Ecological Mitigation and Management Plan

Steeple Aston, Oxfordshire

On Behalf of:

Rectory Homes

December 2019

www.ses-eco.co.uk

Author	Dan Carne BSc (Hons)
Technical Review	Sean Crossland BSc BCA MCIEEM
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Ecology, Countryside Management
Professional Service ● Pragmatic Solutions
phone: 01268 711021 email: team@ses-eco.co.uk website: www.ses-eco.co.uk
Address: The Sudbury Stables, Sudbury Road, Downham, Essex, CM11 1LB

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1.0 Introduction and Aims

1.1 Southern Ecological Solutions Ltd (SES) was commissioned to create an Ecology Mitigation and Management Plan (EMMP) for the site at Steeple Aston, Oxfordshire. The site is seeking planning consent for residential development of the site, comprising 10 houses on the approximately 0.9ha site. Appendix 1 depicts the masterplan of the site and Phase 1 Habitat plan.

1.2 The aim of this report is to provide information on the provision for habitat creation and management during the life of the proposed development as well as mitigation for impacts upon identified protected/notable species. The reason for this is to make appropriate provision for protecting, conserving and enhancing the natural environment within the approved development in the interests of biodiversity and in accordance with national and local planning policies.

1.3 The information given in this report is based on the findings of previous surveys and reports by SES and should be read in conjunction with the reports listed below:

- Ecological Assessment, November 2019 (SES, 2019a)
- Preliminary Ecological Appraisal, June 2019 (SES, 2019b)

2.0 Summary of Existing Ecological Features

2.1 A summary of the key ecological features of the site is provided below in Table 1. Assessments of importance are made on the basis of evaluations within the Ecological Assessment (SES, 2019a) and Preliminary Ecological Appraisal (SES, 2019b).

Table 1: Summary of Existing Ecological Features

Feature	Summary Description	Importance	Confidence
SSSI/LNR	Three ecological statutory designated sites within 5km Middle Barton Fen SSSI 2.3km north-west.	National	High
Non-statutory designated sites	Two non-statutory designated sites within 2km. Glyme and Dorn Valleys CTA 0.9km south-west.	Local	HIgh
Rare and notable flora	Common and widespread species only. Large numbers of pyramidal orchid *Anacamptis pyramidalis*.	Site	High
Priority Habitats	Boundary hedgerows (north and west boundaries)	Local	High
Other Habitats	Semi-improved grassland, scrub, tall ruderal vegetation and non-native species hedgerow (east boundary)	Site	High
Badger	No setts present but the site provides suitable sett building, foraging and commuting habitat.	Site	High
Bats - foraging	Foraging/commuting potential restricted to boundary habitat.	Local	High
Birds - breeding	Potential nesting of common and protected species in hedgerows and scattered scrub.	Site	High
Invertebrates	Habitats of moderate invertebrate value, value likely to degrade if unmanaged	Site	High
Reptiles	Suitable habitats may be used by small numbers of reptiles.	Site	High
Other notable species	Habitats suitable for European hedgehog, common toad, and western polecat, and may also be used by individual brown hare.	Site	High

SSSI Site of Special Scientific Interest
LNR Local Nature Reserve
CTA Conservation Target Area

3.0 Mitigation

Habitats

Hedgerows

3.1 This habitat will be retained and enhanced where possible, though it is anticipated that up to 30m of the northern hedgerow will be cleared to accommodate an access road and visibility splays. To mitigate for this, the retained hedgerows on site will be enhanced through infill planting and allowing occasional standard trees to develop. Where hedgerows are to be retained, they will be protected using Heras fencing during construction.

Semi-improved Grassland

3.2 The existing grassland features a moderately diverse range of species and a varied sward. This habitat is transitional and would eventually become scrub in the absence of management. The majority of this habitat will be lost as a result of the proposed development, however the masterplan (Appendix 1) features an area of open green space along the northern boundary, to be managed as wildflower-rich meadow (Appendix 2).

3.3 The proposal will unavoidably result in a reduced total area of semi-improved grassland, however a portion will be retained and enhanced along the northern boundary and protected from construction traffic using Heras fencing. An additional area of wildflower-rich grassland will be created in the north-west portion of the site in order to mitigate for the loss of this habitat elsewhere.

Protected and Notable Species

Badger

3.4 Due to the propensity of badger to move around the landscape and establish new setts, A pre-construction walkover will be undertaken no more than 12 months prior to the start of development. If an active sett is found, a licence may be required to close the sett if it is to be impacted by the development

3.5 Regardless of whether an active badger sett is present on site, precautionary measures will be put in place to ensure that in the event of a badger coming on to the site during construction the risk of injuring and killing is minimised:

- Covering any trenches at night or leaving a plank of wood leant against the side to ensure they can escape if they were to accidentally fall in;
- Covering open pipework with a diameter of greater than 120mm at the end of the working day to prevent animals from entering/becoming trapped;
- Chemicals will be stored in a sealed compound (following COSHH guidance), and;
- Toolbox talks to contractors to ensure ability to identify and flag up any possible badger setts during construction.

3.6 Reduced speed limits will be implemented along the access road during the construction and operational phases of the development. The landscaping plan features hedgerow planting between the built environment and existing areas of potential off-site sett-building habitat (woodland and hedgerows). The retention and enhancement of existing hedgerows and creation of new hedgerows along external

and internal boundaries will improve landscape connectivity and provide a foraging and commuting corridor as well as potential sett-building habitat.

3.7 General precautionary techniques sympathetic to badgers (applicable to most sites) will be put in place to mitigate potential impacts on foraging/commuting badgers:

- Covering trenches at night or leaving a plank of wood (ramp) leant against the side to ensure badgers can escape if they were to accidentally fall in;
- Covering open pipework with a diameter of greater than 120mm at the end of the work day to prevent animals from entering/becoming trapped; and
- Covering chemicals overnight.

Bats

3.8 The proposal will require the clearance of scattered scrub and wildflower grassland, however boundary vegetation will be retained where possible in order to maintain linear linkages. The planting scheme includes areas of native wildflower-rich grassland the provision of scattered trees and ornamental planting across the site to mitigate for the loss of scattered scrub and reduction in semi-improved grassland.

3.9 A sensitive lighting management strategy will be applied throughout the construction and operational phases of the development, based on Gunnell *et al*. (2012), the Institution of Lighting Professionals (ILP) Guidance Note 8 Bats and Artificial Lighting (ILP, 2018), and other referenced sources:

- In general, light sources will not emit ultra-violet light to avoid attracting insects and thus potentially reducing numbers in adjacent areas, which bats may use for foraging. Metal halide and fluorescent sources will not be used.
- LED luminaires will be used where possible. A warm white spectrum (ideally <2700Kelvin) will be adopted to reduce blue light component. Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- The height of lighting columns will be limited to 8m and the spacing of lighting columns will be increased to reduce spill of light into unwanted areas such as hedgerows and trees (Fure, 2006). Only luminaires with an upward light ratio of 0% and with good optical control will be used. Luminaires will always be mounted on the horizontal, *i.e.* no upward tilt.
- Other ways to reduce light spill include the use of directional luminaires, shields, baffles and/or louvres. Flat, cut-off lanterns are best. Additionally, lights will be located away from reflective surfaces where the reflection of light will spill onto potential foraging/commuting corridors. Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill. Where windows and glass facades etc. cannot be avoided, low transmission glazing treatments may be a suitable option in achieving reduced illuminance targets.
- Lighting that is required for security or access will use a lamp of no greater than 2000 lumens (150 Watts) and be PIR sensor activated on a short timer (1 minute), to ensure that the lights are only on when required and turned off when not in use (Jones, 2000; Hundt, 2012). A control management system can be used to dim (typically to 25% or less) or turn off groups of lights when not in use.

Birds

3.10 The hedgerows, scattered scrub, and dilapidated shed in the north-west corner of the site provide suitable nesting opportunities for a limited assemblage of generalist species. The proposal will require the removal of the dilapidated shed and scattered scrub, and is expected to require the removal of up to 30m of hedgerow to accommodate visibility splays. The site also currently offers foraging habitat for breeding and wintering birds. The loss of nesting and foraging habitat will be mitigated for through retaining and enhancing the existing hedgerows and planting a 140m native scrub buffer strip along the southern boundary, and the planting of native trees and scrub to provide structural and species diversity.

3.11 Vegetation clearance works will be scheduled so that they do not occur during the bird breeding season (outside March-August inclusive). If this is not possible, vegetation will be cleared following a nesting bird survey conducted by a suitably qualified ecologist, to ensure that active bird nests are not damaged or destroyed by the works.

Invertebrates

3.12 The landscaping scheme includes the provision of potential habitat areas and corridors across the site (Appendix 2) to mitigate for the reduction in natural habitats. The planting schemes will provide appropriate habitats and resources to mitigate for the loss of semi-natural habitats to hard standing, buildings, and residential gardens. Key items are:

- Planting of scrub, hedgerows, and grassland with an aim to provide a range of habitat conditions with transitions between habitats, from hedgerows through to open grassland.
- Planting of new native wildflower-rich meadow areas, with topsoil spread in these areas to preserve the seed bank and encourage locally adapted flora to benefit invertebrates.

3.13 Artificial lighting will be kept to a minimum and be designed to avoid lighting areas of semi-natural vegetation, with lighting columns of appropriate height, directional lighting and the use of baffles. Where possible wavelengths will include a minimal UV component (for more information see Section 3.6 above).

Reptiles

3.14 The 2019 reptile survey did not record any reptiles and reptiles are likely to be absent from the site. However, small numbers may use the site opportunistically and habitat manipulation is recommended through staged directional cutting to encourage any animals (including reptiles, amphibians, hedgehogs, and other wildlife) to move outside of the construction zone, according to the following precautionary method:

- An Ecological Clerk of Works (ECoW) will give a 'tool-box talk' to ensure all site workers are aware of the species which have potential to be on site and will brief them on the methods for avoiding breaches of legislation.
- Site workers must ensure the work is undertaken in a slow methodical way, with the ECoW checking for protected species as the work is undertaken where necessary – this will include nesting bird checks and hand searches of suitable vegetation for reptiles as well as hedgehog and harvest mouse nests.

- Vegetation should be cleared on the first cut to no less than 150mm from the ground and cut in a directional manner (south) towards suitable offsite habitat to allow animals to move out of harm's way, the second cut (min of 24 hours later) will be made to ground after the ground has settled.
- Vegetation will be cleared when reptiles are active, typically between April and October, although it is entirely dependent on temperatures. In practice, these works can be carried out into November when using professional judgement.
- All works should take place during the day, with night-time work not permitted.
- Vehicles and site workers must keep to paths of least ecological resistance, creating as few access lines as possible. This will be determined and marked by the ECoW prior to commencement of work on site

3.15 Once all working areas and access routes have been cleared, the site should be kept free of vegetation until the works have been completed. This will ensure that reptiles and nesting birds are discouraged from moving into the works area.

3.16 The landscaping plan for the site provides an area of wildflower-rich meadow along the northern boundary, with rough grassland margins adjacent to the boundary hedgerow. The proposed development will therefore ensure the continued provision of suitable reptile habitat on site. This is considered adequate mitigation for the reduction in rough grassland habitat, given that reptiles are likely absent.

Other Notable Species

3.17 The risk of construction impacts to brown hare, hedgehog, harvest mouse, and common toad will be minimised through the retention and protection of existing hedgerows and trees.

3.18 Where clearance of suitable habitat is necessary, precautionary measures will be followed to reduce risk of direct harm, to include:

- Sensitive timings of works e.g. outside of hedgehog hibernation season (November-March)
- A search by an ecologist for hedgehog and harvest mouse nests prior to clearance, and in addition for leverets if works take place between March and September.
- A two-stage cut of tall grasses for common toad, where the first cut is made to a height of no less than 15cm and 24hours then left to elapse before remaining vegetation is cleared to ground level, allowing time for any disturbed animals to move away from the area.

3.19 Recreational impacts during occupation will be mitigated through the retention and enhancement of hedgerows the creation of a dark corridor along the southern boundary. In addition, retained and created habitats will be specifically managed to benefit wildlife.

4.0 Enhancements and Habitat Creation

Habitats

4.1 The landscaping plan is provided in Appendix 2. The greenspace provision includes a wildflower meadow along the northern boundary, new hedgerow planting, and a native scrub buffer along the southern boundary.

Soils

4.2 The online data from Soilscape (http://www.landis.org.uk/soilscapes/) suggests that the soil on site is *Freely draining slightly acid sandy soils.*

Amenity Grassland

4.3 The residential gardens will be sown with EL1 'Flowering lawn mixture'. As these gardens will be privately owned their ongoing management cannot be secured, however the native wildflowers within this mixture respond well to regular short mowing.

Grassland Meadow

4.4 Areas of native wildflower-rich grassland will be created along the northern buffer and managed as Lowland Meadow, a NERC Act 2006 Habitat of Principal Importance (HoPI). The wildflower-rich seed mix Emorsgate EM7 'Meadow mixture for sandy soils' will be sown in autumn or spring and then managed as per Emorsgate specifications through the first year.

Rough grassland margins

4.5 Narrow strips of tall grassland will be maintained at the interface between wildflower-rich grassland meadow and boundary vegetation such as scrub patches and hedgerows. These rough grassland margins will be 1m wide and managed on a two-year rotation to ensure the continued provision of rough grassland with a thatch layer suitable for reptiles.

Hedgerows

4.6 There is provision around the development for the enhancement of all retained hedges through infill planting and sensitive management, as well as the provision of further ornamental hedgerow planting north of residential properties. The hedgerow locations are shown in Appendix 2.

4.7 The existing defunct hedgerows along the western, northern, and eastern boundaries will be enhanced by filling any gaps with native species of local provenance (where species). At least five woody species will be planted to create species-richness including: field maple *Acer campestre*, hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa* and holly *Ilex aquifolium*. In addition, occasional standard trees will either be planted or allowed to develop along the lengths of these hedgerows.

The boundary hedgerows will provide successional food resources throughout the year to benefit invertebrates, birds and other wildlife. The landscape plan (Appendix 1) also includes the provision of several stretches of ornamental hedgerow planting, with further details provided in the landscape plan (TPM Landscape, 2019).

Ornamental Planting

4.8 The development will feature extensive areas of ornamental planting, which will further enhance the site for biodiversity by creating ecological links between features on and off-site as well as foraging and refuge opportunities. A range of flowering species have been chosen to provide benefits to invertebrates. A list of advised plant species of known benefit to invertebrates and bats is provided in Appendix 4.

Scrub

4.9 A broad (3-6m) strip of native species-rich scrub will be planted as a buffer along the newly created southern hedgerow. This will create a 'dark corridor' shielded from light pollution, particularly benefitting nocturnal wildlife such as bats and badgers, and improving landscape connectivity across the site.

4.10 The native scrub buffer will be planted with a mixture of at least eight native woody species in order to create a diverse scrubby edge habitat with a varied structure that provides food resources for wildlife throughout the year. The mixture will include hawthorn, blackthorn, hazel, elder *Sambucus nigra*, guelder rose *Viburnum opulus*, oak *Quercus robur*, and honeysuckle *Lonicerum periclymenum*. All native planting will consist of species known to benefit invertebrates and bats (Appendix 4).

Scattered Trees

4.11 The proposal incorporates scattered trees known to be of value to wildlife along streets and within residential properties, including native fruit/seed-bearing species such as field maple, silver birch *Betulus pendula*, and beech *Fagus sylvatica* to benefit a range of species including badgers and invertebrates.

Protected and Notable Species

Badgers

4.12 To enhance the site for badgers, native scrub and hedgerows including fruit/seed-bearing trees are incorporated into the planting scheme, such as hazel, hawthorn and blackthorn (TPM Landscape, 2019). Once mature, these will provide additional food resources for badgers (and other wildlife). The creation and/or enhancements of the hedgerows, scrub, scattered trees, and wildflower meadow grassland will overall provide a net gain in food resources. Furthermore, the enhanced hedgerows will also provide potential sett building habitat.

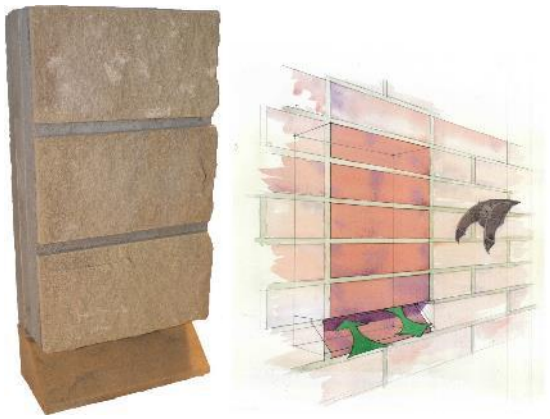
Bats

4.13 Retained habitats will be enhanced to benefit bats. In addition, the proposal features areas of wildflower grassland, approximately 140m of scrub planting, scattered fruit-bearing trees, and extensive ornamental planting. The native scrub buffer planting along the southern boundary will serve as a 'dark corridor' suitable for foraging and commuting bats. Collectively, these measures are considered adequate to enhance the site's value for foraging bats.

4.14 To further enhance the site for roosting bats a box scheme will be provided. Two Habibat bat boxes (Figure 1) will be installed within the proposed buildings around the site, away from artificial light and regular disturbance. Appendix 3 provides information on the installation of these enhancements and

Appendix 2 shows their locations. The hedgerows, scrub, scattered trees, and wildflower meadow grassland will also benefit foraging/commuting bats through enhancing the site for invertebrates and maintaining and enhancing landscape connectivity.

Figure 1. Habibat bat box (available with a variety of custom facings)
https://www.nhbs.com/habibat-bat-box-custom-stone-facing



Birds

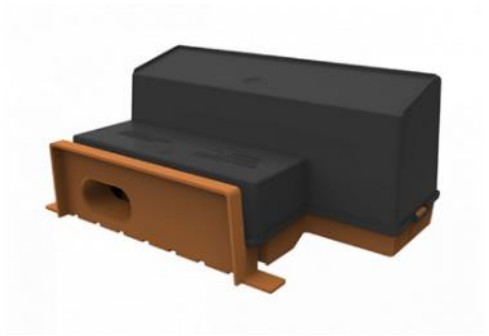
4.15 Given that it will take time for newly planted trees and hedges to develop into potential nesting bird habitat, bird-nesting features or boxes will be installed on site to provide additional nesting sites. The nest box scheme (Appendix 3) has been designed to cater for a range of bird species of conservation concern (BoCC) (Eaton *et al.* 2015) and will comprise the following or similar:

- 6 x house sparrow terraces (Figure 2) installed on buildings
- 4 x Mansthorpe swift bricks (Figure 3) installed on buildings

4.16 Appendix 3 provides information on the installation of these enhancements and Appendix 2 shows their locations.

Figure 2: 1SP Terrace House Sparrow Box
https://www.nhbs.com/1sp-schwegler-sparrow-terrace?bkfno=185099&ca_id=1495&gclid=CjwKCAjw4uXaBRAcEiwAuAUz8DgwUNTkLujerNk-kTUaOeg1lLH7KCQ40yDoAnAmAG6BDCeLE6OmBRoCbP0QAvD_BwE

Figure 3: Manthorpe Swift Brick
https://www.nhbs.com/manthorpe-swift-brick



Invertebrates

4.17 The above detailed habitat enhancements will provide optimal conditions for common invertebrates. In addition, any dead wood created through habitat management will be used to create dead wood piles suitable for saproxylic invertebrates. Two artificial invertebrate nesting features will also be installed to provide additional nesting opportunities for invertebrates such as solitary bees (Figure 4). These artificial 'insect nests' will be installed in south-facing sheltered locations at a height of 1.5m, either on buildings, walls, or retained trees.

Figure 4. Schwegler Clay and Reed Insect Nest
https://www.nhbs.com/schwegler-clay-and-reed-insect-nest?bkfno=193069

Reptiles

4.18 Habitat creation/enhancement will provide diverse potential foraging/commuting, sheltering and nesting habitats for reptiles, which are not currently thought to be present on site but may disperse on to site with time given the presence of nearby populations. Dead wood and vegetation arisings generated from habitat management will be piled in sunny, south-facing positions along the northern boundary hedgerow to provide potential refugia for reptiles. Furthermore, the wildflower meadow will provide foraging and basking opportunities for reptiles.

Other Notable Species

4.19 European hedgehogs, harvest mice, and common toads will benefit from the habitat creation and enhancement measures above. The rough grassland habitat adjacent to hedgerows and scrub will provide transitional habitat suitable for harvest mice.

4.20 Research has found a decline of hedgehogs in the UK, partially due to the lack of access into residential gardens (Wembridge, 2011). To enhance the site, hedgehog highways will be provided by creating 13cm x 13cm holes in fencing/walls. The size of the gap is too small for most pets. Highways can be created by cutting a neat hole in the fence (Figure 5), raising a fence panel per garden, installing hedgehog friendly fencing or removing a brick at the bottom of a wall). These will provide the hedgehog population in the local area with an important foraging resource. Indicative hedgehog highway locations are provided in Appendix 3.

Figure 5: Example hedgehog highway with signage sold by the People's Trust for Endangered Species (https://ptes.org/product-category/hedgehog-highways-signs/ **).**

5.0 Management of the Site and Phasing

5.1 A management summary is provided below in Table 2. The phasing/timing of works attempts to avoid direct impacts on protected species. Year one indicates the year of construction.

5.2 It is envisaged that the long-term management of the habitats created will be undertaken by the developer or an appropriate agent, to manage the site for the benefit of wildlife and the local community. Management would be undertaken in compliance with the requirements of this report, with more detailed advice provided in the landscaping plan (TPM Landscape, 2019).

Habitats

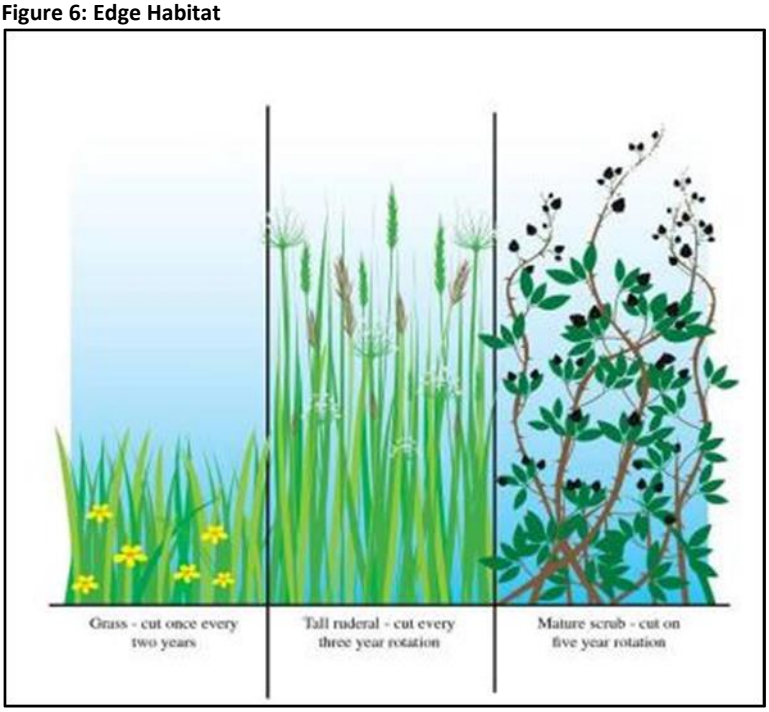
Hedgerows

5.3 Hedgerow management will aim to produce bushy hedgerows of 3-4m tall, with occasional standard trees allowed to develop. Hedgerows will be cut on a three-year rotation with one cut made in winter (December to February).

5.4 The species-rich boundary hedgerows will be managed through rotational cutting of alternate sides to benefit biodiversity, with no more than one third of this habitat trimmed in any one year and only one side of a section trimmed in a single season. Where these hedgerows fall within residential gardens, their management cannot be controlled. Hedgerows will be trimmed according to a 3- to 5-year rotation, with longer rotations preferable. Hedge trimming will take place in winter (December to February) to avoid impacts on breeding birds and maximise the hedgerows' value as a food resource for wintering birds. Hedgerow management will aim to produce bushy hedgerows of 3-4m tall, with occasional standard trees allowed to develop

5.5 All native hedgerows will incorporate transitional rough grassland edges 1-2m wide which will be cut between September and November on a 2 to 3-year rotation, with a 3-year rotation preferable. This will create a transitional edge habitat between the hedgerows/scrub and the wildflower meadow (Figure 6, below) All arisings from routine hedgerow and grassland management will be gathered and either removed from the site or piled in a south-facing aspect to provide potential hibernacula for hedgehogs and reptiles.

Figure 6: Edge Habitat



Lowland Wildflower Grassland Meadow

5.6 Topsoil from the most wildflower-rich areas of the site (to be identified by an ecologist prior to commencing works) will be spread over those areas of the site to be managed as lowland meadow. This will ensure that the existing seed bank is retained and help to retain floral diversity. Where existing areas of semi-improved grassland are to be retained, these will not be spread with topsoil, to avoid nutrient enrichment.

5.7 The wildflower-rich seed mix Emorsgate EM7 'Meadow mixture for sandy soils' will be sown within proposed areas of wildflower-rich grassland in autumn or spring and then managed as per Emorsgate specifications through the first year. Subsequent management will principally be an annual cut and collect with areas of wildflower grassland allowed to flower before being cut in late July to late August, inclusive. A late summer cut will maintain floral diversity whilst minimising the risk to nesting birds. Arisings will be left as compost heaps under/adjacent to hedges which will provide valuable reptile and amphibian refugia habitats.

5.8 The wildflower grassland at the base of native hedgerows and the margins of native planting (1m wide) will be left uncut to form a buffer and create areas of transitional habitat.

Ornamental Planting

5.9 Areas of ornamental planting will be managed primarily for amenity purposes, with up to eight visits annually. In September, the site shall be considered for the need for any strategic replacement or additional planting to enhance the vegetation already present.

Scattered Trees

5.10 Trees should be left to grow naturally and pruning should only be carried out if necessary. Any pruning will be performed by a qualified arboricultural contractor outside the bird nesting season (March to August, inclusive), preferably in January/February to minimise impacts on wintering wildlife. Any trees

that die or are felled in the course of long-term management shall be replaced by native fruit-bearing tree species known to benefit bats (Appendix 4). Any deadwood generated through arboricultural work will be retained on site either *in situ* or along the northern boundary in the form of log piles or hibernacula.

Table 2: Management Plan

Item	Year 1	Year 2	Year 3 onwards
Hedgerows	Establishment period including planting hedgerows with plant guards, with monitoring visits as appropriate within the first two years.	Follow Year 1 as necessary.	Top and sides of all native hedgerows to be trimmed/cut on a 3 to 5-year rotation. Cutting/trimming to take place in January/February.
Lowland Wildflower Grassland Meadow	North-western meadow section to be spread with topsoil from the areas of greatest floral diversity on site. Seeding to take place in either early autumn or spring, with protection from pedestrian/vehicular damage. Area to be mown throughout the first year of establishment to control annual weeds and maintain a balance of fast-growing grasses and slow-growing wildflowers.	After the first year areas of wildflower grassland shall generally be cut three to four times a year, once in July/August (after flowering), twice in October / November and again in spring if required. Cut one third of rough grassland transitional buffer along the edge of hedgerows and scrub. Cut to take place between September and November.	Follow Year 2 as necessary.
Amenity Grassland	Seeding to take place in either early autumn or spring, with protection from pedestrian/vehicular damage. Area to be mown throughout the first year of establishment to control annual weeds and maintain a balance of fast-growing grasses and slow-growing wildflowers. During first 2-3 months keep areas of amenity grassland well-watered to ensure satisfactory germination and establishment. Plant scattered bulbs for spring flowers.	Cut areas of amenity grass a minimum of 10 times during the growing season at intervals so that the grass is maintained around 50mm in height, varying the frequency of the cuts to ensure the grass looks well maintained. In spring delay cutting areas with bulbs until the plants have finished flowering and the foliage has died back.	Follow Year 2 as necessary.
Sustainable Urban Drainage (SUDs) swale wildflower grassland	Seeding to take place in either early autumn or spring, with protection from pedestrian/vehicular damage. Area to be mown throughout the first year of establishment to control annual weeds and maintain a balance of fast-growing grasses and slow-growing wildflowers.	After the first year areas of wildflower grassland shall generally be cut three to four times a year, once in July/August (after flowering), twice in October / November and again in spring if required.	Follow Year 2 as necessary.
Ornamental Planting	Establishment period including planting ornamental shrubs with plant guards, with monitoring visits as appropriate within the first two years.	Litter pick on a regular basis.	Follow Year 2 as necessary. Remove over-shading shrubs where necessary.
Scattered trees	Establishment period including planting hedgerows with tree stakes and ties. In the first year after planting all trees should be watered according to stock size and weather conditions, with watering frequency approximately once per week to once a fortnight throughout the growing season to ensure successful establishment	Follow Year 1 as necessary.	Trees should be left to grown naturally and pruning should only carried out if necessary. Trees shall be inspected for signs of disease in September of every year. During the inspection, the site shall also be considered for the need for any strategic replacement or additional planting required to broaden the age of existing vegetation and/or enhance the level of tree cover already present
Scrub	Establishment period including planting native shrub species with plant guards.	This area of the site will not be subject to a continued management plan as it will be privately owned.	Not applicable.

Item	Year 1	Year 2	Year 3 onwards
Bat Boxes	Install integral boxes within the fabric of buildings.	Check to see whether boxes are in use.	No further monitoring required.
Bird Boxes	Mount boxes away from bird feeders, prevailing winds and areas prone to hours of excessive sunshine.	Check to see whether boxes are in use. Checking fixings are in good order.	No further monitoring required.
Insect boxes	Mount boxes away from bird feeders and prevailing winds, within south-facing sunny positions.	Check to see whether boxes are in use.	No further monitoring required.

6.0 Conclusions

6.1 Southern Ecological Solutions Ltd (SES) was commissioned to create an Ecology Mitigation and Management Plan (EMMP) for the site at Steeple Aston, Oxfordshire. The site is seeking planning consent for the development of 10 residential dwellings.

6.2 Most of the site was semi-improved grassland with scattered scrub and boundary hedgerows with some value for bats, badgers, breeding and wintering birds, invertebrates, and other notable species. The existing habitats on site are subject to increasing levels of scrub encroachment, and if the current lack of management continues, the grassland habitat will be lost within a few years. A summary of each feature, mitigation and enhancement is found in Table 3 below.

Table 3: Summary of Ecological Features on the site, mitigation and enhancement.

Feature	Summary	Mitigation	Enhancement
Hedgerows	Defunct hedgerows along western, northern, and eastern boundaries.	Portion of northern hedgerow cleared to accommodate visibility splays. Protection of hedgerow with heras fencing.	Retained hedgerows enhanced through infill planting and sensitive management.
Semi-improved grassland	Covers most of the site.	Topsoil to be collected from areas of greatest floral diversity (to be identified by an ecologist prior to commencing works) and spread in areas of proposed wildflower-rich meadow in north-west of site. Protection of grassland to be retained, using heras fencing.	Areas of proposed wildflower-rich meadow to be sown with wildflower-rich seed mix and managed appropriately.
Badger	Foraging/commuting habitat.	Precautionary measures. Walkover survey no more than 12 months prior to commencing works to reassess the status of the disused sett and check for newly established setts on site. If an active sett is discovered, this will be closed under a licence from Natural England, with appropriate mitigation put in place.	Planting fruit-bearing trees. Wildflower meadow will provide foraging opportunities. Hedgerows and scrub planting will provide potential future sett-building opportunities.
Bats	Foraging/commuting habitat along northern and eastern boundary.	Sensitive lighting. New hedgerows along southern boundary to create dark corridor suitable for foraging/commuting bats.	Bat box scheme. Hedgerow and scrub planting to feature species of benefit to bats.
Birds	Breeding and wintering birds.	Sensitive removal of suitable nesting habitat. Provision of hedgerows, scrub, and trees across site. Bird box scheme.	Scale of mitigation works will result in enhancements for birds.
Invertebrates	Common species	Habitat creation/enhancement scheme will mitigate for loss of (transitional) grassland habitat.	Native hedgerow/scrub/tree planting. Insect box scheme.
Reptiles	Unlikely to be present on site, though common species known to occur within the local area.	Precautionary two-stage vegetation removal outside hibernation season (November to February), with fingertip search by an ecologist prior to clearance. New rough grassland and hedgerow habitats will offer suitable habitat for reptiles and maintain landscape connectivity.	N/A
Other Notable Species	Possibility of European hedgehog, common toad and harvest mouse on site.	Two-stage vegetation removal outside hedgehog hibernation season (November to March). A search by an ecologist for hedgehog and harvest mouse nests prior to clearance.	Hedgehog highways and transitional habitats along hedgerows.

6.3 Management advice is found in section 6.0, summarised in Table 1. Overall the mitigation will sufficiently protect habitats/species in accordance with wildlife legislation. Furthermore, the scheme aims to create wildlife corridors across the site in the form of wildflower-rich grassland, hedgerows, and native scrub buffer planting in accordance with Cherwell District Council policy ESD 11. The artificial bat, bird, and insect box scheme will result in enhanced roosting and nesting opportunities for these species as a result of the proposed development.

7.0 References

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Southern Ecological Solutions (SES) 2019b) Preliminary Ecological Appraisal, June 2019.

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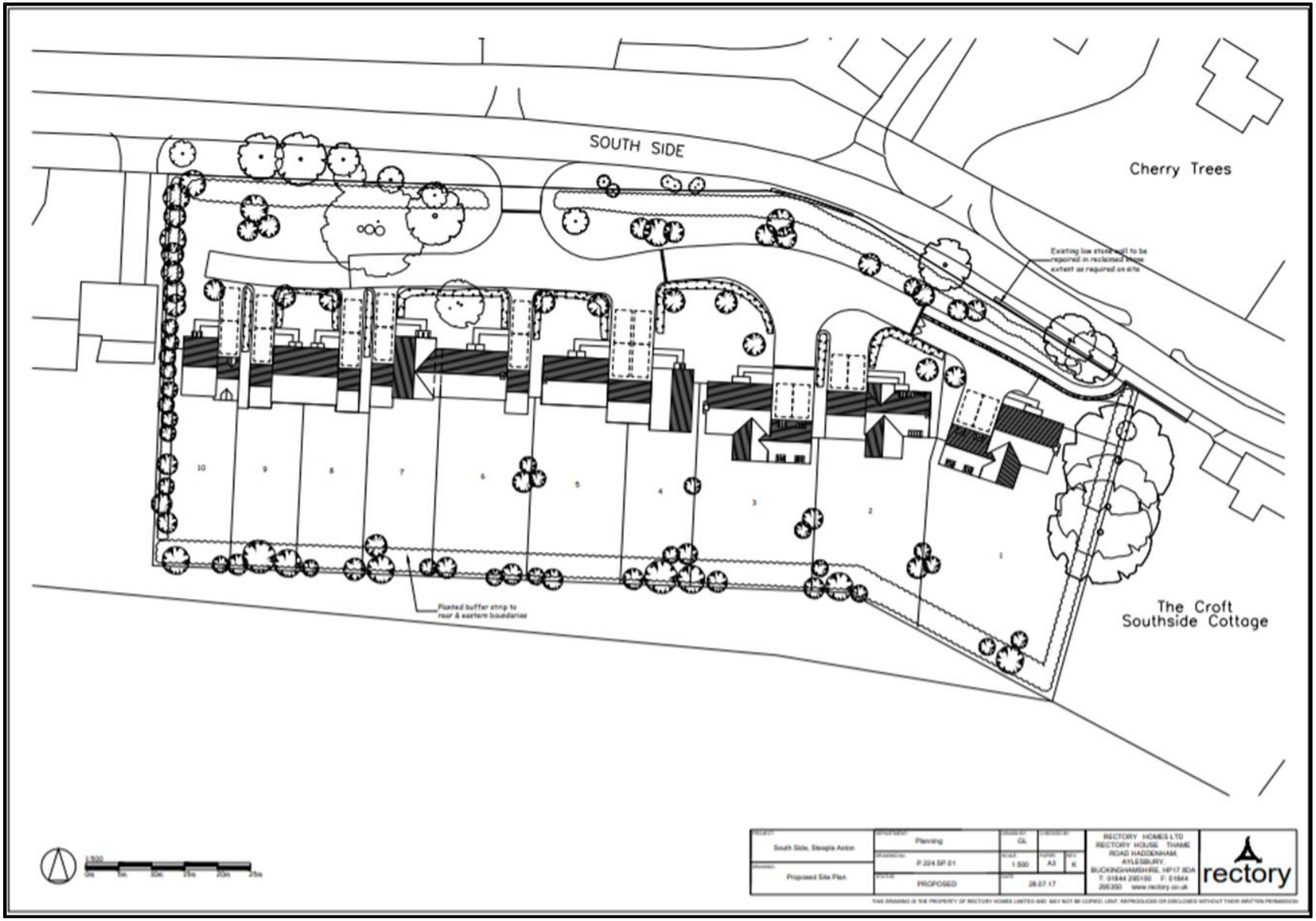
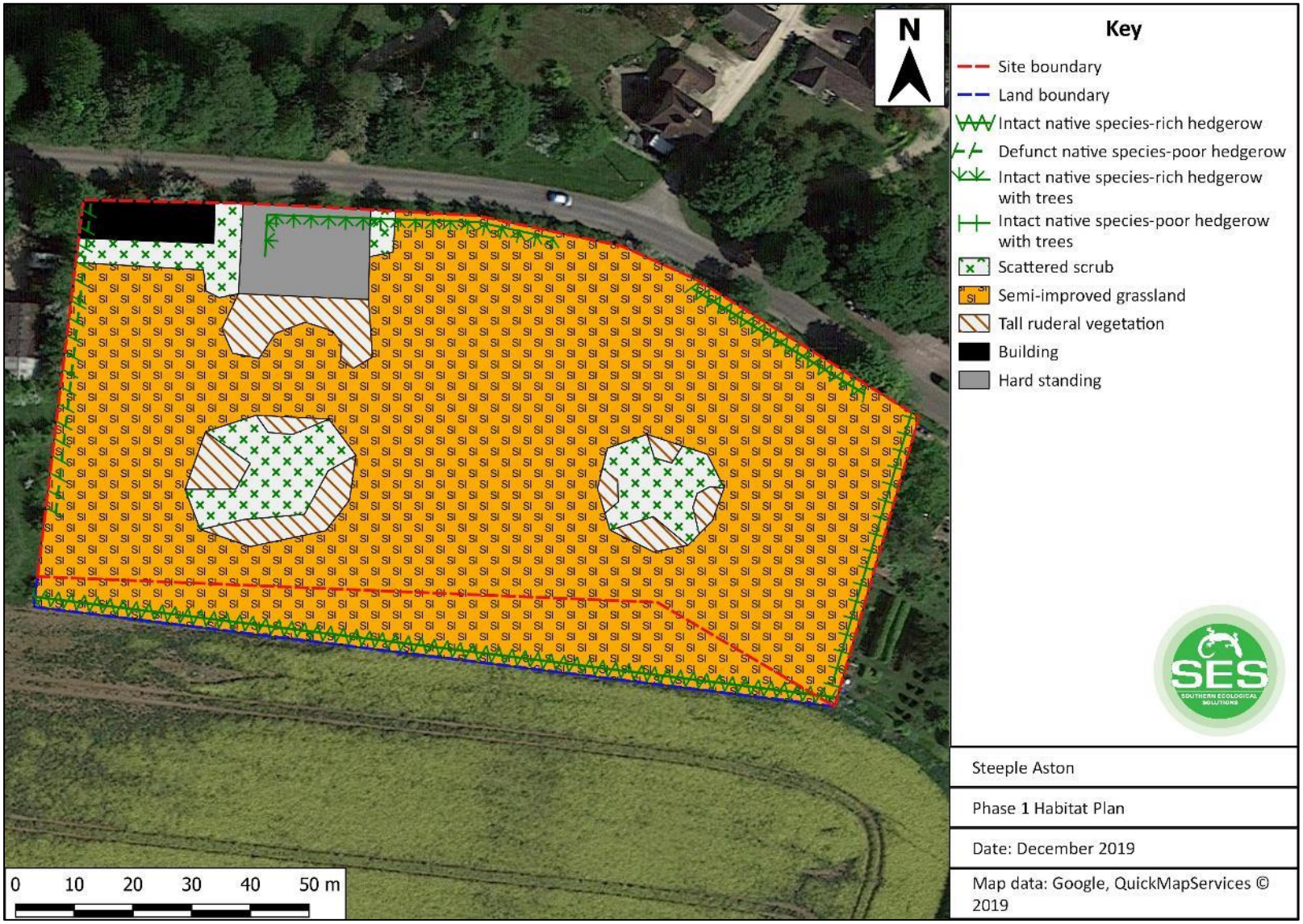
Appendix 1: Site Plans

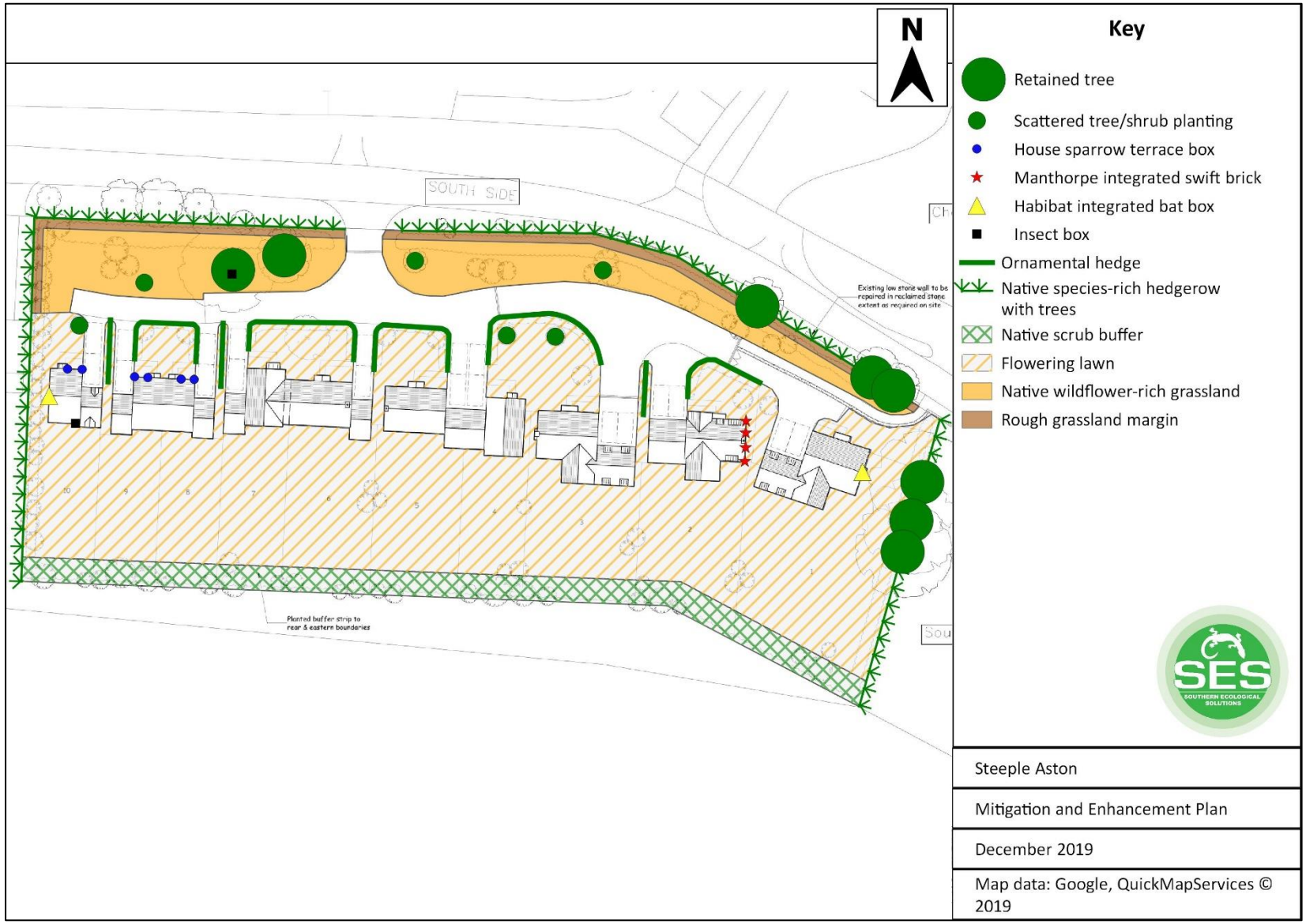
Appendix 1a: Landscape Masterplan



Appendix 1b: Phase 1 Habitat Plan



Appendix 2: Mitigation and Enhancement Plan



Appendix 3: Ecological Specifications

Bird and Bat Boxes:

Boxes can be fixed in many ways and the method must be chosen to suit the location and design; a horizontal or vertical batten will keep a box away from the mounting surface and running water and is ideal for fixing to trees; nails must be checked yearly due to the danger of the box falling as the tree grows. Some boxes can be hung from branches or be attached to trees with a single nail.

If wooden boxes are used, a non-toxic preservative will be applied to the outside and not the inside. Minor repairs to the boxes can be carried out when the box is not in use. Chicken wire can be applied to the outside of the box if repeated squirrel damage is experienced.

The direction the boxes are mounted makes little difference if they are out of the prevailing wind and not exposed to long hours of sunshine; however, some organisations recommend that nest-boxes will be facing between north and east. The boxes will be kept away from any naturally wet areas on trees and small boxes will be angled slightly forward off the tree. Bird boxes will not be placed near feeding stations as most birds are territorial and this may put birds off from nesting. Boxes will be installed at a suitable height to reduce the risk of predation from domestic cats.

Appendix 4: Plant species of known benefit to bats

The following table is reproduced from *Gunnell, K., Grant, G. and Williams, C. (2012). Landscape and Urban Design for Bats and Biodiversity, Bat Conservation Trust*. This suggests plant species that can provide benefit for bats by either providing a food source for insects and/or roost potential. The plants listed are predominately native to Britain. The small group of non-native plants included for their documented value for wildlife. This list has been checked against Natural England's list of invasive non-native plants.

Plant species	Common name	Native (N)	Type	Benefit	Soil	Light	Extensive green roofs	Living walls	Rain gardens	Hedge/ trees	Beds/ borders
Acer campestre	Field maple	N	T/S	C	Any	Sun/ shade				Y	
Acer platanoides	Norway maple		T	S	Well drained/ alkaline	Sun/ shade				Y	
Acer saooharum	Sugar maple		T	S	Any	Sun/ shade				Y	
Achillea millefolium	Yarrow	N	HP	C,F	Well drained	Sun				Y	
Ajuga reptans	Bugle	N	HP	C,F	Any	Sun/ shade	Y		Y		
Anthyllis vulneraria	Kidney vetch	N	HP	F	Well drained	Sun	Y				
Aubrieta deltoidea	Aubrieta		H	F	Well drained	Sun/shade		Y			
Betula pendula	Sliver birch	N	T	C	Sandy/ acid	Sun				Y	
Cardamine pratensis	Cuckoo- flower	N	HP	F	Moist	Sun/ shade			Y		Y
Carpinus betulus	Hornbeam	N	T	C	Clay	Sun				Y	
Centaurea nigra	Common knapweed	N	HP	C,F	Dry, not acid	Sun	Y				Y
Centranthus ruber	Red valerian		HP	F	Well drained	Sun	Y				Y
Clematis vitalba	Old man's Beard	N	C	F	well drained/ alkaline	Sun				Y	
Corylus avellana	Hazel	N	S	C	Any dry	Sun/ shade		Y		Y	
Crataegus monogyna	Hawthorn	N	S	S,C	Any	Sun/shade				Y	
Daucus carota	Wild carrot	N	Bi	S,C,F	Any	Sun	Y				Y
Dianthus spp.	Pinks	N	A-Bi	F	Well drained	Sun	Y	Y			Y
Digitalis purpurea	Foxglove	N	Bi	C	Well drained	Shade/ partial shade				Y	Y
Erica cinera	Bell heather	N	S	F	Sandy	Full sun					Y
Ersimum cherira	Wallflower		Bi-P	F	Well drained	Sun		Y			Y
Eupatorium	Hemp agrimony	N	H	F	Moist	Sun/ shade			Y		Y
Fagus sylvatica	Beech	N	T	C, R	Well drained alkaline	Sun/shade				Y	
Foeniculum vulgare	Fennel		H	F	Well drained	Sun					Y
Fraxinus excelsior	Common Ash	N	T	C, R	Any	Sun/ shade				Y	
Hebe spp.	Hebe species		S	F	Well drained	Sun /shade				Y	Y

Hedera Helix	Ivy	N	C	F,C	Any	Sun/ shade		Y	Y	Y	Y
Hesperis matrionalis	Sweet Rocket		H	F	Well drained/ dry	Sun/ shade					Y
Hyacinthoides non -scripta	Bluebell	N	B	F	Loam	Shade/ partial shade		Y		Y	Y
llex aquailfolium	Holly	N	T	C	Any	Sun/ shade				Y	
Jasmine officinale	Common jasmine		C	F	Well drained	Sun		Y			Y
Lavandula spp.	Lavender species		S	F	Well drained / sandy	Sun		Y			Y
Linaria vulgaris	Toadflax	N	HP	C	Well drained/ alkaline	Sun	Y				Y
Lonicera periclymenum	Honeysuckle	N	C	F	Well drained	Sun		Y		Y	
Lotus corniculatus	Bird's foot trefoil	N	HP	F	Well drained/ dry	Sun	Y				Y
Lunaria annua	Honesty		Bi	F	Any	Sun/ partial shade	Y				Y
Malus spp.	Apple		T	C	Any	Sun				Y	Y
Matthiola longipetala	Night - scented stock		A	F	Well drained/ moist				Y		Y
Myosotis spp.	Forget me not species	N	A	F	Any	Sun	Y	Y			Y
Nicotiania alata	Ornamental tobacco		A	F	Well drained moist	Sun /partial shade			Y		Y
Oneothera spp.	Evening primrose		Bi	F	Well drained	Sun	Y				Y
Origanum vulgare	Marjoram	N	HP	F	Well drained / dry	Sun				Y	
Populus alba	White poplar	N	T	C	Clay loam	Sun				Y	
Primula veris	Cowslip	N	HP	F	Well drained/ moist	Sun/ partial shade	Y				Y
Primula vulgaris	Primrose	N	HP	F	Moist	Partial shade	Y	Y		Y	Y
Prunus avium	Wild cherry	N	T	C	Any	Sun				Y	Y
Prunus domestica	Plum		T	C	Well drained/ moist	Sun				Y	Y
Prunus spinosa	Blackthorn	N	S	C	Any	Sun/ partial shade				Y	
Querois petraea	Sessile oak	N	T	C,R	Sandy loam	Sun/ shade				Y	
Quercus robur	Common oak	N	T	R	Clay Loam	Sun/ shade				Y	
Rosa canina	Dog rose	N	S	C	Any	Sun			Y	Y	Y
Salix spp.	Willow species	N	S	S,C	Moist	Sun/ shade			Y	Y	
Sambucus nigra	Elder	N	T	C	Clay loam	Sun				Y	
Saponaria officinalis	Soapwort	N	HP	F	Any	Sun					Y
Saxifraga oppositifolia	saxifage	N	HP	C	Well drained	Sun	Y	Y			Y
Scabiosa columbaria	small scabious	N	HP	F	Well drained/ alkaline	Sun	Y				Y
Sedum spectabile	Ice plant		HP	F	Well drained/ dry	Sun	Y				Y

Silene dioecia	Red campion	N	HP	F	Any	Shade/ partial shade		Y	Y	Y	Y
Sorbus aucuparia	Rowan	N	T	C	Well drained	Sun				Y	
Stachys lanata	Lamb's ear		HP	F	Well drained/ dry	Sun					Y
Symphotrichum spp.	Michalemas daisies		HP	F	Any	Sun					Y
Tages patula	French marigold		A	F	Well drained	Sun					Y
Thymus serpyllum	Creeping thyme	N	HP/S	F	Well drained/ dry	Sun	Y	Y			Y
Tilia x europaea	Common lime		T	C	Any	Sun/ shade				Y	
Trifolium spp.	Clover species	N	H	F	Any	Sun	Y				Y
Valerina spp.	Valerian species	N	HP	F	Moist	Sun/ partial shade			Y		Y
Verbascum spp.	Mulliens	N	Bi, HP	C	Well drained	Sun					Y
Verbena bonariensis	Verbena		HP	F	Well drained/moist	Sun					Y
Viburnum lantana	Wayfaring tree	N	S	C	Any	Sun/ shade				Y	Y
Viburnum opulus	Guelder rose	N	S	C	Moist	Sun/ shade			Y	Y	
Viola tricolor	Pansy	N	A	F	Well drained/ moist		Y	Y			Y

Legend

Type		**Benefit**	
HP	Herbaceous perennial	C	Moth caterpillar food plant
Bi	Biennial	S	Sap sucking insects (e.g. whiteflies)
BiP	Biennial perennial	F	Flowers attract adult moths
T	Tree	E	Good roost potential
S	Shrub		
H	Herb		
A	Annual		
B	Bulb		
C	Creeper/ climber		