for commuting over to the adjacent woodland. This will be replicated in the final development with native trees, hedge and scrub planting along the western site boundary. There will be further planting across the site to include species that are good for pollinators. Table 3.1 provides a list of recommended native tree species.

3.5.2 Whilst the new vegetation establishes, if there is a period when there is no vegetative cover, temporary cover must be provided in the form of potted trees/plants or a suitable alternative agreed with the ecologist.

TABLE 3.1: SUGGESTED TREE/HEDGEROW SPECIES

Latin Name	Common Name
Prunus spinosa	Blackthorn
Crataegus monogyna	Hawthorn
Corylus avellana	Hazel
Acer campestre	Field maple
Rosa canina	Dog rose
Cornaceae sp.	Dogwood
Euonymus europaea	Spindle
Viburnum opulus	Guelder rose
Viburnum lantana	Wayfaring tree
Sorbus torminalis	Wild service tree
Sorbus aucuparia	Mountain ash/rowan
Sorbus aria	Whitebeam
Prunus avium	Wild cherry
Prunus padus	Bird cherry
Pyrus pyraster	Wild pear
Prunus domesticus	Denbigh plum
Prunus domesticus	Damson
Ilex aquifolium	Holly

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4.0 Mitigation: Lighting

4.1 *Lighting Plan*

4.1.1 To ensure the new development will not have a negative impact on the bats using the site or in the wider area, the entrances to the temporary roosts (bat tower and bat boxes), the new permanent roost entrances and the woodland edge to the west of the site will be kept as dark as possible. There will be 'darker corridors' from the roost entrances and along the western site boundary to the woodland to the west.

4.1.2 The lighting plan for the final development (Appendix A), shows there to be a number of 'Realta SmartScan' LED lights across the site, which are designed to minimise light pollution with a less than 2% upward light. These lights have daylight and PIR sensors built in and timings and light levels can be programmed to perform in line with requirements. They can be programmed to illuminate when it perceives the motion of someone in the area and will stay on for a predetermined time and then switch off or alternatively dim for a set amount of time and then switch off.

4.1.3 There will be no external lighting along the western side of the larger apartment block and the lighting level at the roost entrance has been modelled to be <1 Lux, when the lights are on. Low lighting from the small car park (for the adjacent retirement housing) between the woodland and apartment block will remain unchanged.

4.1.4 The western side of the smaller apartment block, is to house a bin store and will be lit by a 8W LED Realta SmartScan light, mounted on the apartment block. When this light is on, it has been modelled to be 5 Lux in the immediate area of the bin store (when the light is fixed at a height of 3m) and approx. 1 Lux at the woodland edge. To ensure this light does not impact the roost entrances at the eaves and the lower LHS chute, the following measures will be implemented:

- The light will be fixed as low is practically possible, for it to still be fit for purpose.
- The light levels, when the light is switched on, will be set to as low a level as regulations will allow.
- The light will be motion censored and set so movement along the road by pedestrians or cars will not trigger it.
- Once triggered, the light will stay on for a maximum of 1 minute before switching off.

4.2 *General Lighting Guidance*

4.2.1 The following notes are summarised from ILP (2023) 'Bats and Artificial Lighting At Night. Guidance Note GN08/23' and it is essential that this guidance is incorporated into the lighting design to ensure the new development will not have a negative impact on the bats using the site or in the wider area.

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4.2.2 ILP (2023) conclude that for bats, artificial lighting at night (ALAN) is thought to increase the chances of predation by avian predators (such as owls and hawks) and in lit areas, bats are known to modify their behaviour, potentially in response to this threat. Illuminating a bat roost can cause disturbance and this may result in the bats deserting the roost, or even becoming entombed within it. Lighting would therefore be considered an obstruction under the legislation protecting bats and their roosts. In addition, artificial lighting can also affect the feeding behaviour of bats.

4.2.3 Key messages from the ILP (2023) 'Bats and Artificial Lighting at Night' guidance include:

- The ecological mitigation hierarchy applies to lighting design: impacts to biodiversity should be avoided in the first instance through design and where this has been clearly demonstrated not to be possible, appropriate mitigation needs to be put in place. Compensation is the least desirable option, so all other avenues should first be explored and ruled out. In parallel, opportunities to design lighting betterment for biodiversity should be sought wherever possible.

- It is important to integrate avoidance measures into developmental design, by retaining ecologically functional 'dark corridors' within schemes wherever feasible, and in preference to seeking lighting mitigation strategies. Consideration should be given to the lighting effect of a scheme on Key Habitat and Supporting Habitat areas for bats, as well as commuting routes.

- It is important to minimise Artificial Lighting At Night (ALAN) close to vegetation, particularly for slower-flying bat species.

- Dense vegetation should be included in urban landscapes to protect against ALAN for open-space foraging bats in city landscapes, and provide potential longer-term roosting opportunities.

- ALAN has been shown to be particularly harmful along river corridors, near woodland edges and hedgerows.

- Bats have considerable sensitivity to very low light levels and distances from light sources, and there is a need to maintain or reduce existing light levels in the environment.

- Careful choices would need to be made about the type of lighting chosen for a scheme, and this should be designed through a multi-disciplinary design approach. Whilst Part Night Lighting (PNL) schemes and the installation of LED lights may have energy-saving benefits, they can result in an increase in light intensity, impacting on bat behaviours, and the lighting design for each site should be developed using information from bat surveys, and pre-development light level data.

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4.2.4 Slower-flying, broad-winged species (such as long-eared, *Myotis* species (which include Brandt's, whiskered, Daubenton's, Natterer's and Bechstein's), barbastelle and greater and LHS) have been shown to avoid commuting and foraging routes illuminated with a variety of different street luminaires. Consequently, these bat species are put at a competitive disadvantage and are less able to forage successfully and efficiently, and ILP (2023) suggest that Artificial Lighting At Night (ALAN) has potentially devastating conservation consequences for these species.

4.2.5 Faster-flying species (such as noctule, Leisler's, serotine and pipistrelle) can congregate around white light sources, particularly those on the UV spectrum (ILP, 2023). This is because their prey are attracted to the light source and the feeding opportunities for these bats are then concentrated into a smaller area around the light. ILP (2023) conclude that the cumulative impacts from Artificial Lighting At Night (ALAN) on these bat species are likely to have negative impacts on the Favourable Conservation Status of a bat species.

4.2.6 In terms of commuting through the landscape, and in towns and cities, bats will, in general, avoid heavily lit areas, which can be a barrier to bat commuting, with bats altering their commuting routes to avoid light areas.

4.2.7 After avoiding, wherever possible, the potential impacts of Artificial Lighting At Night (ALAN) through scheme designs, if further mitigation measures are required in the form of lighting controls, ILP (2023) recommend that a lighting professional helps to select those light sources, lamps, LEDs and their fittings which are most appropriate for the project. To assist with the decision-making process, ILP (2023) suggest that the following are considered when choosing luminaires:

- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component.
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone et al, 2012).
- Internal luminaires can be recessed (as opposed to using a pendant fitting) where installed in proximity to windows to reduce glare and light spill.
- Waymarking inground markers (low output with cowls or similar to minimise upward light spill) to delineate path edges.

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- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards.

- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered - see ILP (2021) GN01.

- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt.

- Where appropriate, external security lighting should be set on motion sensors and set to as short a possible a timer as the risk assessment will allow. For most general residential purposes, a 1 or 2 minute timer is likely to be appropriate.

- Use of a Central Management System (CMS) with additional web-enabled devices to light on demand. Use of motion sensors for local authority street lighting may not be feasible unless the authority has the potential for smart metering through a CMS.

- The use of bollard or low-level downward-directional luminaires is strongly discouraged. This is due to a considerable range of issues, such as unacceptable glare, poor illumination efficiency, unacceptable upward light output, increased upward light scatter from surfaces and poor facial recognition which makes them unsuitable for most sites. Therefore, they should only be considered in specific cases where the lighting professional and project manager are able to resolve these issues.

- Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed. However, due to the lensing and fine cut-off control of the beam inherent in modern LED luminaires, the effect of cowls and baffles is often far less than anticipated and so should not be relied upon solely.

4.2.8 ILP (2023) provide guidance associated with the layout (location, orientation and height) of newly built structures and hard standing, as the design can have a considerable impact on light spill:

- Key or Supporting Habitat is often located alongside, or to the rear of buildings, on new developments. In this case, the removal or reduction of windows can be the most effective way to permanently limit light spill, potentially alongside the internal reconfiguration of the building, to ensure high-use spaces are not as impacted by loss of natural light.

- It may be possible to include Key or Supporting Habitat into unlit public open space such as parks. However, schemes should avoid including Key or Supporting Habitats in

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residential gardens, as uncontrolled and inappropriate lighting may be introduced by residents following occupation.

- It is often considered better for a residential scheme to specify good quality downward-directional external light fittings for security, and/or at the front entrance, on short PIR timers, rather than risk the imposition of poor quality and poorly controlled lighting at a later date.

- Buildings, walls and hard landscaping may be sited and designed so as to block light spill from reaching habitats and features.

- Paved surfaces should not be located within Key Habitat or buffer zones, unless they form part of unlit public open space.

- Taller buildings may be best located toward the centre of the site, or sufficiently set back from Key Habitats, to minimise the effect of their light spill.

- Column mounted luminaires can be located so that the rear shields are adjacent to habitats, or narrow optics selected that direct light into the task area where needed.

- As planting may be removed, die back or inadequately replaced over time, it should never be relied on as the sole means of attenuating light spill.

5.0 Monitoring and Mitigation Contingencies

5.1 *Monitoring*

5.1.1 Monitoring of the temporary 'bat tower' will be first be undertaken in Year 1 (May – August) following its construction and then Year 2 and Year 3 if required. Prior to its destruction a survey will be undertaken to confirm the number and species present. The surveys will comprise a check of the bat boxes and a static detector left within the bat tower for 7 nights.

5.1.2 Monitoring will be carried out in Year 2, Year 4 and Year 5 following completion of the compensatory roosts and will comprise an internal inspection of the roosts by a licenced ecologist and a static detector left within each of the two roosts for 14 nights. An emergence survey will also be undertaken and the monitoring results submitted to NRW.

5.1.2 Compensation of the roosts will be considered a success if monitoring finds bats, in particular LHS, using the roosts. If monitoring proves unfavourable after the Year 2 visit, a data logger will be left in the two roosts to monitor temperatures and humidity levels to determine if the environment is suitable. If results continue to be unfavourable then further liaison with NRW, the site owner and the ecologist will be carried out to agree improvements.

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5.2 *Auditing*

5.2.1 Work will be supervised where appropriate throughout the project by a licenced worker. All mitigation measures will be inspected by an ecologist to ensure compliance with measures detailed in the licence method statement.

5.2.2 The licensed ecologist will be available throughout the project to provide advice on more detailed points as the project progresses.

5.2.3 A record of visits will be kept and a toolbox talk will be given to all those who will be involved in the project.

5.2.4 The works will be audited through the formal bat licencing process to include the submission of the development licence report form, with evidence of the implementation of the detailed mitigation and compensation measures, within four weeks of the licence expiry. The NRW ecological compliance audit form will be completed as required by the bat licence. Monitoring and Compliance Audit reports will be submitted to NRW and the local planning authority and success will be determined by the achievement of performance indicators detailed in Section 5.3.

5.3 *Performance Indicators*

5.3.1 The surveys showed the site is used by non-breeding day and night roost for lesser horseshoe (LHS) (15) and a low number of common pipistrelle, soprano pipistrelle, BLE and *Myotis* sp. Therefore, the mitigation measures will be considered successful if the following are achieved:

- The audit found that all mitigation measures were in place as per this document and the licence method statement.
- The work was carried out within the proposed timescales.
- A small number of LHS are found to be using at least one of the two roosts.
- Any of the crevice dwelling species previously identified on site are using at least one of the two roosts.

5.3.2 All records will be submitted to Cofnod, the Local Environmental Records Centre and reported to NRW as a condition of the bat licence.

5.4 *Timetable of works*

5.4.1 As the development is still in the early stages of planning the demolition and construction periods are currently difficult to accurately forecast, however early estimates put the

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demolition period at approximately three months, with the construction period at approximately 18 months. An estimate of the timing, phasing and duration of the construction activities and monitoring of the new roost has been provided in Table 5.1.

TABLE 5.1. TIMETABLE OF WORKS AND MONITORING SCHEDULE

	Year 0	**April to October (inclusive). (September, October or April is preferable).**	**Any time of year Approx. 3mths**	**Any time of year Approx. 18mths**	**Once at least one of the compensatory roosts are completed**
Completion of temporary 'bat tower'					
Removal of potential bat roosting features including roof and roof line etc.					
Demolition of remaining structures					
Construction of new apartment blocks and completion of compensatory roosts					
Dismantling and removal of the temporary bat roosts					
Monitoring of roosts	Monitoring of the temporary 'bat tower' will be first be undertaken in Year 1 (May – August) following its construction and then Year 2 and Year 3 if required. Monitoring of the compensatory roosts in Year 2, Year 4 and Year 5 following completion.				

5.6 *Mitigation Contingencies*

5.6.1 If, when carrying out the pre-works checks or during works, it becomes apparent that a higher number of bats, or different species of bats, are to be affected by the works than first thought, works will be stopped until the working method and type/scale of compensation measures can be reviewed and agreed with NRW and the licence amended. Further surveys may be required.

5.7 *Persons Responsible for Implementing the Works*

5.7.1 It is currently unknown who will be responsible for implementing the works, however this will be confirmed prior to the submission of the licence.

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5.8 *Mitigation Site/Compensation Ownership Post-Construction*

5.8.1 It is currently unknown who the owners of the site will be after completion, however the owners will be responsible for the upkeep of the buildings and maintenance of any bat mitigation and habitat creation on site. As the site will contain designated areas for bats, these areas will then be protected by the current bat legislation and will be retained and remain un-disturbed. Any potential works to the site in the future that may directly or indirectly impact the designated bat areas, including any future proposed lighting schemes, will be subject to further licencing requirements and all proposals for the site will need to be discussed with an ecologist and NRW. The legal responsibilities which accompany these works will be written into the deeds of the property and will be the responsibility of the new owners to ensure they are adhered to if the site ever changes ownership.

6.0 Biosecurity Risk Assessment

6.1 *Biosecurity Risk Assessment - Bats*

6.1.1 Table 6.1 below relates to ecologists employed to monitor bat populations that come into direct contact, i.e. handling bats, but is applicable to these works where bats may need to be captured and moved to a bat box, as well as contractors and ecologists entering the bat roosting areas.

6.1.2 The fungus that causes white-nose syndrome (WNS), has been identified on a number of bats in at least 17 European countries. In the UK a case was detected from a Daubenton's bat at a hibernation site in Kent in February 2013 and a second positive case from another Daubenton's bat at a hibernation site in Norfolk in March 2014 and there has been a small number of subsequent cases. Cases in the UK and Europe have not appeared to cause high levels of mortality, unlike in North America where mass mortalities have been recorded.

6.1.3 Transmission in the UK is most likely to arise due to the increasing trend of 'International Bat Work' with bat ecologists from the UK travelling to other countries where the disease is known to be present. The fungal spores can be persistent on equipment and clothing.

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TABLE 6.1. BIOSECURITY RISK ASSESSMENT FOR WHITE NOSE SYNDROME AND COVID19 IN RELATION TO BATS

Risk	Transmission Vector	Level of Risk	Consequences	Control Measures
Introduction of White Nose Syndrome to the bat population.	Bat ecologists, their equipment & clothing	High if ecologists have taken part in bat work in areas of known infection outside the UK. Low if ecologists have not taken part in bat work in areas of known infection outside the UK.	The spread of the disease throughout the bat population. Due to bats being very mobile animals the infection could eventually spread throughout the UK.	The most effective way of preventing the spread of White Nose Syndrome is to use 'site specific' equipment such as gloves and holding bags. This is the approach that will be adopted for this site. Avoid capturing and/or handling bats unless absolutely necessary. The Bat Conservation Trust guidelines for reducing the risk of transmission of White Nose Syndrome will be adhered to at all times.
Covid 19	Bat ecologists	Low	A risk of passing Covid 19 on to bats. The virus that causes COVID-19 hasn't been isolated from any of the UK's 17 resident breeding bat species.	When handling bats, practice good hygiene and wear a facemask to reduce the risk of possible transmission. No surveyors showing any Covid symptoms or feeling generally unwell will attend site.

6.2 *General Biosecurity Procedures*

6.2.1 The following points are a summary of the biosecurity procedures, which must be followed at all times by all workers who visit the sites.

6.2.2 Prior to accessing the site, and before leaving:

- All footwear and outerwear must be cleaned to remove any organic material, for example leaves and soil, when entering and prior to leaving the site. Clean brushes are to be carried for this purpose.

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- Following the removal of organic material all footwear must be sprayed or dipped in disinfectant (Virkon or bleach) until it runs off. See disinfection procedure, below.

- Mud and other organic material to be cleaned from vehicle tires, tracks, wheels and wheel arches prior to entering and leaving the site. This is especially important when working near water courses.

- Vehicles will keep to established tracks. All vehicles not specifically required for the works – (i.e. any vehicle other than the 3-tonne machine) must be restricted to hardstanding areas of the site at all times.

- Storage of fuel must follow best working practise and machinery provided with drip trays, especially when refuelling. Refuelling and storage of potential pollutants should be restricted to the nearby roads and hardstanding areas, well away from the ditches and field drains, so that runoff can be prevented from entering the watercourse.

- Clean and disinfect tools and equipment before accessing site.

6.2.3 **Disinfection Procedure:**

1. Brush off all debris, plant fragments, and all organic material e.g. soil.
2. Rinse with water.
3. Disinfect by spraying with a solution of Virkon disinfectant, (10mg/ml or as printed instructions, if for example using tablets) until the spray runs off; or soak in a bleach solution (1 measure of household bleach to 9 measures water) for 15 minutes. Boots should be stood in a bucket or other container of solution, especially prior to entering and leaving the site. Wheel arches, tyres and tracks to be cleaned and sprayed. Ensure as much mud as possible is removed and good coverage obtained.
4. Spraying should take place away from vegetation.
5. Leave for at least 1 minute.
6. Rinse with clean water, brought to site for this purpose.

6.2.4 Virkon solution should ideally be kept and flushed into a sink, or drain with water. If on site disposal is required the solution should be disposed of on a large hardstanding area away from vegetation.

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7.0 Legislation

7.1 Bats

7.1.1 All species of bat, their breeding sites and their resting places in England and Wales are protected through a 'dual' system of protection, under the England and Wales Habitats Regulations and W&CA. Because two regimes give legal protection to bats, the implications of both regimes must be fully understood (Reason & Wray, 2023).

7.1.2 Regulation (Reg.) 43 of the England and Wales Habitats Regulations makes it an offence to:

- deliberately capture, injure or kill a bat;
- deliberately disturb bats (which includes any disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate or to affect significantly the local distribution or abundance of the species to which they belong);
- damage or destroy a breeding site or resting place of a bat; or
- possess, control, transport, sell or exchange, or offer for sale or exchange, any live or dead bat or part of a bat or anything derived from a bat or any part of a bat.

7.1.3 Under Section 9 of the W&CA (s.9(4)(b), 9(4)(c) and 9(5) only), it is an offence (in relation to bats) to:

- intentionally or recklessly disturb a bat while it is occupying a structure or place of shelter or protection;
- intentionally or recklessly obstruct access to any structure or place used by a bat for shelter or protection;
  or
- sell, offer or expose for sale, or have in their possession or transports for the purpose of sale, any live or dead bat or any part of, or anything derived from a bat (or be responsible for adverts suggesting the intention to do this).

7.2 *Birds*

Under the Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way Act 2000, all wild birds, their nests and eggs are protected during the breeding season (typically March to August inclusive). This makes it an offence to:

- Intentionally kill, injury or take any wild bird.
- Take, damage or destroy the nest of a wild bird included in Schedule ZA1.
- Take, damage or destroy the nest of any wild bird while that nest is in use or being built.
- Take or destroy an egg of any wild bird.

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7.3 *Biodiversity Net Gain – Relevant sections of legislation*

Section 6 of the Environment (Wales) Act 2016:

Biodiversity and resilience of ecosystems duty
(1) A public authority must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.

(2) In complying with subsection (1), a public authority must take account of the resilience of ecosystems, in particular the following aspects—

(a) diversity between and within ecosystems;

(b) the connections between and within ecosystems;

(c) the scale of ecosystems;

(d) the condition of ecosystems (including their structure and functioning);

(e) the adaptability of ecosystems.

…. (5) In complying with subsection (1), a public authority other than a Minister of the Crown or government department must have regard to—

(a)the list published under section 7;

- Section 7 of the Environment (Wales) Act 2016:

Biodiversity lists and duty to take steps to maintain and enhance biodiversity

(1) The Welsh Ministers must prepare and publish a list of the living organisms and types of habitat which in their opinion are of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales.

(2) Before publishing a list under this section the Welsh Ministers must consult the Natural Resources Body for Wales ("NRW") as to the living organisms or types of habitat to be included in the list.

(3) Without prejudice to section 6, the Welsh Ministers must—

(a) take all reasonable steps to maintain and enhance the living organisms and types of habitat included in any list published under this section, and

(b) encourage others to take such steps.

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8.0 References and Useful Information Sources

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Appendix A

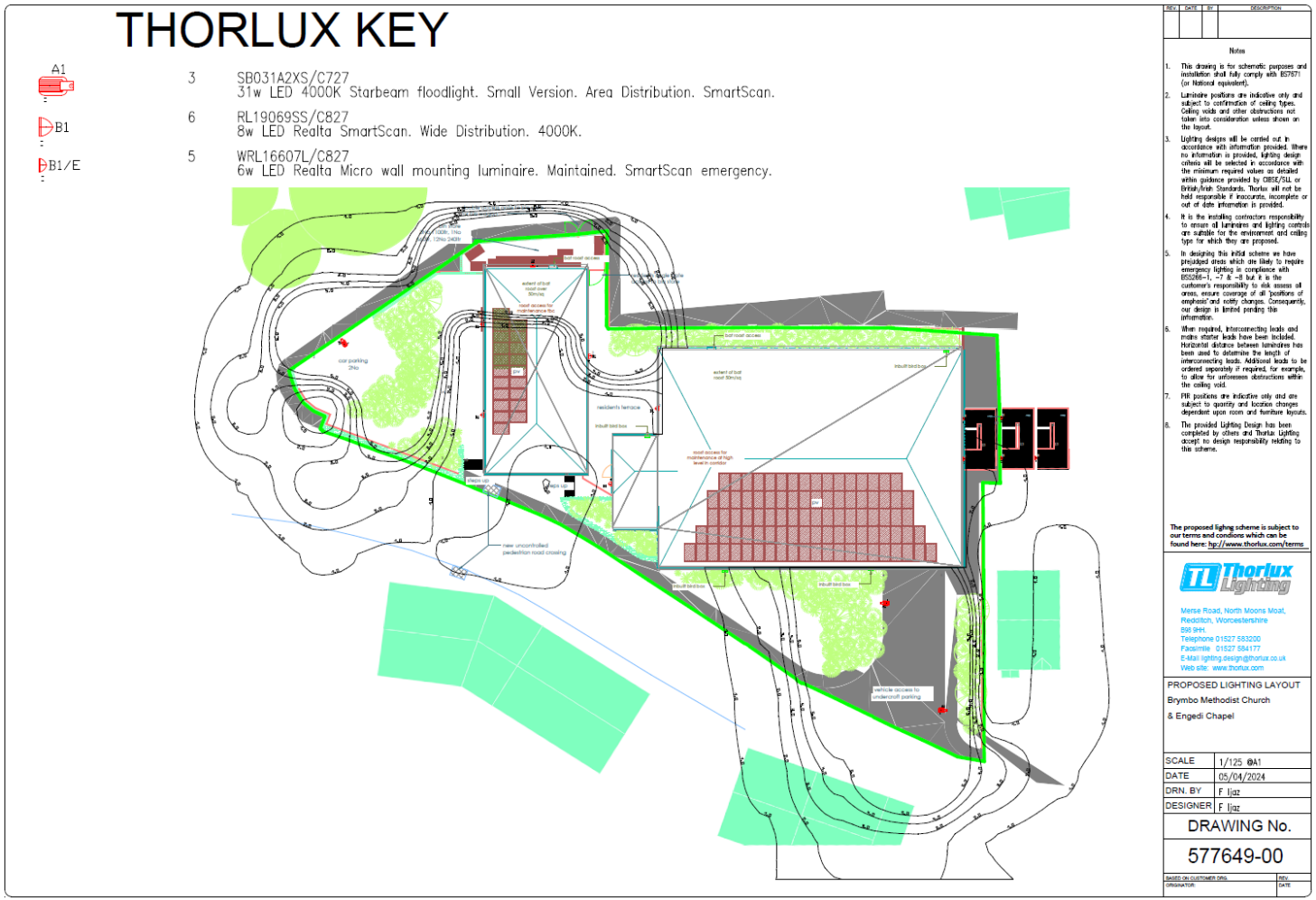


FIGURE A.1. LIGHTING PLAN © *THORLUX LIGHTING*

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