Ecological Mitigation, Enhancement and Management Plan

De La Bere Riding School and Stables, Southam,

Cheltenham, Gloucestershire, GL52 3NJ

Paul Duncliffe

Status	Issue	Name	Date
Draft	1	Katy Perry BSc (Hons) MCIEEM, Senior Consultant	28/03/2024
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Arbtech Consultant's Contact Details:

Katy Perry
Senior Ecological Consultant
Tel: 07874 871273 **Email:** katyperry@arbtech.co.uk
https://arbtech.co.uk

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Industry Guidelines and Standards

This report has been written with due consideration to:

- Chartered Institute of Ecology and Environmental Management (2017). Guidelines for Preliminary Ecological Appraisal. 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.
- Chartered Institute of Ecology and Environmental Management (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.
- Chartered Institute of Ecology and Environmental Management (2017). Guidelines on Ecological Report Writing. Chartered Institute of Ecology and Environmental Management, Winchester.
- Chartered Institute of Ecology and Environmental Management (2020). Guidelines for Accessing, Using and Sharing Biodiversity Data in the UK. 2nd Edition. Chartered Institute of Ecology and Environmental Management, Winchester.
- British Standard 42020 (2013). Biodiversity – Code of Practice for Planning and Development.
- British Standard 8683:2021 (2021). Process for Designing and Implementing Biodiversity Net Gain.

Proportionality

> The work involved in preparing and implementing all ecological surveys, impact assessments and measures for avoidance, mitigation, compensation, and enhancement should be proportionate to the predicted degree of risk to biodiversity and to the nature and scale of the proposed development. Consequently, the decision-maker should only request supporting information and conservation measures that are relevant, necessary, and material to the application in question. Similarly, the decision-maker and their consultees should ensure that any comments and advice made over an application are also proportionate.
>
> The desk studies and field surveys undertaken to provide a Preliminary Ecological Appraisal (PEA) might in some cases be all that is necessary.
>
> (BS 42020, 2013)

Contents

1.0 Introduction

Arbtech Consulting Limited was instructed by Paul Duncliffe to produce an Ecological Mitigation, Enhancement and Management Plan for De La Bere Riding School and Stables, Southam, Cheltenham, Gloucestershire, GL52 3NJ (hereafter referred to as "the site").

A planning application for the demolition of the existing stable blocks, and for the construction of a new residential dwelling (hereafter referred to as "the proposed development") was granted approval, with conditions, by Tewkesbury Borough Council Local Planning Authority October 2023 (23/00879/FUL). This plan has been produced to inform the discharge of Condition Numbers 5, 7 and 8 below, which state:

- *5. Prior to commencement of the development hereby permitted, an Ecological Enhancement Plan shall be submitted to and approved in writing by the Local Planning Authority. The report will detail suitable enhancement measures to be included within the site and the specifications and locations are to be detailed on a plan.*
  Reason: To ensure the development contributes to the conservation and enhancement of biodiversity within the site and the wider area
- *7. The development hereby approved shall be carried out in strict accordance with the Mitigation Measures provided in the Preliminary Ecological Appraisal and Preliminary Roost Assessment (Arbtech, September 2022).*
  Reason: To ensure proper provision is made to safeguard protected species and their habitats
- *8. No removal of trees/scrub/hedgerows shall be carried out on site between 1st March and 31st August inclusive in any year, unless otherwise approved in writing by the Local Planning Authority.*
  Reason: To ensure that the nature conservation interest of the site is protected.

A plan showing the proposed development is provided in Appendix 1.

The aim of this plan is to outline mitigation measures required to minimise impacts on biodiversity as well as to outline habitat creation and enhancement opportunities and long-term management which will ensure that a net gain in biodiversity is achieved and maintained on the site, in accordance with the National Planning Policy Framework.

This plan has been informed by a The Preliminary Ecological Appraisal and Preliminary Roost Assessment which was completed by Arbtech Consulting Ltd on August 2022 (Arbtech PEA/PRA, September 2022).

2.0 Site Context and Survey Information

2.1 Site Location and Landscape Context

The site is located at National Grid Reference SO 97216 25137 and has an area of approximately 0.1ha comprising of hard standing and amenable grassland. It is surrounded by arable and pastoral farmland with Cleeve Hill to the east and the town of Cheltenham to the south.

A site location plan is provided in Appendix 2.

2.2 Ecological Information

Table 1 summarises the survey findings for the site and outlines any potential impacts as a result of the proposed development along with recommendations and biodiversity enhancement opportunities, as detailed in the PEA/PRA, Arbtech, 2022.

Table 1: Summary of baseline survey information, potential impacts, recommendations, and biodiversity enhancement opportunities for the site (PEA/PRA, Arbtech, 2022)

Feature	Summary of Survey Findings and Impacts	Recommendations	Biodiversity Enhancement Opportunities
Habitats and flora	No direct impacts to any notable habitats will occur as a result of the proposed development. However, due to the proximity of the site to scattered trees and the water course, indirect effects such as pollution or tree damage could occur during construction.	Best practice measures to minimise the possibility of pollution and tree damage must be implemented during construction.	The following habitat creation and enhancement opportunities could be incorporated into the proposed development: • Native tree, hedgerow, and shrub planting. • Creation of wildflower grassland. Species-specific enhancement opportunities are detailed later in this table.
Reptiles and Amphibians	No direct impacts, but thought to be present in the wider landscape.	None.	The following habitat creation and enhancement opportunities could be incorporated into the proposed development which would be beneficial for reptiles: • Creation of reptile refugia and hibernacula using debris and brash from site clearance. • Planting of native scrub and grassland to increase foraging opportunities. • The creation of basking areas such as rock piles or areas of cleared ground with shelter nearby.
Roosting bats (B1, B2 and B3)	**Buildings:** Bats are very unlikely to be roosting within the buildings and as such, there are not anticipated to be any impacts on bats in this location as a result of the proposed development.	**Buildings:** In the unlikely event that a bat or evidence of bats is discovered during the development all work must stop and a bat licensed ecologist contacted for further advice.	Bat bricks can be installed in the new building on site which will provide new permanent bat roosting provision on site. Suitable bat bricks include the Building in WoodStone Bat Box and the Ibstock Bat Box 'C'. These should be installed during construction of the development and should ideally be placed on a

			south/west facing elevation or facing an area of greenery, and they should have a clear flight path. Alternatively, bat boxes could be installed on mature trees in the wider landscape, such as Beaumaris Bat Box Vivara Pro Woodstone Bat Box Or a similar alternative brand. Bat boxes should be positioned 3-5m above ground level facing in a south or south-westerly direction with a clear flight path to and from the entrance, away from artificial light.
Foraging and commuting bats	The proposed development will not result in the removal of any habitats which could be used by foraging or commuting bats. The proposed development will include the use of lighting which could spill on to bat roosting, foraging or commuting habitat and deter bats from using these areas.	A low impact lighting strategy will be adopted for the site during and post-development.	The following habitat creation and enhancement opportunities could be incorporated into the proposed development which would be beneficial for foraging bats: • Planting of native tree, shrub, and hedgerows to increase foraging opportunities.
Badger	There was no evidence of badgers observed within the wider site and the proposed working area will be impacting suboptimal habitats for badgers and are unlikely to be present within the working area. However, construction activities could result in the death or injury of badgers that may commute through the site, if present	Owing to the nature of the proposed development and the low potential for impacts to commuting badgers, further badger surveys are considered to be disproportionate. A precautionary working method will be implemented during construction.	None, however, enhancements for other species will benefit badgers.
Hedgehog	There was no evidence of hedgehogs observed within the wider site and the proposed working area will be impacting suboptimal habitats for hedgehogs and are unlikely to be present within the working area. However, construction activities could result in the death or injury of hedgehogs if present.	A precautionary working method will be implemented during construction.	None, however, enhancements for other species will benefit hedgehogs.
Birds	Old swallow nests were located within all three buildings surveyed. Anecdotal evidence from the client indicates regular swallow presence in the buildings every year. Active nests could be destroyed during the works.	Works should be undertaken outside the period 1st March to 31st August. If this timeframe cannot be avoided, a close inspection of the vegetation should be undertaken immediately, by qualified ecologist, prior to the commencement of work. All active nests will need to be retained until the young have fledged.	Integrated bird boxes can be installed within the new building on site, which will provide new permanent bird nesting provision on site. Due to the loss swallow nesting sites, it is recommended that these should be replaced by installing the following bird boxes: Ceramic Swallow Bowl No. 10 Schwegler Swallow Nest

			WoodStone Swallow Nest Bowl (Plywood board mounted) These should ideally be placed within outbuilding (with access) or in a sheltered location externally such as below building eaves. There should be a gap of at least 6cm between the top of the nest and ceiling to allow access. As swallows will often nest close together it is recommended that multiple nests should be placed together with gaps smaller than 1m between them. They should not be placed above windows to prevent them from becoming messy with bird droppings.
Invertebrates	The habitats within the proposed development area are of negligible ecological value. The loss of such habitats is likely to be inconsequential to local invertebrate populations owing to their low value and the presence of more extensive habitat locally.	None.	The following habitat creation and enhancement opportunities could be incorporated into the proposed development which would be beneficial for invertebrates: • Native tree, hedgerow, and shrub planting. • Creation of wildflower grassland. • Retention of deadwood on the site.

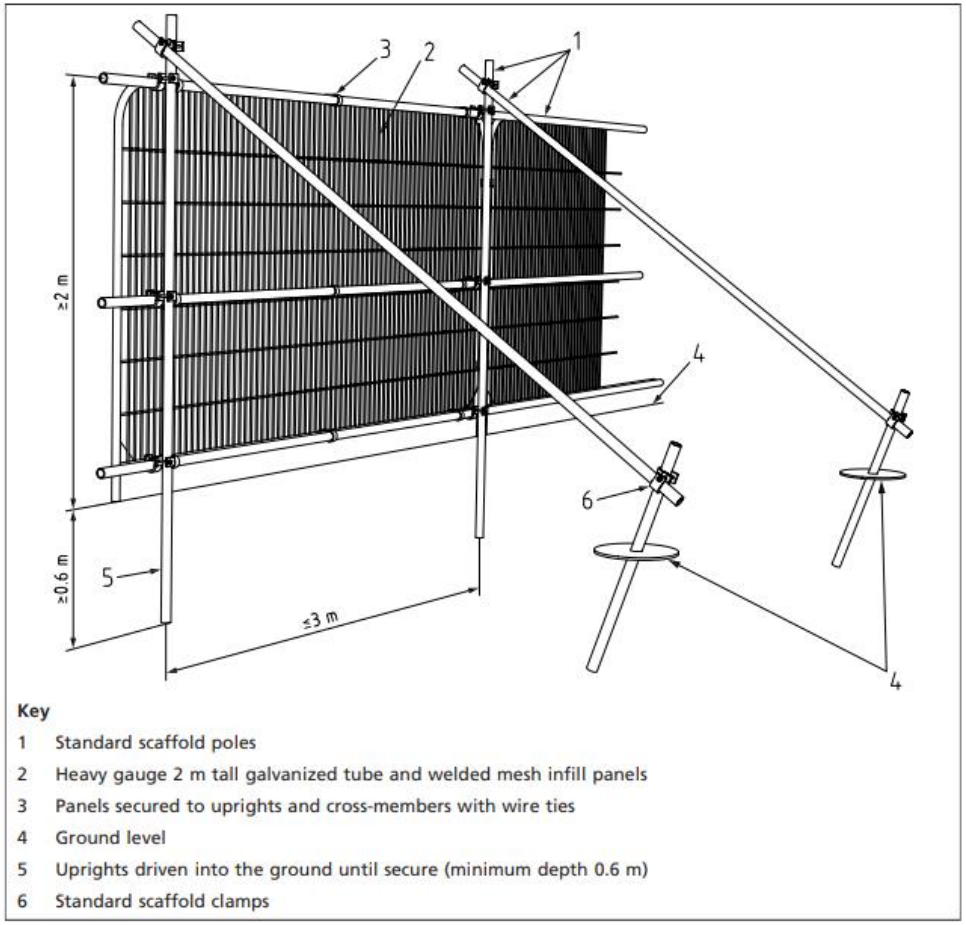
2.3 Geology, Hydrology and Soils

The site does not contain any underlying aquifers or important geology according to MAGIC maps. The site is on lime-rich loamy and clayey soils with impeded drainage.

3.0 Construction Ecological Management Plan (CEMP)

Table 2: Mitigation Measures

Works	Specification
Persons Responsible and Lines of Communication	It is recommended that a Development Biodiversity Champion is selected for the construction phase of the development. The Biodiversity Champion should be someone with significant influence during construction, such as the contract or project manager. The Development Biodiversity Champion is responsible for ensuring all actions outlined in this (C)EMP are implemented including the provision of a toolbox talk prior to works commencing. Any queries with regards to the mitigation prescriptions should be addressed to the project ecologist and communication should be retained between the Development Biodiversity Champion and project ecologist or a suitably qualified Ecological Clerk of Works (ECoW) throughout the construction phase of the development where necessary to ensure the mitigation is applied and impacts to adjacent ecological receptors are effectively minimised. The project ecologist's contact details are located on the title page of this report. It is recommended that the Biodiversity Champion informs the project ecologist or ECoW of the commencement of construction works and provides updates where necessary.
Timing of Works	Construction activities will be restricted to the normal working day 8am-6pm Monday to Friday, and 8am to 1pm Saturday. Working at night, including lighting at night should be avoided to prevent impacting nocturnal species, such as bats or badgers that may be commuting in the landscape.
General Construction Activities	Heras fencing (or similar) will be installed around the perimeter of the construction zone to prevent any vehicle or construction encroachment onto Hyde brook along the southern boundary and to ensure the root protection zones of scattered trees are protected. Any machinery used should be made safe or temporarily fenced off when not in use, and stored on hard standing, within a bunded area, if possible, but located over 10m from the brook. Storage of construction materials will be kept to a minimum. Where materials must be stored, they will be restricted to inert objects and located on hardstanding away from the drainage ditch, mature oak tree and vegetated boundaries which are to be retained. Materials will be stored on pallets to discourage animals from using them as shelter. Skip or similar containers may also be used in place of piles on the ground. Trenches or open excavations will be covered at the end of each working day, or include a means of escape such as a sloping ramp for any animals that may fall in. Any temporarily exposed open pipe systems or ducts will be capped at the end of each working day in such a way as to prevent animals from gaining access.
Pre-commencement Inspection	Prior to works on site, a nesting bird check should be undertaken on to ensure the buildings are free of nesting birds before demolition or vegetation removal. If active nests are observed, these should be retained until the chicks have fledged and checked again. Otherwise, works outside the nesting bird season is recommended. If there is a significant delay to the start of the works, there should be a pre-commencement badger survey to ensure there is no evidence of badgers inhabiting the site.
Site Visit and Reporting	The ECoW will produce a report outlining the actions taken under the CEMP.
Tree Protection	No trenches or ground works will be completed within 5m of any trees or hedgerows on site or the root protection zones as determined by an arboricultural survey. The larger of the two measurements should be adhered to. Trees and hedgerows will be appropriately protected in accordance with BS 5837:2012 -

	"Trees in relation to design, demolition and construction – Recommendations". As such, it is recommended that the trees are separated from construction works by protective fencing throughout the duration of the construction phase of the development. A fencing specification is included within **Figure 1** below.  **Key** 1 Standard scaffold poles 2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels 3 Panels secured to uprights and cross-members with wire ties 4 Ground level 5 Uprights driven into the ground until secure (minimum depth 0.6 m) 6 Standard scaffold clamps **Figure 1**: Default protective barrier specification (British Standards Institute 2012).
Pollution Prevention	To limit impacts of pollution resulting from the construction phase of the development, construction works must be completed in accordance with current statutory guidelines relating to pollution prevention (Environmental Agency 2016). Furthermore, although withdrawn in 2015, pollution prevention guidelines detailed within guidance document: *PPG6: Working at Construction and Demolition Sites* (Environment Agency 2010) remain applicable to the site. Considering both the relevant statutory requirements and best practice measures detailed within guidance document PPG6, the below mitigation prescriptions are considered suitable to mitigate impacts of pollution during the construction phase of the development. The allocated Biodiversity Champion will be responsible for ensuring the below mitigation recommendations are undertaken successfully during the works.

Buffer from construction activities:

A minimum 10m buffer from Hyde Brook which runs along the southern boundary of the site must be retained from construction activity and material storage for the duration of the construction phase in accordance with current guidelines (Environmental Agency 2016). If a 10m buffer cannot be retained, then secondary containment measures must be put in place in this area to prevent pollution entering Hyde Brook for both hazardous and non-hazardous waste. Secondary measures implemented within 10m must comprise the use of a secondary containment system such as the construction of an impermeable bund or the use of drip trays. Secondary containment systems must be implemented in accordance with current guidance published by the Construction Industry Research and Information Association (CIRIA) within guidance document *C736F: Containment systems for the prevention of Pollution* (CIRIA 2014).

Site drainage:

It is recommended that the Biodiversity Champion ensures that:

- Pollution risks are identified pre-construction.
- Pollutants are prevented from entering drains where possible.
- If any pollutant enters a drain, immediately stop the pollution with a physical block, stop the activity causing the pollution, then notify the Environment Agency for surface water drains or the local sewerage provider for foul water drains. If there's a spill, accident, or emergency, try and prevent pollutants entering the drains.
- Report all pollution incidents to site management and the Environment Agency.
- Inspect drains and protection measures frequently and maintain them during the construction activity. Well maintained drains will also reduce risks of flooding and subsequent surface water run-off.
- As a last resort, should any pollutants be required to enter the drainage system on site, permission from Environment Agency or the local sewerage provider must be sought before discharging anything other than clean uncontaminated surface water to a drain and other surface waters or groundwater. Apply for permission early, as authorisation can take up to four months.

Airborne particle suppression:

It is recommended that the Biodiversity Champion ensures that:

- Effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.
- Carry out regular site inspections to monitor compliance.
- Ensure all vehicles switch off engines when stationary.
- Avoid the use of petrol- or diesel-powered generators and use mains electricity or battery power where possible.
- Only use cutting, grinding, or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction.

- Ensure an adequate water supply on the site for effective dust/ particulate matter suppression/ mitigation, using non-potable water where possible and appropriate.
- Use enclosed shuts and conveyors and covered skips.

Materials storage and water run-off:

It is recommended that the Biodiversity Champion ensures that:

- No stockpiles are created on exposed ground areas and ensure that all materials and chemicals are stored securely and safely on site in accordance with current Control of Substances Hazardous to Health (COSHH) regulations (HSE 2002).
- Stockpiles are located as far away as possible from Hyde Brook and on level ground to prevent any accidental run-off.
- Contaminated materials, chemicals, and other hazardous substances must be stored on an impermeable surface, in a bunded area, within any area of the site.
- All chemicals and hazardous substances are stored away from areas where there is heightened risk of damage from impact or collision such as site traffic.
- All chemicals and hazardous substances are labelled, containers are sealed when not in use and inspected regularly and fit for purpose.
- Any damaged or old containers are replaced in line with the duty of care requirements. Note such containers may be considered hazardous waste.
- Staff are trained in use of spill kits and emergency procedures.
- Ensure there is a designated 'responsible person' on site at all times.
- Lock storage facilities when not in use.

Implementation of the Waste Hierarchy:

The Biodiversity Champion must ensure that all construction activity is completed in accordance with the Waste Hierarchy (Defra 2011) in an attempt to reduce the amount of waste produced during the construction phase of the development. As such, the construction phase must be completed in accordance with the below core principles:

In the first instance:

- Re-use products and materials where possible.
- Recycle and compost material resources where possible.
- Attempt to recover energy from waste.

Where none of the above options offer an appropriate solution, waste disposal is the final option:

- Only transfer controlled waste to an “authorised person” (Waste Collection Authority, the holder of an Environmental Permit, Registered Water Carrier, or Waste Disposal Authority).
- Ensure that non-hazardous waste is transferred under a Waste Transfer Note which must be retained for two years.
- Hazardous waste is moved under a waste consignment note that provides a clear description of the waste material. The consignment note must be retained for three years.

- The waste is the responsibility of the company until it has been fully recovered or finally disposed of.

Noise:

The Biodiversity Champion must ensure that noise levels are kept to a minimum in accordance with best practice as defined in the Control of Pollution Act 1974 to avoid unacceptable levels of noise and vibrations. Further guidance can be found in British Standard 5228-1:2009. Such measures applicable to the proposed development primarily include agreed working hours limiting night work, using the quietest equipment and plant available, shutting down equipment when not in use, and completing deliveries during working hours only. Most notably, prescriptions as to limit noise of plant machinery as detailed within **Table B.1** within the code of practice for noise control (British Standards Institution, 2014) is likely to have the most significant impact during construction activity. Table B.1 is shown below.

Table B.1 **Methods of reducing noise levels from construction plant**

Plant	Noise reduction of plant			Alternative plant
	Source of noise	**Possible remedies** (to be discussed with machine manufacturers)	**A-weighted sound reduction** dB	
Hammer drive piling equipment	Pneumatic/diesel hammer or steam winch vibrator driver	Enclose hammer head and top of pile in acoustic screen	5 to 10	Bored piling Vibratory system Drop hammer completely enclosed in box with opening at top for crane access Steel jacket completely enclosing drop hammer with dolly and polystyrene chips fed to impact surface to dissipate energy Pressed-in piling which generates its driving force from the frictional restraint of other piles
	Sheet pile	Acoustically dampen sheet steel piles to reduce levels of resonant vibration		
	Impact on pile	Use resilient pad (dolly) between pile and hammer head. Packing needs to be kept in good condition		
	Cranes cables, pile guides and attachments	Careful alignment of pile and rig		
	Power units or base machine	Fix more efficient sound reduction equipment or exhaust. Acoustically dampen panels and covers. When intended by the manufacturer, engine panels need to be kept closed. Use acoustic screens when possible		
Earth-moving plant: • bulldozer • compactor • crane • dump truck • dumper • excavator • grader • loader • scraper	Engine	Fit more efficient exhaust sound reduction equipment Manufacturers' enclosure panels need to be kept closed	5 to 10	Alternative super silenced plant might be available. Consult manufacturers for details

Table B.1 **Methods of reducing noise levels from construction plant** *(continued)*

Plant	Noise reduction of plant			Alternative plant
	Source of noise	**Possible remedies** (to be discussed with machine manufacturers)	**A-weighted sound reduction** dB	
Compressors and generators	Engine Compressor or generator body shell	Fit more efficient sound reduction equipment Acoustically dampen metal casing Manufacturers' enclosure panels need to be kept closed	Up to 10	Super silenced plant is available. Consult manufacturers for details Electric-powered compressors are available as opposed to diesel or petrol Sound-reduced compressor or generator can be used to supply several pieces of plant. Use centralized generator system
	Total machine	Erect acoustic screen between compressor or generator and noise-sensitive area. When possible, line of sight between top of machine and reception point needs to be obscured	Up to 10	
		Enclose compressor or generator in ventilated acoustic enclosure	Up to 20	
Pneumatic concrete breaker, rock drills and tools	Tool	Fit suitably designed muffler or sound reduction equipment to reduce noise without impairing machine efficiency	Up to 15	Hydraulic and electric tools are available For large areas of concrete, machine designed to break concrete in bending can be used Thermic lance
		Ensure all leaks in air line are sealed		
	Bit	Use dampened bit to eliminate ringing		
	Total machine	Erect acoustic screen between compressor or generator and noise-sensitive area. When possible, line of sight between top of machine and reception point needs to be obscured	Up to 10	
		Enclose breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation	Up to 20	
Rotary drills, diamond drilling and boring	Drive motor and bit	Use machine inside acoustic shed with adequate ventilation	Up to 15	Thermic lance

Table B.1 **Methods of reducing noise levels from construction plant**

Plant	Noise reduction of plant			Alternative plant
	Source of noise	**Possible remedies** (to be discussed with machine manufacturers)	**A-weighted sound reduction** dB	
Hammer drive piling equipment	Pneumatic/diesel hammer or steam winch vibrator driver	Enclose hammer head and top of pile in acoustic screen	5 to 10	Bored piling Vibratory system Drop hammer completely enclosed in box with opening at top for crane access Steel jacket completely enclosing drop hammer with dolly and polystyrene chips fed to impact surface to dissipate energy Pressed-in piling which generates its driving force from the frictional restraint of other piles
	Sheet pile	Acoustically dampen sheet steel piles to reduce levels of resonant vibration		
	Impact on pile	Use resilient pad (dolly) between pile and hammer head. Packing needs to be kept in good condition		
	Cranes cables, pile guides and attachments	Careful alignment of pile and rig		
	Power units or base machine	Fix more efficient sound reduction equipment or exhaust. Acoustically dampen panels and covers. When intended by the manufacturer, engine panels need to be kept closed. Use acoustic screens when possible		
Earth-moving plant: • bulldozer • compactor • crane • dump truck • dumper • excavator • grader • loader • scraper	Engine	Fit more efficient exhaust sound reduction equipment Manufacturers' enclosure panels need to be kept closed	5 to 10	Alternative super silenced plant might be available. Consult manufacturers for details

Lighting

A low impact lighting strategy will be adopted for the site during and post-development, which will include the following measures:

- Lighting of trees, hedgerows and the brook will be avoided, both pre-, during and post-construction.
- Use narrow spectrum light sources to lower the range of species affected by lighting.
- Use light sources that emit minimal ultra-violet light.
- Avoid white and blue wavelengths of the light spectrum to reduce insect attraction and where white light sources are required in order to manage the blue shortwave length content they should be of a warm / neutral colour temperature <4,200 kelvin.
- Not use bare bulbs and any light pointing upwards. The spread of light will be kept in line with or below the horizontal.
- Light spill will be reduced via the use of low-level lighting used in conjunction with hoods, cowls, louvers, and shields. Lights will also be directional to ensure that light is directed to the intended areas only.
- External lighting will be on PIR sensors that are sensitive to large objects only (so that they are not triggered by passing bats) and will be set to the shortest time duration to reduce the amount of time the lights are on.

	• Wall lights and security lights will be 'dimmable' and set to the lowest light intensity settings. There are several products on the market that allow the control of the light intensity and the duration that the lights are on. All lighting on the developed site will make use of the most up to date technology available.
Herpetofauna	Vegetation clearance works are best undertaken between April and June. During this timeframe, amphibians and reptiles are active and able to escape to adjacent areas when disturbed. If this timeframe cannot be achieved, vegetation clearance works can be undertaken between June and September. During this timeframe, all refugia present (such as log piles, piles of debris and rubble or materials) will need to be subject to detailed finger-tip searches prior to removal. Clearance works must not take place between October and March when reptiles are mostly torpid and thus highly vulnerable to injury or death. Vegetation removal will comprise a phased cutting method in addition to cutting in systematic patterns. The phased cutting method will be undertaken in two stages; the first cut will remove all vegetation to approximately 150mm from ground level and the second cut will be to ground level/ bare ground. Amphibians and reptiles are most likely to be present at or just below ground level; the phased technique allows any individuals present to disperse prior to reducing vegetation to ground level. The systematic vegetation cutting must be applied to both cutting phases and comprises cutting systematically towards areas of retained habitat to the south in an attempt to encourage any individual amphibians or reptiles to retreat to retained habitat unharmed. This method also prevents the creation of habitat islands during the second cutting phase which has potential to trap amphibians and reptiles in isolated pockets of habitat and thus increase the potential for injury or death during works. Two suitable systematic cutting techniques are schematically represented on **Figure 2**. Once the sensitive vegetation clearance has been completed, these areas will then be maintained at a short sward (sward length<50mm) which is unsuitable to support amphibians and reptiles and is likely to prevent individuals from recolonising these areas of the site prior to construction works.

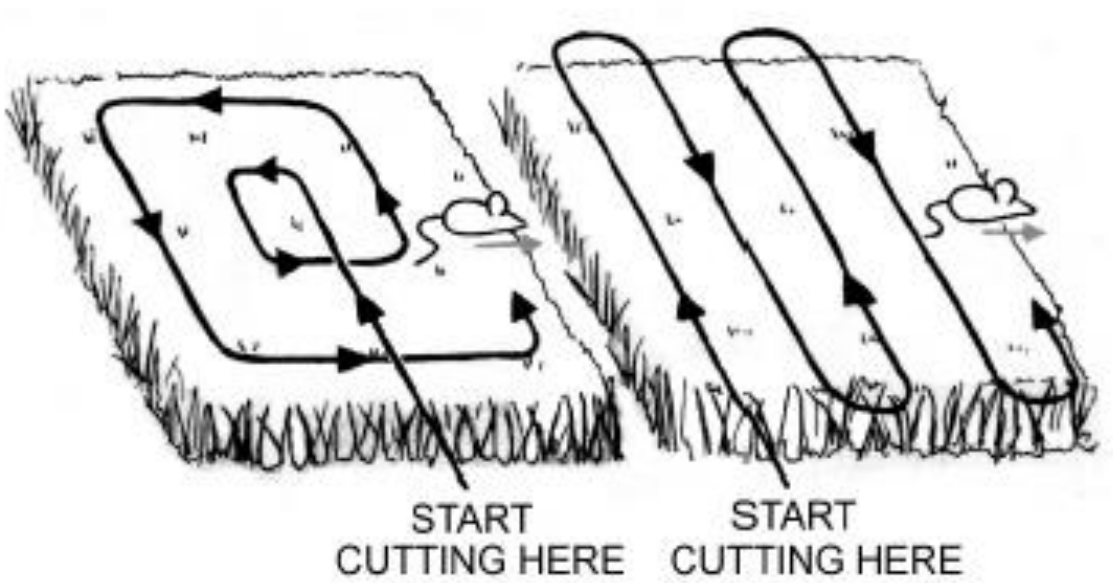


Figure 2: A schematic representation of vegetation cutting patterns as best to eliminate terrestrial opportunities for reptiles and amphibians within the construction zone.

If a common amphibian or reptile is found then this should be allowed to move away into adjacent habitats unharmed, of their own accord or, if at immediate risk, moved by gloved hand to an undisturbed and sheltered area of the site or adjacent land.

In the unlikely event that a great crested newt is identified, works must cease and advise must be sought from a suitably qualified ecologist.

Birds	Works to the building and vegetation clearance should be undertaken outside the core nesting period 1st March to 31st August. If this timeframe cannot be avoided, a close inspection of the building/vegetation should be undertaken, by the project ecologist or ECoW, within 48 hours prior to the commencement of work. All active nests will need to be retained with a species-appropriate buffer until the young have fledged (species specific but typically 4-6 weeks). **This is subject to approval by the LPA.**

4.0 Provision of New Landscaping and Species-Specific Enhancements

Table 3: Provision of New Landscaping and Species-Specific Enhancements

Works	Specification
Persons Responsible	The Biodiversity Champion will be responsible for the provision of the new landscaping and species-specific enhancements. The occupier of the proposed development (i.e., the landowner or managing agent) will be responsible for the management of these features post development.
Management Term	The management prescriptions outlined within this table must be implemented over a period of at least 30 years.
Site Visit and Reporting	The ECoW will make a final site check and sign off once the landscaping and installation of species-specific enhancements are complete.
Wildflower grassland creation	***Overview:*** Areas of wildflower grassland to the south of the wider site be created, as shown in **Appendix 1 & 3**. Where possible, seeds from a local provenance should be utilised to benefit ground dwelling mammals or herpetofauna. ***Objectives:*** • To create a successful and species rich wildflower grassland that will provide habitat for pollinating invertebrate species, that will in turn, provide foraging opportunities for notable species groups including bats and birds on the green roof and if any is installed at ground level (not currently detailed in the landscape plan) this could benefit small mammals and herpetofauna. • Ensure a healthy species diverse sward is maintained; • Ensure that a natural appearance is retained by utilising a seed mix alongside allowing native species of local prevenance to recolonise from the seedbank; • Employ techniques that use organic fertilizers and minimise the use of chemicals wherever possible. ***Creation Method:*** • **Ground preparation** Soil should be specific to the wildflower requirement. With regards to any sown on the ground, the soil is likely to be lime-rich loamy and clayey soils with impeded drainage and therefore wildflower seeds tolerant of clay soils should be utilised. However, the location of the proposed wildflower meadow creation may currently comprise areas of dense vegetation. For areas of ground currently covered by vegetation, any existing weeds should be removed through repeated cultivation and the land subsequently ploughed/ turned to bury all remaining vegetation. • **Seeding** To be undertaken in the spring between April and May. The following seed rates are recommended: 40 kg/ha of a wildflower and grass seed mix. Inclusion of yellow rattle *Rhinanthus minor* in the seed mix will help suppress vigorous grass growth that may suppress the success of wildflowers within the sward. • **Bedding in of seed:**

After sowing, seeds will be 'bedded' in by trampling or light rolling.

- **Seed mix:**

  A combination of two seed mixes is proposed. Specifically, a 50/50 mix of Emorsgate General Purpose Seed Mix EM2 and Emorsgate Mixture for Clay Soils EM4 are proposed to be utilised. This combination of seed mixes will help create a minimum of 9 species per m^2 of grassland and retain a species composition consistent with the UKHabs definition of other neutral grassland. The proposed seed mix combination includes numerous grassland and wildflower species suitable for neutral and clay dominated soils. Notably, the species mix includes yellow rattle which is known to suppress dominant grass species which will allow existing grasses within the seed bank to colonise whilst preventing dominance and thus increasing species diversity per m2. For exact specifications, please refer to: https://wildseed.co.uk/product/mixtures/complete-mixtures/general-purpose-meadow-mixtures/standard-general-purpose-meadow-mixture/ and https://wildseed.co.uk/product/mixtures/complete-mixtures/meadow-mixtures-for-specific-soils/meadow-mixture-for-clay-soils/

Management Prescriptions:

Table 3.2: Wildflower meadow management prescriptions.

Management	When	Rationale
Cut meadow twice annually	Late March / early April and– late August/ early Sept	This ensures the meadow does not grow excessively long and become rank but allows wildflowers to set seed and invertebrates to breed. This will also allow a diverse sward of varying lengths to naturally occur in accordance with growth characteristics of each species. Cutting twice annually will also prevent encroachment of scrub and bracken.
Cut grass as to provide a heterogeneous habitat structure aiming to maintain at least 20% of grass <7cm and 20% >7cm. As such, each cutting phase must cut 20% of the area to ground level, 60% of the area to 15cm, and the	Late March / early April and– late August/ early Sept	To retain a diverse sward whilst limiting impacts to protected species potentially present at ground level and ensuring the natural germination of seeds.

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<tr><td>remainder to 30cm. These areas must be rotated each year to maintain a diverse sward.</td><td></td><td></td></tr>
<tr><td>Turn and dry the cut grass over 3-5 days before removing arisings off Site</td><td>Post cut</td><td>This allows the seeds to drop encouraging species diversity and invertebrates to relocate unharmed.</td></tr>
<tr><td>Do not apply chemical fertilisers</td><td>At all times.</td><td>The use of chemical fertilisers will encourage vigorous grasses and weeds to grow or cause large areas of bare ground due to inhospitable growing conditions,</td></tr>
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<tr><td>Tree Planting</td><td>
Overview:
Multiple areas of proposed landscaping will be created through new tree planting including:
• The planting of native trees, as shown in Appendix 1 & 3.
Objectives:
• To plant native trees species that will provide pollinating, foraging, and refuge opportunities for protected and/ or notable species groups including amphibians, bats, birds, hedgehogs, invertebrates, and reptiles. Species could include fruit bearing trees.
• Ensure that good horticultural practice is employed to encourage long-term health and vitality of all trees.
• Ensure well-balanced crowns and/ or natural shape by preventing over competition.

<u>Species to selected from the following native species: oak, alder, beech, aspen, horse chestnut, willow, elm, lime, ash, and birch but also fruit trees such as damson and elder.</u>

Creation Method:
• Ground preparation and planting
Each tree should be planted within a hole three times as wide of the supplied pot and of a similar depth. Root balls should be soaked thoroughly in water before planting and root balls should be loosened to expose restricted roots before planting. The planted trees should then be backfilled ensuring there are no air pockets around roots or any roosts protruding out of the ground.
• Timing
It is best to prepare the land during the summer ready for planting between November and March. Planting trees before the new year helps ensure
</td></tr>
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better rooting and subsequent establishment including faster growth during the first growing season.

Management Prescriptions:

Table 3.3: New tree planting.

Management	When	Rationale
At the end of each growing season all plant failures are to be 100% replaced	When required; checked annually in Autumn.	To maintain amenity and wildlife value.
If required, provision of stakes and guards. Guards to be left on for a minimum of 5 years	N/A	Protect from damage
Stakes should be checked and any broken or damaged stakes during this time would be removed (as above) and replaced with ties re-fixed	When required; checked annually in Autumn.	Maintain protection
Remove weeds	When required; checked twice annually in early spring and in Autumn.	Reduce competition for resources nutrients etc.by weeds
Application of bark mulch at a depth of 50 mm	Immediately after planting and then when required; checked annually in Autumn.	Reduce competition for resources nutrients etc.by weeds
Do not apply chemical fertilisers	At all times.	The use of chemical fertilisers will encourage vigorous grasses and weeds to grow
Apply a light dressing of well-rotted manure	Annually in the winter	Note the overuse of manure fertilisers will encourage vigorous grasses and weeds to grow.

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<tr><td>Removal of spent flowers from perennial plants should be removed through ‘deadheading’</td><td>Twice annually, late spring and in the Autumn.</td><td>Allows plants to place more energy into re-growth.</td></tr>
<tr><td>Watering should be undertaken before and after planting out and as necessary for the continued thriving of all planting.</td><td>When required; provide more water during periods of draught and less water during times of prolonged rain.</td><td>Ensures plants do not dry out and subsequently fail.</td></tr>
<tr><td>Check and replace any plant failures once a year</td><td>For the first 5 years</td><td>To ensure no gaps form.</td></tr>
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<tr><td>Native Hedgerow Planting</td><td>
Overview:
It is proposed to create native hedgerows along the boundaries, as shown in Appendix 1 & 3.

Objectives:
• To create dense hedgerows that will provide foraging, commuting, and refugia opportunities for notable species groups including bats, birds, badgers, and hedgehogs.
• To ensure native species only are planted.
• Ensure cultural techniques are employed which use a variety of mulches and organic fertilisers and which minimise the use of chemicals and peat wherever possible.

<u>Species to selected from the following native species: field maple, blackthorn, hawthorn, elder, hazel, privet, oak, holly, and beech. A minimum of four species to be included in the creation of the hedgerows to increase biodiversity on site.</u>

Creation Method:
• Ground preparation
Prepare the ground by digging over a strip approximately 60-90cm (2-3ft) wide and one spit (or spade blade) deep. Soils that become waterlogged in winter may require a permanent drainage system. Alternatively, form the soil into a ridge about 15-20cm (6-8in) high and 50-70cm (20-28in) across to plant into.
• Planting
Plants should be positioned set back from hardscaped boundaries to allow space for the hedgerow to develop and mature prior to requiring any significant management/ cutting back. Plant density should focus on achieving a hedgerow width >1m; as such, plants should be planted in a staggered double row approximately 45-60cm apart, where individual plants are planted 90cm apart within each row.
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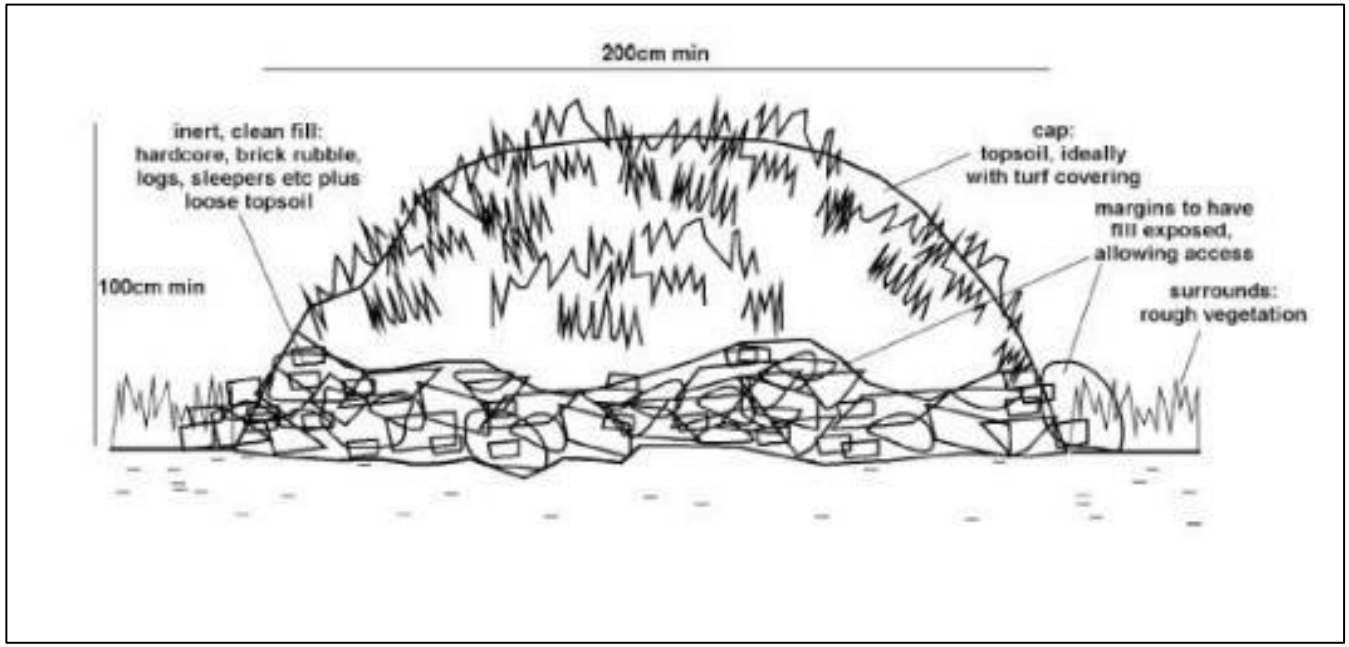
- **Timing**

  It is best to prepare the land during the summer ready for planting between November and March. Planting before the new year helps ensure better rooting and subsequent establishment including faster growth.

Management Prescriptions:

Table 3.4: New hedgerow planting hedgerow.

Management	When	Rationale
At the end of each growing season all plant failures are to be 100% replaced	When required; checked annually in Autumn.	To maintain amenity and wildlife value.
If required, provision of stakes and guards. Guards to be left on for a minimum of 5 years	N/A	Protect from damage
Stakes should be checked and any broken or damaged stakes during this time would be removed (as above) and replaced with ties re-fixed	When required; checked annually in Autumn.	Maintain protection
Remove weeds	When required; checked twice annually in early spring and in Autumn.	Reduce competition for resources nutrients etc.by weeds
Application of bark mulch at a depth of 50 mm	Immediately after planting and then when required; checked annually in Autumn.	Reduce competition for resources nutrients etc.by weeds
Apply a light dressing of well-rotted manure	Annually in the winter	Note the overuse of manure fertilisers will encourage vigorous grasses and weeds to grow.
Watering should be undertaken before and after planting out and as necessary for the continued thriving of all planting.	When required; provide more water during periods of draught and less water during times of prolonged rain.	Ensures plants do not dry out and subsequently fail.
Check and replace any plant failures once a year	For the first 5 years	To ensure no gaps form.
Once the hedgerow reaches an	To be checked annually once	To ensure the hedgerow is not

		average height of 1.5m or above along the hedgerow length, this height or above must be retained.	hedgerow reaches 1.5m in height.	maintained at a low level of worse value to biodiversity.
		Once the hedgerow reaches an average width of 1.5m or above along the hedgerow length, this width or above must be retained.	To be checked annually once hedgerow reaches 1.5m in width.	To ensure the hedgerow is not maintained at a thin density of worse value to biodiversity.
Hibernacula	Two hibernacula will be constructed using natural materials such as logs, stone, and earth (refer to **Figure 3**). The hibernacula are to be installed adjacent to the brook to the south of the site and along the site boundary to the north-east. Brash piles and cuttings can be used each year during pruning to add to the piles.  **Figure 3**: A schematic representation of a man-made hibernacula to provide suitable refuge.			
Bat Boxes	Two bat boxes are recommended to be installed on the retained trees present on site, such as the large oaks within the middle of the fields and two are proposed to be included within the building, as integrated bat bricks. ***Bat boxes specification:*** • The recommended bat boxes will be constructed of woodcrete/ woodstone. Boxes of this construction are designed to require no maintenance and have a lifespan of 25 years plus.			

- 2x General Purpose Bat Boxes (or similar alternative brand) are recommended on the trees, as shown in **Figure 4 and 5**.
- 2 x integrated Bat Bricks (or similar alternative brand) are recommended on the constructed buildings, as shown in **Figure 6.**
- Bat boxes should be positioned 2-5m above ground level facing in a south, southeast, or southwest aspect with a clear flight path to and from the entrance, away from artificial light.

Figure 4: General Purpose Bat Box (image credit https://www.nhbs.com/convex-wood-concrete-bat-box)

Figure 5: Vivara Pro Chambord Small Wooden Bat Box (image credit https://www.amenity.co.uk/products)

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Figure 6: Ibstock Enclosed Bat Box 'C' (image credit https://www.nhbs.com/ibstock-enclosed-bat-box-c)

Recommended Management:
The proposed bat boxes are designed to require no management or maintenance. Furthermore, preventing physical disturbance of bat boxes will increase the chances of occupation by roosting bats. However, it is recommended that the bat boxes are inspected annually for the first five years outside of the typical active season for bats (May to September inclusive) following installation. Bat boxes must be replaced if they are damaged, removed, or have fallen from their recommended location.</td></tr>
<tr><td>Bird Boxes</td><td>Four bird boxes are recommended to be installed on site, two upon mature trees to be retained and two upon the newly constructed building.
Bird box specification:
The recommended bird boxes will be constructed of woodcrete/ woodstone. Boxes of this construction are designed to require no maintenance and a lifespan of 25 years plus.
2x Woodstone Nest Boxes (or a similar alternative brand) with 28mm entrance holes are proposed on the trees, as shown in Figure 7.
2x Eco Swallow Cup Nest Box (or a similar alternative brand) is proposed on the building, as shown in Figure 8.
Nest Boxes should be positioned approximately 3m above ground level where they will be sheltered from prevailing wind, rain, and strong sunlight.
Swallow Cup Nest Boxes should be positioned at the eaves of the building and following manufacturers guidelines.</td></tr>
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Figure 7: Woodstone Nest Box (image credit arkwildlife.co.uk)

Figure 8: Eco Swallow Cup Nest Box (image credit https://www.nhbs.com/eco-swallow-nest?bkfno=241644)

Recommended Management:

The proposed bird boxes are designed to require no management or maintenance. Furthermore, preventing physical disturbance of bird boxes will increase the chances of occupation by nesting birds. However, it is recommended that the bird boxes are inspected annually for the first five years outside of the typical nesting bird season (March to September inclusive) following installation. Bird boxes must be replaced if they are damaged, removed, or have fallen from their recommended location.

Insect log piles	Deadwood and brash piles should be retained on site, either as part of the refugia for reptiles or along the boundaries. These will be beneficial for many species such as herpetofauna and small mammals but would encourage insects on site, such as overwintering larvae that require decaying matter.

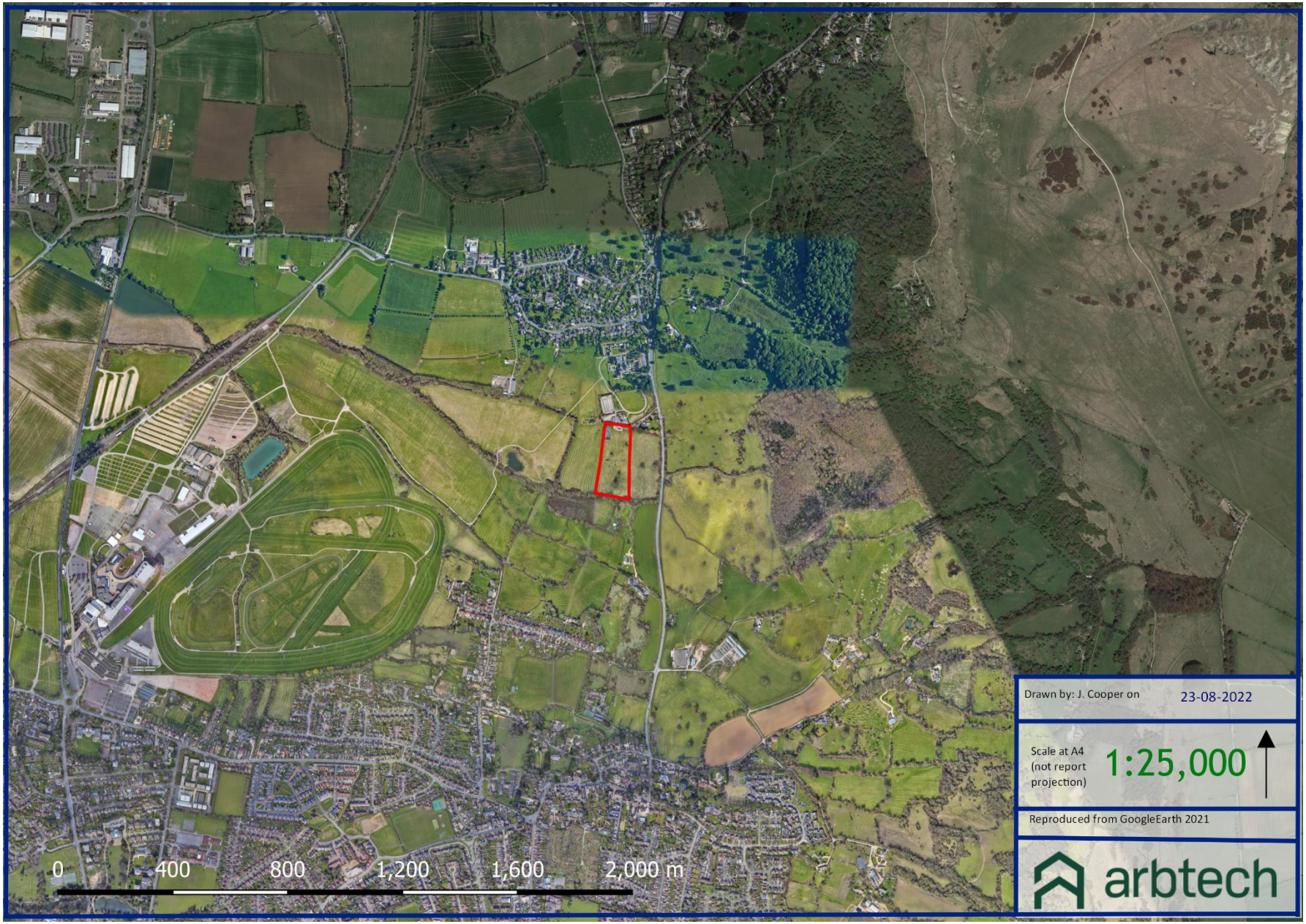
Hedgehog House	A hedgehog house will be installed within the dense vegetation to the north-east of the site (**Figure 9**). A hedgehog house suitable for the site (or a similar alternative brand) can be found here: https://www.nhbs.com/hedgehog-house Alternatively, loosely piled brash and log piles could support hedgehogs. In addition, if fencing or walled boundaries are proposed, small gaps should be created to allow hedgehogs to commute through the landscape.

Figure 9: Hedgehog house (image credit https://www.nhbs.com/hedgehog-house)

Appendix 1: Proposed Development Plan

To be provided

Appendix 2: Site Location Plan



Appendix 3: New Landscaping and Species-Specific Enhancements Plan