
Biodiversity Enhancement and Lighting Strategy

**PROPOSED BARN CONVERSION AND ERECTION OF
CARTLODGE**
Shelley Priory, Stoke Road, Shelley, Ipswich, Suffolk.

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ADDRESS | Mill House, Homersfield, Harleston, Suffolk IP20 0ET

TELEPHONE | 01986 788791

EMAIL | millhouseecology@gmail.com

REPORT PRODUCED BY:

MHE Consulting Ltd
Mill House
Homersfield
Harleston
IP20 0ET

01986 788791
07766 771305
millhouseecology@gmail.com

CLIENT:

Mr & Mrs B Martin
Pink Cottage
Withermarsh Green
Stoke by Nayland
Colchester
CO6 4TD

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1 INTRODUCTION

Planning permission (Ref: DC/19/02414) was granted by Babergh District Council on the 16 July 2019 for the conversion of an agricultural barn to form a single dwelling and home office, together with the erection of an associated cart lodge, on land to the south of Shelley Priory, Stoke Road, Shelley, Ipswich Suffolk. A further application (DC/20/00132) was subsequently submitted and approved with the same footprints for the barn conversion and cartlodge. The final application (DC/20/02907) was submitted on the 10th August 2020, for the relocation of the same barn design but 6m further away from the north site boundary.

Of the 18 planning conditions, conditions 15. (Action required in accordance with ecological appraisal recommendations), 16. (Biodiversity Enhancement Strategy) 17. (Wildlife sensitive lighting design scheme).

15. Action Required in Accordance With Ecological Appraisal Recommendations

All mitigation measures and/or works shall be carried out in accordance with the details contained in the Ecology Survey Report (MHE Consulting Ltd, December 2019) as already submitted with the planning application and agreed in principle with the local planning authority prior to determination.

This may include the appointment of an appropriately competent person e.g. an ecological clerk of works (ECoW,) to provide on-site ecological expertise during construction. The appointed person shall undertake all activities, and works shall be carried out, in accordance with the approved details.

Reason - To conserve and enhance Protected and Priority species and allow the LPA to discharge its duties under the UK Habitats Regulations, the Wildlife & Countryside Act 1981 as amended and s40 of the NERC Act 2006 (Priority habitats & species)

16. Prior to Occupation: Biodiversity Enhancement Strategy

A Biodiversity Enhancement Strategy for Protected and Priority species shall be submitted to and approved in writing by the local planning authority, following the recommendations of the Ecology Survey Report (MHE Consulting Ltd, December 2019). The content of the Biodiversity Enhancement Strategy 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; and*
- 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).

17. Prior to Occupation: Wildlife Sensitive Lighting Design Scheme

A lighting design scheme for biodiversity shall be submitted to and approved in writing by the local planning authority. The scheme shall identify those features on site that are particularly sensitive for bats and that are likely to cause disturbance along important routes used for foraging; and show how and where external lighting will be installed (through the provision of appropriate technical specifications) so that it can be clearly demonstrated that areas to be lit will not disturb or prevent bats using their territory.

All external lighting shall be installed in accordance with the specifications and locations set out in the scheme and maintained thereafter in accordance with the scheme. Under no circumstances should any other external lighting be installed without prior consent from the local planning authority.

Reason - To allow the LPA to discharge its duties under the UK Habitats Regulations 2017, the Wildlife & Countryside Act 1981 as amended and s40 of the NERC Act 2006 (Priority habitats & species)

2 SCOPE

This document outlines good practice working methods which if implemented will avoid and reduce ecological impacts, together with compensation and enhancement measures to offset residual losses and provide biodiversity gains where possible, as specified within supporting documentation submitted with the planning application. It will enable the LPA to demonstrate its compliance with its statutory duties including its biodiversity duty under S. 40 of the NERC Act 2006. The document will also contribute to the discharge of Planning Conditions 14 (BES) and 15 (Wildlife sensitive lighting design scheme).

It is based on the most recent drawings and text within:

- Project Orange Architects (Drawings: P001 - Site location), P200 E - Site plan proposed, P300 D - North and South elevations, P301 C - East and South elevations, P401 A - Cartlodge plan proposed, P402 A - Cart lodge elevations; and
- MHE Consulting Ltd (2019) Ecology Report - Proposed Barn Conversion, Shelley Priory, Shelley, Suffolk - December 2019 Update.

This document should be revised and amended in response to any deviations or revisions to the site and landscape proposals.

3 BIODIVERSITY INTERESTS

The application site (Figure 1) comprises a former agricultural barn, which has been stripped back to the metal frame, with an attached red brick lean-to on the west elevation. The barn is set within hard standing, with areas of mown grassland/lawn and established and recently planted hedgerows and trees. An area of paddock, a driveway and avenue of trees are located to the south.

The remaining steel frame of the barn and hard standing are of negligible ecological value, though a brown long-eared bat (*Plecotus auritus*) (BLE) (EPS; S. 41 NERC Act 2006) feeding perch was identified in the barn prior to the cladding/roof being removed. Adjacent habitats present may be used by widespread amphibians and reptiles, foraging/commuting bats, nesting birds and small mammals including hedgehogs (*Erinaceus europaeus*) (S. 41 NERC Act 2006). Hedgerows present on-site were assessed as supporting low potential for hazel dormice (*Muscardinus avellanarius*) (EPS; S. 41 NERC Act 2006).

4 PURPOSE AND CONSERVATION OBJECTIVES

The purpose of this document is to outline measures to: i) avoid and mitigate impacts upon existing habitats and features of ecological value on or near to the site, and ii) provide enhancements to offset residual losses and provide biodiversity gains where possible.

Specific mitigation measures will include (Figure 2):

- The erection of temporary fencing and use of Root Protection Areas (RPAs) as well as good working practices to protect retained habitats on or adjacent to the site;
- Good working practices (methods and timings) to minimise and avoid impacts on amphibians and reptiles, breeding birds and small mammals including hedgehogs; and
- Wildlife sensitive lighting and roof structure/cladding (membrane) design to minimise and avoid impacts on wildlife including roosting, foraging and commuting bats.

Biodiversity enhancements measures will include (Figure 3):

- Native tree and/or hedgerow planting;
- Planting of nectar rich climbers;
- Installation of Schwegler 2F-DFP or Kent bat boxes;
- Installation of small passerine bird boxes;
- Installation of a barn owl (*Tyto alba*) nest box; and
- Installation of bug hotels.

In addition the proposed open sided sections on the ground floor will provide opportunities for small passerines such as swallow (*Hirundo rustica*).

5 DETAILED DESIGNS, RESPONSIBILITIES AND MAINTENANCE

Detailed guidance to inform avoidance, mitigation, and enhancement measures are provided in the text below and summarised in Tables 1 and 2. Timely and effective implementation is the responsibility of the landowner/developer and their contractor(s) unless specified otherwise.

5.1 Avoidance, mitigation, and compensation measures

a) Habitats

All retained hedgerows, trees and plantation woodland must be protected with temporary (e.g. Heras) fencing to prevent accidental damage.

RPA's must be used for any 'at risk' individual trees to prevent damage to root systems as per the British Standard (where the RPA is the diameter at breast height in metres multiplied by 12, capped at 15m). Where operations are required within the RPA, hand digging must be used, and vehicle movement should be avoided.

b) Species

Good practice measures will be employed to avoid impacts upon amphibians and reptiles, birds and small mammals (including hedgehogs):

- Any areas of hedgerow or thick grassy/ruderal/shrub or similar vegetation should be cleared in early autumn to avoid impacts upon nesting animals. If clearance is required in the spring to avoid nesting bird issues, vegetation should be retained to no lower than 300mm above ground level to avoid injury or harm to hibernating animals until temperatures are regularly (6 consecutive days/nights) above 6°C. Clearance at other times of year should be undertaken with prior checks/supervision by an ecologist;
- Hedgerows should be cut by hand (e.g. chainsaw) to c. 300mm above ground level to provide some cover for reptiles and small mammals but removing nesting bird cover;
- Existing vegetated aggregate piles should be moved sensitively during April to October inclusive, when animals are active;
- Should any amphibians, reptiles or small mammals be encountered they should be allowed to displace into retained habitat (e.g. boundaries) or carefully relocated in an area of retained habitat (i.e. the western boundary tree line) as soon as possible;
- During the construction phase, trenches will be filled on the same day as excavation where possible. Trenches left overnight will be covered with ply/OSB sheets and any gaps filled with damp sharp sand;
- Mammal ladders (medium to large branches, rough pieces of timber) should be placed within trenches to enable animals to escape;
- Footings and concrete slabs will be poured during the morning to ensure they have hardened off prior to evening to reduce the risk of animals encountering wet concrete;
- Any hand mixing of mortar or concrete will be on ply boarding over a tarpaulin which is folded over the boarding at the end of each day to prevent animals coming into contact;

- Any excess cement/concrete will be poured into a concrete skip, so it can then set to prevent animals coming into contact;
- Concrete mixers and shovels, rakes, boots etc. must be cleaned off in a safe location whereby any washing will not enter any waterbodies;
- All building materials will be stored on bare ground or hard standing, or stored off the ground on pallets;
- Any building waste temporarily stored on site should be stored on bare/hard ground or in skips to prevent animals from seeking refuge;
- Any installed gully pots that do not discharge without impediment straight into a ditch or pond must be situated $\geq 100\text{mm}$ from roadside; OR a wildlife-kerb¹ must be installed adjacent to each gully pot; OR a gully pot ladder² placed into each gully pot; and
- Any downpipes taking water off the roofs should be sealed at ground level by using a leaf and debris screen³ to prevent amphibians entering drains.

If GCNs (Appendix A1) are observed by any worker during construction, work must immediately cease and a qualified EcoW be contacted (advice can be sought from MHE Consulting Ltd on 01986 788 791). The poster in Appendix A1 should be placed in welfare facilities on site.

i) Bats

Bat friendly roofing membranes

If modern tiles with negligible gaps (<6mm) are used breathable membranes can be used. However, if reclaimed or handmade clay pantiles or peg tiles are used, traditional roofing felt Type 1F or a breathable sarking board (e.g. Pavatex Isolair or Steico sarking board) is recommended.

Lighting disturbance

The lighting strategy (Section 6) identifies the recommended lighting to avoid illumination of hedgerows and trees which may be used for commuting and/or foraging. In general lighting levels (if used) must be as low as possible using warm white LEDs, with mercury or metal halide lamps avoided. Movement sensors must be used to minimise the lit time.

ii) Nesting birds

To avoid impacts upon nesting/roosting birds, avoidance and mitigation measures will include:

- Any site compounds (if required) should be positioned away from any boundary hedgerows or adjacent woodland to minimise disturbance during the main bird-breeding season (March to August inclusive);
- Retained trees, hedgerows and shrubs should be protected with temporary fencing (e.g. Heras) during the works to prevent damage to above ground growth whilst Root Protection Areas (RPAs) should be used to inform the detailed design;
- The hedgerow sections to be removed should be inspected for the presence of nesting birds if the clearance works are to commence during the main bird breeding season (March to August inclusive); and
- Should active nests be found they should be left undisturbed until any dependent young have fledged and left the nest. Any nest sites should be clearly marked on site and site staff briefed on their location.

5.2 Enhancement measures

The following enhancement measures should be implemented as part of site landscaping to be consistent with planning policy and to ensure the development delivers a biodiversity net gain.

¹ <https://www.aco.co.uk/products/wildlife-kerb>

² <https://www.thebhs.org/the-bhs-amphibian-gully-pot-ladder>

³ <https://www.drainagepipe.co.uk/leaf-and-debris-gully-screen>

a) Landscaping

i) *Native tree and shrub planting*

The planting of some native English oak (*Quercus robur*) trees are proposed as part of the proposed landscape masterplan to reflect characteristic boundary trees.

ii) *Flowering lawn*

Some additional lawn is proposed around the barn will be sown or turfed with a flowering lawn seed mix⁴ or turf⁵ following supplier guidance on creation and long-term management. This habitat can be regularly mown but will still provide benefit for pollinators.

Preparation and establishment

Tree should be individually protected from browsing using biodegradable tree guards with canes (to reduce movement to allow roots to establish) to increase survival rates until established.

If seed is used for the flowering lawn, it is best sown in the autumn or spring but can be sown at other times of the year if there is sufficient warmth and moisture. The seed must be surface sown and can be applied by machine or broadcast by hand. To get an even distribution and avoid running out, divide the seed into two or more parts and sow in overlapping sections. Do not incorporate or cover the seed, but firm in with a roll, or by treading, to give good soil/seed contact.

Turf if used should be laid as per the suppliers instructions⁶ with the ground cleared of weeds prior to rotovating and raking over to level. Turf should then be rolled out and lightly tamped down to make the roots are in contact with the earth. A scaffold board can be used to stand on to prevent compacting the ground. The turf should be watered on completion of laying and then every few days during dry periods. The first cut should be left for 2 weeks to allow the turf to root.

Management

i) *Trees*

Management of the trees in the first year after planting should focus on weed control with mulching regularly. Any dead trees should be replaced like-for-like. Plants should only be watered during extended dry spells (roots will stay shallow if regularly watered) for the first two years, top-dressed annually with a general-purpose fertiliser, and have mulch re-applied as required.

ii) *Flowering lawns*

Year 1 – early establishment

The wild flower and grass species in this mix are perennial; they will be slow to germinate and grow and will not usually flower in their first growing season. There will often be a flush of annual weeds from the soil in the first growing season. This annual weed growth is easily controlled by repeated mowing.

Mow newly sown flowering lawns regularly (every 7 -10 days during growing season) throughout the first year of establishment. Cut to a height of 40-60mm, removing cuttings if dense. This will gradually develop a good sward structure, help maintain balance between faster growing grasses and slower developing wild flowers, and control annual weeds. Dig out any residual perennial weeds such as docks.

Long-term management

Mow regularly as a lawn but not too short (25-40mm). To permit flowering, mowing can be relaxed from late June. Cut again when the sward gets untidy (after 4-8 weeks). Mowing may be suspended earlier in the year to allow cowslips to flower. Heavy quantities of cuttings should be collected and removed from site.

⁴ <https://wildseed.co.uk/mixtures/view/56/flowering-lawn-mixture>

⁵ <https://www.wildflowerlawnsandmeadows.com/product/wild-flower-lawn-seed-mix/>

⁶ <https://www.wildflowerlawnsandmeadows.com/blog/how-to-lay-wild-flower-turf/>

Responsible Parties

The applicant is responsible for implementing or assigning a competent contractor to carry out the work as described. MHE Consulting Ltd can provide further guidance as requested.

b) Nectar rich climbers

Wild honeysuckle (*Lonicera periclymenum*) and/or traveller's joy (*Clematis vitalba*) will be planted at intervals of 5-10m along existing and new hedgerows, walls, and other linear features at a rate of one plant per 5-10m.

Preparation and establishment

Planting holes should be 'hand dug' alongside existing hedgerows. The base of the plant should be kept cool and shaded by carefully positioning other plants or put a layer of pebbles or flat stones at the base. Shoots should be cut back, and canes should be used to encourage vertical growth.

Management

Water regularly during the first spring and summer, after which only water infrequently during summer months. Mulch annually and prune after flowering. Replace any plant to die within the first year like-for-like.

Responsible Parties

The applicant is responsible for implementing or assigning a competent contractor to carry out the work as described. Ongoing maintenance will be the responsibility of homeowners. MHE Consulting Ltd can provide further guidance as requested.

c) Bat boxes

A minimum of 3 woodcrete (e.g. Schwegler 2F-DFP⁷), woodstone⁸ or timber boxes such as Kent bat boxes or Vincent Pro boxes (Appendix A4) suitable for crevice dwelling bats will be erected on suitable trees retained on site.

Installation

The bat boxes should be positioned preferably a minimum of 4m above ground, to prevent cat predation, and in a sheltered sunny place, away from artificial light sources. The box should not be positioned in direct sunlight with no branches below the entrance which could hinder bats finding the boxes and entering/leaving the boxes. Exact positions are to be agreed with a suitably experienced ecologist as correct placement is fundamental to the successful uptake by the species.

Management

Generally, bat boxes are self-cleaning and require minimal pr no maintenance.

Responsible Parties

The applicant is responsible for erecting the boxes or assigning a competent contractor to install the bat boxes with exact locations to be agreed with a suitably experienced ecologist.

d) Small passerine bird boxes

Combined robin (*Erithacus rubecula*)/wren (*Troglodytes troglodytes*) nest boxes⁹ (x2), house sparrow (*Passer domesticus*) terraces¹⁰ (x2) and starling (*Sturnus vulgaris*) (x2) boxes¹¹ (x2) suitable for and will be erected on suitable trees/shrubs within the application site (Figure 3).

⁷ <https://www.nhbs.com/2f-schwegler-bat-box-with-double-front-panel>

⁸ <https://www.birdfood.co.uk/harlech-woodstone-bat-box->

⁹ <https://www.nhbs.com/robin-and-wren-fsc-nest-box>

¹⁰ <https://shopping.rspb.org.uk/garden-bird-nest-boxes/rspb-sparrow-terrace-nest-box.html>

¹¹ <https://shopping.rspb.org.uk/garden-bird-nest-boxes/apex-starling-nestbox.html>

Installation

Nest boxes should be hung at a height of approximately 1.5 metres or higher and angled so that they face away from the prevailing wind (usually south-westerly in the UK). Robin/wren boxes should be mounted in an area well-hidden with vegetation (e.g. existing hedgerow or mature tree).

Management

Generally, the boxes require no maintenance with the birds cleaning the boxes as necessary. Birds and their nests (including any eggs or young in the nest) are legally protected from disturbance and damage during the breeding season.

Responsible Parties

The applicant is responsible for implementing or assigning a competent contractor to install the bat boxes as per the manufacturer's recommendations.

d) Barn owl nest box

A barn owl nest box (Appendix A3) will be erected on a mature oak tree (Figure 3) overlooking the rough grassland to the south of the application site.

Installation

The barn owl nest box should be erected a minimum of 4m above ground level and positioned so that the access hole is visible to a passing owl, even when the tree is in full leaf and seen from a distance.

Management

Generally, management required is minimal, though boxes can be cleaned periodically outside of the main breeding season (1st March to August inclusive).

Responsible parties

The applicant is responsible for assigning a competent contractor to install the nest boxes, though the box location should be agreed with a suitably experienced person, whether ECoW or local ornithologist. The design of the box should follow best practise to avoid young falling¹².

e) Bug hotels

A minimum of 3 bug houses¹³ will be erected on suitable trees around the site, providing an important refuge habitat for numerous species of invertebrate including solitary bees.

Installation

Bug hotels should be firmly fixed in a warm location (at least 1m off the ground) and oriented to face between south/southeast. It is also preferable to have some flowering plants and bare soil nearby for food and nest building substrate.

Management

Minimal management is required, though bug hotels should be regularly checked for signs of degradation and replaced every 2-3 years to reduce the risk of parasite infestations and prevent the spread of disease.

Responsible Parties

The applicant is responsible for implementing or assigning a competent contractor to install the bug hotels.

¹² <https://www.barnowltrust.org.uk/barn-owl-nestbox/owl-boxes-for-trees/>

¹³ <https://www.nhbs.com/bug-hotel>

6 LIGHTING DESIGN STRATEGY

6.1 Scope

This section outlines the features of the site used by wildlife sensitive to lighting and identifies lighting specifications required to avoid or reduce impacts upon those features and species. It is based on the baseline ecological assessment for the scheme¹⁴ as well as current guidance, specifically:

- Bats and artificial lighting guidance note (2018)¹⁵ produced by the Bat Conservation Trust (BCT) and the Institute of Lighting Professionals (ILP); and
- Eurobats guidance on bats and artificial light (2018)¹⁶ produced by a panel of experts including the BCT, to provide broad international guidance that complements the nationally drafted BCT/ILP guidance above.

The specifications aim to balance the important safety and amenity needs of the residents of the site, with the requirement to protect biodiversity features on and adjacent to the site (and to comply with the relevant wildlife legislation).

6.2 Sensitive habitat features

Habitats which may support commuting or foraging bats and birds include trees/shrubs and hedgerows to the north, east, south, and west of the barn, grassland to the south, and established gardens to the east (Figure 4). Once the proposed species-rich tree and shrub planting has matured, this will provide an important bat foraging/commuting corridor.

Even low-level light pollution upon these features has the potential to impact animals using these and adjacent habitats. Therefore, the lux and duration of light reaching the features should be minimised where possible.

6.3 Proposed lighting layout

As the existing site access road is private (i.e. not adopted by the Local Authority), no street lighting is proposed apart from a single light by the new cartlodge (Figure 4).

6.4 Lighting design – biodiversity related specifications

External lighting design scheme

Guidance (see section 6.1) recommends the following mitigation measures be used to minimise lighting impacts:

- Light levels should be as low as possible, with no horizontal spillage towards existing trees/shrubs and the number of fixtures kept to the minimum required, to fulfil the lighting need;
- **Security lights should have a maximum of 7.5 to 10 lux with ;**
- **LED lights should be installed, using the warm white (or amber) spectrum, with peak wavelengths >550nm (2700 or 3000°K) and no UV component;**
- Light columns in general should be as short as possible as light at a low level reduces the ecological impact.
- If taller columns (>4m) are required, the use of cowls, hoods, reflector skirts or shields should be used to prevent horizontal spill towards adjacent trees.
- The use of asymmetric beam floodlights (as opposed to symmetric) orientated so that the glass is parallel to the ground will ensure that the light is cast in a downward direction and avoids horizontal spillage;
- **Luminaires with an upward light ratio of 0% should be mounted on the horizontal i.e. with no upward tilt; and**
- **Passive Infra-Red (PIR) motion sensors and timers to minimise the lit time, set to the minimum (1 min) to minimise the duration of disturbance.**

¹⁴MHE Consulting Ltd (2019) Ecology Report – Proposed Barn Conversion, Shelley Priory, Shelley, Suffolk - December 2019 Update

¹⁵www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting

¹⁶https://cdn.bats.org.uk/pdf/Resources/EUROBATSGuidelines8_lightpollution.pdf

6.5 Responsible parties

It is the responsibility of the client and their contractor(s) to ensure lighting installation is as per the specifications proposed. If any significant deviations or amendments are subsequently required, the prior consent of the LPA must be sought by the proposer prior to installation.

The proposed lighting design aims to minimise impacts from artificial lighting upon wildlife (notably bat commuting and foraging habitat), whilst still providing a safe and practical solution for the residents of the converted barn.

7 TIMETABLE

Section 5 identifies whether measures relate to the construction or operational phases of the scheme and provides information on e.g. seasonal timing constraints. A further indicative timetable for activities within those two phases is included in Tables 1 and 2 (N.B. 'works' include debris clearance and associated site management in addition to construction works).

8 ECOLOGICAL CLERK OF WORKS AND MONITORING

During and upon completion of works an ECoW (as per BS 42020:2013¹⁷) should be employed to supervise works as identified in section 5.1 in relation to checks for breeding birds in hedgerows and installation of features such as bat and barn owl boxes.

For advice regarding the installation of features which are not identified as requiring ecologist supervision, free telephone advice can be provided by MHE Consulting Ltd on 01986 788791. The same contact can be used if GCNs are encountered during works.

9 INDIVIDUAL RESPONSIBILITIES AND COMMUNICATION

Individual responsibilities associated with the measures and monitoring proposed are outlined in the relevant sections above and in Tables 1 and 2 below.

In summary, and unless agreed otherwise by all relevant parties, it is the responsibility of the applicant during the site clearance and construction phases to employ and instruct the Principal Contractor to undertake works as per this document, and to secure the input of a qualified ecologist (e.g. ECoW) as required.

It is the responsibility of the ECoW to provide ongoing advice as requested, to undertake the site visits to assess adherence to good working practices (Place Services on behalf of the LPA could undertake this role), mitigation and delivery of BNG through implementation of enhancement measures, and to confirm to the LPA that the monitoring visits proposed have been undertaken.

It is the responsibility of the homeowner to maintain features in the short to medium-term.

Clear lines of communication should be maintained between the client, principal contractor, and ECoW should any issues arise and require resolving. MHE Consulting can provide the role of ECoW upon request, as well provide Toolbox Talks, instructional material, ongoing supervision, and materials (e.g. bat boxes).

¹⁷ BSI Standards publication BS 42020:2013 Biodiversity – Code of practice for planning and development

Table 1 Biodiversity avoidance and mitigation measures

| Objective | Action | Further information | Responsible party | Timing | Progress |
|--|---|---|-------------------------------------|--|----------|
| Avoid damaging to retained adjacent habitats | <ul style="list-style-type: none"> All retained hedgerows, trees and plantation woodland must be protected with temporary (e.g. Heras) fencing to prevent accidental damage. RPAs must be used for any 'at risk' individual trees to prevent damage to root systems as per the British Standard (where the RPA is the diameter at breast height in metres multiplied by 12, capped at 15m). Where operations are required within the RPA, hand digging must be used, and vehicle movement should be avoided. | Section 5.1 Figure 2 | Client & their Principal Contractor | Prior to works commencing and maintained throughout. | |
| Good practice measures to avoid impacts upon amphibians and reptiles, birds and small mammals including hedgehogs. | <ul style="list-style-type: none"> Any areas of hedgerow or thick grassy/ruderal/shrub or similar vegetation should be cleared in early autumn to avoid impacts upon nesting animals. If clearance is required in the spring to avoid nesting bird issues, vegetation should be retained to no lower than 300mm above ground level to avoid injury or harm to hibernating animals until temperatures are regularly (6 consecutive days/nights) above 6°C. Clearance at other times of year should be undertaken with prior checks/supervision by an ecologist. Hedgerows should be cut by hand (e.g. chainsaw) to c. 300mm above ground level to provide some cover for reptiles and small mammals but removing nesting bird cover; Existing vegetated aggregate piles should be moved sensitively during April to October inclusive, when animals are active; Should any animals be encountered, they should be allowed to displace into retained habitat (e.g. boundaries) or carefully relocated in an area of retained habitat (i.e. the western boundary tree line) as soon as possible; During the construction phase, trenches will be filled on the same day as excavation where possible. Trenches left overnight will be covered with ply/OSB sheets and any gaps filled with damp sharp sand; Mammal ladders (medium to large branches, rough pieces of timber) should be placed within trenches to enable animals to escape; Footings and concrete slabs will be poured during the morning to ensure they have hardened off prior to evening to reduce the risk of animals encountering wet concrete; Any hand mixing of mortar or concrete will be on ply boarding over a tarpaulin which is folded over the boarding at the end of each day to prevent animals coming into contact; | Section 5.1 https://www.thebhs.org/the-bhs-amphibian-gully-pot-ladder https://www.aco.co.uk/products/wildlife-kerb https://www.drainagepipe.co.uk/leaf-and-debris-gully-screen Figure 2 Appendix A2 | Client & their Principal Contractor | Prior to works commencing and maintained throughout. | |

| Objective | Action | Further information | Responsible party | Timing | Progress |
|---|--|---|--|--|----------|
| | <ul style="list-style-type: none"> Any excess cement/concrete will be poured into a concrete skip, so it can then set to prevent animals coming into contact; Concrete mixers and shovels, rakes, boots etc. must be cleaned off in a safe location whereby any washing will not enter any waterbodies; All building materials will be stored on bare ground or hard standing, or stored off the ground on pallets; Any building waste temporarily stored on site should be stored on bare/hard ground or in skips to prevent animals from seeking refuge; Any installed gully pots that do not discharge without impediment straight into a ditch or pond must be situated $\geq 100\text{mm}$ from roadside; OR a wildlife-kerb must be installed adjacent to each gully pot; OR a gully pot ladder placed into each gully pot; and Any downpipes taking water off the roofs should be sealed at ground level by using a leaf and debris screen to prevent amphibians entering drains. <p>If GCNs are observed by any worker during construction, work must immediately cease and a qualified EcoW be contacted (advice can be sought from MHE Consulting Ltd on 01986 788 791). The poster in Appendix A1 should be placed in welfare facilities on site.</p> | | | | |
| Avoid impacts on roosting, commuting or foraging bats | <ul style="list-style-type: none"> Breathable Roofing Membranes (BRM) to be avoided behind any timber cladding unless tongue and groove or similar cladding is used which prevents bats from entering gaps between the cladding and the BRM. Exterior lighting design as per Lighting Design Strategy for Biodiversity (planning condition 17). Lighting levels must be as low as possible using warm white LEDs. Movement sensors must be used to minimise the lit time. | Planning Condition 15 Section 5.1 Figure 4 Section 6 (Lighting Design) | Client & their Main Contractor | Prior to works commencing and maintained throughout. | |
| Avoid impacts on nesting birds | <ul style="list-style-type: none"> Any site compounds (if required) should be positioned away from any boundary hedgerows or adjacent woodland to minimise disturbance during the main bird-breeding season (March to August inclusive); Retained trees, hedgerows and shrubs should be protected with temporary fencing (e.g. Heras) during the works to prevent damage to above ground growth whilst Root Protection Areas (RPAs) should be used to inform the detailed design; The hedgerow sections to be removed should be inspected for the presence of nesting birds if the clearance works are to commence during the main bird breeding season (March to August inclusive); and | Section 5.1 Figure 2 | Client & their Main Contractor Ecologist (ECoW) | Prior to works commencing and maintained throughout | |

| Objective | Action | Further information | Responsible party | Timing | Progress |
|-----------|--|---------------------|-------------------|--------|----------|
| | <ul style="list-style-type: none"> Should active nests be found they should be left undisturbed until any dependent young have fledged and left the nest. Any nest sites should be clearly marked on site and site staff briefed on their location. | | | | |

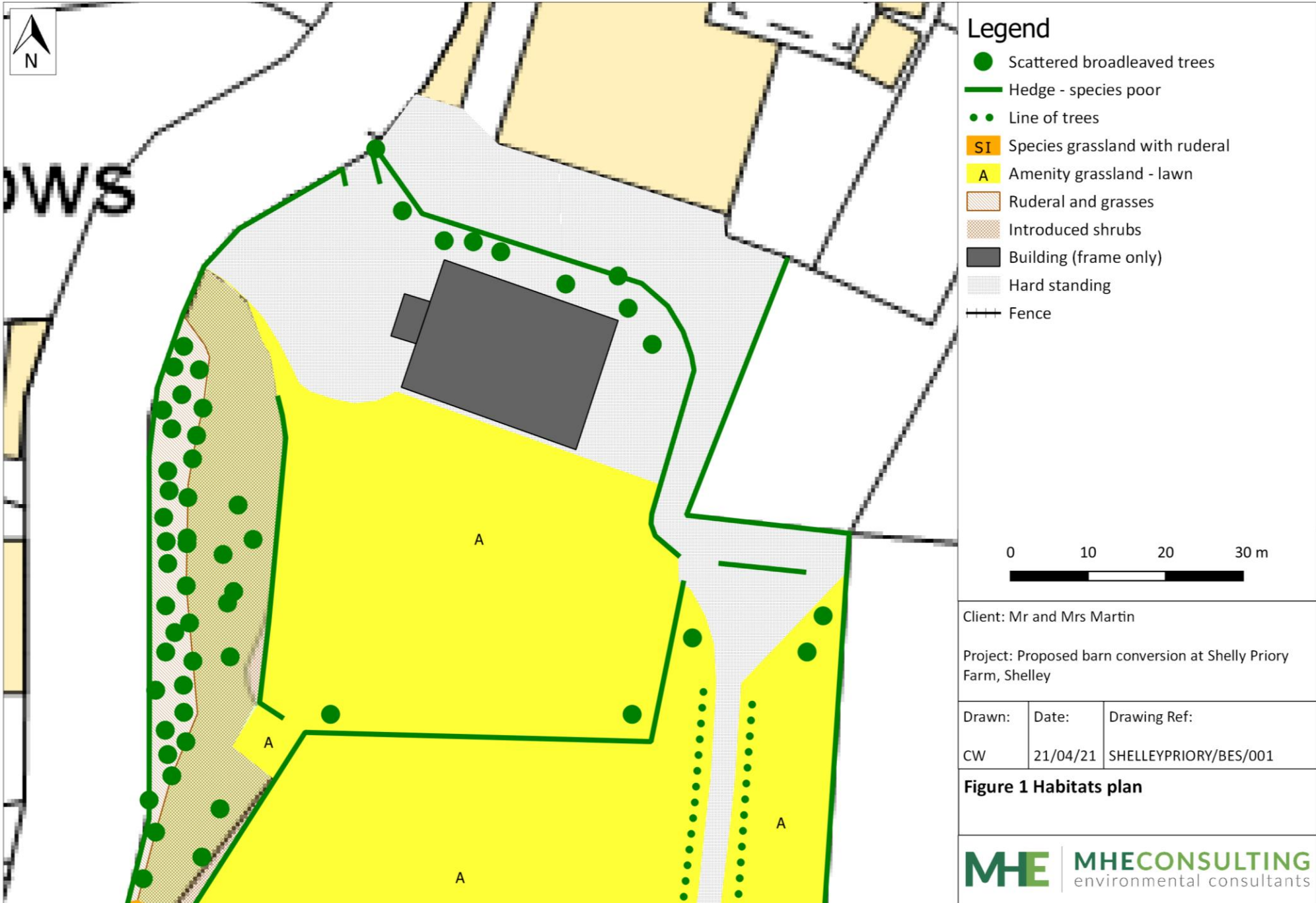
Table 2 Biodiversity enhancement measures

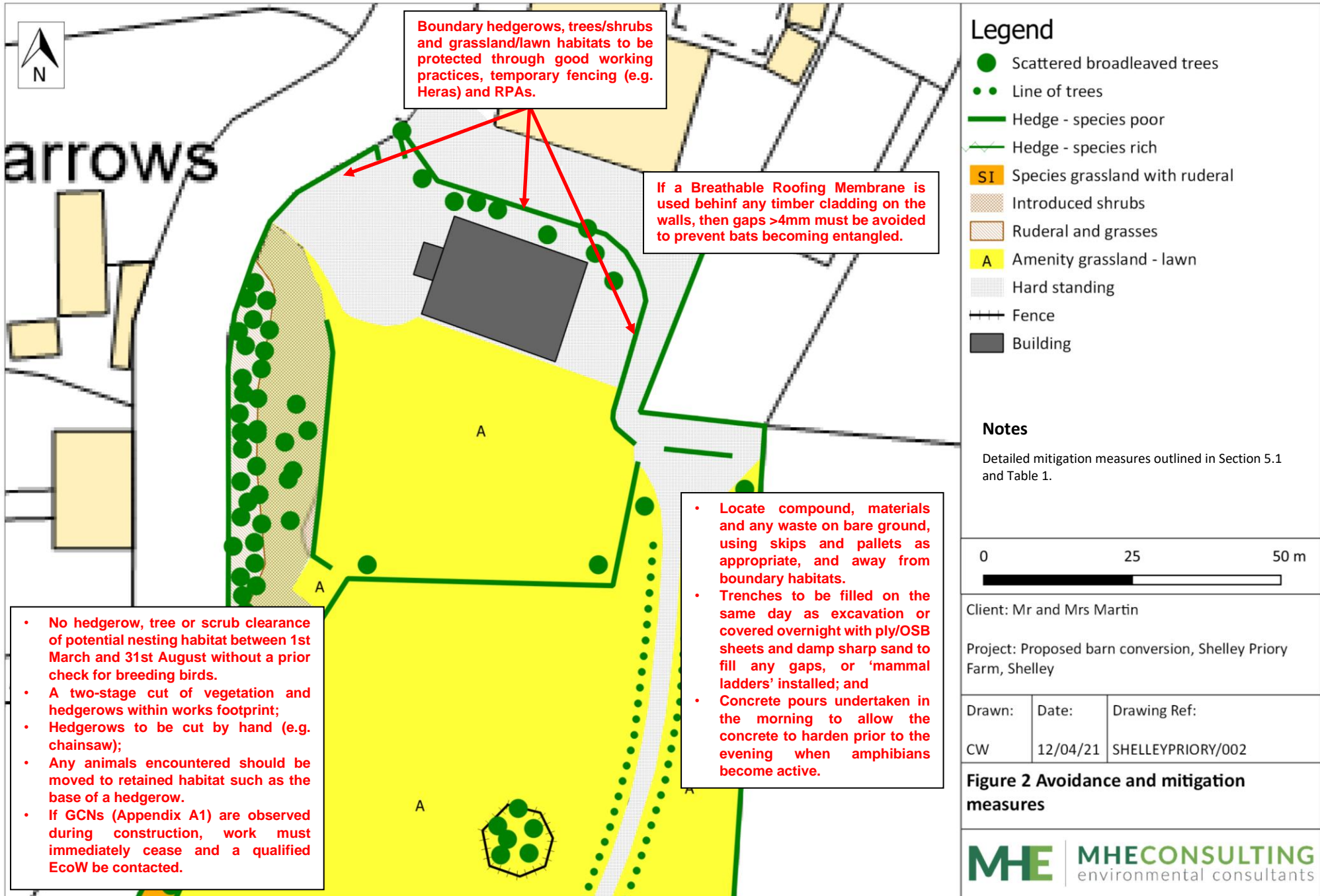
| Objective | Action | Further information | Responsible party | Timing | Progress |
|--------------------------------|--|---|---------------------------------------|--|----------|
| Native tree and shrub planting | <ul style="list-style-type: none"> Native tree and shrub planting is proposed. Plants should be individually protected from browsing using biodegradable tree guards with canes (to reduce movement to allow roots to establish) to increase survival rates until established. Management of the shrub and trees in the first year after planting should focus on weed control with mulching regularly. Any dead plants should be replaced like-for-like. Plants should only be watered during extended dry spells (roots will stay shallow if regularly watered) for the first two years, top-dressed annually with a general-purpose fertiliser, and have mulch re-applied as required. During the first spring following planting of the shrub plants should be cut down to 45-60cm above ground to encourage lateral shoot growth which will produce a denser growth which is beneficial for hedgehog and birds. Any dead shrubs or trees should be replaced within the first 5 years and trees similarly. When established several years after planting, the shrubs should be cut back every two to three years, ideally leaving the top (sides can be cut to maintain the desired width) uncut for at least one year at a time to maximise productivity for wildlife. Cutting should be undertaken outside of the bird nesting period (1st March to 31st August). | <p>Section 5.2</p> <p>https://ptes.org/hedgerow/managing-hedgerows-top-tips/</p> <p>Figure 3</p> | Client or their Landscape Contractor | <p>During construction and/or prior to occupation.</p> <p>Will require ongoing maintenance</p> | |
| Flowering lawns | <ul style="list-style-type: none"> Sow the lawn with an appropriate seed mix or turf as per supplier instruction If turf is used it should not be mown for a minimum of 2 weeks to allow the roots to establish. If seed is sown it should be allowed for sufficient time to allow forbs to establish before cutting. Turfed areas should be watered every few days during dry spells. | <p>Figure 3</p> <p>Section 5.2</p> | Client or their Landscape Contractor | <p>During construction and/or prior to occupation.</p> <p>Will require ongoing maintenance</p> | |
| Nectar rich climbers planting | <ul style="list-style-type: none"> Nectar rich climbers to be planted at intervals of 5-10m along existing and new hedgerows, walls, and other linear features to benefit pollinators. Planting holes should be 'hand dug' alongside new and existing hedgerows. The base of the plant should be kept cool and shaded by carefully positioning other plants or put a layer of pebbles or flat stones at the base. | <p>Section 5.2</p> <p>Figure 3</p> | Client or their Landscape Contractor. | <p>During construction and/or prior to occupation.</p> <p>Will require ongoing maintenance</p> | |

| Objective | Action | Further information | Responsible party | Timing | Progress |
|---|--|--|--|---|----------|
| | <ul style="list-style-type: none"> Shoots should be cut back, and canes should be used to encourage vertical growth. Water regularly during the first spring and summer, after which only water infrequently during summer months. Mulch annually and prune after flowering. Replace any plant to die within the first year like-for-like. | | | | |
| Provide enhancements for roosting bats | <ul style="list-style-type: none"> Woodcrete/woodstone or timber bat boxes (Appendix A2) suitable for crevice dwelling bats will be erected on suitable trees retained on site or on the converted barn. The bat boxes should be positioned preferably a minimum of 4m above ground, to prevent cat predation, and in a sheltered sunny place, away from artificial light sources. The box should not be positioned in direct sunlight. Exact positions are to be agreed with a suitably experienced ecologist as correct placement is fundamental to the successful uptake by the species. | Section 5.2 Figure 3 Appendix A2 | Client or appointed contractor ECoW or LPA ecologist to confirm installation | Prior to occupation | |
| Provide enhancements for small passerines | <ul style="list-style-type: none"> Robin/wren (x2), house sparrow (x2) and starling (x2) boxes to be erected on suitable trees within the application site. Nest boxes should be hung at a height of approximately 1.5 metres or higher and angled so that they face away from the prevailing wind (usually south-westerly in the UK). Robin/wren boxes should be mounted in an area well-hidden with vegetation (e.g. existing hedgerow or mature tree). | Section 5.2 Figure 3 https://www.nhbs.com/robin-and-wren-fsc-nest-box https://shopping.rspb.org.uk/garden-bird-nest-boxes/rspb-sparrow-terrace-nest-box.html https://shopping.rspb.org.uk/garden-bird-nest-boxes/apex-starling-nestbox.html | Client or appointed contractor ECoW or LPA ecologist to confirm installation | During construction and/or prior to occupation. | |
| Provide enhancements for barn owl | <ul style="list-style-type: none"> Barn owl box erection on a suitable tree overlooking the rough grassland to the south of the application site. The barn owl nest box should be erected a minimum of 3m above ground level and positioned so that the access hole is visible to a passing owl, even when the tree is in full leaf and seen from a distance. Nest boxes should be sited close to areas of suitable owl hunting habitat (e.g. areas of rough grassland). Nest boxes can be cleaned periodically outside of the main breeding season (1st March to August inclusive). | Section 5.2 Figure 3 https://www.barnowltrust.org.uk/barn-owl-nestbox/owl-boxes-for-trees/ For a tree mounted example and purchasable barn owl box see Appendix A3 | Client or appointed contractor ECoW, experienced local ornithologist or LPA ecologist to confirm installation | During construction and/or prior to occupation | |
| Provide enhancements for invertebrates | <ul style="list-style-type: none"> A minimum of 4x Bug houses will be erected on suitable trees around the site, providing an important refuge habitat for numerous species of invertebrate including solitary bees. Bug hotels should be firmly fixed in a warm location (at least 1m off the ground) and oriented to face between south/southeast. It is also preferable to have some flowering plants and bare soil nearby for food and nest building substrate. | Section 5.2 Figure 3 https://www.nhbs.com/bug-hotel | Client or appointed contractor | During construction and/or prior to occupation. | |

| Objective | Action | Further information | Responsible party | Timing | Progress |
|-----------|--|---------------------|-------------------|--------|----------|
| | <ul style="list-style-type: none"> <li data-bbox="434 188 1115 261">Bug hotels should be regularly checked for signs of degradation and replaced every 2-3 years to reduce the risk of parasite infestations and prevent the spread of disease. | | | | |

Figures





Boundary hedgerows, trees/shrubs and grassland/lawn habitats to be protected through good working practices, temporary fencing (e.g. Heras) and RPAs.

If a Breathable Roofing Membrane is used behind any timber cladding on the walls, then gaps >4mm must be avoided to prevent bats becoming entangled.

- Locate compound, materials and any waste on bare ground, using skips and pallets as appropriate, and away from boundary habitats.
- Trenches to be filled on the same day as excavation or covered overnight with ply/OSB sheets and damp sharp sand to fill any gaps, or 'mammal ladders' installed; and
- Concrete pours undertaken in the morning to allow the concrete to harden prior to the evening when amphibians become active.

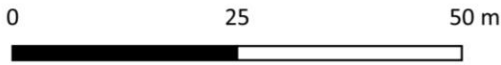
- No hedgerow, tree or scrub clearance of potential nesting habitat between 1st March and 31st August without a prior check for breeding birds.
- A two-stage cut of vegetation and hedgerows within works footprint;
- Hedgerows to be cut by hand (e.g. chainsaw);
- Any animals encountered should be moved to retained habitat such as the base of a hedgerow.
- If GCNs (Appendix A1) are observed during construction, work must immediately cease and a qualified EcoW be contacted.

Legend

- Scattered broadleaved trees
- Line of trees
- Hedge - species poor
- Hedge - species rich
- SI Species grassland with ruderal
- Introduced shrubs
- Ruderal and grasses
- A Amenity grassland - lawn
- Hard standing
- Fence
- Building

Notes

Detailed mitigation measures outlined in Section 5.1 and Table 1.



Client: Mr and Mrs Martin

Project: Proposed barn conversion, Shelley Priory Farm, Shelley

| | | |
|--------|----------|-------------------|
| Drawn: | Date: | Drawing Ref: |
| CW | 12/04/21 | SHELLEYPRIORY/002 |

Figure 2 Avoidance and mitigation measures



Client: Mr and Mrs Martin

Project: Proposed barn conversion, Shelley Priory Farm, Shelley

| | | |
|--------|----------|-------------------|
| Drawn: | Date: | Drawing Ref: |
| CW | 21/04/21 | SHELLEYPRIORY/003 |

Figure 3 Biodiversity enhancements

Appendices

Appendix A1 GCN signage

Great Crested Newt

If seen by any employee, works must cease immediately and an ecologist be contacted for advice

It is an offence to intentionally or recklessly disturb, injure or kill great crested newts

Further information can be found at www.arguk.org



https://secure.telegraph.co.uk/multimedia/archive/03435/great_crested_newt_3435922k.jpg

Appendix A2 Bat box options



Vincent Pro bat box



Kent 'style' bat box Example (produced by and available from MHE Consulting Ltd upon request, or from numerous suppliers online - use search term 'timber Kent box').



WoodStone large chamber bat box

Appendix A3 Tree mounted barn owl nest box



Eco Barn Owl Nest Box



Usually dispatched within 2-4 weeks

£129.00

#216867

Price:

£129.00

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Conserving the Barn Owl and its Environment



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Barn Owl box for a tree

£167.00

Current Lead Time: 6 Weeks

Our outdoor Barn Owl box is a much safer home for owlets than some designs due to a 460mm (18") drop from the entrance hole to the bottom.

Made from sustainable FSC-approved pressure treated 9mm plywood and torch-on roofing felt. Sealed joints throughout.

Approximate size (mm) 740W x 710H x 500D. Weight 18kg.

Designed for fixing to an exposed tree trunk, this Barn Owl box can also be positioned in a fork provided that the entrance is visible to birds flying past.

A 'Nestbox Hanging Kit' is included.

** We use as little packing material as possible to minimise our environmental impact. This means your nestbox will likely be visible when delivered **