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SANDY LANE, YSTRADOWEN

STAGE 2 ECOLOGY REPORT

JULY 2023

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STAGE 2 ECOLOGY REPORT

DOCUMENT REF: E22108601/DOC 02 – JULY 2023

Issue	Revision	Stage	Date	Prepared by	Approved by	Signed
1	-	Draft for review	07 December 2022	Daniel Jones (Senior Ecologist)	Dr M Watts (Director)	
2		For submission	05 July 2023	Daniel Jones (Senior Ecologist)		

CONTENTS

1.0 INTRODUCTION

1.1 Soltys Brewster Ecology (SBE) were commissioned by Lewis Homes to undertake additional ecological survey work (Stage 2 surveys) at land located to the north of Sandy Lane in Ystradowen, Vale of Glamorgan. The site, approx. 1.5 ha in size, is proposed for the development of 46no. residential units. A plan showing the site location and proposed layout is included in Appendix I.

1.2 A Preliminary Ecological Appraisal was undertaken at the site by SBE in March 2022 (SBE, 2022). The survey identified a limited range of habitats present at the application site including poor semi-improved grassland, hedgerow boundaries and scattered trees. The habitats at the site were considered to have potential to support foraging and commuting bats, nesting birds, Hazel Dormouse and Great Crested Newt within their terrestrial phase.

1.3 Based on the proposed layout and expected development impacts (i.e., loss of poor SI grassland & translocation of southern hedgerow), targeted survey work to establish the level of use of the application site by foraging and commuting bats and the likely presence/absence of Hazel Dormouse and Great Crested Newt was recommended to inform any mitigation or enhancement measures.

1.4 The current report presents the findings of bat activity and automated monitoring surveys, Great Crested Newt eDNA sampling and Hazel Dormouse presence/absence surveys undertaken at the application site and surrounding area between April and November 2022. The report describes appropriate avoidance, mitigation and enhancement measures in regard to protected species associated with the proposals at the application site. This report should be read in conjunction with the 2022 PEA document – both documents would form part of the planning submission to the Vale of Glamorgan.

2.0 METHODOLOGY

Bats

2.1 The habitats at the application site (e.g., hedgerow and tree boundaries) were considered likely to support locally foraging and commuting bats species. The proposed layout plan indicates that the hedgerow located along Sandy Lane will be removed and translocated to another location on-site to accommodate the development design. The aim of additional bat surveys was to identify which bat species are using the site, establish the level of use and assess the likely impacts of the development design. As noted within the PEA survey (SBE 2022), no trees with bat roost potential would be affected by the proposed layout – a mature Oak within the northern boundary hedgerow will be retained.

Activity transect

2.2 A total of 4no. bat activity transects were undertaken at the application site between April – August 2022 (see Table 1 for bat survey schedule), although the survey in June was affected by rain. The surveys were undertaken by a team of two suitability experienced surveyors and followed current best practice guidelines (BCT, 2016) e.g., no rain or strong winds, temperatures above 10 °C. The transect route followed the hedgerow boundaries whilst also incorporating a listening stop within the centre of the field (transect plan included in Appendix II). During the surveys, the surveyors noted the time, species and behaviour of each bat recorded. Bat calls were recorded using either an Echo Meter Touch 2 or Peersonic unit and were later analysed in Anabat Insight Pro software.

Table 1: Bat Survey Schedule

Date	Sunset	Start	End	Notes
Activity transect				
27th April 2022	20:30	20:30	22:30	11°C at start, overcast 100% cloud cover, no rain, light wind
30th June 2022	21:35	21:35	22:30	13°C at start, overcast 100% cloud cover, unforecast heavy rain at 22:30. Survey stopped early
4th July 2022	21:30	21:30	23:30	15°C at start, 3-40% cloud cover, no rain, light wind
3rd August 2022	20:59	20:59	22:59	21°C at start, 25% cloud cover, no rain or wind

Automated monitoring

2.3 In addition to the above, three automated monitoring sessions were undertaken at the application site between April – August 2022. For each monitoring session, 2no. static bat detectors (Anabat Express or Swift models) were deployed and left recording *in situ* for 5-7 nights. Monitoring sessions were undertaken from 27th April – 2nd May, 30th June – 5th July and 3rd – 8th August 2022. Static detectors were placed within areas of the site likely

to be impacted by the development design (e.g., Sandy Lane hedgerow to be translocated) and within retained boundary vegetation (northern boundary hedgerow). The locations are shown on the plans included in Appendix II. As above, all bat calls were later analysed in Anabat Insight Pro software. Larger data sets were initially checked using the Bat Classify UK plug-in (confidence limited set at 70%), however, all highlighted calls were manually verified to confirm species.

Survey limitations

2.4 During the activity transect undertaken on 30th June 2022, unforecast heavy rain at 22:30 resulted in the survey being stopped early. An additional survey visit was programmed in on 4th July 2022. As such, it is not considered this had any overall negative impact on the findings and conclusions of the survey work.

Great Crested Newt

eDNA sampling

2.5 The Preliminary Ecological Appraisal identified the location of 3no. ponds located within 250m of the application site. This included two attenuation basins located at Badgers Brook Rise (approx. 100m south of the site) and a single pond located alongside the A4222 carriageway (approx. 175m north). The latter of which was found to be dry and overgrown with scrub during subsequent site visits. The two attenuation basins were subject to a Habitat Suitability Index (HSI) assessment for Great Crested Newt based on ARG (2010) and Oldham *et al.,* (2000) guidelines. The lager pond was assessed to be of Average suitability (HSI score = 0.61) with the smaller pond as Below Average (0.58). The larger pond was the focus of the eDNA sampling.

2.6 In order to establish the presence/absence of Great Crested Newts within the larger pond at Badgers Brook Rise (Grid Ref: ST 01648 77746), water samples were collected on 19th May 2022 by a licensed surveyor[1]. Samples were collected using eDNA kits purchased from FERA Science Ltd and followed the recommended protocol and methodologies approved by Natural England (Biggs *et al.,* 2014). An *ad-hoc* check of aquatic vegetation was undertaken during the sample collection for any characteristically folded leaves although no other sampling techniques were used.

Hazel Dormouse

2.7 As described in the PEA report no desk study records of Hazel Dormouse were identified within 1km of the site. However, the hedgerow habitats at the site were considered suitable to support Dormouse, containing a mixture of food resources and existing connectivity to woodland habitats in the wider landscape. A nest tube survey was undertaken based on best practice guidelines (e.g., Chanin & Woods, 2003 and Bright *et al.,* 2006),

[1] NRW Reference: S089080/1

over the 2022 season with nest tubes deployed on 7th April and subjected to monthly checks up to 16 November – nest tubes were collected on completion of the survey.

2.8 A total of 47no.[2] nest tubes were deployed within the hedgerow boundaries at the application site (see plan in Appendix III). Checks of nest tubes were completed by a licensed dormouse surveyor[3] and notes made on the presence or absence of Dormice (i.e. observation of the animal itself or characteristic nesting materials) or occupation by species other than dormice (e.g. nesting birds and other small mammals).

[2] The relatively small size of the site and availability of suitable hedgerow vegetation was such that the recommended 50no. nest tubes within the guidance could not be accommodated whilst still maintaining a reasonable spacing (10 – 20m) between net tubes. The use of 47 nest tubes was still considered appropriate to provide a thorough and robust survey.

[3] NRW Reference: S089089/1

3.0 RESULTS

Bats

Activity transect

3.1 Plans to illustrate the bat activity transect results are included in Appendix II. During the first transect survey (April) low levels of activity by Common Pipistrelle *Pipistrellus pipistrellus* were observed, with the majority of activity associated with the northern hedgerow boundary and north-east corner of the site. At least two pipistrelle bats were seen foraging along the northern hedgerow 20 minutes following sunset. Regular passes by individual common pipistrelle were recorded along this section throughout the survey. A single pipistrelle bat was also observed foraging near the centre of the field.

3.2 During the second survey visit (June) limited levels of bat activity were recorded, due to unforecast heavy rain which stopped the survey early. A single Soprano Pipistrelle *Pipistrellus pygmaeus* was observed foraging up and down the northern hedgerow, with two Common Pipistrelle bats seen flying south along the western boundary. Prior to stopping the survey two Brown Long-Eared bats *Plecotus auritus* were also observed flying from the field centre towards the northern hedgerow boundary 45 minutes following sunset.

3.3 The July survey (third transect visit) recorded regular foraging and commuting activity by several Common and Soprano Pipistrelle and Myotis[4] bats, again associated with the northern hedgerow boundary. Single passes by Noctule *Nyctalus noctula* and Serotine *Eptesicus serotinus* were also recorded at listening stops along the southern hedgerow.

3.4 Similar levels of bat activity were recorded during the fourth survey visit in August. Surveyors noted regular passes by foraging Common and Soprano Pipistrelle along the northern hedgerow boundary (2-3 bats), close to the mature Oak tree located near the static detector position. A single Noctule was also observed foraging over the open grassland habitats within the centre of the field.

3.5 Overall, the activity transect surveys highlighted that the majority of bat activity at the application site is associated with the hedgerow habitats located along the northern boundary. Across all four survey visits, most bat recordings were attributed to Soprano Pipistrelle (55 passes[5]) and Common Pipistrelle (41 passes) with lower numbers of Myotis sp. (20 passes), Noctule (4 passes), Brown Long-Eared bat (2 passes) and Serotine (1 pass) recorded.

[4] Both the monitoring and activity surveys recorded a number of passes identified as Myotis species. Due to the similarities of call characteristics between different Myotis species and the cluttered nature of some calls no positive identification to species level could be made. However, some calls were considered to be characteristic of Daubenton's bat and Whiskered/Brandt's bat.

[5] For the context of this report a bat pass is defined the identification of any part of a bat call within a 5-10 second sound file and does not necessarily correlate to the number of bats present.

Automated monitoring

3.6 The findings of the automated monitoring sessions are summarised in Table 2 and Figure 1. The surveys established the use of the application site by at least 6no. different bats species including Common and Soprano Pipistrelle, Noctule, Serotine, Myotis sp. and Brown Long-Eared bat, similar to the activity surveys. Significantly higher levels of bat activity were recorded along the northern hedgerow compared to the southern hedgerow (located along Sandy Lane).

3.7 The highest levels of bat activity were observed during the August 2022 session when a peak count (week total) of 4009 bat passes were recorded at the northern hedgerow detector. Lower levels of bat activity were recorded during the April – May session. The highest per night data was recorded 3rd August at the northern hedgerow where a total of 965 Soprano Pipistrelle passes were recorded on one night, equating to approx. 1.8 passes per minute.

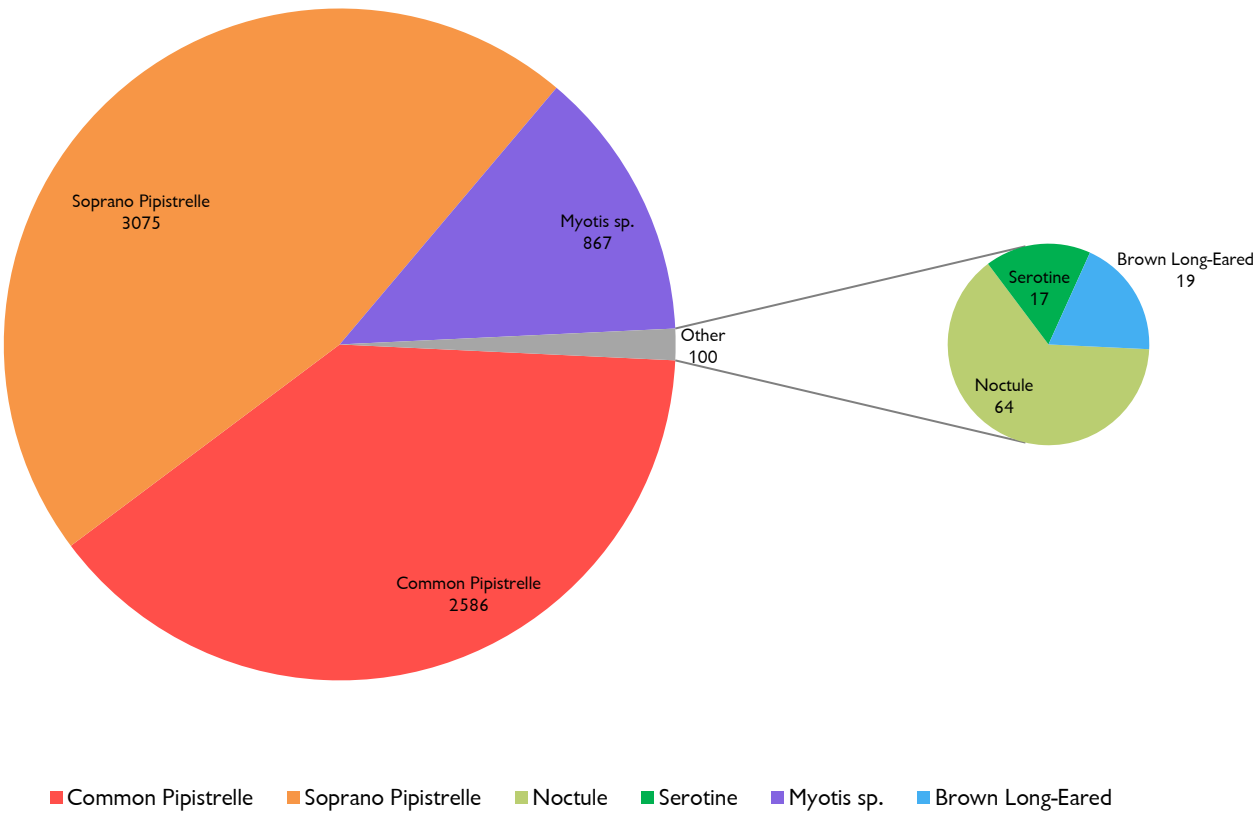
3.8 Overall, across all detectors and monitoring periods, Soprano Pipistrelle accounted for 46% of all bat passes, Common Pipistrelle 39%, Myotis sp. 13% and Noctule 1% with <1% of passes attributed to Serotine and Brown Long-Eared bat.

3.9 Levels of activity by Common and Soprano Pipistrelle were found to be significantly higher along the northern hedgerow compared to the southern hedgerow. Noctule, Serotine and Brown Long-Eared activity was found to be more evenly distributed across both hedgerow boundaries.

Table 2: Automated monitoring survey results.

Detector	Species						Total
	Common Pipistrelle	Soprano Pipistrelle	Noctule	Serotine	Myotis sp.	Brown Long-Eared	
April – May 2022							
Northern	381	30	1	1	21	1	**435**
Southern	97	13	0	1	10	1	**122**
June – July 2022							
Northern	599	728	16	4	507	2	**1856**
Southern	33	20	13	3	9	5	**83**
August 2022							
Northern	1436	2237	13	2	319	2	**4009**
Southern	40	47	21	6	1	8	**123**

Figure 1: Accumulation of bat passes recorded at both hedgerow locations across all automated monitoring sessions.



Great Crested Newt

eDNA sampling

3.10 Analysis of the samples collected at the larger attenuation pond returned a negative result for presence of Great Crested Newt (Appendix IV). The nearest known GCN population is located approx. 350m west of the application site (information informed by previous survey work undertaken in Ystradowen by SBE in 2017). Adult newts generally use terrestrial habitats within 250m of breeding ponds, but are known to disperse up to 1km away to colonise new ponds (Langton *et al.,* 2001). The application site is also separated from the known GCN record by existing residential development and the A4222 carriageway, which are likely to act as overland dispersal barriers for any regular movement by the species in the local area. As such, the presence of GCN within the terrestrial habitats at the application site is considered unlikely.

Hazel Dormouse

3.11 No evidence of Dormice was identified from the nest tube checks completed between May and November 2022 (see Table 3). Using the scoring system devised by Chanin & Woods (2003) for the probability of finding Dormice in nest tubes, the survey effort at Sandy Lane would score 22.56[6]. A robust survey is considered to be represented by a score of 20 and the current survey indicates likely absence of Dormice within the surveyed habitats.

3.12 Surveys between May and July identified very limited use of the nest tubes by any species (Table 3) although regular use by Woodmice was noted over the late summer/autumn period (Aug – Nov). Nest tubes which were occupied at the time of the November check were left in place – all other tubes were collected/removed from site.

Table 3 Summary of nest tube checks: May – November 2022

Date	Conditions	Findings
20 May	Check from 11.45h: Fine, 16°c, 20-30% cloud, rain overnight, wind force Beaufort 2-3	All tubes checked and empty apart from bird droppings in No. 39
14 June	Check from 13.30h: 19°c, 20-30% cloud, no rain, wind force 1 – 2.	All tubes checked & empty apart from loose moss (suggesting birds or Woodmouse) in No. 24
06 July	Check from 09.00h: 19°c, 70% cloud, no rain, wind force 1 – 2.	All tubes checked and empty.
22 August	Check from 12.00h: 19°c, 90% cloud, no rain during	Nest tubes checked and empty apart from: No.2, 3, 8, 17, 21 – Loose green/brown leaves indicative of Woodmouse

[6] Deployment of 47 tubes in April 2022 with checks up to November gives a score of 24, which is multiplied by 0.94 as 47 nest tubes were deployed during the survey (see section 2.8).

Date	Conditions	Findings
	check but drizzle prior to start, wind force 1 – 2.	No. 27 – Loose grass stems – indicates Woodmouse
20 Sept.	Check from 12.00h: 16°c, 30-40% cloud, no rain, wind force 1.	Nest tubes checked and empty apart from: No. 2, 3, 8, 21, 27, 29, 37, 38 – Loose green/brown leaves indicates Woodmouse. No.10 – Woodmouse in loose nest of green/brown leaves No. 17 – Woodmouse in loose nest of grass No. 39 – 2no. Woodmice in loose Willow leaves No. 43 – Woodmouse in loose Blackthorn leaves
10 Oct.	Check from 13.00h: 15°c, 10-20% cloud, no rain, wind force 1.	Nest tubes checked and empty apart from: No. 2, 8, 10, 17, 21, 27-30, 34, 38 – Loose green/brown leaves or grass indicative of Woodmice No. 37 – Woodmouse in loose green leaves No.41 & 42 – Woodmouse in loose Blackthorn leaves
16 Nov.	Check from 13.00h: 11°c, overcast 100% cloud, no rain, wind force 1.	Nest tubes checked and empty apart from: No. 3, 5, 8, 17, 19, 23, 24, 27, 29, 31, 33 – Loose nest of green/brown leaves or grass. Indicated Woodmouse No. 22 – Small cache of Hawthorn berries. Suggests Woodmouse No. 28 – 4no. Woodmice in nest of loose grass. No. 30 – 2no. Woodmice in loose leaves/grass No. 38 – Woodmouse in loose nest No. 41 – 4no. Woodmice in loose nest Nest tubes collected unless occupied.

3.13 The surveys completed at the site indicate likely absence of Dormice from the surveyed habitats and no specific mitigation or licensing requirements would apply for proposed hedgerow translocation or management works.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Bats

4.1 The bat survey work established the use of the habitats present at the application site by at least 6no. different bats species including Common and Soprano Pipistrelle, Noctule, Serotine, Myotis sp. and Brown Long-Eared bat. A number of which are considered to be light sensitive species (e.g., Brown Long-Eared bat and Myotis species). In addition, whilst all other bat species recorded at the site would be considered common, Serotine is classified as a Vulnerable species within the IUCN Red List for British Mammals (Matthews *et al.,* 2018). The species was recorded on 17 occasions during the monitoring sessions indicating the use of the site by a small number of bats on an irregular basis.

4.2 The surveys identified that the northern hedgerow boundary supports significantly higher levels of bat activity compared to the hedge located along Sandy Lane. The latter hedge is shorter and regularly managed/cut as opposed to the northern hedgerow which is well established and contains mature trees. The northern hedgerow is likely to act as important flight corridor and foraging resource for bats in the local area. The survey data and activity transect observations indicate that this hedgerow is used on a regular basis by Common and Soprano Pipistrelle and Myotis bats, and on an occasional basis by individual Noctule, Serotine and Brown Long-Eared bats. Based on guidance from Wray *et al.,* (2010) the habitats at the site would be considered of County importance for foraging and commuting bats.

4.3 Low levels of bat activity were associated with the hedgerow located along Sandy Lane. It is not considered that the removal and translocation of the hedge (to be planted around the areas of POS) would result in a long-term negative impact to commuting bats, but may result in a temporary loss of a small foraging resource. The proposed site layout indicates that the northern hedgerow is to be retained. This linear habitat feature should be maintained as a dark corridor for foraging and commuting bats to avoid any impacts to habitat connectivity. The design of site lighting should aim to reduce artificial light spill onto this corridor as far as practicable i.e., illuminated at <0.5 lux. Design measures to minimise artificial light spill include appropriate positioning of lighting columns, the use of cowls or hoods, dimming of site lighting during sensitive times for bats (e.g., nights during summer months), the placement of internal lighting away from windows and the design of outdoor security lighting to include down-lighters. In addition, positioning of interior lighting and the type of window glass on the western elevation of plot 21 could be designed to further reduce any light spill onto the hedgerow corridor.

4.4 Other mitigation and enhancement measures would include a long-term management for existing and translocated hedgerows habitats. The management aims would be to maintain the current conditions of the northern hedgerow and suitability for foraging/commuting bats. For the translocated hedgerow, this hedge could be allowed to develop a taller and thicker shrub layer with a less intensive management regime (than

currently) to provide both biodiversity and landscape value (e.g., trimmed on a bi-annual basis to allow fruit/seed production). Other landscape elements (e.g., public open space and tree/shrub planting) would also provide new foraging resources of bats post-development.

Great Crested Newt

4.5 Based on the negative eDNA sample from the nearby pond, the habitats at the application site were considered unlikely to support Great Crested Newt in their terrestrial phase. On a precautionary basis it is recommended that the removal and translocation of the hedgerow located along Sandy Lane is undertaken via a supervised destructive search. This would include:

- Prior to the start of works, project ecologist to provide a toolbox talk to contractors detailing the working method and legal and conservation status of Great Crested Newt;
- Woody hedgerow vegetation to be trimmed to a height of 150-300mm outside of the nesting bird season (i.e., clearance possible between September – February);
- Removal/translocation of hedgerow roots and stumps be undertaken in autumn (September/October) or spring (when night temperatures regularly exceed 5 to avoid impacts to hibernating amphibians) under direct ecological supervision;
- Works to be undertaken via the use of a small excavator equipped with a toothed bucket. Root balls and stumps will be carefully pulled back and inspected by hand by the ecologist prior to translocation. Any wildlife found (e.g., reptiles or other common amphibians) will be transferred to retained habitats to the north of the site outside of the works footprint;
- No grubbing of root systems over winter period (November – February) to avoid impacts to hibernating amphibians;
- In the unlikely event a Great Crested Newt was found, all works would stop immediately and the project ecologist or Natural Resources Wales contact for advice on how to proceed.

4.6 Enhancement measures to improve the suitability of the site to support GCN and other amphibians and reptiles post development include the design of the attenuation basin to feature a damp base or hold water for most parts of the year. This could provide breeding habitats for amphibians in the spring. The attenuation basin banks could also be seeded with a native wetland grass mix or allowed to colonise naturally and managed via a single annual cut in later July/early August. In addition, the design could also feature the creation of hibernacula or log/brash piles around the basin to provide new shelter and hibernation opportunities for amphibians and reptiles. Guidance on the design of hibernacula is provided in Appendix VI.

Hazel Dormouse

4.7 No evidence of Dormice was recorded over the course of the 2022 surveys. The precautionary approach to translocation of the southern hedgerow would also be considered appropriate to address the low risk of

encountering this species (and other small mammals) during hedgerow cutting/movement. As noted for GCN, in the unlikely event that a Dormouse was found during works, all activity would stop immediately and NRW contacted for advice on how to proceed.

Avoidance, Mitigation & Enhancement

4.8 In addition to the precautionary approach to hedgerow translocation, the measures described within the PEA are considered appropriate to the proposed development layout at Sandy Lane.

REFERENCES

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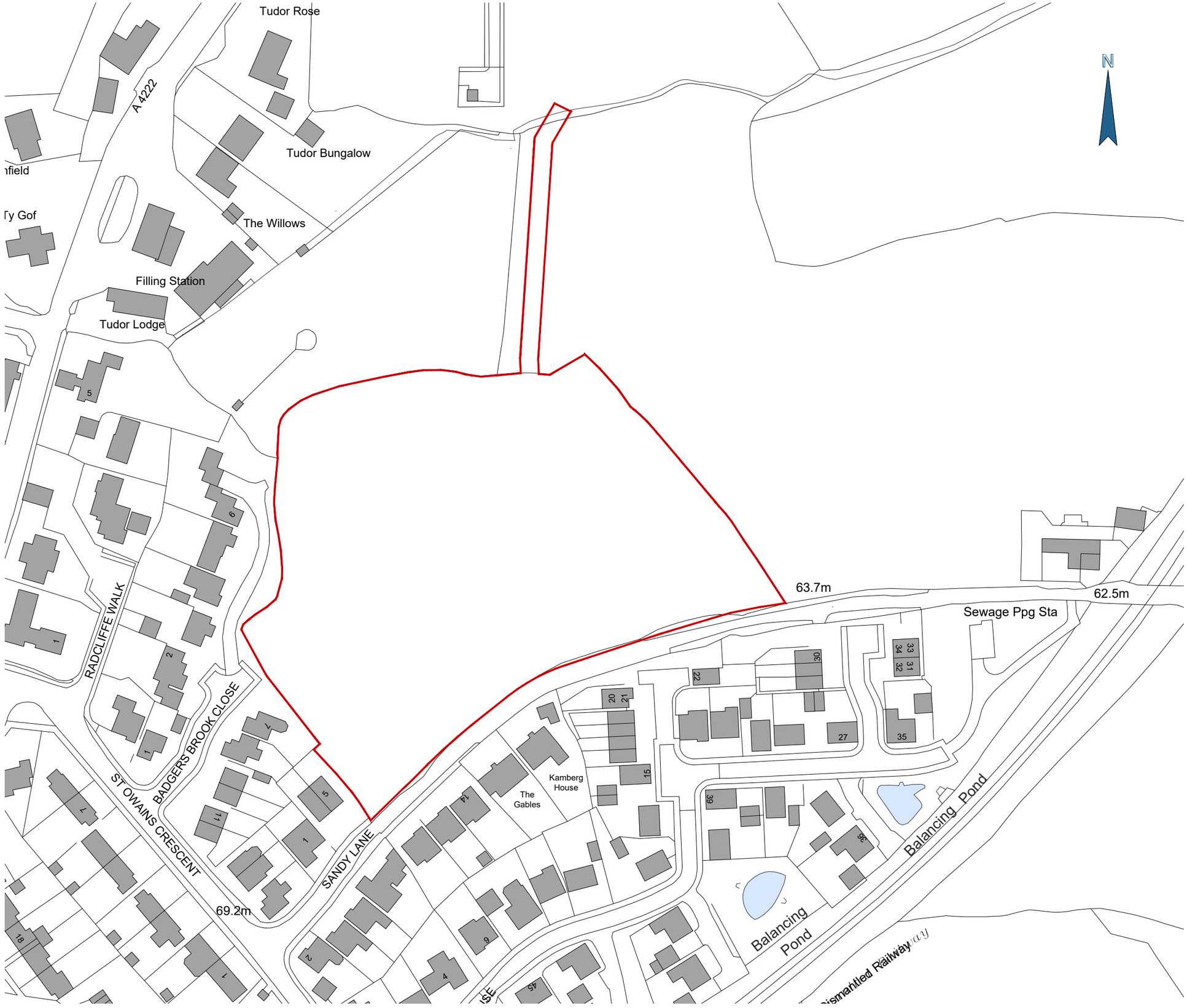
Wray S., Wells D., Long E., & Mitchell-Jones T. (2010) *Valuing Bats in Ecological Impact Assessment*. CIEEM InPractice. Issue 70. December 2010.

APPENDIX I SITE LOCATION & PROPOSED LAYOUT



Site Key

Application Boundary

REV.	DESCRIPTION	DATE

CLIENT

Lewis Homes

JOB TITLE

Sandy Lane, Ystradowen

DRAWING TITLE

Site Location Plan

SCALE @ A3	DATE	DRAWN BY
1:1250	June '23	RW
JOB NO.	DRAWING NO.	REVISION
1941	SLP-01	-

hammond Architectural Ltd

10 Gold Tops
Newport
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Accommodation Schedule

House Name	Code	Beds	Structural Area (ft²)	No. of Units	Total Area
Open Market Units					
Hyatt	HY	3	978	8	7824
Burnaby	BU	3	1021	5	5105
Shelby	SH	4	1213	8	9704
Roxbury	ROX	4	1417	3	4251
Thornbury	TH	4	1479	3	4437
Sub Total				***27***	***31321***
Affordable Units			*Finished Area (ft²)*		
1 Bed Flats	2.1.1	1	557	8	4456
2 Bed House	4.2.1	2	850	5	4250
3 Bed House	5.3.1	3	1003	6	6018
Sub Total				***19***	***14724***
Total				**46**	**46045**

Site Key

- Application Boundary
- Social Rented Unit
- LCHO Unit
- 1.8m Close Board Fence
- 1.8m Screen Wall
- Proposed Translocated Hedgerow
- Proposed Tree Planting
- Existing Tree and RPZ
- Refuse Storage Area
- Refuse Collection Point
- Bicycle Storage Shed
- Easements
- Proposed Rain Gardens
- Proposed Retaining Walls and Steps

N

Scale
0 10m 20m 30m 40m 50m

REV.	DESCRIPTION	DATE
D:	Engineering information imported in to layout.	07.06.23
C:	Minor adjustments to house types. Private footpaths added with refuse storage added within rear gardens. Bicycle Storage sheds added to plots that have not been allocated a garage space. Refuse collection points added. Colour added and site key updated.	05.06.23
B:	New open market units added to site layout to comply with new 'Part L' regulations, resulting in revised floor areas. To accommodate larger units; plot 28 substituted to a Shelby house type (previously a Roxbury), plot 43 substituted to a Roxbury (previously a Thornbury). Plots 38 and 39 switched. All units and boundaries adjusted as a result of revised footprints.	20.04.23
A:	New WDQR affordable units added to layout (plots 3-21). Plots 15-16 reoriented to face north. Latest attenuation basin design imported from engineers site pack. Translocated hedgerow relocated to top edge of basin's southern boundary.	03.03.23

CLIENT
The key to quality
Lewis Homes

JOB TITLE
Sandy Lane, Ystradowen

DRAWING TITLE
Proposed Site Layout

SCALE @ A2	DATE	DRAWN BY
1:500	June '23	RW
JOB NO.	DRAWING NO.	REVISION
1941	TP-01	D

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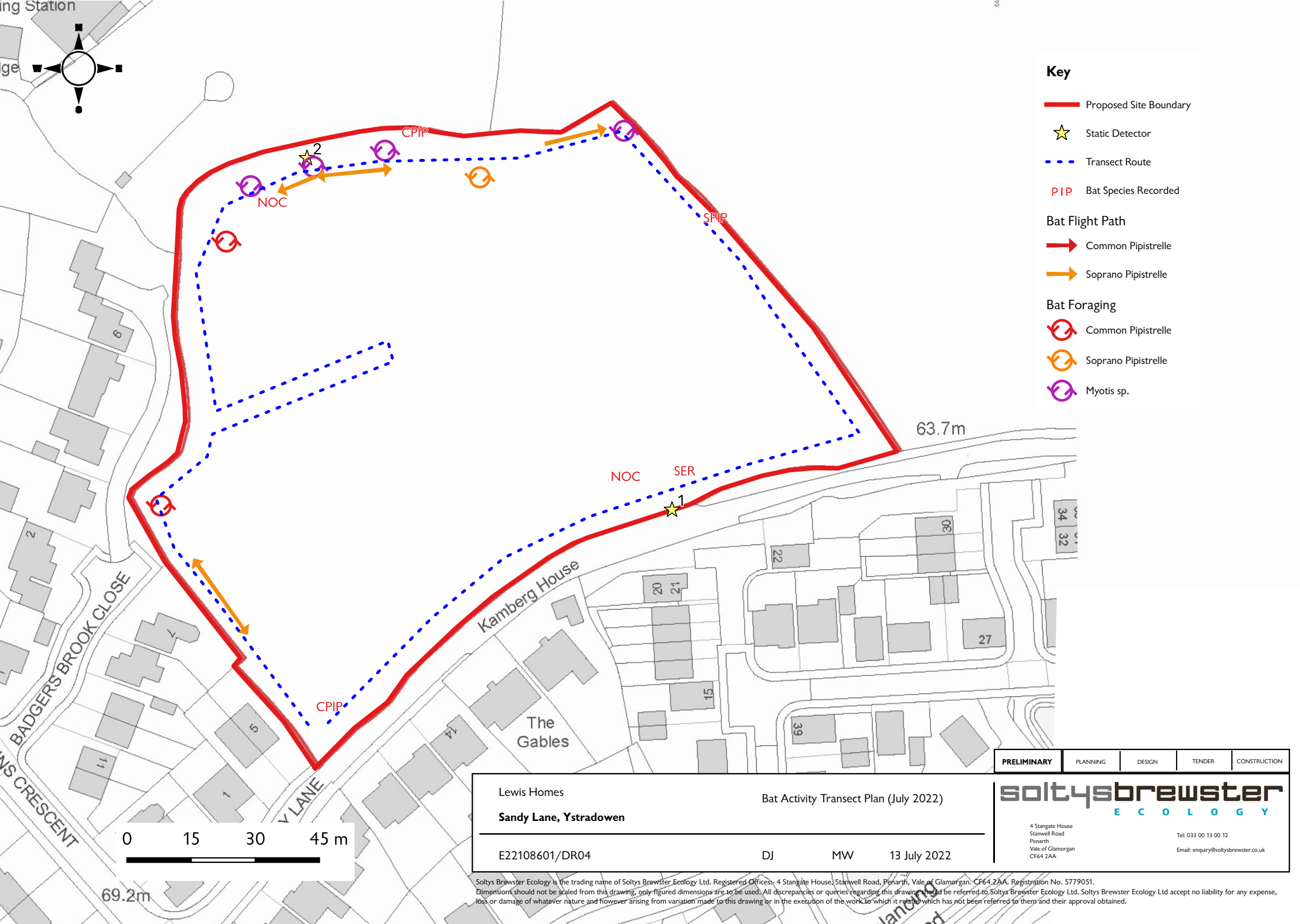
APPENDIX II BAT SURVEY TRANSECTS AND AUTOMATED MONITORING



PRELIMINARY	PLANNING	DESIGN	TENDER	CONSTRUCTION

Lewis Homes

Sandy Lane, Ystradowen

Bat Activity Transect Plan (July 2022)

E22108601/DR04 DJ MW 13 July 2022

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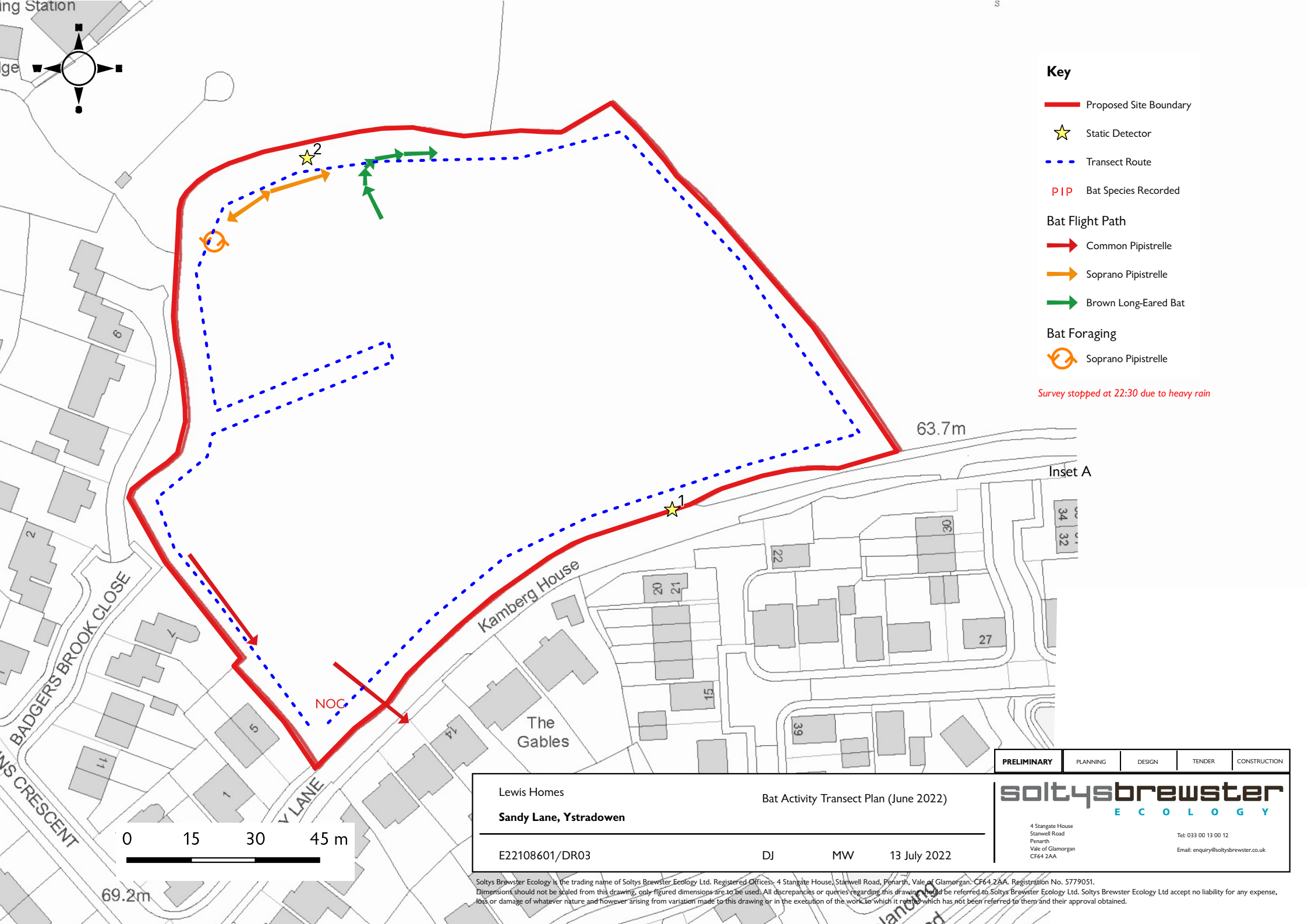

PRELIMINARY	PLANNING	DESIGN	TENDER	CONSTRUCTION

Lewis Homes

Sandy Lane, Ystradowen

Bat Activity Transect Plan (June 2022)

E22108601/DR03 DJ MW 13 July 2022

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4 Stangate House
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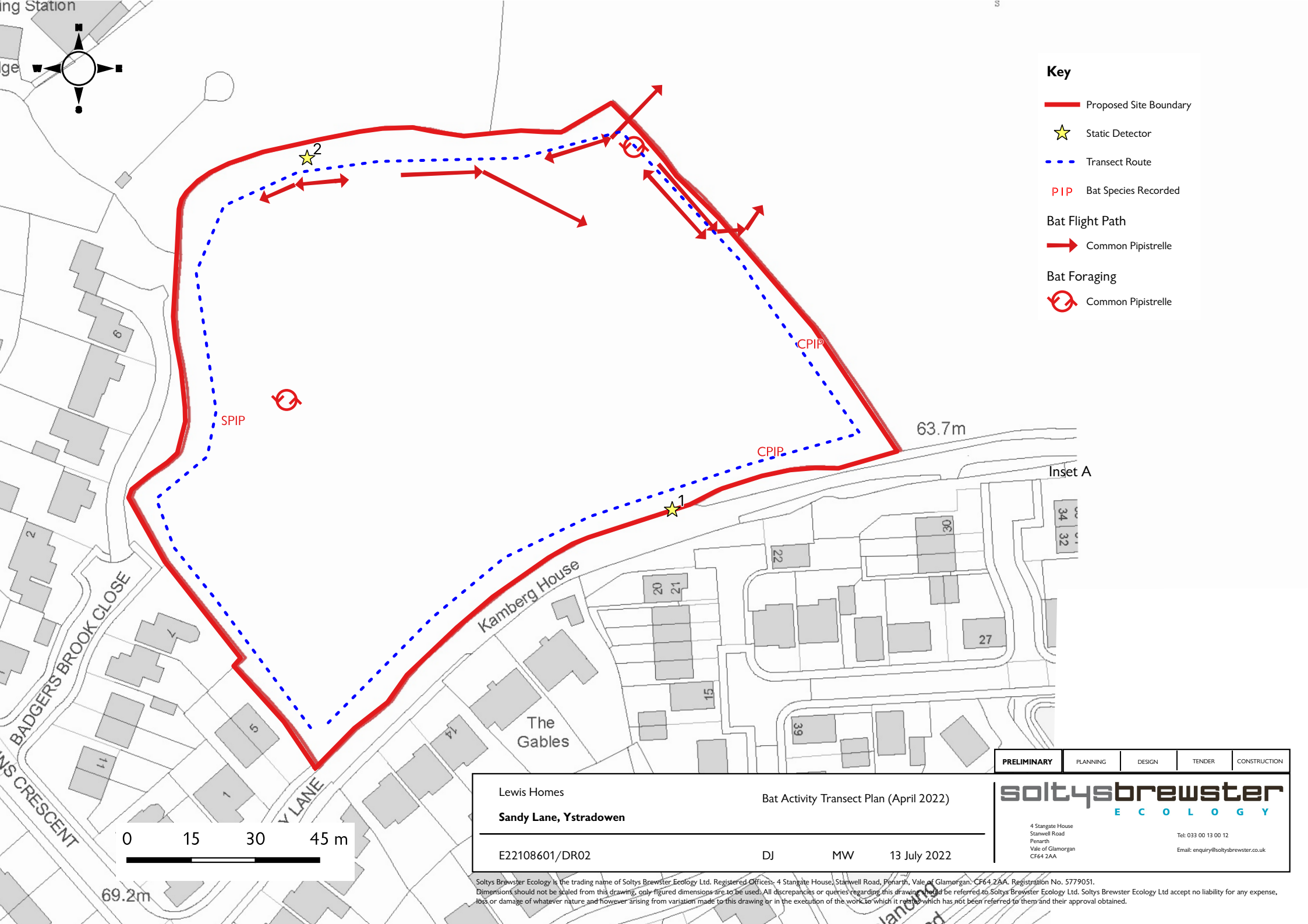

PRELIMINARY	PLANNING	DESIGN	TENDER	CONSTRUCTION

Lewis Homes

Sandy Lane, Ystradowen

Bat Activity Transect Plan (April 2022)

E22108601/DR02	DJ	MW	13 July 2022

soltysbrewster ECOLOGY

4 Stangate House
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Vale of Glamorgan
CF64 2AA

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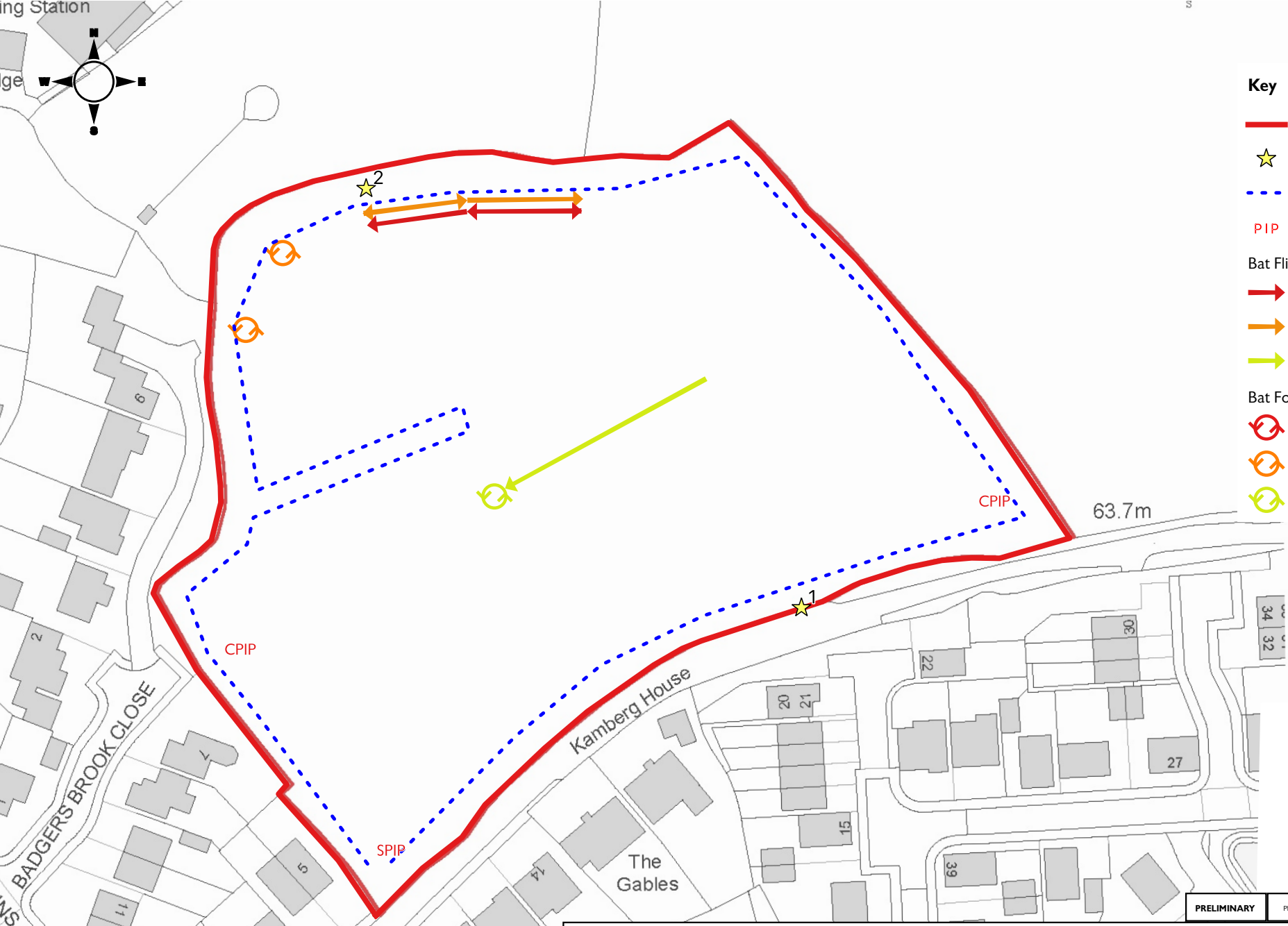
Email: enquiry@soltysbrewster.co.uk



PRELIMINARY	PLANNING	DESIGN	TENDER	CONSTRUCTION

Lewis Homes

Sandy Lane, Ystradowen

Bat Activity Transect Plan (August 2022)

E22108601/DR05	DJ	MW	24 August 2022

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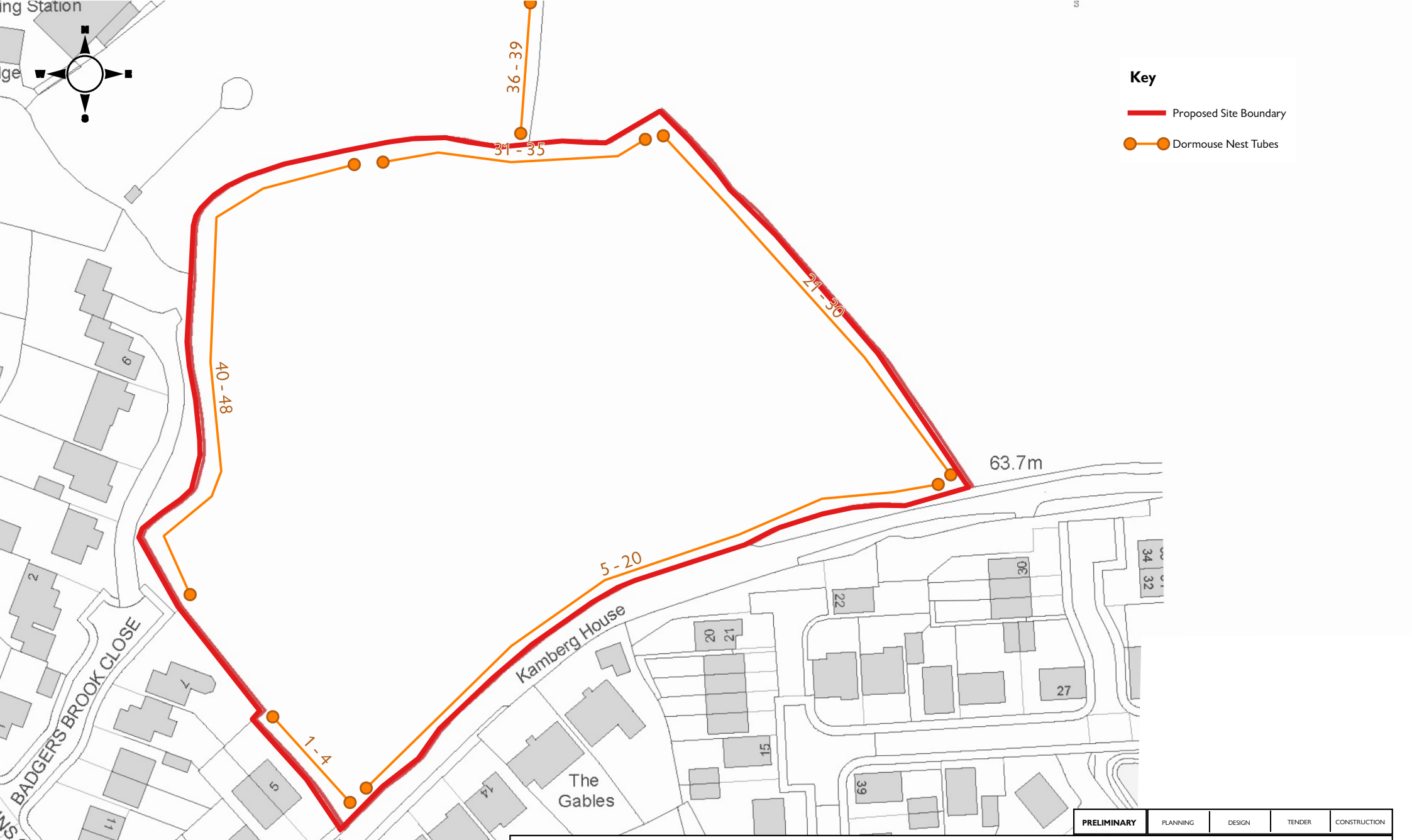
APPENDIX III DORMOUSE NEST TUBE PLAN



PRELIMINARY	PLANNING	DESIGN	TENDER	CONSTRUCTION

Lewis Homes

Sandy Lane, Ystradowen

Dormouse Nest Tube Locations

E22108601/DR06	DJ	MW	07 December 2022

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APPENDIX IV EDNA SAMPLING RESULTS (GREAT CRESTED NEWT)

DNA Analysis Report - Commercial in Confidence

Customer:	Soltys Brewster Ecology Ltd
Address:	4 Stangate House Stanwell Road Penarth Vale of Glamorgan CF64 2AA
Contact:	Matthew Watts
Email:	matthew.watts@soltysbrewster.co.uk
Tel:	07852944042
Report date:	10-Jun-2022
Order Number:	GCN22-1482
Samples:	Pond Water
Analysis requested:	Detection of Great Crested Newt eDNA from pond water.

Thank you for submitting your samples for analysis with the Fera eDNA testing service. The details of the analysis are as follows:

Method:
The method detects pond occupancy from great crested newts (GCN) using traces of DNA shed into the pond environment (eDNA). The detection of GCN eDNA is carried out using real time PCR to amplify part of the cytochrome 1 gene found in mitochondrial DNA. The method followed is detailed in Biggs J., et al, (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA. Freshwater Habitats Trust, Oxford.

The limits of this method are as follows: 1) the results are based on analyses of the samples supplied by the client and as received by the laboratory, 2) any variation between the characteristics of this sample and a batch will depend on the sampling procedure used. 3) the method is qualitative and therefore the levels given in the score are for information only, they do not constitute the quantification of GCN DNA against a calibration curve, 4) a 'not detected' result does not exclude presence at levels below the limit of detection.

The results are defined as follows:

Positive:	DNA from the species was detected.
eDNA Score:	Number of positive replicates from a series of twelve.
Negative:	DNA from the species was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.
Inconclusive:	Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided.

DNA Analysis Report - Commercial in Confidence

CustomerReference	Fera Reference	GCN Detection	eDNA Score	Inhibition	Degradation
Fairwater Park Pond	S22-012655	Positive	7	n/a	n/a
Ystradowen Pond	S22-012656	Negative	0	No	No

The results indicate that eDNA for great crested newts was detected in one of the samples and in the remaining sample eDNA was not detected (as detailed in the table above). Analysis was conducted in the presence of the following controls: 1) extraction blank, 2) appropriate positive and negative PCR controls for each of the TaqMan assays (GCN, Inhibition, and Degradation). All controls performed as expected.

This test procedure was developed using research funded by the Department of Environment, Food and Rural Affairs.

Issuing officer: Steven Bryce
Tel: 01904 462 070
Email: e-dna@fera.co.uk

APPENDIX V BATS AND ARTIFICAL LIGHTING IN THE UK GUIDANCE NOTE

The following is an extract from the Bat Conservation Trust and Institution of Lighting Professionals (2018) guidance note on Bats and Artificial lighting in the UK. Section 3 contains advice on how to mitigate for the impacts of artificial lighting on bats. Full citation:

Bat Conservation Trust & Institution of Lighting Professionals (2018) *Bats and artificial lighting in the UK*. *Guidance Note 08/18*. Bat Conservation Trust, London.

3. Mitigation of artificial lighting impacts on bats

This section provides a simple process which should be followed where the impact on bats is being considered as part of a proposed lighting scheme. It contains techniques which can be used on all sites, whether a small domestic project or larger mixed-use, commercial or infrastructure development. It also provides best-practice advice for the design of the lighting scheme for both lighting professionals and other users who may be less familiar with the terminology and theory.

The stepwise process and key follow-up actions are outlined in the flowchart overleaf, and are followed throughout the chapter.

The questions within this flow chart should be asked as early as possible, so that necessary bat survey information can be gathered in advance of any lighting design or fixing of overall scheme design.

Effective mitigation of lighting impacts on bats depends on close collaboration from the outset between multiple disciplines within a project. Depending on the specific challenges this will almost certainly involve ecologists working alongside architects and/or engineers; however, lighting professionals and landscape architects should be approached when recommended by your ecologist. This should be done as early in your project as possible in order to ensure mitigation is as effective as it can be and to minimise delays and unforeseen costs.

Step 1: Determine whether bats could be present on site

If your site has the potential to support bats or you are at all unsure, it is highly recommended that an ecologist is appointed to advise further and conduct surveys, if necessary. This information should be collected as early as possible in the design process, and certainly before lighting is designed, so as to avoid the need for costly revisions.

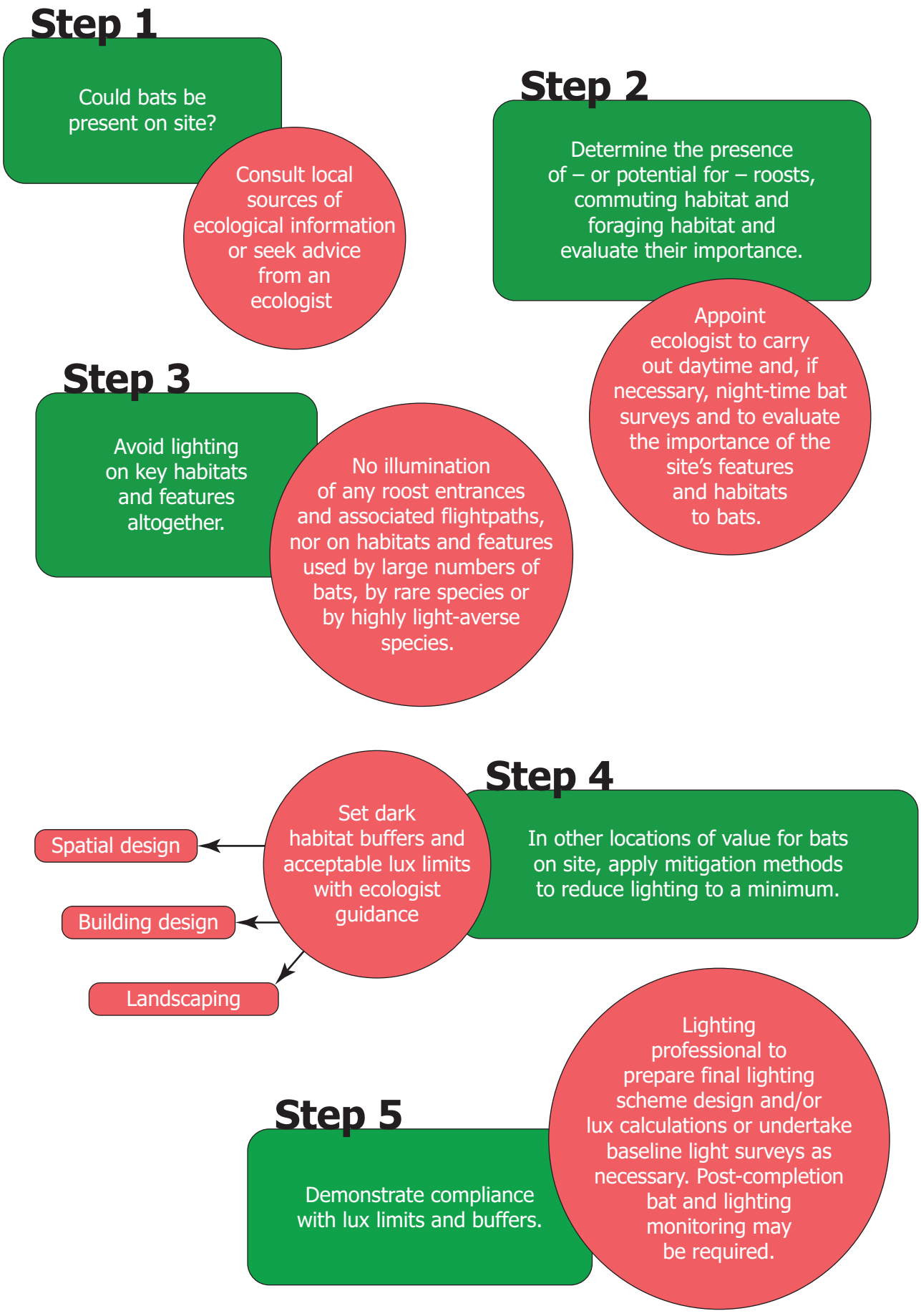
If any of the following habitats occur on site, and are adjacent to or connected with any of these habitats on or off site, it is possible that newly proposed lighting may impact local bat populations:

- Woodland or mature trees
- Hedgerows and scrub
- Ponds and lakes
- Ditches, streams, canals and rivers
- Infrequently managed grassland
- Buildings – pre 1970s or in disrepair

If you are unsure about whether bats may be impacted by your project, and an ecologist has not yet been consulted, sources of information on the presence of bats within the vicinity of your site include the following.

- Local environmental records centres (LERC) – Will provide third-party records of protected and notable species for a fee. Search http://www.alerc.org.uk/ for more information.
- National Biodiversity Network Atlas – Provides a resource of third-party ecological records searchable online at https://nbnatlas.org. Typically this is less complete than LERC data. Please note: Some datasets are only accessible on a non-commercial basis, while most can be used for any purpose, as long as the original source is credited.
- Local authority planning portals – Most local planning authorities have a searchable online facility detailing recent planning applications. These may have been accompanied by ecological survey reports containing information on bat roosts and habitats.
- Defra's MAGIC map – Provides an online searchable GIS database including details of recent European protected species licences and details of any protected sites designated for bat conservation.

The professional directory at the website of the Chartered Institute of Ecology and Environmental Management (www.cieem.net) will provide details of ecologists in your area with the relevant


Step 1
Could bats be present on site?
Consult local sources of ecological information or seek advice from an ecologist
Step 2
Determine the presence of – or potential for – roosts, commuting habitat and foraging habitat and evaluate their importance.
Appoint ecologist to carry out daytime and, if necessary, night-time bat surveys and to evaluate the importance of the site's features and habitats to bats.
Step 3
Avoid lighting on key habitats and features altogether.
No illumination of any roost entrances and associated flightpaths, nor on habitats and features used by large numbers of bats, by rare species or by highly light-averse species.
Step 4
Set dark habitat buffers and acceptable lux limits with ecologist guidance
Spatial design
Building design
Landscaping
In other locations of value for bats on site, apply mitigation methods to reduce lighting to a minimum.
Step 5
Demonstrate compliance with lux limits and buffers.
Lighting professional to prepare final lighting scheme design and/or lux calculations or undertake baseline light surveys as necessary. Post-completion bat and lighting monitoring may be required.

skills/experience. The early involvement of a professional ecologist can minimise the likelihood of delays at the planning stage (if applicable) and ensure your project is compliant with conservation and planning legislation and policy.

It should be noted that the measures discussed in this document relate only to the specific impacts of lighting upon bat habitat features on or adjacent to the site. If loss or damage to roosting, foraging or commuting habitat is likely to be caused by other aspects of the development, separate ecological advice will be necessary in order to avoid, mitigate or compensate for this legally and according to the ecologist's evaluation.

Step 2: Determine the presence of – or potential for – roosts, commuting habitat and foraging habitat and evaluate their importance

Your ecologist will visit the site in order to record the habitats and features present and evaluate their potential importance to bats, and the likelihood that bats could be affected by lighting both on and immediately off site. This may also include daytime building and tree inspections. On the basis of these inspections further evening surveys may be recommended, either to determine the presence of roosts within buildings and/or trees or to assess the use of the habitats by bats by means of a walked survey. Such surveys may be undertaken at different times during the active season (ideally May to September) and should also involve the use of automated bat detectors left on site for a period of several days. The surveys should be carried out observing the recommendations within the Bat Conservation Trust's Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016).

The resulting report will detail the relative conservation importance of each habitat feature to bats (including built structures, if suitable). The ecologist's evaluation of the individual features will depend on the specific combination of contributing factors about the site, including:

- The conservation status of species recorded or likely to be present
- Geographic location
- Type of bat activity likely (breeding, hibernating, night roosting, foraging etc)
- Habitat quality
- Habitat connectivity off-site
- The presence of nearby bat populations or protected sites for bats (usually identified in a desk study)

The evaluation of ecological importance for each feature is most commonly expressed on a geographic scale from Site level to International level, or alternatively in terms of that feature's role in maintaining the 'favourable conservation status' of the population of bats using it.

The ecologist should set out where any key bat roost features and/or habitat areas (ie flightpath habitat and broader areas of foraging habitat) lie on a plan of the site or as an ecological constraints and opportunities plan (ECOP) together with their relative importance. The ECOP and report can then be used to help guide the design of the lighting strategy as well as the wider project.

Step 3: Avoid lighting on key habitats and features altogether

As has been described in 'Artificial lighting', above, there is no legal duty requiring any place to be lit. British Standards and other policy documents allow for deviation from their own guidance where there are significant ecological/environmental reasons for doing so. It is acknowledged that in certain situations lighting is critical in maintaining safety, such as some industrial sites with 24-hour operation. However in the public realm, while lighting can increase the perception of safety and security, measureable benefits can be subjective. Consequently, lighting design should be flexible and be able to fully take into account the presence of protected species

and the obligation to avoid impacts on them.

Sources of lighting which can disturb bats are not limited to roadside or external security lighting, but can also include light spill via windows, permanent but sporadically operated lighting such as sports floodlighting, and in some cases car headlights. Additionally, glare (extremely high contrast between a source of light and the surrounding darkness – linked to the intensity of a luminaire) may affect bats over a greater distance than the target area directly illuminated by a luminaire and must also be considered on your site.

It is important that a competent lighting professional is involved in the design of proposals as soon as potential impacts (including from glare) are identified by the ecologist in order to avoid planning difficulties or late-stage design revision. Your lighting professional will be able to make recommendations about placement of luminaires tailored to your specific project.

Where highways lighting schemes are to be designed by the local planning authority (LPA) post-planning, an ecology officer should be consulted on the presence of important bat constraints which may impact the design and illuminance in order for the scheme to remain legally compliant with wildlife legislation.

Where adverse impacts upon the 'favourable conservation status' of the bat population using the feature or habitat would be significant, an absence of artificial illumination and glare, acting upon both the feature and an appropriately-sized buffer zone is likely to be the only acceptable solution. Your ecologist will be best placed to set the size of such a buffer zone but it should be sufficient to ensure that illumination and glare is avoided and so the input of a lighting professional may be required. Further information on demonstrating an absence of illumination via lux/illuminance contour plans is provided in Step 5.

Because different species vary in their response to light disturbance (as discussed in section 1 'Bats'), your ecologist will be able to provide advice tailored to the specific conditions on your project, however examples of where the no-lighting approach should be taken in particular include:

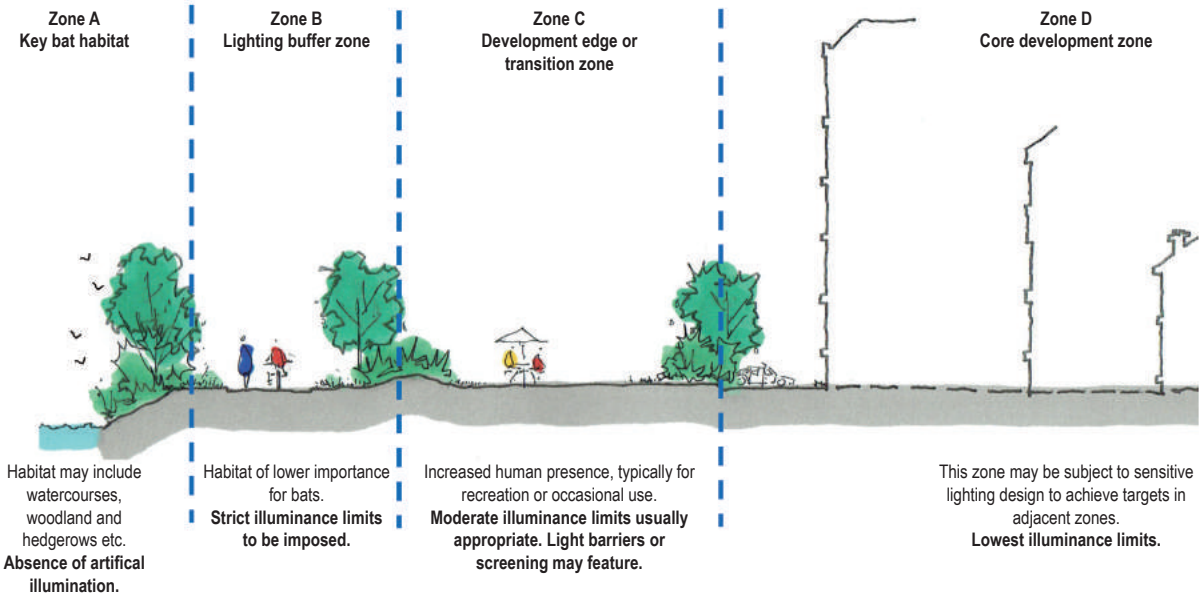
- Roosting and swarming sites for all species and their associated flightpath/commuting habitat.
- Foraging or commuting habitat for highly light-averse species (greater and lesser horseshoe bats, some Myotis bats, barbastelle bats and all long-eared bats).
- Foraging or commuting habitat used by large numbers of bats as assessed through survey.
- Foraging or commuting habitat for particularly rare species (grey long-eared bat, barbastelle, small Myotis, Bechstein's bat and horseshoe bats).
- Any habitat otherwise assessed by your ecologist as being of importance to maintaining the 'favourable conservation status' of the bat population using it.

Completely avoiding any lighting conflicts in the first place is advantageous because not only would proposals be automatically compliant with the relevant wildlife legislation and planning policy, but they could avoid costly and time-consuming additional surveys, mitigation and post-development monitoring. Furthermore, local planning authorities are likely to favour applications where steps have been taken to avoid such conflicts.

Step 4: Apply mitigation methods to reduce lighting to agreed limits in other sensitive locations – lighting design considerations

Where bat habitats and features are considered to be of lower importance or sensitivity to illumination, the need to provide lighting may outweigh the needs of bats. Consequently, a balance between a reduced lighting level appropriate to the

Example of illuminance limit zonation



ecological importance of each feature and species, and the lighting objectives for that area will need to be achieved.

It is important to reiterate the legal protection from disturbance that bats receive under the Wildlife and Countryside Act 1981, as amended. Where the risk of offences originating from lighting is sufficiently high, it may be best to apply the avoidance approach in Step 3.

Advice from an ecologist and lighting professional will be essential in finding the right approach for your site according to their evaluation. The following are techniques which have been successfully used on projects and are often used in combination for best results.

Dark buffers, illuminance limits and zonation

Dark buffer zones can be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. Buffer zones rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in to zones of increasing illuminance limit radiating away from the feature. Examples of this application are given in the figure above.

Your ecologist (in collaboration with a lighting professional) can help determine the most appropriate buffer widths and illuminance limits according to the value of that habitat to bats (as informed by species and numbers of bats, as well as the type of use).

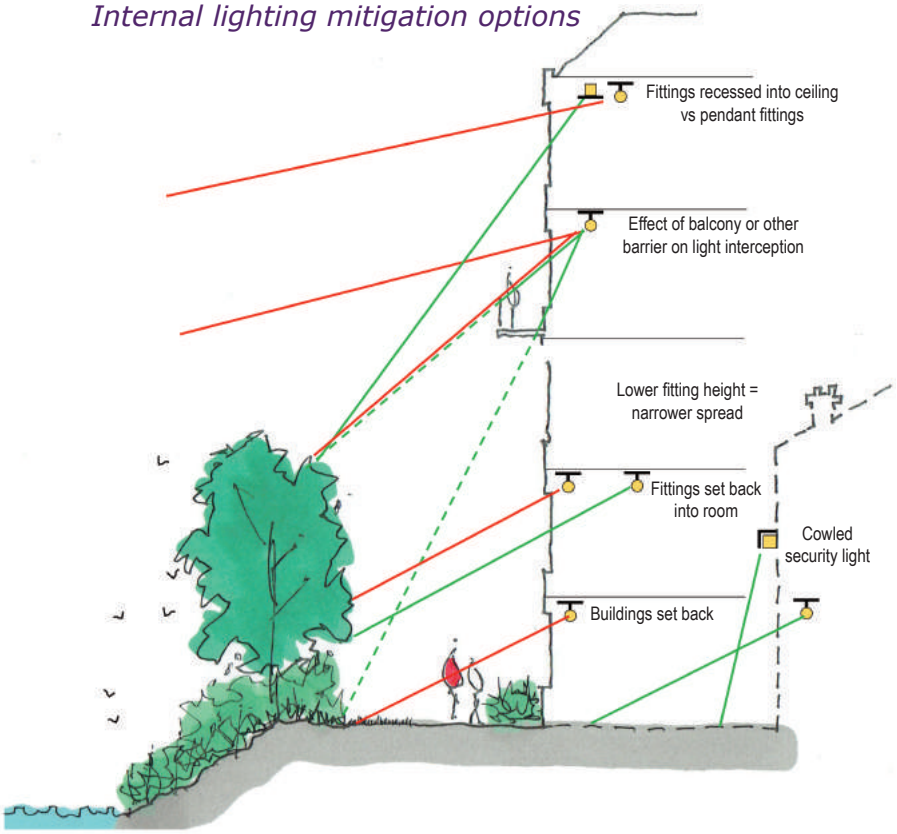
Appropriate luminaire specifications

Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires.

- All luminaires should lack UV elements when manufactured. Metal halide, 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 spectrum (ideally <2700Kelvin) should be adopted to reduce blue light component.
- Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill. (See figure overleaf.)
- The use of specialist bollard or low-level downward directional luminaires to

retain darkness above can be considered. However, this often comes at a cost of unacceptable glare, poor illumination efficiency, a high upward light component and poor facial recognition, and their use should only be as directed by the lighting professional.
- Column heights should be carefully considered to minimise light spill.
- Only luminaires with an upward light ratio of 0% and with good optical control should be used – See ILP Guidance for the Reduction of Obtrusive Light.
- Luminaires should always be mounted on the horizontal, ie no upward tilt.
- Any external security lighting should be set on motion-sensors and short (1min) timers.
- As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

Internal lighting mitigation options



Sensitive site configuration

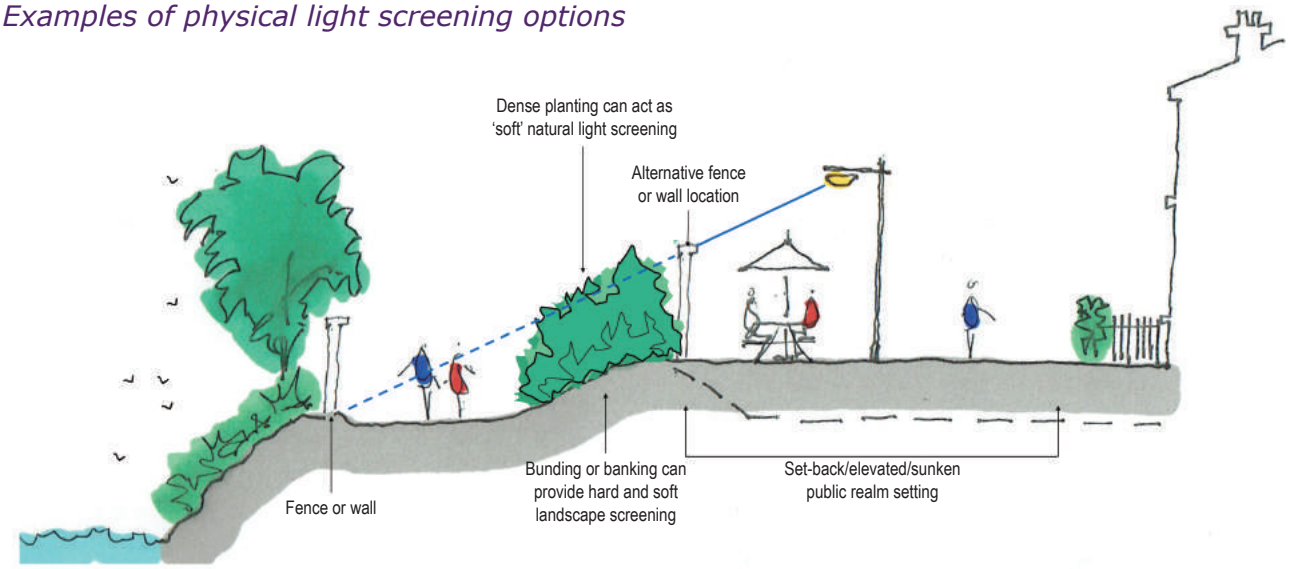
The location, orientation and height of newly built structures and hard standing can have a considerable impact on light spill (see figure above for examples of good internal lighting design). Small changes in terms of the placement of footpaths, open space and the number and size of windows can all achieve a good outcome in terms of minimising light spill on to key habitats and features.
- It may be possible to include key habitats and features into unlit public open space such as parks and gardens.
- Buildings, walls and hard landscaping may be sited and designed so as to block light spill from reaching habitats and features.
- Taller buildings may be best located toward the centre of the site or sufficiently set back from key habitats to minimise light spill.
- Street lights can be located so that the rear shields are adjacent to habitats or optics selected that stop back light thereby directing light into the task area where needed.

Screening

Light spill can be successfully screened through soft landscaping and the installation of walls, fences and bunding (see figure overleaf for example of physical light-screening options). In order to ensure that fencing makes a long-term contribution, it is recommended that it is supported on concrete or metal posts. Fencing can also be over planted with hedgerow species or climbing plants to soften its appearance and provide a vegetated feature which bats can use for navigation or foraging.

The planting of substantial landscape features integrated to the wider network of green corridors such as hedgerows, woodland and scrub is encouraged by

Examples of physical light screening options



planning policy and would make a long-term positive contribution to the overall bat habitat connectivity and light attenuation. A landscape architect can be appointed to collaborate with your ecologist on maximising these natural light screening opportunities.

It should be noted that newly planted vegetation (trees, shrubs and scrub) is unlikely to adequately contribute to light attenuation on key habitats for a number of years until it is well established. Sufficient maintenance to achieve this is also likely to be required. Consequently, this approach is best suited to the planting of 'instant hedgerows' or other similarly dense or mature planting, including translocated vegetation. In some cases, it is appropriate to install temporary fencing or other barrier to provide the desired physical screening effects until the vegetation is determined to be sufficiently established.

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

Glazing treatments

Glazing should be restricted or redesigned wherever the ecologist and lighting professional determine there is a likely significant effect upon key bat habitat and features. Where windows and glass facades etc cannot be avoided, low transmission glazing treatments may be a suitable option in achieving reduced illuminance targets.

Products available include retrofit window films and factory-tinted glazing. 'Smart glass', which can be set to automatically obscure on a timer during the hours of darkness, and automatic blinds can also be used but their longevity depends on regular maintenance and successful routine operation by the occupant, and should not be solely relied upon.

Depending on the height of the building and windows, and therefore predicted light spill, such glazing treatments may not be required on all storeys. This effect can be more accurately determined by a lighting professional.

Creation of alternative valuable bat habitat on site

The provision of new, additional or alternative bat flightpaths, commuting habitat or foraging habitat could result in appropriate compensation for any such habitat being lost to the development. Your ecologist will be able to suggest and design such alternative habitats although particular consideration as to its connectivity to other features, the species to be used, the lag time required for a habitat to sufficiently establish, and the provision for its ongoing protection and maintenance should be given.

Dimming and part-night lighting

Depending on the pattern of bat activity across the key features identified on site by your ecologist, it may be appropriate for an element of on-site lighting to be controlled either diurnally, seasonally or according to human activity. A control management system can be used to dim (typically to 25% or less) or turn off groups of lights when not in use.

It should be noted that these systems depend on regular maintenance and a long-term commitment for them to be successful. Additionally, part-night lighting should be designed with input from an ecologist as they may still produce unacceptably high light levels when active or dimmed. Part-night lighting is not usually appropriate where lights are undimmed during key bat activity times as derived from bat survey data. Research has indicated that impacts upon commuting bats are still prevalent where lighting is dimmed during the middle of the night at a time when illumination for human use is less necessary (Azam et al, 2015). Thus this approach should not always be seen as a solution unless backed up by robust ecological survey and assessment of nightly bat activity.

Step 5: Demonstrate compliance with illuminance limits and buffers

Design and pre-planning phase

It may be necessary to demonstrate that the proposed lighting will comply with any agreed light-limitation or screening measures set as a result of your ecologist's recommendations and evaluation. This is especially likely to be requested if planning permission is required.

A horizontal illuminance contour plan can be prepared by a suitably experienced and competent lighting professional (member of the Chartered Institution of Building Services Engineers (CIBSE), Society of Light and Lighting (SLL), Institution of Lighting Professionals (ILP) or similar to ensure competency) using an appropriate software package to model the extent of light spill from the proposed and, possibly, existing luminaires. The various buffer zone widths and illuminance limits which may have been agreed can then be overlaid to determine if any further mitigation is necessary. In some circumstances, a vertical illuminance contour plot may be necessary to demonstrate the light in sensitive areas such as entrances to roosts.

Such calculations and documentation would need to be prepared in advance of submission for planning permission to enable the LPA ecologist to fully assess impacts and compliance.

Because illuminance contour plots and plans may need to be understood and examined by non-lighting professionals such as architects and local planning authority ecologists, the following should be observed when producing or assessing illuminance contour plans to ensure the correct information is displayed.

- A horizontal calculation plane representing ground level should always be used.
- Vertical calculation planes should be used wherever appropriate, for example along the site-facing aspects of a hedgerow or façade of buildings containing roosts to show the illumination directly upon the vertical faces of the feature. Vertical planes can also show a cross-sectional view within open space. Vertical planes will enable a visualisation of the effects of illumination at the various heights at which different bat species fly.
- Models should include light from all luminaires and each should be set to the maximum output anticipated to be used in normal operation on site (ie no dimming where dimming is not anticipated during normal operation).
- A calculation showing output of luminaires to be expected at 'day 1' of operation should be included, where the luminaire and/or scheme Maintenance Factor is set to one.

- Where dimming, PIR or variable illuminance states are to be used, an individual set of calculation results should accompany each of these states.
- The contours (and/or coloured numbers) for 0.2, 0.5, 1, 5, and 10 lux must be clearly shown as well as appropriate contours for values above these.
- Each contour plan should be accompanied by a table showing their minimum and maximum lux values.
- Where buildings are proposed in proximity to key features or habitats, plots should also model the contribution of light spill through nearby windows, making assumptions as to internal luminaire specification and transmissivity of windows. It should be assumed that blinds or curtains are absent or fully open although low-transmittance glazing treatments may be appropriate. Assumptions will need to be made as to the internal luminaire specification and levels of illuminance likely to occur on 'day 1' of operation. These assumptions should be clearly stated and guided by the building/room type and discussions between architect, client and lighting professional. It is acknowledged that in many circumstances, only a 'best effort' can be made in terms of accuracy of these calculations.
- Modelled plots should not include any light attenuation factor from new or existing planting due to the lag time between planting and establishment and the risk of damage, removal or failure of vegetation. This may result in difficulties in the long term achievement of the screening effect and hamper any post-construction compliance surveys.
- The illuminance contour plots should be accompanied by an explanatory note from the lighting professional to list where, in their opinion, sources of glare acting upon the key habitats and features may occur and what has been done/can be done to reduce their impacts.

N.B. It is acknowledged that, especially for vertical calculation planes, very low levels of light (<0.5 lux) may occur even at considerable distances from the source if there is little intervening attenuation. It is therefore very difficult to demonstrate 'complete darkness' or a 'complete absence of illumination' on vertical planes where some form of lighting is proposed on site despite efforts to reduce them as far as possible and where horizontal plane illuminance levels are zero. Consequently, where 'complete darkness' on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night and are in line with research findings for the illuminance found at hedgerows used by lesser horseshoe bats, a species well known for its light averse behaviour (Stone, 2012).

Baseline and post-completion light monitoring surveys

Baseline, pre-development lighting surveys may be useful where existing on- or off-site lighting is suspected to be acting on key habitats and features and so may prevent the agreed or modelled illuminance limits being achieved. This data can then be used to help isolate which luminaires might need to be removed, where screening should be implemented or establish a new illuminance limit reduced below existing levels. For example, where baseline surveys establish that on- and off-site lighting illuminates potential key habitat, improvements could be made by installing a tall perimeter fence adjacent to the habitat and alterations to the siting and specification of new lighting to avoid further illumination. Further information and techniques to deal with modeling pre-development lighting can be found in ILP publication PLG04 *Lighting Impact Assessments* due to be published late 2018.

Baseline lighting surveys must be carried out by a suitably qualified competent person. As a minimum, readings should be

taken at ground level on the horizontal plane (to give illuminance hitting the ground), and in at least one direction on the vertical plane at, for example, 1.5m or 2m above ground (to replicate the likely location of bats using the feature or site). The orientation should be perpendicular to the dominant light sources or perpendicular to the surface/edge of the feature in question (such as a wall or hedgerow) in order to produce a 'worst case' reading. Further measurements at other orientations may prove beneficial in capturing influence of all luminaires in proximity to the feature or principal directions of flight used by bats. This should be discussed with the ecologist.

Baseline measurements should be taken systematically across the site or features in question. That is, they will need to be repeated at intervals to sample across the site or feature, either in a grid or linear transect as appropriate. The lighting professional will be able to recommend the most appropriate grid spacing.

Measurements should always be taken in the absence of moonlight, either on nights of a new moon or heavy cloud to avoid artificially raising the baseline. As an alternative, moonlight can be measured at a place where no artificial light is likely to affect the reading.

As all proposed illuminance level contours will be produced from modelled luminaires at 100% output, baseline measurements need to be taken with all lights on and undimmed, with blinds or screens over windows removed. Cowls and other fittings on luminaires can remain in place.

Where possible, measurements should be taken during the spring and summer when vegetation is mostly in leaf, in order to accurately represent the baseline during the principal active season for bats and to avoid artificially raising the baseline.

The topography of the immediate surrounding landscape should be considered in order to determine the potential for increased or decreased light spill beyond the site.

Post-construction/operational phase compliance-checking

Post-completion lighting surveys are often required where planning permission has been obtained on the condition that the proposed lighting levels are checked to confirm they are in fact achieved on site and that the lighting specification (including luminaire heights, design and presence of shielding etc) is as proposed.

All lighting surveys should be conducted by a suitably qualified competent person and should be conducted using the same measurement criteria and lighting states used in the preparation of the illuminance contour plots and/or baseline surveys as discussed above. It may be necessary to conduct multiple repeats over different illumination states or other conditions specific to the project.

Results should always be reported to the LPA as per any such planning condition. A report should be prepared in order to provide an assessment of compliance by the lighting professional and a discussion of any remedial measures which are likely to be required in order to achieve compliance. Any limitations or notable conditions such as deviation from the desired lighting state or use of blinds/barriers should be clearly reported. Ongoing monitoring schedules can also be set, especially where compliance is contingent on automated lighting and dimming systems or on physical screening solutions.

4. References

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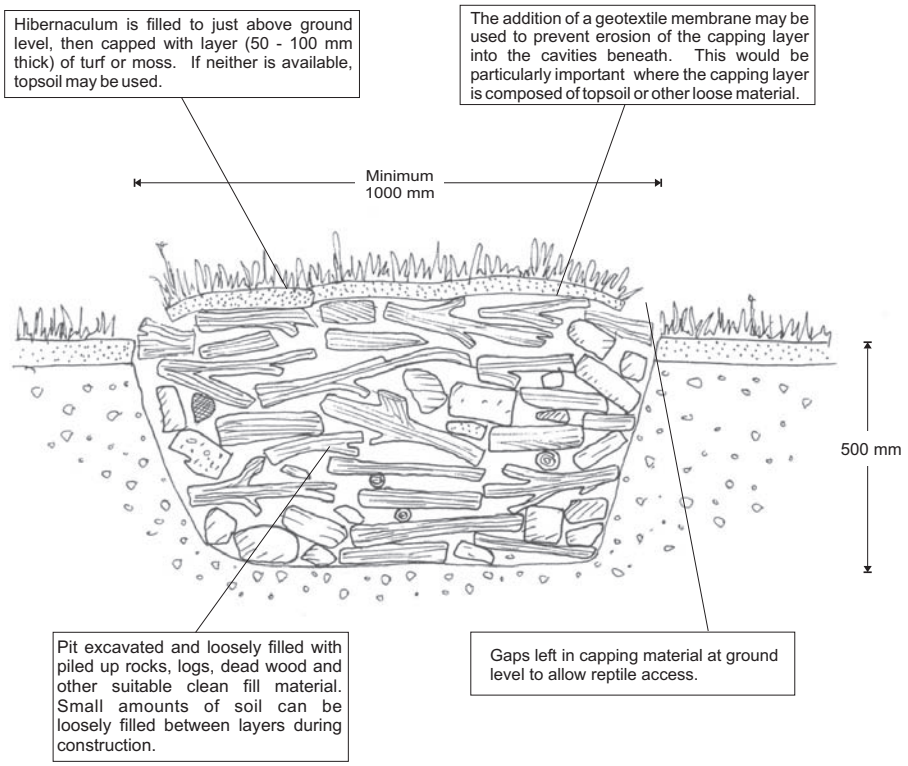
APPENDIX VI EXAMPLE OF REPTILE HIBERNACULA

Hibernaculum on free-draining ground

Where ground conditions allow, the hibernaculum should be incorporated into a shallow pit. This design is more likely to remain frost-free, and will be less obtrusive and thus unlikely to be subject to interference.



Hibernaculum on impermeable ground

Where ground conditions are impermeable, then an 'above-ground' or mounded design should be utilised in order to prevent the hibernaculum from flooding. This design should also be used if it is not possible to excavate a pit for any other reason.