

Bat and Reptile Survey

**Land at Long Acre, Pear Tree Road,
Kent DA12 3JT**

Report to:
Mr. & Mrs. J. King

9th September 2022



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Calumma Ecological Services

info@calumma.co.uk
www.calumma.co.uk

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1. Summary

Background

- 1.1 Land at Long Acre, Pear Tree Road has been proposed as the location of a new development project.
- 1.2 An ecological assessment of the site undertaken in 2022 determined that the proposed development site offered potential for bats and reptiles.
- 1.3 Calumma Ecological Services was subsequently commissioned to undertake appropriate surveys and advise on the need for mitigation.

Bats

- 1.4 Survey work undertaken in 2022 confirmed the presence of a low population of grass snake.
- 1.5 Bat foraging and commuting activity was observed within the surrounding habitats.
- 1.6 Brown long eared bat droppings were found within the pump house but no bats were observed emerging or re-entering this building and no bats were observed emerging from the main residential building.
- 1.7 The low numbers and species of bat recorded (brown long eared bat) were indicative of a day/ transitional roost for low numbers of a common bat species.
- 1.8 Before any work to the pump house is undertaken, a mitigation licence from Natural England is required. The licence would require the production of a method statement of works, the installation or temporary and permanent roost replacement and measures such as hand removal of the roof of the pump house under the supervision of a licenced ecological consultant.

Reptiles

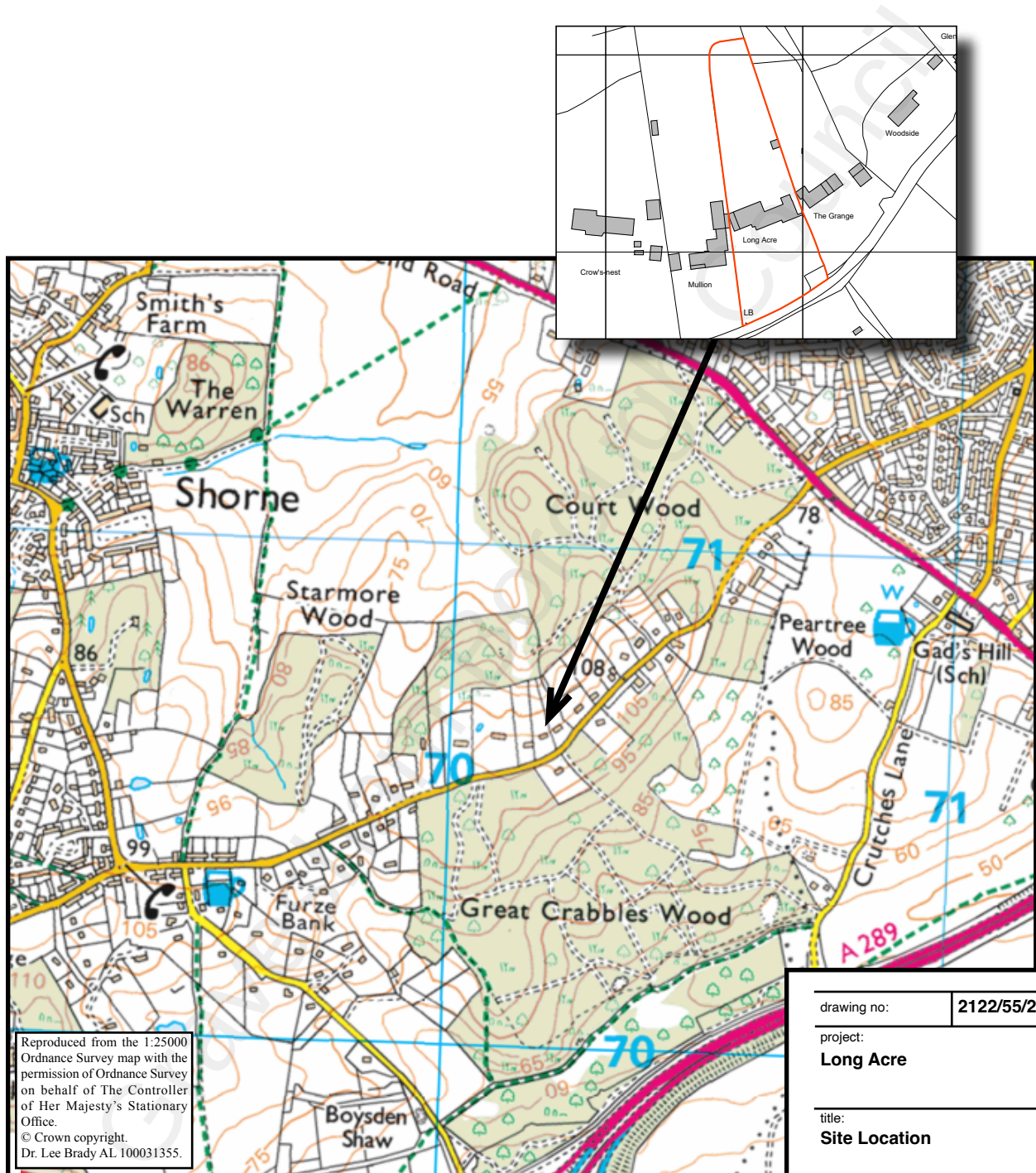
- 1.9 Survey work undertaken in 2022 did not reveal the presence of any reptiles.
- 1.10 Available information indicates that the proposed development site does not qualify for any specific conservation designations based on the presence of reptiles.
- 1.11 Proposed development works will not result in the loss or modified management of reptile habitat.
- 1.12 Reptile mitigation is not considered necessary.
- 1.13 If development work is not undertaken within one year of the date of this report, a further site assessment should be undertaken.

2. Site Location and Assessment

Site Name:	Land at Long Acre, Pear Tree Road, Kent DA12 3JT - <i>the site</i> ; Fig. 2.1
Grid Reference:	TQ 701 706
County:	Kent
Planning Authority:	Gravesham Borough Council
Planning Ref:	tbd
Natural Area:	North Kent Plain
Client:	Mr. and Mrs. J. King
Proposed Disturbance:	Demolition of existing structures and construction of new dwelling.
Survey Request:	Bat and Reptile Surveys
Surveyors:	Lee Brady PhD, BSc (Hons), MCIEEM Richard Law BSc (Hons) MRes CEnv MCIEEM FLS
Assessment Period:	10 th February 2022 & 8 th April to 18 th August 2022
Limitations:	The assessment was undertaken following good practice guidelines and expert opinion. Lack of observations does not necessarily confirm absence. This report may need to be updated if new information becomes available.
Reliance:	Information, including any survey data, contained within this report must only be relied upon for a maximum period of one year from the date of the report.

Fig. 2.1 Land at Long Acre, Pear Tree Lane, Kent (TQ 701 706)

Location of study site.



3. Legal Protection

The legal protection of animals and plants in the United Kingdom is governed by several different regulations and conventions. Principally, these include:

- The Wildlife & Countryside Act 1981 as amended by the Countryside and Rights of Way Act 2000 and
- The Habitats and Species Directive (92/43/EC) enacted through the Conservation of Habitats and Species Regulations 2017. Development works affecting listed species are subject to a licence granted by an appropriate authority. This authority is currently Natural England.
- The Natural Environment and Rural Communities (NERC) Act 2006
- The Hedgerow Regulations 1997

Species and habitats receive legal protection that may prohibit sale, disturbance and/or killing/injury.

3.1 Bats

All species of bat and their breeding sites or resting places (roosts) are protected under Regulation 41 of The Conservation of Habitats and Species Regulations 2010 and Section 9 of the Wildlife and Countryside Act 1981. It is an offence for anyone to intentionally kill, injure or handle a bat, to possess a bat (whether live or dead), deliberately disturb a roosting bat, or sell or offer a bat for sale without a licence. It is also an offence to damage, destroy or obstruct access to any place used by bats for shelter.

3.2 Reptiles

All native reptiles are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (WCA 1981). It is an offence for anyone to intentionally kill or injure a 'widespread' reptile species (viviparous lizard, slow-worm, grass snake or adder), or sell or offer for sale without a licence.

The sand lizard and smooth snake, their breeding sites or resting places (any structure that may offer refuge) are protected under Regulation 41 of The Conservation of Habitats and Species Regulations 2010. It is an offence for anyone intentionally to kill, injure or handle either of these two species, to possess an animal (whether live or dead), deliberately disturb a sheltering animal, or sell or offer an animal for sale without a licence. It is also an offence to damage, destroy or obstruct access to any place used by sand lizards and smooth snakes for shelter.

4. Survey Methods

4.1 Bats

The survey work used the guidance detailed within Bat Surveys Guidelines for Professional Ecologists – Good Practice Guidelines (BCT, 2016) as the basis to the survey methodology and the interim guidance note on surveys and night vision equipment (BCT, 2022).

Approximate bat surveyor locations are illustrated in Fig. 4.1.

4.1.1 Lead Surveyor

The survey work and reporting has been led by Richard Law BSc MRes CEnv MCIEEM FLS and assisted by Lee Brady and Oliver Westergaard. Richard has been undertaking ecological survey work within the last 20 years on a number of differing locations throughout the United Kingdom for a variety of protected species, including bats (Class 2 2015-12576-CLS-CLS) reptiles, amphibians including great crested newt (*Triturus cristatus*) (Class 1 2016-20290-CLS-CLS) and terrestrial mammals including dormice (2015-13188-CLS-CLS) and birds including barn owl licence (CL29/00236). Richard is also qualified in track and sign and trailing via an international system of assessment (www.trackercertification.com).

4.1.2 Equipment Used

Echometer Pro 2 bat detector with iPad processor unit and Bat Box Duet detectors were used to detect bat echolocation. A mixture of night vision equipment was used including; Sionyx Aurora IR camera, a Pulsar Axion 30S thermal imaging camera and a set of Yukon Tracker night vision binoculars. Calls were analysed, when required, identifying species following Russ (2021).

The night vision observation equipment gave a view of the features of the building surveyed that was not possible with the naked eye, enabling effective observation to continue in the dark. The cameras were installed on tripods, which enabled the surveyor to work normally without having to hold the camera steady. The Axion 30S enables a live feed to be viewed and recorded directly through a suitable tablet, which in this incidence was an iPad Pro. The Sionyx Aurora IR camera provide a wide angled view which is also recorded and fixed throughout the survey. The Yukon Tracker night vision are also head mounted, enabling hands free usage. All recorded footage is then reviewed following the survey

4.1.3 Survey Type

Emergence survey and dawn re-entry is undertaken to observe bats emerging from and re-entering a roost. In addition to observation, night vision and thermal imaging equipment was used to ensure that features can be effectively viewed in the dark and that any footage can be reviewed following the survey.

The number of surveyors on the first emergence survey was three, with this reducing to one on the pump house, once droppings were found within this building. Three surveys were carried out on the pump house, and one on the main residential building.

4.1.4 Survey Dates, Times and Weather Conditions

The details of each survey are shown in Table 4.1.

Date	Sunset/sunrise	Start	End	Weather	Temperature
12/6/2022	21:18	20:55	22:55	Clear, dry, light wind	23C
18/7/2022	21:08	20:40	22:40	Clear, dry, still	35C
18/08/2022	05:46	04:15	05:55	Clear, dry, ligh wind	20C

Table 4.1. Bat survey dates, times and weather conditions.

4.2 Reptiles

An initial walkover survey was undertaken on 10th February 2022 to assess the site's potential for supporting populations of different protected species and to identify areas within the site where such species were most likely to be found. The site was subsequently surveyed for reptiles on a total of seven occasions between April and June 2022.

4.2.1 Reptile Presence/Likely Absence Assessment

Reptile survey work undertaken during 2022 included direct visual searching for basking animals and examination of available 'in-situ' refugia (e.g. discarded debris etc). Artificial cover objects (ACOs) were also deployed in suitable habitat throughout the proposed development site. ACOs consisted of 0.5 m² mats constructed from roofing felt that were placed in areas offering potential habitat for basking animals. A total of 35 ACOs were deployed.

The site was visited on a total of seven occasions to visually survey for reptiles and to allow the monitoring of all cover objects. See Table 4.1 for reptile survey dates. Distribution of cover objects is illustrated in Fig. 4.2.

Date	Survey Period (GMT)
8/4/2022	13:00 – 14:00
21/4/2022	14:00 – 16:00
28/4/2022	08:00 – 10:00
05/5/2022	10:00 – 11:00
11/5/2022	12:00 – 13:00
18/5/2022	14:00 – 15:00
26/5/2022	08:00 – 10:00

Table 4.2. Dates for reptile survey visits during 2022. Survey periods are ranked by hour.

4.2.2 Weather Conditions

Survey work was undertaken during appropriate survey conditions wherever possible. Meteorological data is summarised in Table 4.3.

Date	Max. Air Temperature (°C)	Cloud Cover (%)	Wind Speed	Wind Direction	Precipitation	Ground Conditions
8/4/2022	11.0	100	Light	N	None	Damp
21/4/2022	15.0	0	Light	NE	None	Dry
28/4/2022	12.0	100	Light	NE	None	Dry
05/5/2022	15.0	70	Light	NW	None	Dry
11/5/2022	17.0	100	Fresh	SW	Light	Dry
18/5/2022	23.0	100	Light	S	None	Dry
26/5/2022	21.0	85	Light	SW	None	Dry

Table 4.3. Meteorological data for terrestrial survey visits during 2022.

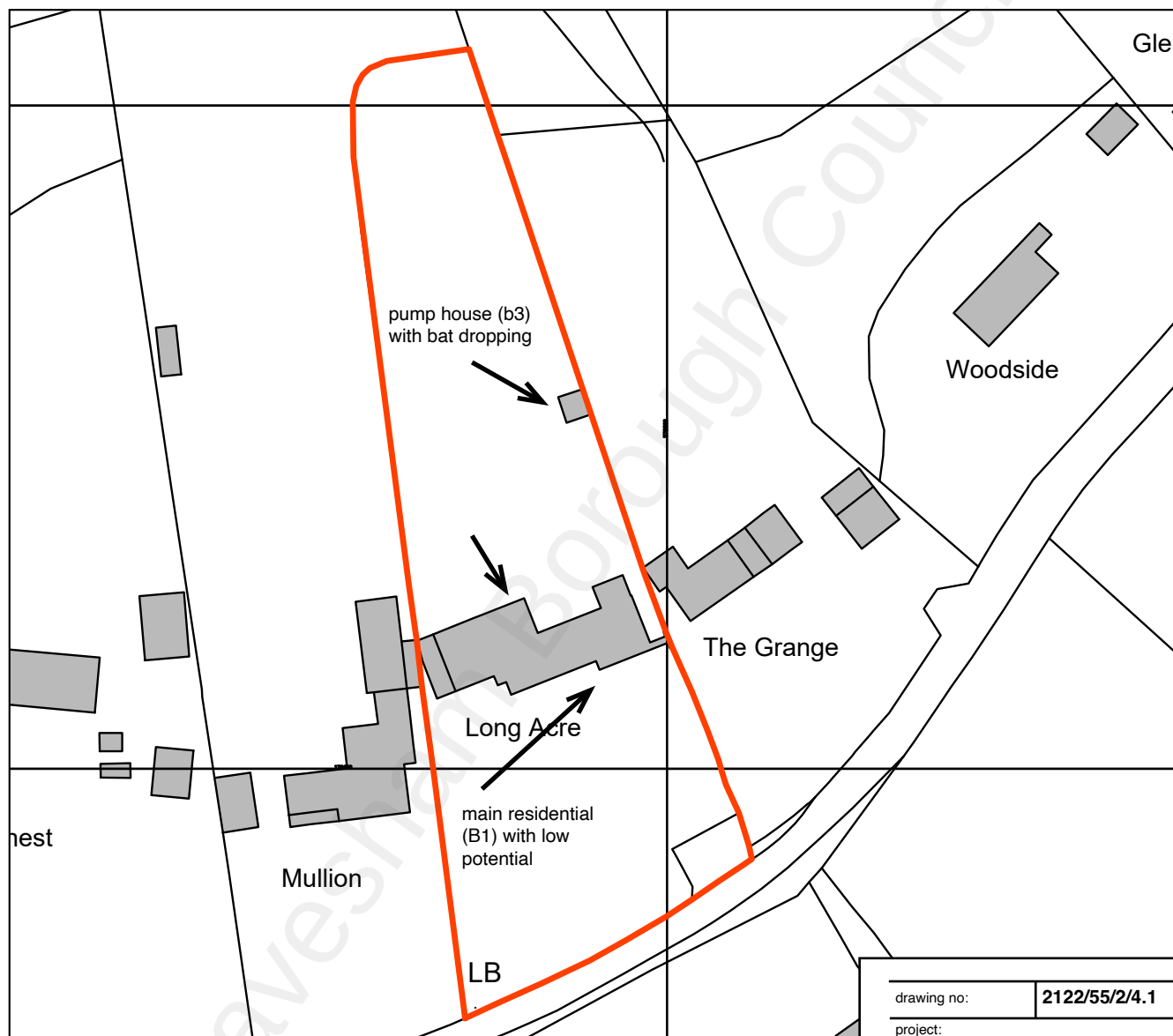
4.2.3 Personnel

All reptile survey work was undertaken by Dr. Lee Brady (PhD, BSc honours, MCIEEM), a qualified ecologist with over 30 years experience of field surveying.

4.2.4 Limitations of Reptile Survey Assessment

The assessment was undertaken following good practice guidelines and according to expert opinion. There was no disturbance to cover objects during the reptile survey period and survey effort is considered sufficient for determining the likely presence of reptiles that may forage or shelter within the study area.

Fig. 4.1 Bat Surveyor Locations



drawing no: 2122/55/2/4.1

project:
Long Acre

title:
Bat Surveyor Locations

scale: **N.T.S.**

date: **Sep 2022**

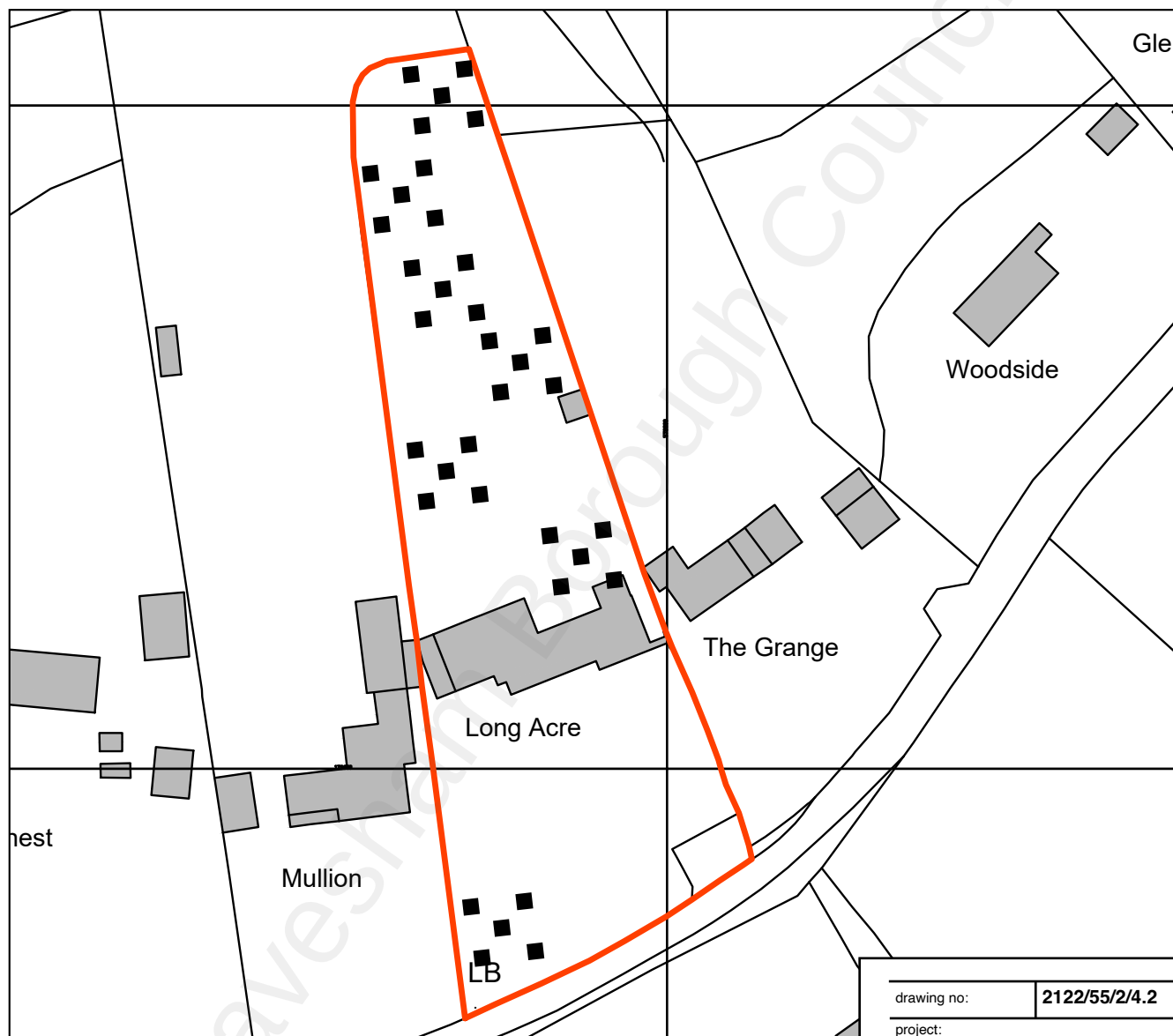


13 Woodside Cottages,
Dunkirk,
Kent ME13 9NY

Tel/Fax: 01227 751408
info@calumma.co.uk

www.calumma.co.uk

Fig. 4.2 Artificial Cover Objects



drawing no: **2122/55/2/4.2**

project:
Long Acre

title:
ACO

scale: **N.T.S.**

date: **Sep 2022**

5. Proposed Development and Summary Site Description

5.1 Site Location

The proposed development area includes a residential property in the North Kent Plain Natural Area (English Nature, 1998). The site is accessed directly from Pear Tree Road.

5.2 Proposed Development

Demolition of existing building(s) and construction of new residential dwelling.

The site is approximately 0.46 Ha.

5.3 Aquatic Habitat

Ponds located within the local area have been identified using the following sources:

- Ordnance Survey (<https://www.bing.com/maps>)
- MAGIC (<http://magic.defra.gov.uk>)
- Google Earth

At least one pond is known to be located within 250 m of the proposed development site. A series of ornamental pools (mostly desiccated but one with very shallow water) are located within the proposed development site. Other small ornamental ponds could also occur in nearby residential gardens.

5.4 Terrestrial Habitat

Land within the proposed development area includes a residential garden with associated grassland, trees and shrubs. The grass had recently been cut and several trees had been felled prior to the site assessment being undertaken.

5.5 Buildings

Three structures are located within the proposed development site:

B1 – Two-storey residential dwelling.

B2 – Garden shed.

B3 – Pump house for now defunct pools.

6. Survey Results

6.1 Bat Survey Results

No bats were observed emerging from any of the buildings. However, droppings were found within the pump house building (B3) and samples taken for analysis. The results of this analysis found these droppings to be brown long eared bat. This species was, however, not observed emerging from any buildings during the survey.

Foraging activity was observed with common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) foraging and commuting activity observed and recorded around the rear garden area treeline and occasionally to the front of the property. Five noctule (*Nyctalus noctula*) passes were recorded by all surveyors, which were likely to be commuting high above the survey area.

The activity during the dawn survey was generally diminished compared to the evening surveys. Two brown long eared bats were observed commuting across the site, with a single noctule and soprano pipistrelle pass recorded respectively.

Bat activity is summarised in Fig. 6.1.

6.1.1 Bat Evaluation Summary

Brown long eared bat droppings were found within the pump house (B3) but no bats were observed emerging or re-entering this building and no bats were observed emerging from the main residential building. Bat foraging and commuting activity was observed within the surrounding habitats.

Time	Species	Passes	Activity and Location
21:25	Noc	1	Flying high over building, west to east. Heard by all surveyors
21:33	C.pip	1	Foraging along treeline in north western garden area
21:47	Noc	1	Flying over building, south west to north east. Heard by all surveyors
21:58	S.pip	1	Foraging along treeline in north western garden area
22:07 – 22:10	C.pip	10	Multiple passes in and around the treeline in the north eastern garden and close to pump house.
22:08	Noc	1	Heard, not seen. Heard by all surveyors
22:08	C.pip	1	Commuting pass – north to south
22:10	S.pip	1	Not seen, but likely to the south of main building
22:18	Noc	1	Heard, not seen. Heard by all surveyors
22:31	Noc	1	Heard, not seen. Very brief call
Noc = Noctule C.pip = Common Pipistrelle S.pip = Soprano Pipistrelle			

Table 6.1. 12th June 2022 Evening Emergence Survey.

Time	Species	Passes	Activity and Location
21:40	Noc	1	Commuting pass overheard, south to north
21:42	C.pip	1	Foraging activity along treeline/ hedge line
21:59	C.pip	1	Foraging activity along treeline/ hedge line
22:01	BLE	1	Brief pass, heard not seen
22:10 – 22:27	C.pip	Multiple	Multiple passes in and around the treeline in the north eastern garden and close to pump house
Noc = Noctule C.pip = Common Pipistrelle BLE = Brown Long Eared			

Table 6.2. 18th July 2022 Evening Emergence Survey of Pump House (B3).

Time	Species	Passes	Activity and Location
04:33	BLE	1	Faint pass. Heard not seen
04:55	Noc	1	Faint, distant call. Heard not seen
04:55	BLE	1	Faint, distant call. Heard not seen
05:01	S.pip	1	Commuting to the north west
BLE = Brown Long Eared Bat Noc = Noctule S.pip = Soprano Pipistrelle			

Table 6.3. 18th August 2022 Dawn Re-Entry Survey of Pump House (B3).

6.2 Reptile Survey Results

Survey work did not reveal the presence of reptiles within the study area (Appendix I).

6.2.1 Reptile Observations

Viviparous lizard: Not recorded within the proposed development site during the 2022 survey period.

Slow-worm: Not recorded within the proposed development site during the 2022 survey period.

Grass snake: Not recorded within the proposed development site during the 2022 survey period.

Adder: Not recorded within the proposed development site during the 2022 survey period.

Year	Maximum Adult Count			
	Viviparous Lizard	Slow-worm	Grass Snake	Adder
2022	0	0	0	0
Population Size Class:	Not recorded	Not recorded	Not recorded	Not recorded
Population Score:	-	-	-	-
Total Key Reptile Site Score:	0			

Table 6.3. Reptile survey results for land at Long Acre in 2022. Figures represent maximum number of adult observations within single survey session per year. Survey work was principally aimed at determining presence and population size classes are estimated using Froglife (1999) criteria.

6.2.2 Reptile Evaluation Summary

Reptiles were not confirmed present on proposed development land at Long Acre. Since proposed development work will not impact upon reptiles, reptile mitigation works are not considered necessary.

If development work has not commenced within a period of one year, the site should be re-assessed.

Fig. 6.1 Bat Activity



-  Brown Long Eared Bat Activity
-  Common Pipistrelle Foraging
-  Noctule Commuting
-  Soprano Pipistrelle Foraging
-  Location of Surveyors

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project:	Long Acre
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title:	Bat Activity
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scale: N.T.S.	date: Sep 2022
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7. Mitigation Recommendations

Appropriate actions should be undertaken to ensure that there is minimal disturbance to protected species and any retained habitat of biodiversity interest. Recommendations include actions for other species of biodiversity interest identified in the preliminary ecological appraisal.

7.1 General Construction Safeguards

In order to reduce adverse effects associated with construction activities on adjacent habitats or fauna that may occur within or close to the site, safeguarding measures should be implemented by site staff during construction, to include the following:

- Working areas will be clearly demarcated and no works that could result in disturbance to boundary trees and shrubs will take place.
- No vegetation outside of the working areas will be disturbed.
- Damping down of dust sources and covering of loose materials to reduce dust deposition within adjacent habitats will be undertaken as appropriate.
- Use of lighting will be kept to a minimum. Any lighting required (e.g. for security purposes) will be directed away from boundary features, with use of directional lighting or screening as required to reduce light spill.
- Storage of chemicals and hazardous materials will be in line with current best practice guidelines, ensuring that they are secure and cannot be accessed or knocked over by roaming animals.
- The storage of topsoil or other 'soft' building materials in the site will be given careful consideration, so as to avoid the adoption of mounds by mammals, such as fox. These will be kept to a minimum and any mounds subject to daily inspections.
- No trenches/excavations will be left open over night without the creation of sloping escape ramps for fox and hedgehog, which may be achieved by edge profiling of trenches / excavations or by using planks placed into them at the end of each working day.
- Any trenches / pits will be inspected each morning to ensure no mammals have become trapped overnight. Should a mammal, such as a hedgehog or fox, become trapped in trench Calumma Ecological Services will be contacted for further advice.
- Open pipe-work larger than 150 mm outside diameter will be blocked off at the end of each day.
- Fires will only be lit in secure compounds and not allowed to remain during the night.
- Food and litter will not be left within the working areas overnight.

7.2 Birds

7.2.1 Timing of Works

To avoid any potential offence under the Wildlife & Countryside Act, no clearance of features that could support nesting birds should be undertaken during the bird-nesting season (1st March to 31st August inclusive).

If this is not practicable, any potential nesting habitat to be removed must first be checked by a competent ecologist in order to determine the location of any active nests. Any active nests identified will then need to be cordoned off (within a minimum 5m buffer) and protected until the end of the nesting season or until the birds have fledged. These checking surveys would need to be carried out no more than three days in advance of vegetation clearance. If vegetation clearance works have not been completed within this timeframe, an update check should be undertaken.

7.2.2 Bird Nesting Boxes

The applicant should consider installing bird nesting boxes in suitable locations. Suitable exterior boxes include those for blue tit and/or house sparrow and should be installed at a height of ~3 m above ground with a minimum distance of 3 m between boxes. Boxes should face north to east.

Details of the boxes that will be installed together with their locations should be included with the application.

7.3 Bats

7.3.1 Summary of Bat Activity

Brown long eared bat droppings were found within the pump house (B1) but no bats were observed emerging or re-entering this building and no bats were observed emerging from the main residential building. Bat foraging and commuting activity was observed within the surrounding habitats.

7.3.2 Roost Categorisation

The maximum number of bats present within the application area is likely to be one. This is based on the low numbers of bats observed foraging locally and that no bats were observed emerging or re-entering the pump house (B3). It was only through the bat droppings found that a roost was identified. The low numbers and species of bat recorded (brown long eared bat) were indicative of these being a day/ transitional roost for low numbers of a common bat species.

7.3.3 Impact Assessment

Any works to building B3 that would impact the location where brown long eared have been found to be roosting would constitute either a disturbance or destruction of the roost present here. The common pipistrelle maternity roost is not to be affected by the proposed works.

Without mitigation, any impact is likely to be permanent and would result in both the disturbance and likely destruction of the brown long eared roost. These carried out without licence would constitute an offence under the Wildlife and Countryside Act (1981).

7.3.4 Mitigation Licencing

A mitigation licence from Natural England is required as it is predicted that there will be disturbance of the roost as a result of the works. The licence would require the production of a method statement of works, the installation or temporary and permanent roost replacement and measures such as hand removal of the roof of the pump house under the supervision of a licenced ecological consultant.

7.3.5 Mitigation and Compensation

Two temporary roost locations would be installed in trees that are as close to the location of the original roost as possible. These would consist of two large multi chambered Woodstone bat boxes.

Replacement roost would have to be installed within any new building. Due to the low numbers of bat and the small space presented by the pump house a large roof void space is not recommended. Instead installing an equivalent wall cavity within the new build roof void space would be sufficient to replace this location. This would consist of a Habibat Box 001. A suitable roof void equivalent to the space present would be installed which would be 2m by 2m with a height of 2m at the apex. This would simulate the approximate dimensions of the pump house. Suitable access tiles would be required, with an entrance and separate exit, installed at least 3m above ground. The location of this roost replacement feature would be confirmed once the full design of the new building is available.

7.3.6 Lighting

To account for the foraging activity of bat species within the local area any lighting installed at the property will conform to the specifications which are outlined within BCT Guidance Note (2018; see also Appendix II). This will reduce any light pollution would have on nocturnal activity of fauna, namely bat species, some of which are extremely sensitive to light pollution. Light spill into adjacent habitats will be reduced and avoided by the following:

- All luminaries will lack UV elements; metal halide and fluorescent sources will be avoided
- A warm white light spectrum on external lighting will be adopted (<2700kelvin) to reduce the blue light component
- LED luminaries will be used where a sharp cut off is required to avoid light spill into adjacent habitat
- External luminaries will feature wavelengths higher than 550nm to avoid the component of light most disturbing to bats
- Column heights of external lighting will be limited
- Luminaries will be mounted on the horizontal plane, with no upwards tilt
- Security lighting will be set on motion sensors and on short timers (<1min)

7.4 Great Crested Newt

The applicant has confirmed that a District Level Licence will be employed for the scheme.

7.5 Hedgehogs

7.5.1 Hedgehog Gates

If any installed fencing will be of a design similar to that of close board fencing which are typically solid from ground level, *hedgehog gates* will be installed in the fencing within the proposed site. The gates consist of semi circular holes (measuring 0.13 m x 0.13 m) cut into the bottom of the fence to allow the movement of hedgehogs into adjacent areas of land.

7.5.2 Open Excavations

During months when hedgehogs are most likely to be active (March to October), excavations will not be left open for animals to fall into. If this is not possible, suitable planks of wood should be placed to allow trapped animals to escape. Any open excavation will be inspected before works commence in the morning and trapped animals relocated to a suitable place of safety along the site boundary.

7.6 Ecological Enhancement and Biodiversity Net Gain

The National Planning Policy Framework (NPPF) encourages new developments to maximise the opportunities for biodiversity through incorporation of enhancement measures. The proposals present the opportunity to deliver ecological enhancements at the site for the benefit of local biodiversity, thereby making a positive contribution towards the broad objectives of national conservation priorities and the local Biodiversity Action Plan (BAP).

Details of habitat management and enhancement works that the applicant has confirmed will be undertaken should be included with the application. As well as protected species, such work should target more widespread species that are of biodiversity interest.

Features that should be considered for inclusion include:

- Bird nesting boxes.
- Bat roosting boxes.
- Ecologically sympathetic soft landscaping that provides shelter and nectar for invertebrates such as bees.
- Creation of log/habitat piles that provide shelter for amphibians and reptiles.
- Eradication of non-native species such as Japanese Knotweed.

8. References and Further Reading

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Appendix I: Reptile Survey Results

Source:

Calumma Ecological Services

Gravesham Borough Council

Long Acre Survey Results for Site [2022]

Site Name & Survey Area

Long Acre
Site

Grid Reference:

TQ 701 706

Vice County:

West Kent

Natural Area:

North Kent Plain

Species Observed in Site Terrestrial Habitat [2022]:

No Observations

Reptile Survey Summary:**V. Lizard****Slow-worm****Grass Snake****Adder**

Maximum Adult Count:

Population Status:

Absent

Absent

Absent

Absent

Reptile Survey Results

Session	Date	Air Temp	Wind	Rain	V. Lizard			Slow-worm			Grass Snake			Adder		
					Adult	Imm	Neo	Adult	Imm	Neo	Adult	Imm	Neo	Adult	Imm	Neo
LB1	8/4/2022	10.0	Light	None												
LB2	21/4/2022	15.0	Light	None												
LB3	28/4/2022	12.0	Light	None												
LB4	5/5/2022	15.0	Light	None												
LB5	11/5/2022	17.0	Fresh	Light												
LB6	18/5/2022	23.0	Light	None												
LB7	26/5/2022	16.5	Light	None												

Date Of Last Modification: 09/09/2022

Calumma Ecological Services Reference:

2122/55

Appendix II: Bats and Lighting

Source:

Bat Conservation Trust and Institution of Lighting Engineers

Gravesham Borough Council

Summary of Requirements

The two most important features of street and security lighting with respect to bats are:

1. The UV component. Low or zero UV installations are preferred to reduce attraction of insects to lighting and therefore to reduce the attraction of foraging bats to these areas.
2. Restriction of the area illuminated. Lighting must be shielded to maintain dark areas, particularly above lighting installations, and in many cases, land adjacent to the areas illuminated. The aim is to maintain dark commuting corridors for foraging and commuting bats. Bats avoid well lit areas, and these create barriers for flying bats between roosting and feeding areas.

UV characteristics:

Low

- Low pressure Sodium Lamps (SOX) emit a minimal UV component
- High pressure Sodium Lamps (SON) emit a small UV component
- White SON, though low in UV, emit more than regular SON

High

- Metal Halide lamps emit more UV than SON lamps, but less than Mercury lamps
- Mercury lamps (MBF) emit a high UV component.
- Tungsten Halogen, if unfiltered, emit a high UV component
- Compact Fluorescent (CFL), if unfiltered, emit a high UV component.

Variable

- Light Emitting Diodes (LEDs) have a range of UV outputs. Variants are available with low or minimal UV output.

Glass glazing and UV filtering lenses are recommended to reduce UV output.

Street lighting

Low-pressure sodium or high-pressure sodium must be used instead of mercury or metal halide lamps. LEDs must be specified as low UV. Tungsten halogen and CFL sources must have appropriate UV filtering to reduce UV to low levels.

Lighting must be directed to where it is needed and light spillage avoided. Hoods must be used on each lamp to direct light and contain spillage. Light leakage into hedgerows and trees must be avoided.

If possible, the times during which the lighting is on overnight must be limited to provide some dark periods. If the light is fitted with a timer this must be adjusted to reduce the amount of 'lit time' and provide dark periods.

Security and domestic external lighting

The above recommendations concerning UV output and direction apply. In addition:

- Lighting should illuminate only ground floor areas - light should not leak upwards to illuminate first floor and higher levels;
- Lamps of greater than 2000 lumens (150 W) must not be used;
- Movement or similar sensors must be used - they must be carefully installed and aimed, to reduce the amount of time a light is on each night;
- Light must illuminate only the immediate area required, by using as sharp a downward angle as possible;
- Light must not be directed at or close to bat roost access points or flight paths from the roost - a shield or hood can be used to control or restrict the area to be lit;
- Wide angle illumination must be avoided as this will be more disturbing to foraging and commuting bats as well as people and other wildlife;
- Lighting must not illuminate any bat bricks and boxes placed on buildings, trees or other nearby locations.



Calumma Ecological Services is an independent wildlife consultancy specialising in the applied conservation of amphibians and reptiles. *Calumma Ecological Services* offers a full range of specialist services to private companies, local authorities, government agencies, wildlife organisations and members of the public.

Calumma Ecological Services works towards the policy of 'best practice' advocated by ARG UK (formally known as Herpetofauna Groups of Britain and Ireland).

For more details please contact:

Dr. Lee Brady, *Calumma Ecological Services*,
13 Woodside Cottages, Dunkirk, Faversham, Kent ME13 9NY

Tel/Fax: 01227 751408
info@calumma.co.uk

www.calumma.co.uk