

WILD FRONTIER ECOLOGY

Proposed Development at Home Farm,
Bedfield



Biodiversity Enhancement Plan

November 2022

Report produced by	Submitted to
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The data which we have prepared and provided is accurate, and has been prepared and provided in accordance with the CIEEM’s Code of Professional Conduct. We confirm that any opinions expressed are our best and professional bona fide opinions.



This report conforms to the British Standard 42020:2013 Biodiversity - Code of practice for planning and development.

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1. Background

Wild Frontier Ecology Ltd. was commissioned by Chapter Build Group Ltd. to undertake an ecological assessment of land and buildings at the site that was formerly RH Barrell Engineering. The site is located to the north of Earl Soham Road within the village of Bedfield in Suffolk (centred on national grid reference TM 22945 65590). The surveys were completed to inform the required Biodiversity Enhancement Plan and also to inform a European Protected Species (EPS) Mitigation licence for bats.

The proposal is for the demolition of existing buildings and the construction of seven dwellings (planning reference DC/21/03606) in addition to the construction of one dwelling and the conversion of one existing building to a dwelling (planning reference DC/20/04727). Both applications have been granted by the local planning authority: Mid Suffolk District Council.

The site location and boundary are shown in Figure 1 and 2, below. The proposed development plans are shown in Figure 3 and 4 below.

Both planning permissions require the provision of a Biodiversity Enhancement Plan, before the development commences. The planning condition which relates to the Biodiversity Enhancement Plan is provided in full, below:

Quote from planning permission (Condition 8 of planning reference: DC/20/04727 & Condition 4 of planning reference: DC/21/03606)

“ACTION REQUIRED PRIOR TO WORKS AT SLAB LEVEL: BIODIVERSITY ENHANCEMENT LAYOUT

A Biodiversity Enhancement Layout for Protected and Priority species shall be submitted

to and approved in writing by the local planning authority. The content of the Biodiversity

Enhancement Layout shall include the following:

- a) Purpose and conservation objectives for the proposed enhancement measures;*
- b) detailed designs to achieve stated objectives;*
- c) locations of proposed enhancement measures by appropriate maps and plans;*
- d) persons responsible for implementing the enhancement measures;*
- e) details of initial aftercare and long-term maintenance (where relevant).*

The works shall be implemented in accordance with the approved details and shall be retained in that manner thereafter.

Reason: To enhance Protected and Priority Species/habitats and allow the LPA to discharge its duties under the s40 of the NERC Act 2006 (Priority habitats & species).”

Figure 1. Location of proposed development site in relation to the wider context

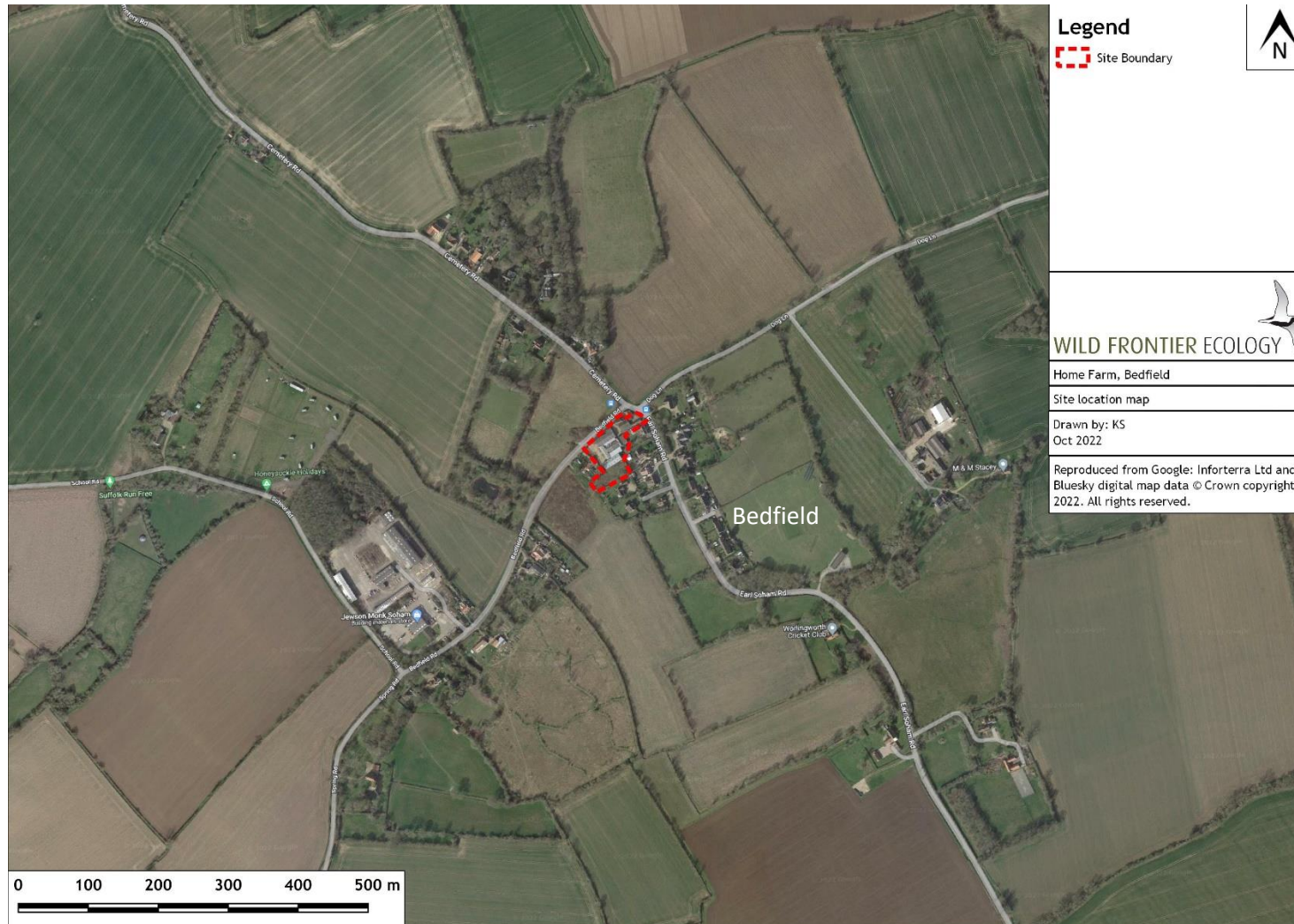


Figure 2. Aerial image of proposed development site

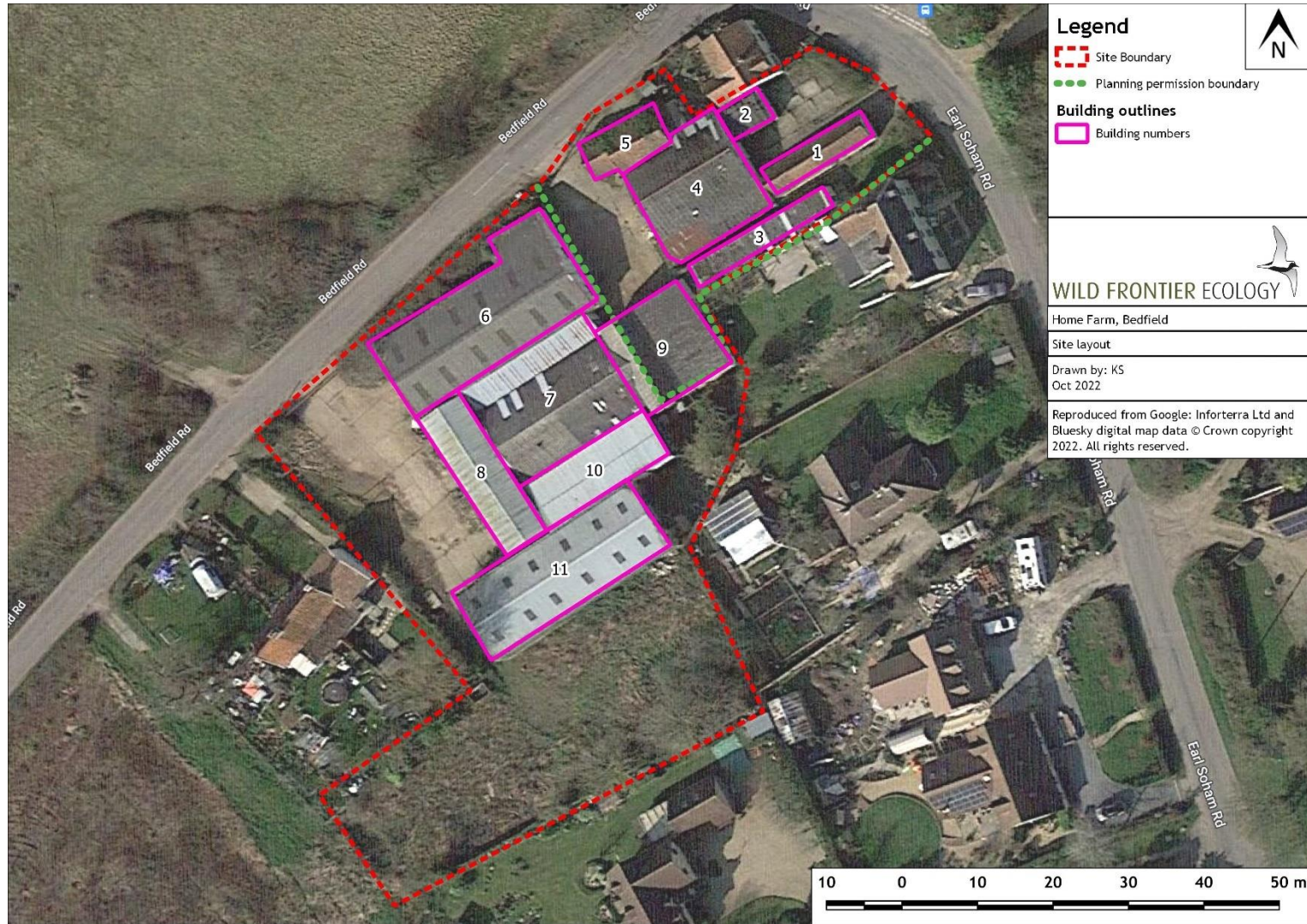
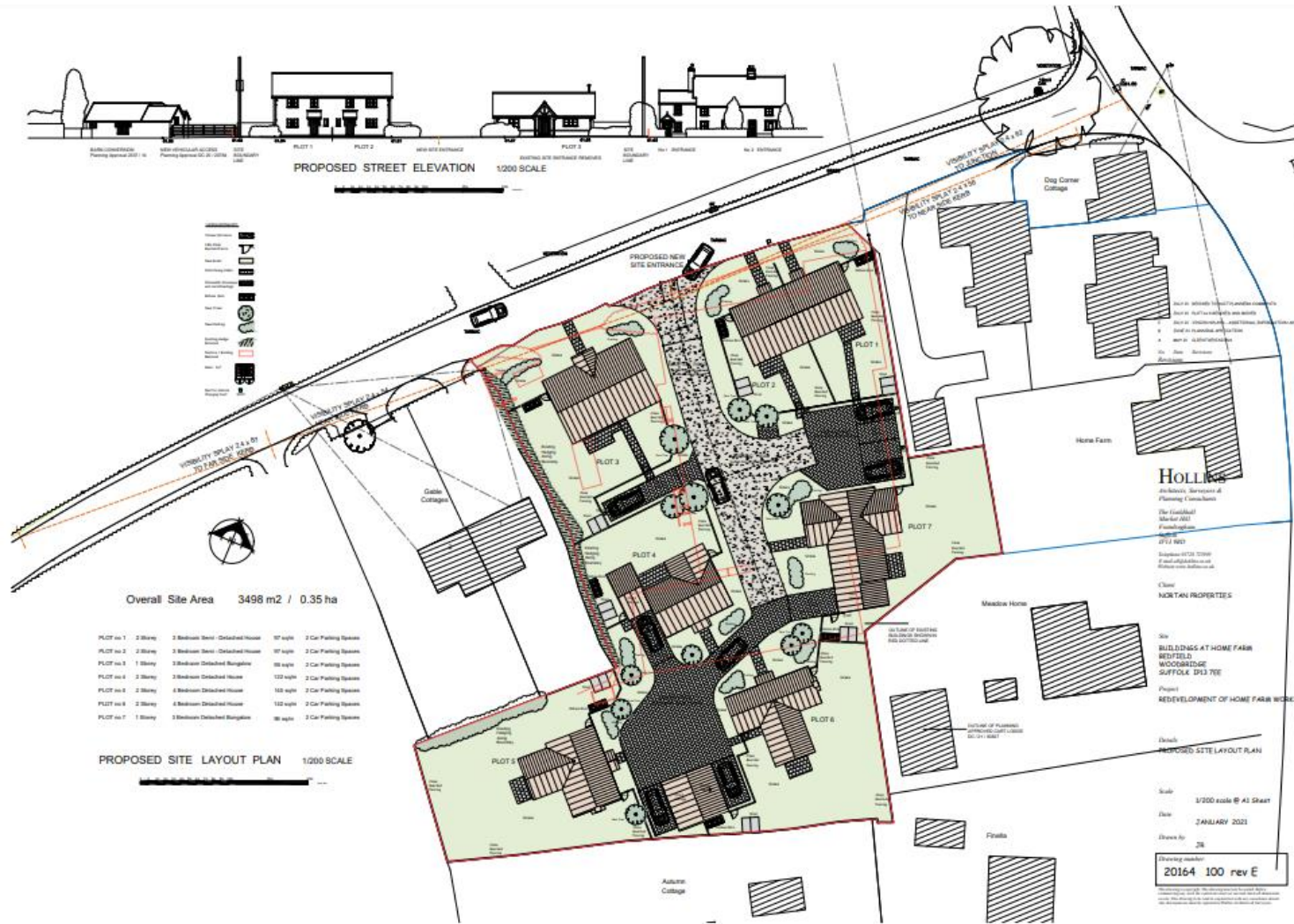


Figure 3. Proposed development plan (DC/20/04727)



Figure 4. Proposed development plans (DC/21/03606)



2. Methods of Site Inspection and Bat Surveys

2.1 Visual Inspection

The visual inspection of the buildings was undertaken on 29th June 2022 by Katrina Salmon BSc (Natural England licence number: 2022-10286-CL17-BAT) and Sam Collin BSc.

All accessible areas of the targeted buildings were investigated for evidence of bat use and bat roosting potential. The search for bat roosts was not only for bats in situ, but also for the more likely droppings, urine and body oil stains, and accumulations of feeding remains (insect parts). Torches, ladders, binoculars, digital endoscope, and thermal imaging camera were all on-hand for use. K. Salmon was accredited under Susannah Dickinson's licence (NE bat licence registration no. 2016-22497-CLS-CLS) for use of the endoscope. Signs of building use by barn owls and other birds were also searched for, including nesting sites, feathers, droppings, and pellets.

2.2 Extended Habitat Survey

An Extended UK Habitat (UKHab) survey of the site was undertaken during the initial site visit was undertaken on the 29th June 2022 by K. Salmon and S. Collin. The survey method followed UKHab methodology¹, with the methods being 'extended' to include a general evaluation of potential habitats for any protected or valued species. Photographs were taken to record key features/views.

Only habitats on the landholding were available to survey. Habitats outside of the landholding were appraised as far as possible by viewing from the landholding, public footpaths, and roads, as well as by using publicly accessible aerial photographs.

The hedgerows are rated against the criteria for Priority Habitats², which is as follows:

"All hedgerows consisting predominantly (i.e. 80% of more cover) of at least one woody UK native species are covered by this priority habitat, where each UK country can define the list of woody species native to their respective country."

For the purposes of the Hedgerow Regulations (1997)³, hedgerows may also be referred to as 'species rich' if they meet the following criteria:

"Species-rich hedgerows may be taken as those which contain 5 or more native woody species on average in a 30 metre length, or 4 or more in northern England, upland Wales and Scotland. Hedges which contain fewer woody species but a rich basal flora of herbaceous plants should also be included but practical criteria for identifying them have yet to be agreed. Many of the thin straight hawthorn hedges which characterise later parliamentary enclosures, as well as most hedges which consist mainly of beech,

¹ UK Habitat Classification Working Group (2018). UK Habitat Classification User Manual. Ecountability Ltd, Kentisbeare.

² JNCC (November 2016). UK Biodiversity Action Plan Priority Habitat Descriptions. Available at: <https://jncc.gov.uk/our-work/uk-bap-priority-habitats/>.

³ The Hedgerow Regulations 1997. Available at: <https://www.legislation.gov.uk/uksi/1997/1160/contents/made>.

privet or yew or non-native trees, are excluded. Recently planted species-rich hedges are included".⁴

2.3 Bat Emergence Surveys

The bat roost emergence surveys of the buildings which had credible bat roost potential was carried out during the active season of 2022.

The first dusk emergence survey was undertaken on 21st July 2022 by K. Salmon (KS) and Lucy Hadingham MSci (LH), who were assisted by one HIK Micro Owl Pro thermal imaging camera and one Pulsar Helion XP28. The surveyors monitored Buildings 1 and 5 using Anabat SD1 bat detectors, and the thermal cameras were paired with Song Meter Mini bat detectors or SMZC bat detectors. The monitoring positions (Figure 5) were effective from 15 minutes before sunset and held for 90 minutes post-sunset.

The second dusk emergence survey was undertaken on 9th August by Susannah Dickinson BSc MCIEEM bat licence (NE bat licence registration no. 2016-22497-CLS-CLS) (SD), K. Salmon (KS) and L. Hadingham (LH), who were assisted by two HIK Micro Owl Pro, two Pulsar Helion XP28 and a HIK Lynx Pro thermal imaging camera. The surveyors monitored Buildings 1, 4 and 5 using an Anabat SD1 bat detectors and an EchoMeter Touch bat detector, and the thermal cameras were paired with a combination of Anabat Express bat detectors, Song Meter Mini bat detectors and SMZC bat detectors. The monitoring positions (Figure 6) were effective from 15 minutes before sunset and held for 90 minutes post-sunset.

The third dusk emergence survey was undertaken on 23rd August by K. Salmon (KS) and Justin Parry BSc (JP) who were assisted by one HIK Micro Owl Pro and three Pulsar Helion XP28 thermal imaging cameras. The surveyors monitored Building 4 and 5 using Anabat SD1 bat detectors, and the thermal cameras were paired with either Anabat Express or SMZC bat detectors. The monitoring positions (Figure 7) were effective from 15 minutes before sunset and held for 90 minutes post-sunset.

Bat species were identified through a combination of examining flight pattern and behaviour, and echolocation call analysis using Analook software with reference to WFE's in-house library of bat calls and available literature (see below).

All video recordings were reviewed in line with the Thermal Imaging Guidelines⁵ to confirm the locations of bat species and to accurately identify any emerging bats by comparing video recordings with audio recordings. The recordings were analysed by either Philip Farndon BSc, Arabella Stickler MA MA or Lorna Salmon BSc and checked by K. Salmon using VLC Media Player.

2.4 Audio Recording Analysis

All sound recordings were reviewed by K. Salmon to confirm the full range of bat species encountered and to refine the speculation of bat activity exhibited. All recordings were analysed using AnalookW software. Audio analysis of frequency division and time expansion data was achieved by comparing sound characteristics and sonogram shapes and measurements (peak call frequency, call frequency range, and mode pulse interval)

⁴ Biodiversity: The UK Steering Group Report - Volume II: Action Plans (December 1995, Tranche 1, Vol 2, p243).

⁵ Fawcett Williams, K. (2021) Thermal Imaging: Bat Survey Guidelines.

to reference measurements and/or recordings provided by Russ et al. (2012)⁶, Parsons and Jones (2000)⁷, the Bat Conservation Trust (2008)⁸, Sowler (2010)⁹, and WFE's in-house call reference library.

⁶ Russ, J. (2012). *British Bat Calls: A Guide to Species Identification*. Pelagic Publishing, Exeter.

⁷ Parsons, S. and Jones, G. (2000). Acoustic Identification of Twelve Species of Echolocating Bat by Discriminate Function Analysis and Artificial Neural Networks. *The Journal of Experimental Biology* 203: 2641-2656.

⁸ Bat Conservation Trust. (2008). Bat Sound Library. Online at:
http://www.bats.org.uk/pages/bat_sound_library_introduction.html?handle:bat_sound_library_introduction.html

⁹ Sowler S. (2010). Difficult Sonograms and Social Calls - Advanced Anabat Analysis. Alana Ecology Workshop. Bury St. Edmunds, Suffolk

Figure 5. Surveyor positions on first bat emergence survey (21/07/22)

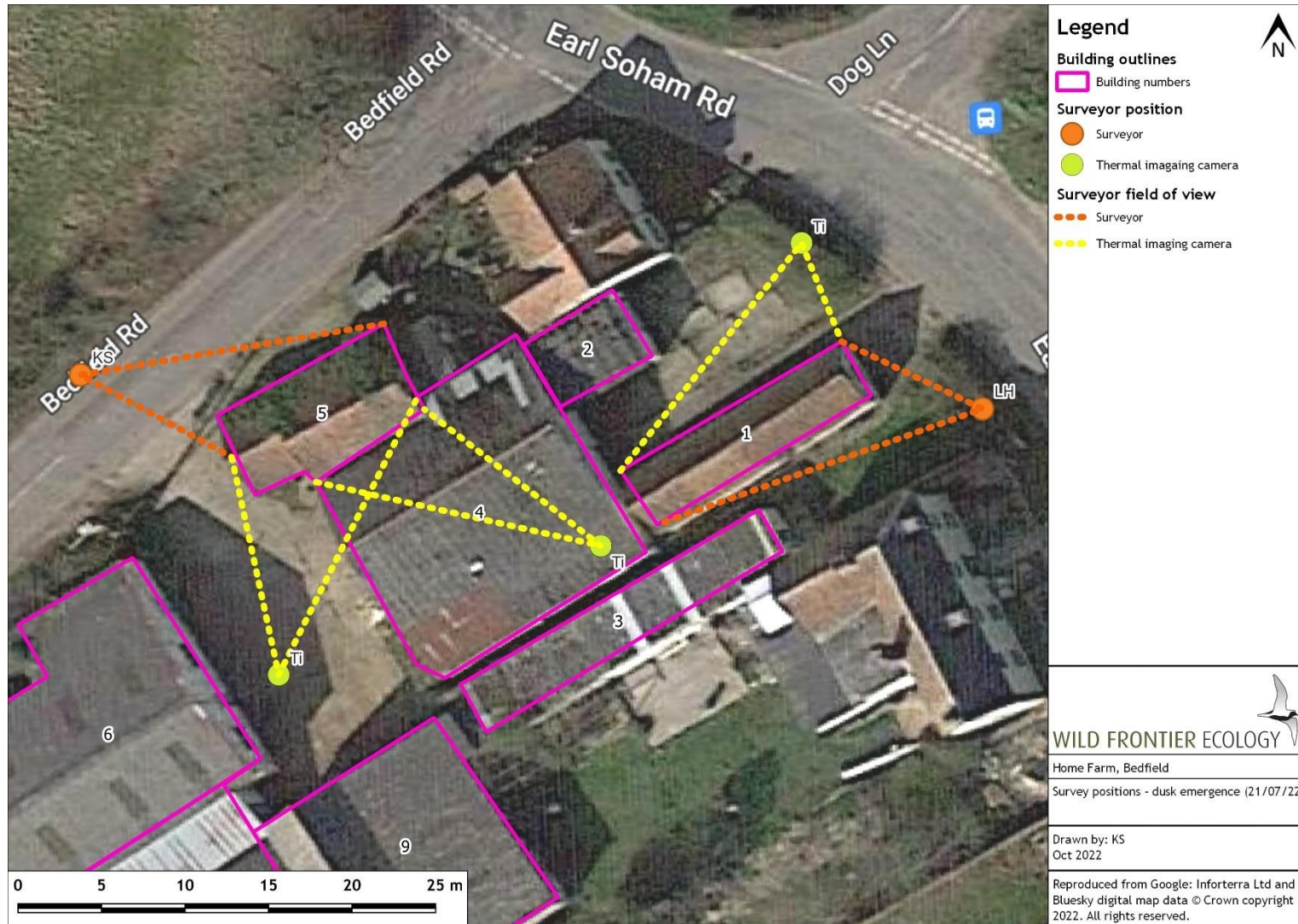


Figure 6. Surveyor positions on second bat emergence survey (09/08/22)

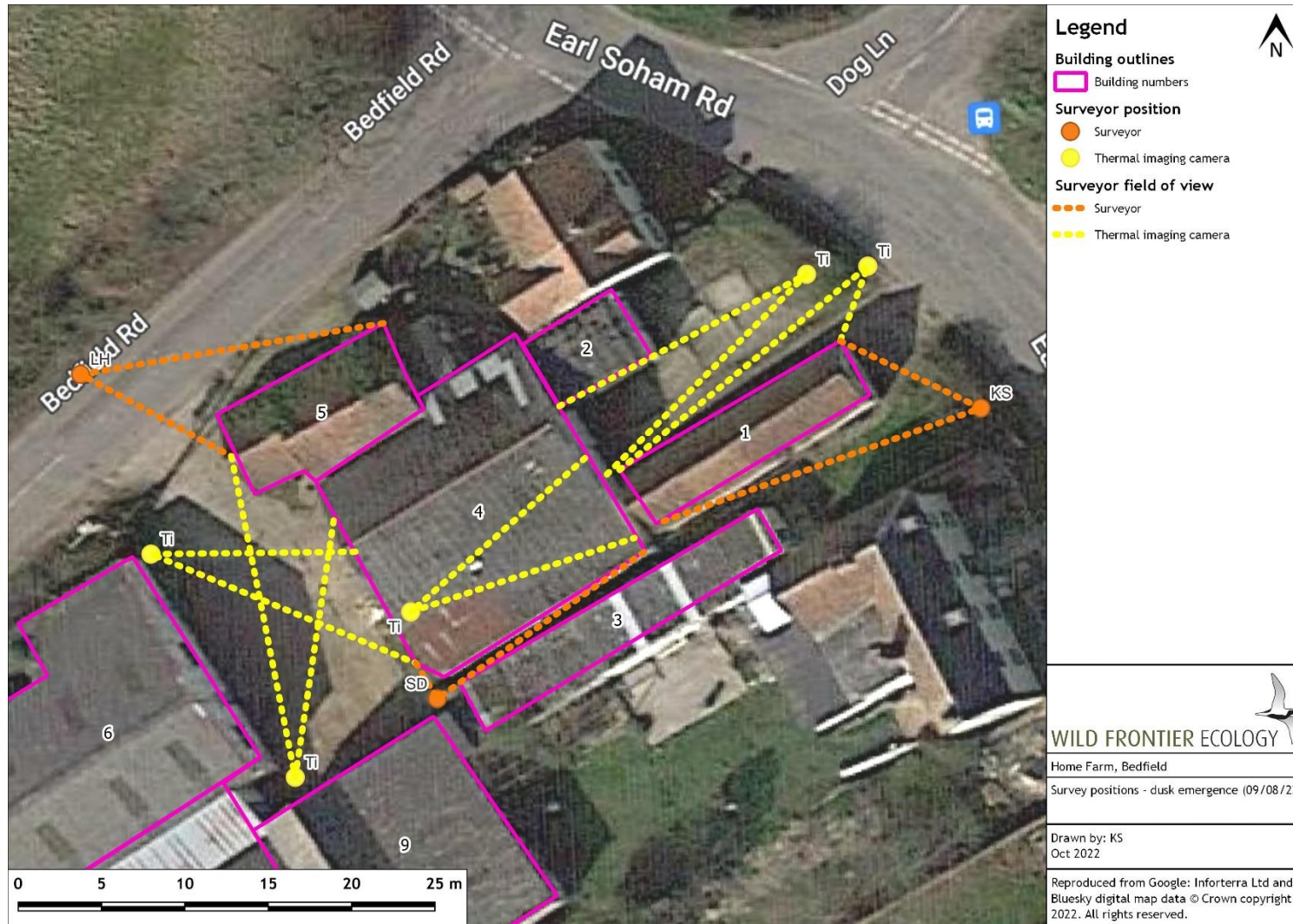
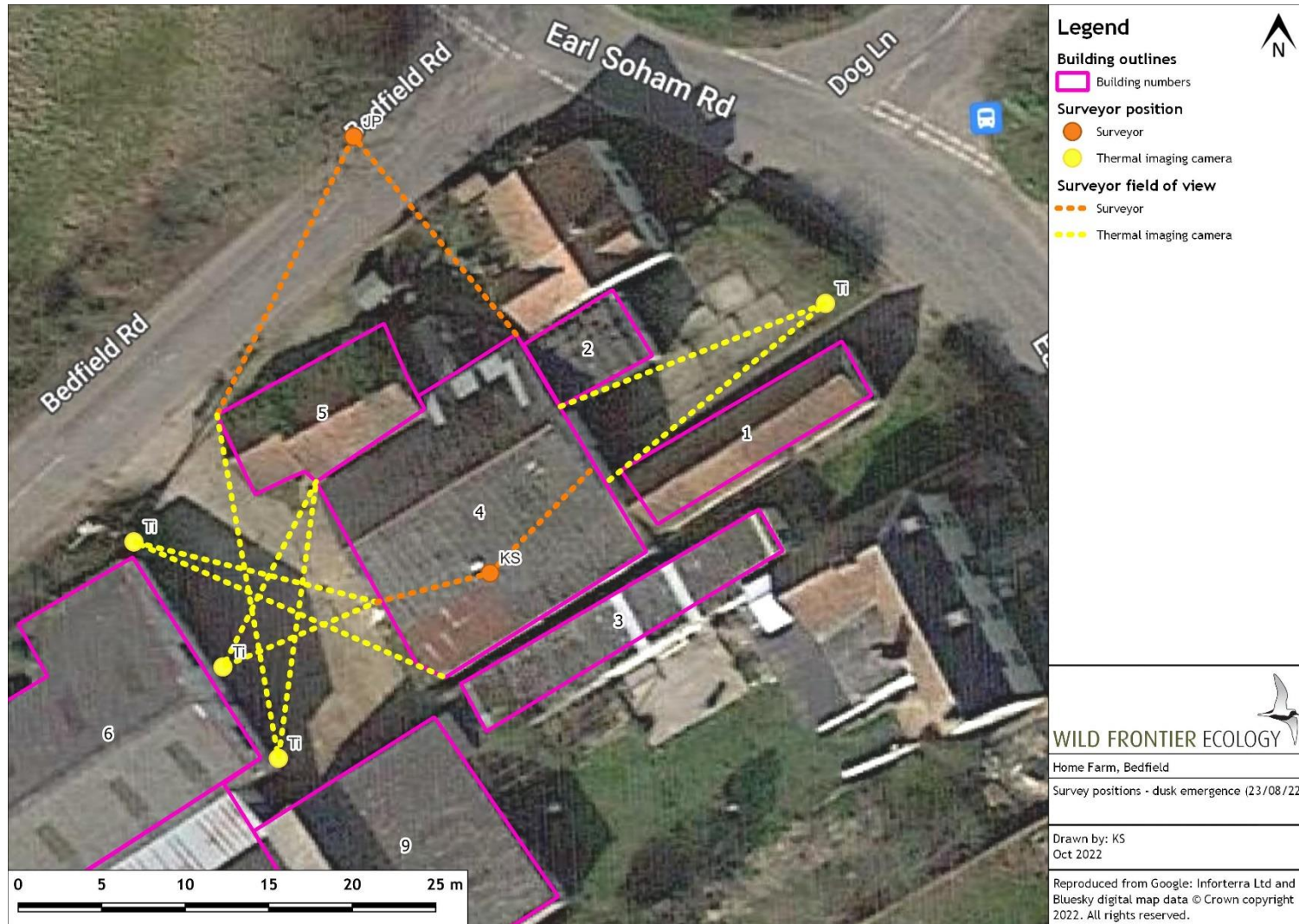


Figure 7. Surveyor positions on third bat emergence survey (23/08/22)



3. Survey Results

3.1 Visual Inspection of Buildings

The visual inspection was completed on a mild day; 80% cloud cover, winds at Beaufort Scale 1, no rain, and a temperature of 18°C.

Table 1. Summary of Building Inspection Results

Building number	Construction description	Bat/Bird signs	Photo Reference (see Appendix 1)	Bat Roost Potential (Neg/Low/Mod/High)
1	Old office building. In good-moderate condition. Of brick construction with rendered walls. Pantile roof, with some tiles lifted or slipped. Shallow roof space with modern machine cut timbers. Roof lined with bitumen felt.	None	Photos 1-3	Moderate
2	Single skin breeze block garage in poor condition. No internal access due to collapsed roof.	None	Photo 4	Negligible
3	Single skin breeze block building split into multiple small sections. Roof is corrugated cement fibre sheet with no roof space. Damp interior.	None	Photos 5-6	Negligible
4	Barn constructed of single skin breeze block walls with corrugated cement fibre sheet roof. Possible gaps around ridge tiles. No roof space. Access into building interior via gaps around the doors and small gaps around the roof. Barn linked to Building 5 on the southern side. Large gaps in the brickwork link the interior of the two buildings.	Two butterfly wings found. Disused black bird <i>Turdus merula</i> nest and a dead swallow <i>Hirundo rustica</i> .	Photos 7-10	*Negligible
5	Small barn of brick construction with an unlined pantile and triple roll tile roof. Gaps possibly suitable for roosting bats along ridge	Disused wren <i>Troglodytes troglodytes</i> nest	Photos 11-13	Low

	and some small gaps in the brickwork.			
6	Large rendered breeze block building with a corrugated cement fibre sheet roof. Small toilet block area in the south of building which has a small unlined loft space. Sky lights throughout remainder of barn.	None	Photos 14-15	Negligible
7	Building situated between Building 6, 8, 9 and 10. Barn is of single skin breeze block construction with a corrugated asbestos roof. Parts of roof are insulated. Skylights present throughout.	None	Photo 16	Negligible
8	Modern single skin breeze block barn, with large metal doors and a corrugated cement fibre sheet roof. Roof lined with wooden boards.	None	Photos 17-18	Negligible
9	Barn of single skin breeze block construction with a corrugated cement fibre sheet roof. Roof part lined with bitumen felt with a substantial gap between the roof and the lined areas.	None	Photos 19-20	Negligible
10	Barn of single skin breeze block construction. Western aspect is wooden boards. Roof is corrugated metal sheets, partly lined with insulation material.	One disused bird nest	Photos 21	Negligible
11	Barn of single skin breeze block construction with a corrugated metal sheet roof. Roof unlined with skylights throughout.	None	Photos 23-22	Negligible

* This building was originally assessed as holding negligible potential, but further surveys found evidence of bats using the building and the building is now a confirmed bat roost (see Section 3.3, below.).

3.2 Site Inspection

The site inspection was completed at the same time as the visual inspection of the buildings, and weather conditions were the same.

The site is comprised of a number of buildings, mostly surrounded by hard standing. In the south-east of the site is an area of tall ruderal and scrub bounded by hedgerows. The area in the south-east consists of Yorkshire fog *Holcus lanatus*, feverfew *Tanacetum parthenium*, bristly oxtongue *Helminthotheca echioides*, greater plantain *Plantago major*, ribwort plantain *Plantago lanceolata*, bramble *Rubus fruticosus* agg., white clover *Trifolium repens*, creeping buttercup *Ranunculus repens*, greater willowherb *Epilobium hirsutum*, ground ivy *Glechoma hederacea*, field horsetail *Equisetum arvense*, timothy grass *Phleum pratense*, black knapweed *Centaurea nigra*, creeping thistle *Cirsium arvense*, common nettle *Urtica dioica*, herb Robert *Geranium robertianum*, selfheal *Prunella vulgaris*, creeping bent *Agrostis stolonifera*, spear thistle *Cirsium vulgare* and cleavers *Galium aparine*, along with occasional small trees including European ash *Fraxinus excelsior*, apple *Malus* sp., grey willow *Salix cinerea* and field maple *Acer campestre* (Photo 24 and 25). Along the southern boundary of this area is a hedgerow including hazel *Corylus avellana*, cherry laurel *Prunus laurocerasus*, bramble, bamboo *Bambusa sensu lato* and apple (Photo 26).

The hard standing area between Building 4 and Building 6 has sparse vegetation including common nettle, cocksfoot *Dactylis glomerata*, bristly oxtongue, false oat *Arrhenatherum elatius*, barren brome *Bromus sterilis*, perennial rye grass *Lolium perenne*, hoary ragwort *Jacobaea erucifolia*, white dead nettle *Lamium album*, mugwort *Artemisia vulgaris* and self heal (Photo 27).

The hardstanding area around Building 1 includes species such as creeping cinquefoil *Potentilla reptans*, creeping bent, creeping buttercup, ribwort plantain, false oat, mugwort, bramble, common nettle, perennial rye grass, spear thistle and white clover. Along the eastern boundary, adjacent to Building 1 is a short section of hedgerow including species such as bramble, elder *Sambucus nigra*, ivy *Hedera helix*, oak *Quercus robur*, and plum *Prunus* sp. (Photo 28).

Along the western boundary adjacent to a hard standing area is a section of hedgerow comprising plum, apple, ivy, elder and bramble with an ash tree (Photo 29).

Along the northern boundary is a length of hedgerow comprising hawthorn *Crataegus monogyna*, bramble, plum, grey willow, ash, ivy, dogrose *Rosa canina* and field maple (Photo 30).

Results of the habitat survey and building inspection are summarised in Figure 8, below.

3.3 Bat Emergence Surveys

3.3.1 First Bat Emergence Survey (21/07/22)

On the first dusk emergence survey on 21st July 2022, the weather conditions were mild with a start temperature of 17°C and an end temperature of 15°C; there was no rain throughout the survey; wind estimated to a Beaufort scale 2 and 100% cloud cover to begin with and 70% at the end. The first survey focussed on Buildings 1 and 5.

The thermal camera recorded four brown long-eared bats *Plecotus auritus* emerging from the apex of the western aspect of Building 5 and another brown long-eared bat emerging from the north-west corner of Building 4. Five brown long-eared bats were recorded at the end of the survey roosting within the ridge and a gap in the wall of Building 4. A total

of 10 brown long-eared bats were recorded using Building 4/5 and as such confirms the presence of a maternity roost. No emergences were recorded from Building 1. The results are summarised in Figure 9.

Analysis of calls recorded on the detectors found brown long-eared bats, common pipistrelles *Pipistrellus pipistrellus*, soprano pipistrelles *Pipistrellus pygmaeus* and a *Myotis* bat species all overflying the site during the survey.

3.3.2 Second Bat Emergence Survey (09/08/22)

On the second dusk emergence survey on 9th August 2022, the weather conditions were mild with a start temperature of 20.5°C and an end temperature of 13°C; there was no rain throughout the survey; wind estimated to a Beaufort scale 2 and 10% cloud cover throughout the survey. This survey focused on Buildings 1 and 5. Survey scope expanded to include Building 4, as the first survey confirmed that bats were using this building.

The thermal cameras recorded six brown long-eared bat emergences, two from above the door of the western aspect of Building 4 and four from the apex of the western aspect of Building 5. Four brown long-eared bats were recorded roosting along the ridge of Building 4 at the end of the survey (Photo 31). A total of 10 brown long-eared bats were recorded using Building 4/5. One common pipistrelle emergence was recorded from the north-west corner of Building 4. The results are summarised in Figure 10.

Analysis of calls recorded on the detectors found brown long-eared bats, common pipistrelles, soprano pipistrelles and a *Myotis* bat species all overflying the site during the survey.

3.3.3 Third Bat Emergence Survey (23/08/22)

On the third dusk emergence survey on 23rd August 2022, the weather conditions were warm with a start temperature of 22°C and an end temperature of 20°C; there was no rain throughout the survey; wind estimated to a Beaufort scale 1 and 70% cloud cover to begin with and 5% at the end. This survey focused on Buildings 4 and 5. As no bats were seen emerging from Building 1 on the first two surveys it was not included in the survey scope.

The thermal cameras recorded seven brown-long eared bats emerging from the western aspect roof of Building 4 and an additional five from the western upper apex of Building 5. One soprano pipistrelle was recorded emerging from the roof of the western aspect roof of Building 4. A total of four brown long-eared bats were recorded along the interior ridge of Building 4, which brings the total number of bats recorded on this survey to 16 brown-long eared bats. The results are summarised in Figure 11.

Analysis of calls recorded on the detectors found brown long-eared bats, common pipistrelles, soprano pipistrelles and a *Myotis* bat species all overflying the site during the survey.

Figure 8. Summary of baseline ecological features

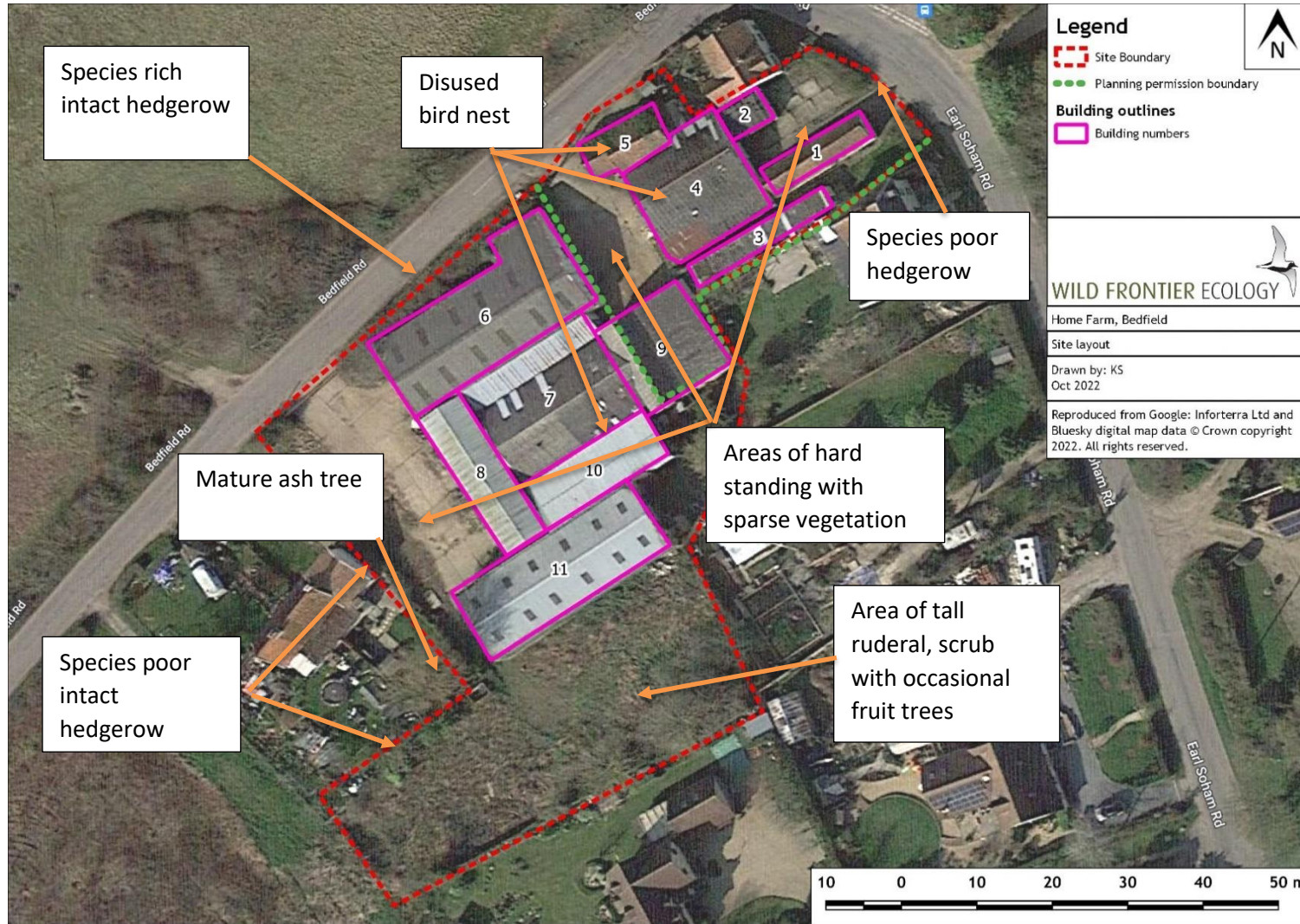


Figure 9. Emergence locations on first bat emergence survey (21/07/22)

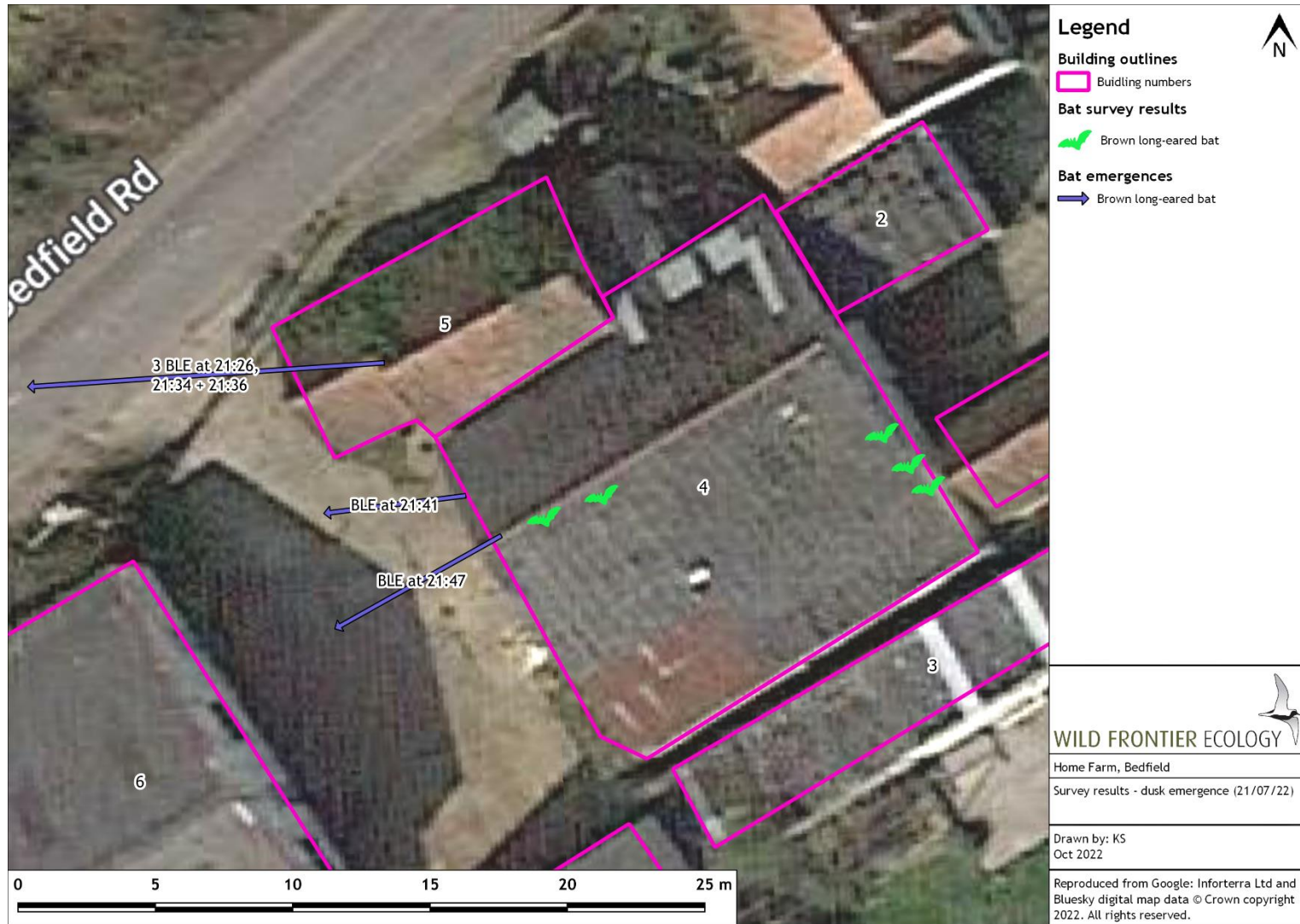


Figure 10. Emergence locations on second bat emergence survey (09/08/22)

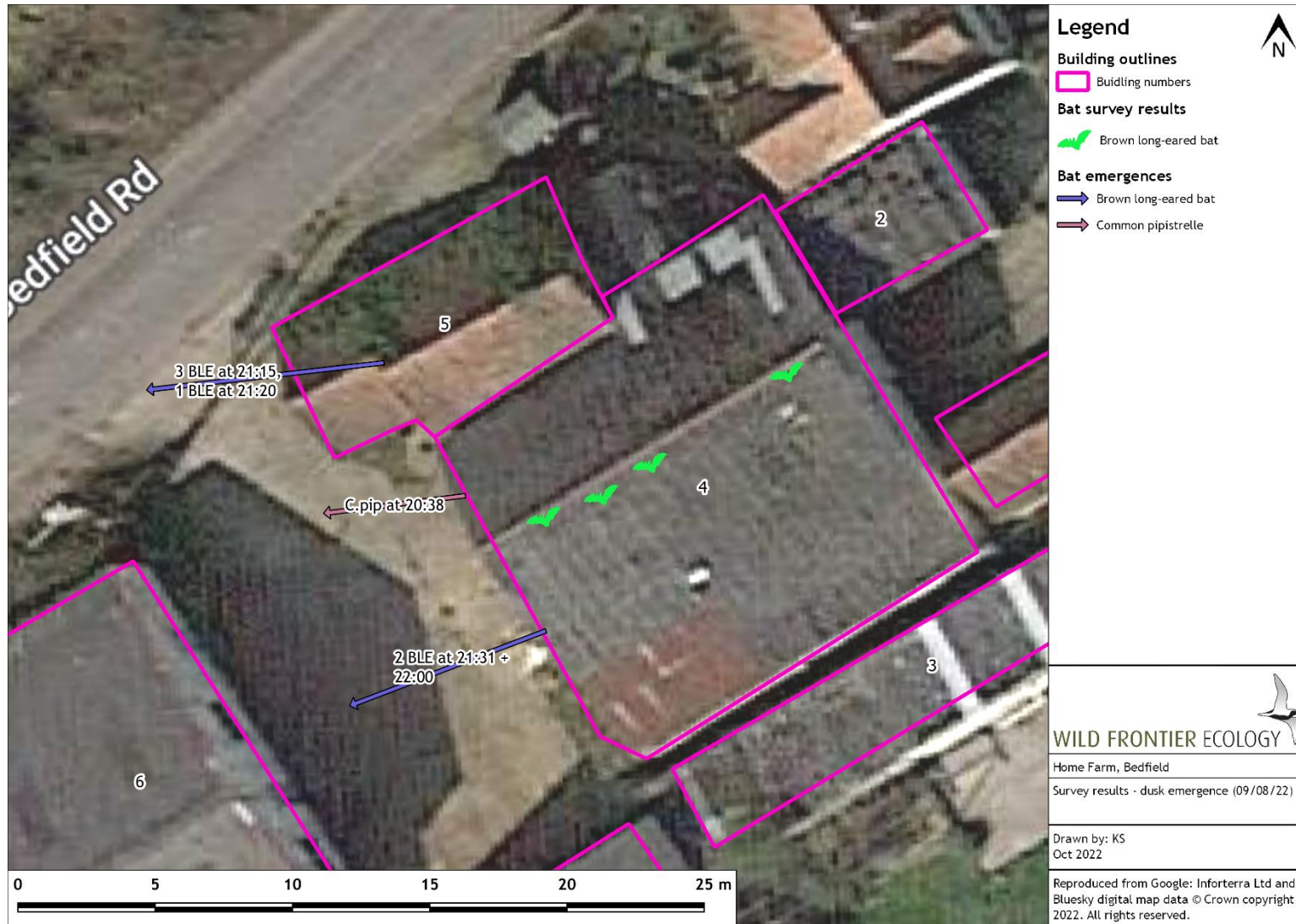
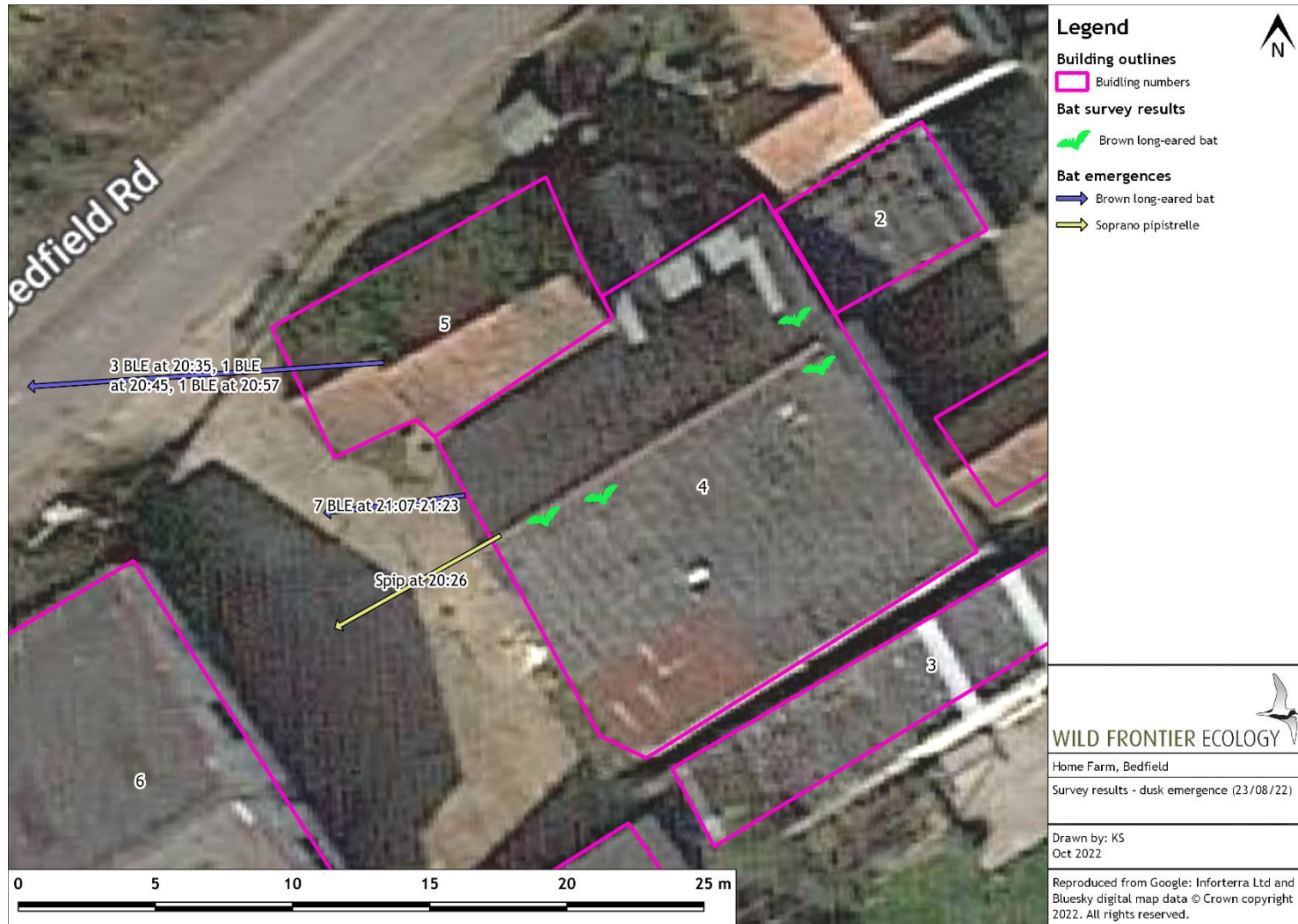


Figure 11. Emergence locations on third bat emergence survey (23/08/22)



4. Mitigation

4.1 General Principles

The Mitigation Hierarchy is a key principle, with the sequential strategies given in order. This is interpreted by WFE, as it applies to build development, in Table 2 below.

Table 2. Mitigation Hierarchy

Action and sequential number	Description
1. Avoidance	The first stage is to seek options that avoid impacts/effects on ecological receptors, for example through adjusting the development footprint to avoid valued/sensitive features, or confining works to certain times of the year or the day when a receptor would not be impacted. An example would be adjusting a development footprint to avoid a hedgerow, thereby allowing it to be retained.
2. Mitigation	Where potential adverse impacts cannot be avoided, the next stage is to use measures aimed at reducing/ameliorating the magnitude and/or likelihood of impacts/effects. This can typically be done through the design of the project or adoption of specific working practices. An example would be restricting hedgerow removal to those sections which are of lower ecological value, thereby allowing relatively higher value sections of hedgerow to be retained; this reduces the magnitude of the adverse impact on hedgerow habitat.
3. Compensation	Where significant residual adverse impacts cannot be satisfactorily avoided or mitigated, the next stage is to use appropriate measures which subsequently offset, repair, reinstate or compensate for the predicted impact/effect. An example would be replanting a hedgerow after it has been removed.
Enhancement	The final stage of the Mitigation Hierarchy is distinct in that it does not seek to solely address adverse impacts; it goes over and above requirements for avoidance, mitigation, and compensation. In accordance with the NPPF, developments should achieve net gains in biodiversity even if adverse impacts are not anticipated. Enhancement measures are those which seek to provide net benefits for biodiversity and are advised wherever appropriate; this may include enhancements for receptors which are otherwise expected to experience adverse impacts. An example would be planting an additional hedgerow.

4.2 Bats

4.2.1 Roosting Bats

The bat surveys confirmed the presence of a brown long-eared bat maternity roost, a common pipistrelle day roost and a soprano pipistrelle day roost within Building 4 and 5. Mitigation and compensation under a European Protected Species (EPS) mitigation licence will be required for the proposed building works. The mitigation principles expected to be included in the licence method statement and subsequently employed are:

- Having a licensed bat worker provide an induction talk to contractors prior to starting works.
- Placing exclusion devices over and blocking unoccupied identified roosts as is feasible.
- Having a licensed bat worker present to monitor specified high-risk works (and otherwise on call) to safely translocate any bats encountered during the works.
- Erecting three artificial roost boxes on a mature tree on the site to act as a translocation box for any bats found during the course of the works.
- Timing works outside of the maternity season (licensable works to take place between October-April).
- Having like-for-like roost provision on the developed site. This will include two dedicated lofts for brown long-eared bats and two bat boxes suitable for pipistrelle species.
- **Bitumen 1F type felt underlay, and not modern breathable membranes** (which pose a risk to roosting bats) will be used on all new buildings.

Following the English Nature Bat Mitigation Guidelines (2004), the appropriate compensation requirement for the level of impact predicted would be the provision of new roost facilities which are, if not like-for-like, then at least suitable based on the species' requirements. Two bat lofts will be installed on the developed site, see Figure 12. The bat lofts will need to include a means of access. A small hole or prefabricated access panel such as the 1FE Schwegler Bat Access Panel would be suitable. Within the bat lofts there will need to be additional bat boxes, timbers overlapping the standard roof timbers and/or wooden boards attached to the internal timbers to provide niches suitable for brown long-eared bats.

Bat boxes are more likely to be used by bats if installed on warmer aspects of the buildings, such as south, west or east sides. Installing boxes on a range of different building aspects provides a range of thermal conditions for bats to use throughout the year. Bat roost boxes will provide superior roosting opportunities if installed in close proximity to gardens and other green spaces, and away from sources of disturbance such as roads, parking spaces and any exterior lighting. Any of the following bat boxes suitable for general use, or similar models (in terms of lifespan and demonstrated effectiveness) will be used:

- Habibat boxes
- Ibstock enclosed bat boxes
- Built-in woodstone bat box

All Mitigation and enhancement measures relating to roosting bats will be confirmed during the EPS licence application process.

See Figure 12-15 for locations of required mitigation measures.

4.2.2 Foraging Bats

The potential risks to foraging and commuting bats (including those exiting from roosts within the site) are linked to possible impacts from night-lighting of the site, both during construction and during the occupation of the finished dwellings. A lighting plan has been provided and is shown in Figure 12. The following measures will be adhered to:

- Lighting will only be used where absolutely necessary; there will be a commitment to keep lighting levels at the site as low as possible. A maximum of one new external light will be installed per property.

- Exterior lights will emit light of <2700k, to avoid the parts of the light spectrum most disturbing to bats.
- Positioning lights at angles of not greater than 90° to the ground (i.e. facing directly downwards) will reduce overspill of light and sky glow, which can disrupt the nocturnal behaviours of bats and insects¹⁰.
- Any exterior lights, such as security lighting, will use Passive Infra-Red sensor (PIR) or other motion-activated lighting rather than lighting which remains on throughout the night.
- Any street lighting will use down-cast or low-level lighting (such as bollards) to illuminate pavements or walkways where necessary.
- All exterior lights will use LEDs and will be fitted with hoods/cowls to limit light spills.
- Lights will be placed on the site in a configuration which focuses light inwards, preventing spilled illumination of the surrounding area, particularly nearby trees and hedges.
- Lighting will also be focused away from the installed bird, bat and invertebrate boxes, and away from loft access points as these are far more likely to be used if installed in dark location.

4.3 Birds

Some vegetation removal is expected to clear the site ready for the new development. Any removal of woody vegetation will commence outside of the nesting bird season (which runs from 1st March to 31st August inclusive). If this is not possible, a check will be undertaken by an ecologist to ensure no active nests are present on the site. If any active nests are discovered they must be allowed to reach a natural conclusion without disturbance, interference, or destruction. Nests will be protected from disturbance by a buffer zone advised by an ecologist.

Some evidence of birds using the building were found, although no active nests were found at the time of the surveys. Before the buildings are demolished, they will also be thoroughly checked by the contractor to ensure no active birds are present. If there is any doubt, an ecologist must be contacted to check the building before any demolition work takes place.

4.4 Habitats

According to the most recent development plans, approximately 40m of hedgerow is expected to be removed, including the section of hedgerow along the north of the site and a small amount of hedgerow along the eastern boundary of the site. Scrub, trees and tall ruderal in the south of the site will be lost as a result of the development. Hedgerows, scrub and trees will be retained where possible. Where removal is required, these will be replaced on a like for like basis.

¹⁰ Stone, E.L. (2013). Bats and lighting: Overview of current evidence and mitigation guidance.

4.4.1 Hedgerows

An approximately 55m length of new hedgerow will be planted along the southern boundary of the site as shown in Figure 16. The following mix of hedgerow species is advised:

- 25% Hawthorn *Crataegus monogyna*
- 15% Dog rose *Rosa canina*
- 10% Hazel *Corylus avellana*
- 10% Dogwood *Cornus sanguinea*
- 10% Guelder rose *Viburnum opulus*
- 5% Blackthorn *Prunus spinosa*
- 5% Field maple *Acer campestre*
- 5% Crab apple *Malus sylvestris*
- 5% Holly *Ilex aquifolium*
- 5% Elder *Sambucus nigra*
- 5% Oak *Quercus robur*

Hedgerows will be planted in double (parallel) rows with 4-6 plants per metre of hedgerow. Hedgerow plants will be specimens at least 30cm tall at the time of planting.

Non-native species such as leyland cypress *Cupressocyparis x leylandii* and cherry laurel *Prunus laurocerasus* will not be used in hedgerow planting because they are of relatively low ecological value and can suppress native species.

Cutting will aim to trim the hedgerows into a slightly tapered shape with a marginally wider base than crown. This will maintain the health of hedgerow plants, improve the stability of the hedgerow structure and benefit a range of wildlife. The desired hedgerow dimensions would be a height of approximately 2-4 metres, width at base of 1.5-3.5 metres and width at top of 1-2 metres (e.g. between 2m in height x 1.5m wide at base and 1m wide at top, and 4m in height x 3.5m wide at base and 2m wide at top).

For the first three years after planting, any diseased, dead, dying or badly damaged hedgerow shrubs will be removed and replaced on a like-for-like basis.

4.4.2 Trees

From current plans, three apple trees in the south of the site will be removed as part of the development. To compensate for the loss of these trees, at least six trees will be required on the developed site. Any further trees which must be removed as part of the developed will be replaced by planting two trees for every one tree removed. Tree planting will include native or fruit bearing species such as the following:

- Crab apple *Malus sylvestris*
- Cherry *Prunus* sp.
- Field maple *Acer campestre*
- Silver birch *Betula pendula*
- Wild service tree *Sorbus torminalis*
- Pedunculate oak *Quercus robur*
- Common alder *Alnus glutinosa*
- Hazel *Corylus avellana*
- Black poplar *Populus nigra*

Where shading is an issue, trees such as rowan *Sorbus aucuparia*, apple and pear *Pyrus* sp. (which can be brought on dwarf root stock) will be used.

Trees will be planted with separation distances from the next nearest tree of at least 5 metres, preferably 10 metres.

4.5 Hedgehogs

Two hedgehogs were seen on site during the surveys. As per the ecology report provided by John Dobson in 2019, the developed site will include provision for hedgehogs in the form of a hedgehog house along the western boundary. The hedgehog house will have piles of leaves and logs in close proximity. The following hedgehog houses (or similar) are suitable:

- HH7 Hogilo Hedgehog / Mammal House
- Eco-Plate Hedgehog House
- National Trust Luxury Pine Hedgehog House

See Figure 16 for locations of required mitigation and enhancement measures.

4.6 Best Practice Measures for Terrestrial Animals

Best practice measures are advised for effects which, although often not predicted to be of great magnitude, may affect valued ecological receptors in a way that would be preventable and/or a legal offence. The measures that will be applied to compensate for potential ecological impacts on terrestrial animals are as follows:

- All building materials and waste materials will be stored above the ground, such as on pallets or in skips respectively. This measure will ensure that such materials do not provide a sheltering opportunity, attractive to invertebrates, amphibians, reptiles, and small mammals.
- Any excavations will not be left open overnight, or else will be fitted with egress boards sloped at a shallow angle (<40°) or have shallow battered/sloped edges (also <40°) to allow any animals which fall in to climb out. Preferably all excavations will be backfilled at the end of each working day or covered overnight to prevent animals from falling in.
- Works will be restricted to daylight hours only to prevent disturbance or accidental harm to nocturnal animals such as hedgehogs. Ideally night lighting of the site will be minimised to reduce disturbance to other nocturnal animals such as bats and moths. Many species typically forage terrestrially at night, so restricting works to occur in daylight hours will minimise the chances of these species encountering the works.
- Any boundary fences/walls on the developed site should have a small gap at ground level (approximately 13cm wide by 13cm high) on each boundary section. This will allow small terrestrial animals such as hedgehogs to access the site freely. The ground level gaps should be installed both within and around the site, to allow animals to both access the site from outside and move freely within the site.
- Any clearance work of the area of scrub/ tall ruderal in the south of the site will take place from east to west. This will allow any small mammals or amphibians to move away from the site whilst the work is taking place.

5. Biodiversity Enhancement Measures

5.1 Ecological Constraints on Site

The site had a high level of human disturbance from the active steel works on site until they ceased to be used in approximately the last 20 years. The site has since been used for storage. The site is located on the edge of a village and adjacent to a small road, so there will be a level of baseline human disturbance surrounding the site. This will constrain the opportunities to enhance ecological connections on the site and constrain the ecological opportunities on the site itself.

Once the development is complete and in use (occupied) there will be constraints such as recreational pressures, increased noise, light and air pollution and additional traffic, all of which could influence the management of ecological features.

5.2 Aims and Objectives of the Biodiversity Enhancement Plan

The purpose of the Biodiversity Enhancement Plan is to ensure the successful establishment and long-term continuance and safeguarding of native biodiversity at the site, with a particular focus on species of conservation concern. The enhancements aim to increase the quantity, quality and connectivity of ecological features at the site, taking into consideration (and ideally contributing to) its ecological context within the wider area.

5.3 Bird Nest Boxes

One bird box will be installed on each new dwelling. These will be “swift box” type nest chambers. Boxes intended for swifts are well used by other species of conservation concern and can be considered a universal nest chamber^{11,12}.

Nest boxes and chambers are more likely to be used by birds if installed in suitable positions on the buildings. In general, bird boxes and chambers should be sited in or on gable ends, or under overhanging eaves, overlooking gardens or other green spaces, and with a clear/unobstructed flight line for easier access and egress. Exposed locations should be well insulated against overheating, by using integrated designs or suitably insulating material such as woodcrete.

Integral boxes are strongly advised due to their relatively superior longevity and thermal insulation; they are also often considered to have a minimal visual impact on the building relative to superficially mounted boxes.

This type of box can be used for nesting or roosting by starling *Sturnus vulgaris*, house sparrow *Passer domesticus*, swift *Apus apus* or house martin *Delichon urbicum*.

The following boxes (or similar) would be suitable:

- Swift Box - Smooth Brick (available in different facings to match building material)

¹¹ Martins, T (2021). Duchy Report on the Big Duchy Bird Box Survey 2021. <https://nansledan.com/duchy-nest-brick-project-boosts-endangered-wild-birds/>.

¹² Barlow, C., Priaulx, M. et al (2020). Swift Bricks - the “universal” nest brick. <https://actionforswifts.blogspot.com/p/sln.html>.

- Vivara Pro Cambridge Brick Faced Swift Nest Box
- Manthorpe Swift Brick
- Schwegler Delta Shaped Swift Box
- Schwegler Swift Box No17B with Enlarged Brood Chamber, Single Cavity
- Schwegler Lightweight Swift Box No. 1A
- Schwegler No. 16 Swift Nestbox

See Figures 13-16 for locations of required mitigation and enhancement measures.

5.4 Bats

Enhancements for bats will include three additional bat boxes (advice for bat boxes is provided in 4.2.1, above) and three lifted roof tiles. If standard tiles are used, they will be raised to create a gap of 20mm during the construction process or the following raised roof tiles (or similar models in terms of lifespan and demonstrated effectiveness) will be used:

- Bat Access Tile set (includes three tiles)
- Heritage clay bat access tile
- Habibat lead access tile

See Figure 12-15 for locations of required mitigation and enhancement measures.

5.5 Invertebrates

In order to encourage invertebrates at the site (which will in turn encourage birds, bats and other wildlife), at least three invertebrate boxes (or ‘bug-boxes’) will be installed on the buildings and/or trees on and bordering the site. There is a wide variety of commercially available bug boxes which would be suitable for use at the site, such as:

- Heritage Fix On Insect Wooden Hotel Nest Home Bee Keeping Bug Garden Ladybird Box 2630
- Ernest Charles Large Norfolk Bee and Bug House
- Bug - 4 Storey Solid Wood Insect / Butterfly / Bee Hotel / House - Bro
- Insect Hotel Wooden Bee Butterfly Ladybird Nesting Box Aid Large Wood House
- Hexagonal insect boxes wild bees box
- Woodside Wooden Insect & Bee House
- Wildlife World Friendly Bug Barn

Boxes will be provided with instructions for appropriate installation.

See Figure 16 for locations of required mitigation and enhancement measures.

5.6 Gardens and Grassy Areas

Any areas targeted to become grass lawns will also be created in such a way as to encourage biodiversity. Grass lawns will be seeded rather than laying down turf.

Any such areas will be seeded with at least four suitable grass species and four suitable flowering species.

The following grasses are suitable:

- Perennial rye grass *Lolium perenne*
- Common bent *Agrostis capillaris*

- Creeping bent *Agrostis stolonifera*
- Annual meadow grass *Poa annua*
- Crested dog's-tail *Cynosurus cristatus*
- Red fescue *Festuca rubra*
- Timothy *Phleum pratense*
- Smooth-stalked meadow grass *Poa pratensis*
- Small-leaved timothy *Phleum bertolonii*

If perennial rye grass is used, the mixture of seeds must contain less than 30% rye grass in order to ensure that it does not dominate the grass sward.

White clover *Trifolium repens* is recommended as one of the flowering species, along with at least three of the following species:

- Yarrow *Achillea millefolium*
- Knapweed *Centaurea nigra*
- Ox-eye daisy *Leucanthemum vulgare*
- Lady's Bedstraw *Galium verum*
- Wild carrot *Daucus carota*
- Red campion *Silene dioica*
- Self-heal *Prunella vulgaris*
- Meadow buttercup *Ranunculus acris*
- Common sorrel *Rumex acetosa*
- Rough hawkbit *Leontodon hispidus*
- Birdsfoot trefoil *Lotus corniculatus*
- Yellow rattle *Rhinanthus minor*

Each garden will include a flower bed at least 2m² planted up with pollinator friendly flowers (multiple individual plants may be planted per garden but each garden should include at least 3 different species). The RHS produce a list of pollinator friendly flowers or most garden centers will mark suitable species with a bee logo.

Suitable pollinator friendly flowers include:

- Aubretia *Aubrieta* species
- Bell flower *Campanula glomerata*
- Common snowdrop *Galanthus nivalis*
- Cranesbill *Geranium* species e.g. *Geranium pratense*
- Crocus *Crocus* species
- Elephant's ear *Bergenia* species
- Foxglove *Digitalis purpurea*
- Heather *Calluna vulgaris* or *Erica* species
- Hebe *Hebe* species
- Hollyhock *Alcea rosea*
- Ice plant *Hydrotelephium spectabile* & hybrids
- Knapweed *Centaurea* species
- Larkspur *Consolida ajacis*
- Lavender *Lavandula* species
- Lesser calamint *Calamintha nepeta*
- Primrose *Primula vulgaris*
- Sage *Salvia* species
- Scabious *Knautia* species
- Spurge *Euphorbia* species
- Thrift *Armeria maritima*

- Thyme *Thymus* species
- Tickseed *Coreopsis* species

5.7 Indicative Five-Year Work Schedule

The work schedule below (Table 3) covers maintenance works to new ecological features which are to be installed at the site.

Figure 12. Locations of required mitigation and enhancement measures



Figure 13. Locations of required mitigation and enhancement measures (DC/20/04727)



Figure 14. Locations of required mitigation and enhancement measures (DC/20/04727, plot 2)

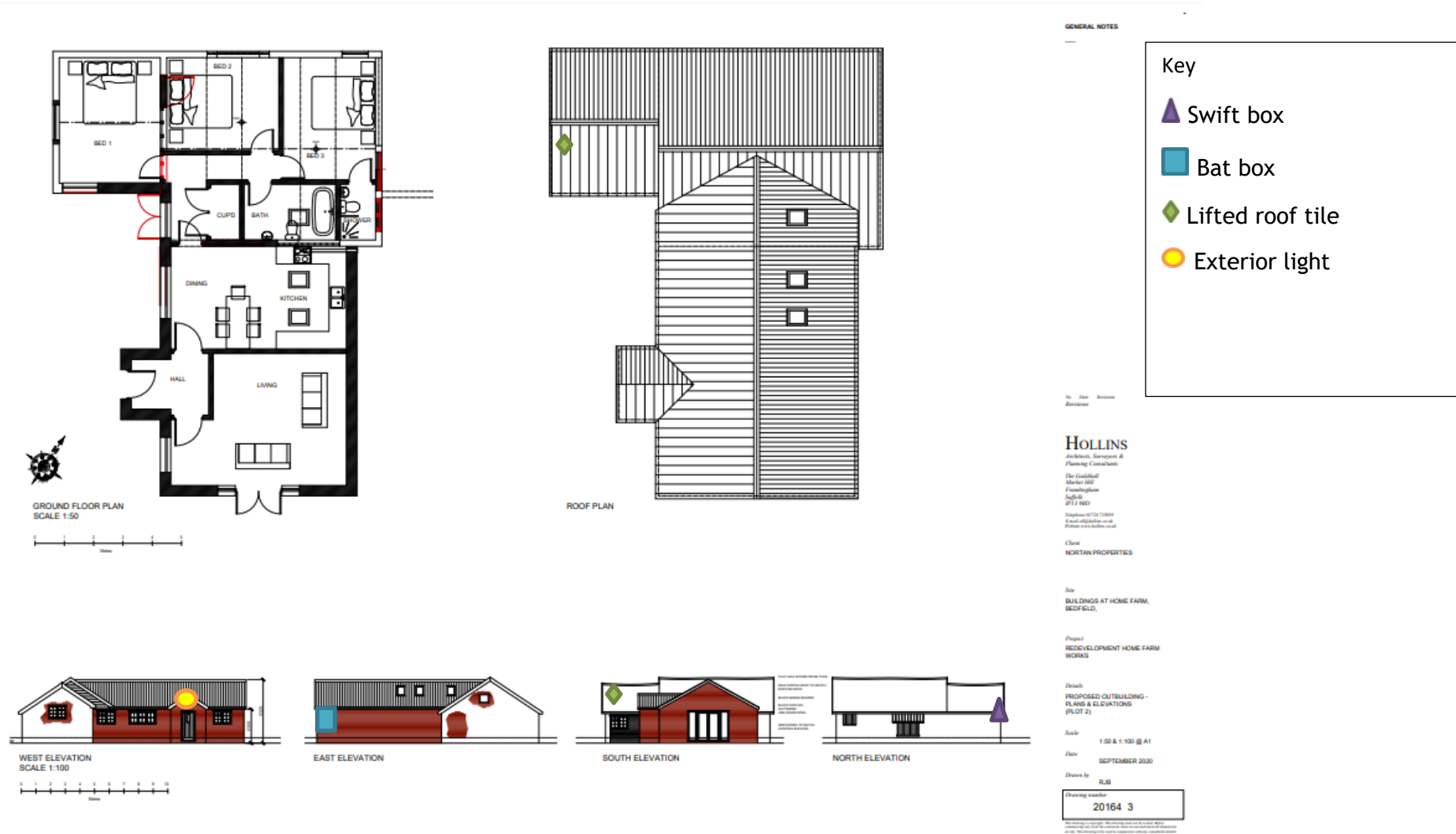


Figure 15. Locations of required mitigation and enhancement measures (DC/20/04727, plot 1)



Figure 16. Locations of required mitigation and enhancement measures (DC/21/03606)

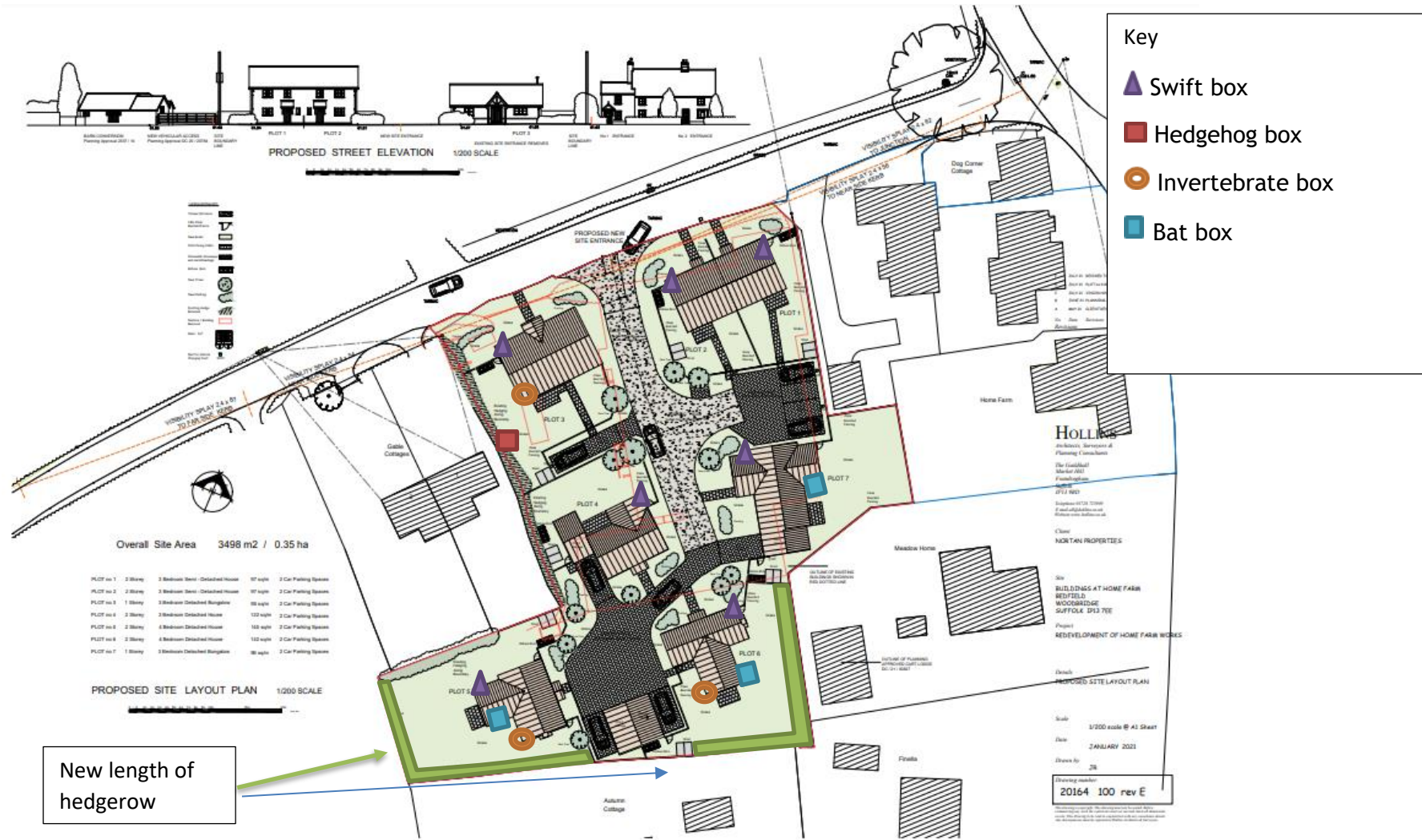


Table 3: Management Schedule

Feature	Management action	Timing, year 1	Timing, year 2	Timing, year 3	Timing, year 4	Timing, year 5	Timing year 5+
Hedgerows, trees and shrubs	Cutting of hedgerows to maintain ‘bushiness’ and correct profile and cutting of trees to maintain stand-offs from buildings/roads.	Not expected to be necessary	Not expected to be necessary	May be necessary - between December and early February. Cut hedges on a rotation and no more than once in every three years	Between December and early February. Cut hedges on a rotation and no more than once every three years	Between December and early February. Cut hedges on a rotation and no more than once every three years	Between December and early February. Cut hedges on a rotation and no more than once every three years
Bat lofts/ boxes and bird boxes	Check by an ecologist to confirm whether mitigation measures for bats (bat lofts and bat boxes) are being used and provide suggestions on possible improvements.	On installation	Not necessary	May-July	Not necessary	May - July	Licence may require long term monitoring of bat loft (May - July)

5.8 Ongoing Monitoring and Remedial Measures

It is advised that the site is visited by a suitably qualified ecologist after the enhancements have been installed, to confirm that the enhancements have been installed in accordance with this Biodiversity Enhancement Plan's advice. The ecologist will provide a brief report or letter following their site visit, outlining how (if at all) the ecological enhancements could be improved, or remedied (if any have not been installed correctly).

The bat lofts and bat boxes will also need to be monitored as part of the licence required for bats.

The management actions outlined above will be sufficient at ensuring the successful long-term maintenance and continuance of the ecological features on the site. Remedial measures are difficult to outline at this stage because it is not known which issues might need to be remedied. Likely issues, such as poor health or death of trees and shrubs, and non-use of nest/roost boxes, are addressed above.

5.9 Legal and funding mechanisms

The short-term implementation of the plan will be the responsibility of the developer: Chapter Build Group Ltd. Many of the enhancement measures will then become the property of the new owners but integrating bat and bird boxes into the new dwellings should reduce the likelihood that these will be lost. It will be the responsibility of the developer to ensure that the owners of the new bat lofts are aware of their purpose and that access is maintained for monitoring checks during the licence period.

Appendix 1. Photographs



Photo 1: View of southern aspect Building 1 exterior, showing pantile roof which in areas has lifted



Photo 2: View of Building 1 interior



Photo 3: View of shallow loft void within Building 1



Photo 4: View north of exterior of Building 2



Photo 5: View west of exterior of Building 3



Photo 6: View of interior of Building 3



Photo 7: View east of exterior of Building 4



Photo 8: View of interior of Building 4



Photo 9: View of disused black bird nest within Building 4



Photo 10: View of dead swallow within Building 4



Photo 11: View north of exterior of Building 5



Photo 12: View of Building 5 interior



Photo 13: View of disused wren nest within Building 5 interior



Photo 14: View west of Building 6 exterior



Photo 15: View of Building 6 interior



Photo 16: View of Building 7 interior



Photo 17: View east of Building 8 exterior



Photo 18: View of Building 8 interior



Photo 19: View south of Building 9 exterior



Photo 20: View of interior of Building 9



Photo 21: View of interior of Building 10



Photo 22: View south of exterior of Building 11 (on the right)



Photo 23: View of Building 11 interior



Photo 24: View east of tall ruderal and scrub area in the south of the site



Photo 25: View south of tall ruderal/ scrub area in south of the site



Photo 26: View of hedgerow along the northern boundary in south-west of the site



Photo 27: View of hoary ragwort present in hardstanding to the west of Building 4



Photo 28: View of hedgerow and hardstanding with sparse vegetation in the east of the site



Photo 29: View of hedgerow and hard standing with sparse vegetation in the west of the site. Red circle shows tree to be retained for instalment of translocation bat boxes.



Photo 30: View of hedgerow along the northern site boundary



Photo 31: View of brown long-eared bats using the ridge of Building 4