

Dandara Ltd.

Land East of Fontwell Avenue, Fontwell
Ecological Mitigation and Enhancement Scheme

February 2020

FPCR Environment and Design Ltd

Registered Office: Lockington Hall, Lockington, Derby DE74 2BH

Company No. 07128076.

This report is the property of FPCR Environment and Design Ltd and is issued on the condition it is not reproduced, retained or disclosed to any unauthorised person, either wholly or in part without the written consent of FPCR Environment and Design Ltd. Ordnance Survey material is used with permission of The Controller of HMSO, Crown copyright 100018896.

Rev	Issue Status	Prepared / Date	Approved/Date
-	DRAFT	HES & KAB / 31.01.20	HES / 02.02.20
-	FINAL	KAB / 28.02.20	

CONTENTS

1.0	INTRODUCTION	3
2.0	BACKGROUND	4
3.0	OBJECTIVES.....	6
4.0	MONITORING.....	40

TABLES

Table 1: Details of hedgerow removal

Table 2: Trees with bat roosting potential and appropriate methods of removal

Table 3: Buildings with bat roosting potential and mitigation required

Table 4: Details of hedgerow removal and suitability for dormice

Table 5: Summary of timings for vegetation removal / building demolition

Table 6: The hedgerow management scale

Table 7: Grassland creation

Table 8: Summary of habitat protection, creation, enhancement and management strategy

Table 9: Five year management and monitoring program

FIGURES

Figure 1: Phase 1 Plan

Figure 2: Ecological Mitigation Plan

Figure 3: Artificial Bat Roost Construction

Figure 4: Reptile Hibernacula Construction

1.0 INTRODUCTION

- 1.1 The following Ecological Mitigation and Enhancement Scheme has been prepared by FPCR Environment and Design Ltd on behalf of Dandara Ltd. for land east of Fontwell Avenue, Fontwell, West Sussex (central OS Grid Reference SU951 068). It provides details of biodiversity enhancements proposed within the site, as required under national and local planning policies. This document also includes mitigation measures to ensure the existing habitats and protected species are protected, thus retaining ecological value.
- 1.2 The GI throughout the site will ensure a balance between recreational and biodiversity interests, with a mosaic of habitats created in place of existing poor semi-improved grassland and horse grazed fields. Recreational features will include footpaths within the GI providing connections to a new Locally Equipped Area of Play (LEAP), outdoor gyms and Multi-Use Games Area (MUGA); areas of open space will provide informal recreation areas, off lead dog exercise and opportunities for wildflower meadows and orchards. Such features will provide long term 'multi-functional' green spaces in line with the aspirations of the National Planning Policy Framework (NPPF) and Natural England's description of green space as a, '*multifunctional resource capable of delivering a wide range of environmental and quality of life benefits (ecosystem services) for local communities*'¹.
- 1.3 Species specific mitigation and management has been incorporated into the scheme to ensure that no offences are committed under the Wildlife and Countryside Act as amended (1981)² and the Conservation of Habitats and Species Regulations 2017 (as amended)³ with particular regards to hazel dormouse *Muscardinus avellanariu*, and a maternity roost of brown long-eared bats *Plecotus auratus* as both these species have been recorded utilising the site. European Protected Species Mitigation Licences from Natural England will be required to facilitate works to areas affecting dormice and brown long eared bats. Mitigation measures to be implemented during the construction phase will ensure no risk to individuals will occur, this will include appropriate timing of vegetation removal (for dormice) and timing of the demolition and artificial roost creation for brown long eared bats. Additional mitigation measures will include strengthening existing hedgerows and planting new linear features, ensuring more refuge and foraging opportunities for dormice and thus ensuring that a Favourable Conservation Status (FCS) is maintained into the future.
- 1.4 Additional mitigation and enhancement measures have been included within the scheme which will have a beneficial effect on a wide range of wildlife, such as birds, reptiles and invertebrates.
- 1.5 Management regimes for habitats to be retained / created are also detailed within the plan; these are to be reviewed five years post construction, following an assessment of the habitats created, where the programme can be changed to address specific maintenance and habitat requirements.

¹ Natural England (2009) Green Infrastructure Guidance [online]

² Act of Parliament, (1981). The Wildlife and Countryside Act 1981 (as amended), London: HMSO

³ *The Conservation of Habitats and Species Regulations* (as amended 2012). [Online]. Available from: <http://www.legislation.gov.uk/uksi/2010/480/contents/made>

2.0 BACKGROUND

- 2.1 FPCR completed a series of ecological surveys including species specific surveys over the period of 2014 – 2019. These surveys were completed to identify potential ecological constraints to the development and provide mitigation appropriate to the findings to avoid or minimise potential effects of the development.
- 2.2 The following reports/surveys have been used to inform this mitigation and enhancement scheme:
- Ecological Appraisal (FPCR, March 2015);
 - Grassland Survey 2015 (FPCR, July 2015);
 - Bat Survey Report Addendum – Buildings Survey (FPCR, July 2015);
 - 2016 Bat Survey Report (FPCR, September 2016);
 - Hazel Dormouse Report (FPCR, September 2016);
 - Updated Phase 1 Report (letter format) (FPCR, 14th September 2018);
 - Building Assessments / Surveys for Bat Roosts: July-August 2019; and
 - Dormouse Surveys: June, July, August, September, October and November 2019.
- 2.3 The site comprises a collection of fields supporting improved and species-poor semi-improved grassland, with differing management regimes. The western extent of the site is managed for silage and hay crops, whilst the majority of the eastern extent is grazed by horses. The site perimeter and larger fields to the west are mostly bound by tree lines and native species hedgerows of ecological interest and value, while the smaller field compartments to the east are largely bound by fences, with a woodland belt running along the eastern boundary. A small number of mature trees, tree groups and small spinneys are present across the site. The built environment consists of two collections of small stables, sheds and barns within the north-western and south-eastern extents of the site.
- 2.4 In summary, the following findings are of relevance to this strategy, however a number of enhancements concerning other species have been addressed to ensure biodiversity is maintained and enhanced through development proposals:
- The assemblage of bats using the site was not identified as being exceptional and was dominated by common and widespread species. Two notable species, barbastelle *Barbastella barbastellus* (an Annex II listed species) and Nathusius pipistrelle *Pipistrellus nathusii* were identified but no significant activity from either was recorded;
 - A maternity roost of brown long-eared bats has been identified within building B5;
 - A low population of grass snake has been identified within the north-eastern extent of the site; and
 - Hazel dormice have been confirmed within the hedgerows and scrub in the north-eastern, western and southern extents of the site.
- 2.5 An outline planning application (WA/22/15/OUT) was granted approval on 13th July 2017 for the creation of up to 400 new dwellings, up to 500sq. m of non-residential floor space (A1, A2, A3, D1 and/or D2), 5,000 sq. m of light industrial floorspace (B1 (b)/(c) and associated works including access, an internal road network, highways works, landscaping, selected tree removal, informal

and formal open space and play area, pedestrian and cyclist infrastructure, utilities, drainage infrastructure, car and cycle parking and waste storage. This Ecological Mitigation and Enhancement Plan has been written in order to discharge Condition 17 of the planning permission granted by the Secretary of State:

'Prior to the commencement of construction works on each phase of the development or any preparatory works, a detailed ecological enhancement scheme based on the recommendations within the supporting ecological statement, which shall include the installation of bat boxes throughout the site, shall be submitted to and approved by the local planning authority. All approved details shall then be implemented in full and in accordance with the agreed timings and details.'

3.0 OBJECTIVES

Ecological Objectives

- 3.1 The main objectives of this strategy are to protect, maintain and enhance the ecology and nature conservation value of habitats and species within the site, which aims to discharge condition 17 of the planning permission granted by the Secretary of State and the aspirations of the NPPF and local policies in providing a net-biodiversity gain.
- 3.2 Habitats will be created that are suitable for species identified during surveys completed during 2015, 2016, 2018 and 2019. Habitat creation and management will be tailored to increase the overall suitability of the site, and therefore not preclude future colonisation by species not currently recorded.
- 3.3 A variety of habitats / micro-habitats will be created, which will include specific management regimes and structural manipulation to create gradual habitat gradients ("ecotones") and natural habitat edges that are not uniform or linear, which will create functional edges (edge effects).
- 3.4 Management of the habitats provided within the site will be completed in accordance with the prescriptions agreed within this document and will be undertaken by a 'management company' employed by the developer following the completion of development, until such time, that management is adopted by another relevant body. To inform the ongoing management plan the habitats created are to be assessed during and post construction, whereby the programme can be changed to address specific maintenance and habitat requirements. A five year management plan following the prescriptions set out in this document is to be implemented post construction which will be reviewed at the end of the fifth year following an assessment of the site by an ecologist and a further five year work programme created.
- 3.5 The key objectives are:

Objective 1:

- 3.6 To retain and protect the ecology and nature conservation value of existing habitats and protected species both during construction and operational phases of the development.

Objective 2:

- 3.7 To enhance existing habitats, create a variety of new habitats and establish a suitable management strategy to increase the biodiversity value of the site and provide suitable green corridors / linkages into the wider local landscape.

Objective 3:

- 3.8 To create 'multifunctional' green spaces where both recreational and functional requirements for wildlife interests are balanced effectively, to ensure they are not detrimental to the objectives outlined above.

Objective 1: To Retain & Protect Existing Ecological Features

Habitats

- 3.9 The proposals will include green infrastructure (GI), with a large proportion created in the northern extent of the site, and smaller swathes along the southern and western boundaries. These areas have been designed to provide recreational and ecological features. Existing habitats of value will be retained and enhanced within the development area and within the GI including periphery features such as hedgerows and trees. This objective will focus on the habitats below:

- Hedgerows;
- Woodland and Trees; and
- Species-poor grassland.

Hedgerows and Scrub

- 3.10 The existing network of hedgerows within the site are largely located within the northern extent. All boundary hedgerows are to be retained, which together with the scrub and woodland belts, will provide a continuous link between habitats both around the site and within the immediate landscape. In accordance with the Hedgerow Evaluation and Grading System (HEGS)⁴ ten of the eleven hedgerows were found to be of moderately high to high conservation value with the remaining one of moderate value. None of the hedgerows qualified as important under the wildlife and landscape criteria of the Hedgerow Regulations 1997⁵.
- 3.11 The majority of hedgerows have been identified as Habitats of Principal Importance under the Natural Environment and Rural Communities (NERC) Act 2006⁶, and hedgerows are identified as a Biodiversity Action Plan (BAP) priority habitat in Sussex⁷. Under the NPPF, development should seek to contribute a net gain in biodiversity with an emphasis on improving ecological networks and linkages where possible.
- 3.12 Areas of dense scrub were recorded around the peripheries of the site, largely comprising bramble *Rubus fruticosus* agg. and hawthorn *Crataegus monogyna* within the northern extent. Dense cherry laurel *Prunus laurocerasus* forms an extension to the woodland belt on the north-western boundary of the site.

Protection

- 3.13 The boundary hedgerows (H1, H5 and H11) are to be retained and enhanced through additional planting and improved management as outlined in Objective 2 below.
- 3.14 Hedgerow losses will occur in eight locations (H2, H3, H4, H6, H7, H8, H9 and H10): see table below for details:

⁴ Clements, D.K. & Tofts, R.J. (1992) Hedgerow Evaluation and Grading System (HEGS): A methodology for the ecological survey, evaluation and grading of hedgerows.

⁵ Hedgerow Regulations (1997), Statutory Instrument No: 1160 [online] <http://www.legislation.gov.uk/uksi/1997/1160/regulation/5/made>

⁶ The Natural Environment and Rural Communities Act 2006. [Online]. Available from: <http://www.legislation.gov.uk/ukpga/2006/15/contents>

⁷ Sussex Wildlife Trust - Biodiversity and Planning in Sussex [online] <https://assets.sussexwildlifetrust.org.uk/Files/swt-planning-guidance-2014.pdf>

Table 1: Details of hedgerow removal

Hedgerow reference	Status through development
H1	To be retained, bounding the employment area
H2	To be lost in its entirety, approximately 45m
H3	Dead hedge and coppiced stools, the majority of which will be lost, approximately 115m
H4	A small section will be removed to facilitate access into the site, approximately 16m
H5	To be retained on the residential boundary
H6	To be lost in its entirety, approximately 27m
H7	To be lost in its entirety, approximately 44m
H8	Two sections will be lost, one to the north and one to the south of the hedgerow, measuring approximately 51m loss in total, leaving the central area of the hedgerow intact.
H9	To be lost in its entirety, approximately 30m
H10	A small section, approximately 2m, will be removed to facilitate pedestrian access connecting public open space to the residential plot to the south of the hedgerow.
H11	To be retained on the southern boundary of the residential development / adjacent to the attenuation pond

- 3.15 This report assumes that a maximum of 330m of hedgerow loss will be required to facilitate the development.
- 3.16 The scrub habitats will largely be retained with small losses occurring within the northern extent, including the entire section of outgrown scrub separating the horse grazed pasture with the improved grassland, the trimming back of an area of outgrown scrub along the north-eastern boundary and the entire loss of sporadic scattered scrub (buddleja and bramble) between hedgerows H2, H6 and H7. The total loss of this habitat would be approximately 0.41ha.
- 3.17 The entirety of the cherry laurel shrub (0.2ha) will be removed.
- 3.18 Further details on suitable methods to be used for removal of scrub and hedgerow sections are provided in the faunal section below to ensure legal compliance with regards to the presence of dormice and nesting birds.
- 3.19 Protection of retained scrub and hedgerows and associated features from the construction phase of the development will be achieved through the protection of Root Protection Ares (RPA) with Heras fencing or similar, which are detailed within the *BS 5837:2012 Trees in Relation to Design, Demolition and Construction*⁸. The RPA fencing will be in place along the lengths of all retained hedgerows, scrub belts and trees, where the buffer will include the canopy spread and / or equivalent to 5m.
- 3.20 The management of the retained hedgerows and scrub will take place outside the nesting bird season (October to March), and will consider the presence of dormice. Management practise will

⁸ The British Standards Institution (2012) *BS 5837:2012 Trees in Relation to Design, Demolition and Construction* <https://www.eden.gov.uk/media/3464/british-standard-bs5837-trees.pdf> [online]

include coppicing, rotational cutting of sections of hedgerows at 2 to 3 year intervals and / or hedgerow laying; such measures will ensure increased fruiting bodies and understorey renewal of growth which will benefit invertebrates. Where existing hedgerows and scrub are to be retained, additional native species will be planted to increase diversity and structure, the details of which are included in Objective 2.

Trees and Woodland

- 3.21 A small spinney and linear woodland belts are located on the eastern and western boundaries, and centrally from north to south. These are largely composed of mature trees with sparse understoreys. The western boundary, adjacent to Fontwell Avenue, is made up of a mature tree line with occasional areas of scattered scrub. A small number of mature standards stand alone or in small groups centrally within the two field compartments in the western extent.
- 3.22 The majority of the woodland habitats on site will be retained, particularly the mature belt running alongside the eastern boundary. Tree losses will occur on the western boundary to facilitate vehicular access into the site, as well as a visual splay (approximately 80m/0.05ha). A few standards will be removed to facilitate the residential development and access through the parcels within the western extent of the site, and a small number centrally located. Species to be lost include Scot's pine *Pinus sylvestris*, hawthorn *Crataegus monogyna*, English oak *Quercus robur*, hybrid Black poplar *Populus x Canadensis*, and sycamore *Acer pseudoplatanus*. In addition, a woodland belt runs centrally through the site from north to south. A section of this will be removed for the provision of access through the parcels, as well as residential dwellings (approximately 70m / 0.05ha). The remaining woodland belt to the south, will be trimmed back but retained overall (140m). In total, the amount of woodland (tree belt) to be removed in full equates to approximately 150m / 0.1ha.
- 3.23 Further details on suitable methods to be used for removal of trees and woodland are provided in the faunal section below to ensure legal compliance with regards to the presence of dormice, bats and nesting birds.
- 3.24 Protection of retained trees and woodland from the construction phase of the development will be achieved through the protection of Root Protection Areas (RPA) with Heras fencing or similar, which is detailed within the BS 5837:2012 Trees in Relation to Design, Demolition and Construction⁸. Further details can be found within the Arboricultural Method Statement (FPCR, May 2019).

Species-poor Grassland

- 3.25 The majority of the site comprised intensively managed species-poor improved and semi-improved neutral grassland, largely dominated by grass species indicative of improved conditions, such as perennial rye-grass *Lolium perenne*, false oat grass *Arrhenatherum elatius* and cock's-foot *Dactylis glomerata*. The dominance of grass species limited floral diversity, with herbs consisting of common and widespread species such as ribwort plantain *Plantago lanceolata*, common sorrel *Rumex acetosa* and creeping buttercup *Ranunculus repens*. Management of the grassland generally consisted of horse grazing in the eastern extent and hay meadows in the western extent. In the eastern horse grazed paddocks, small pockets of increased herb richness was identified on field margins, including species such as bird's-foot trefoil *Lotus corniculatus* and lesser stitchwort *Stellaria graminea*. Ruderal herb communities were present on the peripheries of grasslands and included common species such as nettle *Urtica dioica* and creeping thistle *Cirsium arvense*.

- 3.26 The majority of grassland will be lost to facilitate the residential development, however the public open space in the north-east of the site will be enhanced to provide wildflower meadows, tussock grassland and paddocks. These areas will be managed through a traditional hay meadow cutting regime with a single cut in early spring or late summer / early autumn (see Objective 2 for detailed management strategy). The open space in the south-west of the site will comprise wetland meadow mix around the attenuation pond (see Objective 2 for detailed management strategy) which will add to the species diversity, habitat mosaic and provide foraging opportunities for a range of species.
- 3.27 Further details on suitable methods to be used for removal of vegetation are provided in the faunal section below to ensure legal compliance with regards to the presence of herpetofauna.

Buildings

- 3.28 Seven buildings are present on site, six of which are to be removed. Building B4 will be retained and converted into a community building. Further details on suitable methods to be used for removal of the buildings is provided in the faunal section below to ensure legal compliance with regards to the presence of bats and nesting birds.

Fauna

- 3.29 Protected species are present within the site and their habitats will be protected through the construction and operational phases with specific mitigation strategies to protect their FCS in the long term. Those species addressed include:
- Bats;
 - Hazel Dormouse;
 - Reptiles;
 - Breeding Birds;
 - Badgers / Mammals.
- 3.30 A summary of appropriate timings (*Table 5*) for removal of habitats associated with the protected species present on site has been provided at the end of this section. The habitats to be removed as part of the proposals provide habitat for hazel dormouse, nesting birds, roosting bats and reptiles, and therefore a strategic method of work is required to ensure disturbance is kept to a minimum.

Bats

- 3.31 All bat species and their habitats are protected under the WCA and the Conservation of Habitats and Species Regulations 2017 (as amended). In summary, these make it an offence to damage, destroy or obstruct any place used by bats for breeding and shelter, disturb a bat, or kill, injure or take a bat. Some bat species are also listed as species of Principal Importance under S41 of the NERC Act (2006).
- 3.32 The following section discusses the general bat assemblage identified through activity surveys, and roosting features in trees and buildings; protection and appropriate working methods are detailed for each. The locations of roosting features present are identified on *Figure 3*.

Bat Assemblage

- 3.33 The activity and static detector surveys completed across the site identified seven species and two genus of bat, comprising common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, noctule *Nyctalus noctula*, barbastelle *Barbastellus barbastella*, Leisler's *Nyctalus leisleri* and Nathusius pipistrelle *Pipistrellus nathusii*. Species identified to genus included: unidentified *Myotis* species and unidentified *Nyctalus* species.
- 3.34 Throughout the survey period, very low numbers (eight individual registrations) of barbastelle were recorded on the automated static detectors deployed in June, August and September 2016; four recorded in August and five in September. These were from locations on the tree line on the western site boundary, the southern extent of the eastern boundary, and centrally within the site. These low numbers confirm that the site does not represent a significant resource for these species.
- 3.35 Throughout the survey period, the dataset confirmed bat activity to be generally low level and closely associated with mature hedgerows and tree lines / woodland edge along the eastern and western boundaries, with no significant areas of foraging or commuting activity from any species. Minimal activity was recorded within the field compartment interiors. It is concluded that the habitats do not provide a significant resource for the local population of bats.

Protection

- 3.36 The open field habitats are of little value to bats as they comprise species-poor grassland fields, evidenced by the activity surveys. The woodlands, hedgerows, scrub and tree lines provide foraging and navigational opportunities. As mentioned above, the internal hedgerows and scrub are largely to be severed or removed with exception of hedgerow H10 which will be retained within the GI, with only a small area removed for pedestrian access. Hedgerow H10 will be linked to the retained woodland spinney, northern and western boundary via the planting of native trees, shrubs and an orchard throughout the GI, maintaining commuting links, and providing new foraging opportunities for bats within the internal body of the site. The majority of site boundary hedgerows and trees will be retained, with small losses required for the provision of vehicular access, and its associated visual splay on the western boundary. All retained trees, hedgerows and woodland will be protected from construction via RPAs, as mentioned above.
- 3.37 Where gaps are required to facilitate access on the western boundary, new native tree, hedgerow and scrub planting will be created behind the visual splay to maintain connectivity in this area. This will ensure gaps in vegetation do not exceed 12m and together with the use of 'hop-overs' flight lines will be maintained. 'Hop-overs' entail the planting / maintenance of taller vegetation on the edges of gaps greater than 7m wide to affectively 'push' passing bats and bird over the gaps, thus avoiding vehicles and light. These will be created after the construction phase, so to not restrict access for large / tall construction vehicles.
- 3.38 To ensure dark corridors are maintained along vegetated corridors, green buffers will be maintained alongside the northern, eastern and western boundaries, and a sensitive lighting scheme will be implemented to minimise light spill on retained and created habitats of value, both

during the construction and operational phases of development. Any temporary or permanent lighting during the construction and operational phases will include the following⁹:

- Construction work to be restricted to daytime hours where possible;
- Avoidance of direct lighting of existing trees, hedgerows, scrub, woodland, or proposed areas of habitat creation / landscape planting, during construction and operational phases, achieved through directional or shrouded lighting;
- Buffer zones and GI not to be illuminated;
- Use of directional lighting, avoiding upward lighting and/or spillage;
- Use of low-pressure sodium instead of mercury or metal halide lamps for street and road lighting;
- Lighting columns to be as short as possible, although in some locations taller columns would allow reduced horizontal spill; and
- Lighting levels to be as low as guidelines permit and only used where required for public safety.
- Security lighting on properties backing on to sensitive hedgerows and woodland to be low wattage LED, which will be installed on properties at the construction stage to forestall a future homeowner installing unsuitable lighting which could impact bats.

- 3.39 The hedgerow/tree line buffers, internal residential roads and gardens along the eastern and western boundaries will distance the housing units away from natural habitats, further maintaining dark corridors. These areas will therefore continue to benefit all bat species, and particularly barbastelle bats which are sensitive to light.

Bat Roosts – Trees

- 3.40 The majority of the mature trees present within the site were in good health and lacked features suitable to support roosting bats such as cracks, crevices or hollows. Eight trees were identified during the 2018 walkover with low – moderate potential to support roosting bats; these are detailed on *Figure 1*. The majority of these will be retained and appropriately buffered (as detailed above), with the lighting scheme ensuring no spill is directed onto them. Details of these trees are provided in the table below, along with appropriate measures of removal, where required.

⁹ As recommended by the Bat Conservation Trust Statement on the Impact and Design of Artificial Light on Bats (May 2011) and the Institution of Lighting Professionals Guidance Notes.

Table 2: Trees with bat roosting potential and appropriate methods of removal

Tree ref (Figure 1) (tree ref in Arb assessment)	Bat roost potential	Mitigation measures
T1 and T2 – English oak trees (T63 and T64)	Low - multiple dying branches, platey bark and rotten wood	T1 (T63) to be removed through proposals, T2 (T64) to be retained with the crown to be raised to 4m and all deadwood up to 40mm in diameter; precautionary removal / working methods to be used (see details below)
T3 – Ash (T59)	Low - overlapping branches providing small cavity; branch tear-outs and knot holes	T3 to be retained with no remedial works required
T4 – Leyland Cypress (part of TG28)	Low - natural split in main trunk and re-joining of stems above provide cavity in main trunk	T4 to be retained – crown to be raised to 4m to allow installation of tree protection fencing; this won't affect the main stem of T4 so no further measures required
T5 – English oak (T66)	Moderate – large cavity opening above the base of the main trunk	T5 to be retained with no remedial work required
T6 – English oak (T41 and T42)	Low – small branch tear-out from main stem and suspect cavity in main stem; dead tree	T6 (T41 and T42) to be removed due to their poor conditions; precautionary working / removal methods to be used (see details below)
T7 – Hybrid black poplar (T15)	Low – large branch tear-out leaving split end on remaining branch; occluded union on another branch	T7 to be removed to accommodate access; precautionary working / removal methods to be used (see details below)
T8 – Scots pine (part of TG1)	Low – heavily matted ivy covering main trunk of dying large tree; multiple cracks in main stem	TG1 to be partially removed; northern edge of tree group removed to facilitate highway alterations; precautionary working / removal methods to be used (see details below)

3.41 According to the Bat Conservation Trust guidelines¹⁰, further surveys for trees with low roosting potential are not required, however precautionary measures may be required for removal / remedial works. Five trees with low roosting potential (T1, T2, T6, T7 and T8) are to be affected by the

¹⁰ Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed.). Bat Conservation Trust

proposals and soft felling techniques will be implemented for the removal and remedial works required.

Working Methods

3.42 Trees T1, T2, T6, T7 and T8 will be subject to re-inspection by a suitably experienced ecologist prior to removal. This will involve checking accessible cavities with an endoscope and identifying any additional roosting features. Once the trees have been reconfirmed as having low potential, the trees will be felled using reasonable precautionary measures. These will include the following:

- A suitably qualified ecologist will be present to supervise and advise on the most appropriate felling methods and what to do if a bat is encountered;
- The work will be undertaken during weather conditions suitable for bats to be active, avoiding the main hibernation period; and coinciding with the active period for dormice, avoiding the period when young are dependent (see *Table 5*);
- Sections of the tree containing suitable features such as platey bark, occluded unions and thick ivy stems, will be gently lowered to the ground and inspected by the supervising ecologist;
- The sections of tree supporting thick ivy or features that cannot be explored will be retained in a suitable location overnight to allow for any bats present to disperse.

3.43 Should the initial inspection find the trees to have increased in value, further nocturnal surveys / aerial inspection may be required prior to remedial / removal works. In the event that any bats are encountered during the operations, all works will cease and the supervising ecologist will advise on how to proceed.

Bat Roosts – Buildings

3.44 The buildings on site were subject to internal / external inspections in July and August 2019, resulting in the requirement for further nocturnal surveys. Surveys were completed in line with BCT guidance¹⁰, a summary of the results is provided below:

Table 3: Buildings with bat roosting potential and mitigation required

Building ref (Figure 1)	Bat potential and surveys completed	Mitigation measures
Building B1	Low – one pre-dawn nocturnal survey (19.07.19)	No roost identified Precautionary methods of removal (see details below)
Building B2	No potential	N/A
Building B3	No potential	N/A
Building B4	Low – one dusk nocturnal survey (01.08.19)	No roost identified Precautionary methods of removal (see details below)

Building ref (Figure 1)	Bat potential and surveys completed	Mitigation measures
Building B5	High – three nocturnal surveys (2 dusk, and 1 pre-dawn; 18.07.19, 02.08.19, 15.08.19)	Confirmed maternity roost of brown long-eared <i>Plecotus auritus</i> bats Natural England license required to demolish building (see details below)
Building B6	Low – two nocturnal surveys due to small number of droppings found (1 dusk, 1 pre-dawn; 01.08.19, 16.08.19)	No roost identified, DNA analysis of droppings found identified 'no DNA' Precautionary methods of removal (see details below)
Building B7	Low – two nocturnal surveys due to small number of droppings found (1 dusk and 1 pre-dawn; 15.08.19, 30.08.19)	No roost identified, DNA analysis of droppings found species to be Whiskered bat <i>Myotis mystacinus</i> Building has very little features and droppings considered to be from a foraging bat Precautionary methods of removal (see details below)

Licensable Buildings – Protection and Working Method Statement

- 3.45 A confirmed maternity roost of brown long-eared bats has been identified within building B5, and a European Protected Species Mitigation Licence will be required to legitimise the demolition of the structure. Due to the species and status of the roost identified, as part of this licence a compensatory 'like for like' replacement roost will be created near the existing roost (plot 359) with an access point next to the eastern woodland belt where there will be no lighting (this species is very sensitive to light).
- 3.46 The roost (B5) is located within Phase 2 of construction and lies within the garden of plot 358 (adjacent to plot 359) which backs onto the woodland belt on the eastern boundary. An appropriate void in the garage of plot 359 is proposed and will provide an ideal location for the new roost as it lies within close proximity of the existing roost (approximately 10m) and backs directly onto the woodland belt and dark corridors. Demolition of building B5 will be avoided during the maternity period (April – August inclusive) and due to the nature of the species concerned, the hibernation period will also be avoided (November – February, weather dependent).
- 3.47 Suitable roost provision for the bats displaced during the works must be put in place before the roost is destroyed. The void will have a height (floor to ridge) of at least 2m and be 5m in length and 3m in width to create a large void, similar in size to that being lost (see Figure 3). Long-eared bats require traditional construction giving large uncluttered voids (typical trussed rafter construction must not be used). Suitable construction methods are purlin and rafter with ceiling ties or attic trusses.

- 3.48 The roof must not be insulated above to allow it to heat up from the sun and will be constructed from tiles/slates over traditional roofing felt (or an alternative acceptable membrane) which lie on top of the rafters. Modern membranes which provide poor grip or in which bats can get caught up in must not be used. Bat access needs to be provided for bats with three 19mm wide x 150mm tall gaps at each gable end. Baffles should be placed behind at an appropriate spacing from the wall to allow bats access to the loft as well as helping to reduce drafts.
- 3.49 Rafters/timbers 1m in length would need to be added alongside the roof timbers to create 20-25mm crevices (half bridged over to create a long-enclosed cavity). The upper end should be closed completely. Existing timbers from the structure being replaced should be used where possible. Three pairs should be created either side of the ridge beam (i.e. near gable ends and through the middle) and six pairs just above halfway up the rafters (with four pairs at/near the gable ends and another two in the middle of roof).
- 3.50 The metal ridge plate and roof of B5 would be removed by hand under ecological supervision either during early spring or autumn to minimise disturbing bats with dependent young (see *Table 5*). During suitable weather conditions, before the roof is removed, any bats present will be removed where possible by hand and placed in the bat loft (seeded with droppings from the current loft) that will be built prior to the roof removal and internal works. Any bats found will be moved safely to a bat box and taken to the compensatory roost.
- 3.51 All contractors and those involved with the work will be informed of any action that must be taken should bats be encountered at any stage.

Non-licensable Buildings - Protection and Working Method Statement

- 3.52 These include buildings where the presence of roosting bats was not recorded during the survey work. To ensure compliance with the requirements of the Conservation of Habitats & Species Regulations 2017 (as amended) the following methods are to be employed in relation to demolition. These buildings include:
- B1, B4, B6 and B7.
- 3.53 Prior to any works to the buildings listed above, a licensed bat worker will complete a thorough inspection of the buildings and any potential access points or roost sites. This inspection will be completed from a cherry picker or other suitable platform using an endoscope. In the event any bats or evidence of a roost is identified, works will be stopped immediately and demolition of the building will be completed following granting of a Natural England Mitigation licence.
- 3.54 Following confirmation that no bats are present in the building the following working methods will be employed on areas which could potentially be used by bats. Working methods will involve removing areas where potential roost sites or access points have been identified, by hand. Such features include: barge / fascia boards, areas of lead flashing, tiles and ridge tiles. Upon removal, the underside of each of the removed features would be checked for the presence of bats or bat droppings. If at any point during works a bat or evidence of bats is discovered all operations will be stopped on that building and the licensed bat worker will provide further advice.
- 3.55 Once all potential areas have been inspected, and no bats have been identified within the buildings, these (B1, B6 and B7) will be demolished that same day. Building B4 will be partially retained, and once all potential features of interest have been inspected, the demolition contractor will ensure that any cavities are filled with a suitable material to prevent bats from roosting in the building prior

to finalising extension works. Where required the contractor will fill/adequately cover the required areas at the end of each working day.

Hazel Dormouse

- 3.56 The hazel dormouse *Muscardinus avellanarius* is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of The Conservation of Habitats and Species Regulations 2017 (as amended) making it a European Protected Species. It is an offence to:
- capture, kill, disturb or injure hazel dormice (intentionally or recklessly);
 - damage or destroy a breeding or resting place (intentionally or recklessly);
 - disturb a hazel dormouse while it's in a structure or place of shelter or protection (intentionally or recklessly);
 - obstruct access to their resting or sheltering places (intentionally or recklessly); and
 - possess, sell, control or transport live or dead dormice, or parts of dormice.
- 3.57 Dormice were initially surveyed using 100 nesting tubes in 2016, with no evidence of dormice collected. During vegetation removal in winter 2019, an old dormouse nest was identified within scrub habitat along the southern boundary. This was subsequently followed up by surveys during which three dormouse nests were found within the scrub along the north-eastern boundary of the site. In addition, the start of a dormouse nest was identified along the western boundary during the October survey (strips of dry material), but no woven structure or green leaves were present.
- 3.58 Hedgerows (H1, H5 and H11) are to be retained in their entirety, and enhanced through additional planting and improved management as outlined in Objective 2 below.
- 3.59 Hedgerow losses will occur in eight locations (H2, H3, H4, H6, H7, H8, H9 and H10 *Figure 1*): see table below for details relating to dormice:

Table 4: Details of hedgerow removal and suitability for dormice

Hedgerow reference	Approx. Length to be removed	Description of area to be impacted
H2	45m	Dense / overgrown scrubby hedgerow with no gaps, with connections to other hedgerows and scrub. Vegetation present includes hawthorn, blackthorn, English oak and bramble which offers suitable dormouse habitat.
H3	115m	Dead hedge and coppiced stools engulfed largely by bracken and some bramble, offering some hibernating opportunities, but limited foraging and nesting opportunities for dormice.
H4	16m	Residential boundary hedgerow with no gaps. Sparse section of hedgerow, largely comprising semi-mature trees with little understorey offering limited nesting and hibernating opportunities.
H6	27m (entire length)	Scrubby hedgerow with 0-10% gaps. Linked to scrub to the south but limited connectivity to the north.

Hedgerow reference	Approx. Length to be removed	Description of area to be impacted
H7	44m (entire length)	Dense section of hedgerow, largely comprising semi-mature trees with scrub understorey offering suitable nesting and foraging opportunities.
H8	51m	Overgrown scrubby hedgerow comprising hawthorn, elder and bramble with 0-10% gaps offering suitable dormouse habitat. Links to offsite woodland to the north but does not connect to suitable habitat to the south.
H9	30m (entire length)	Residential boundary hedgerow including privet and bramble offering limited opportunities to dormice, but it does connect to the eastern boundary woodland strip.
H10	2m	Dense hedgerow of mixed species dominance and 0-10% gaps. Vegetation present include hawthorn, English oak, elder and bramble which offers suitable dormouse habitat.

- 3.60 This report assumes that a maximum of 330m of hedgerow loss will be required to facilitate the development.
- 3.61 As detailed in the habitats section, the total loss of scrub habitat would be approximately 0.41ha. This includes an outgrown thicket of bramble, hawthorn and elder (0.26ha) considered to provide good opportunities for hibernating, nesting and foraging. This area is connected to off-site woodlands to the north, however provides no connections to the south. The scrub in which the dormouse nests were found along the north-eastern boundary is to be retained, however some trimming back of the bramble will be required, resulting in approximately 0.09 ha of loss. The habitats between hedgerows H2, H6 and H7 comprises an area of sporadic scattered scrub, which will be removed in its entirety, approximately 0.06ha.
- 3.62 The majority of the woodland habitats on site will be retained, particularly the mature belt running alongside the eastern boundary. Tree losses will occur on the western boundary to facilitate vehicular access into the site, as well as a visual splay (approximately 80m/0.05ha). A few standards will be removed to facilitate the residential development and access through the parcels within the western extent of the site, and a small number centrally located. In addition, a woodland belt runs centrally through the site from north to south (much of which has been heavily coppiced). A section of this will be removed for the provision of access through the parcels, as well as residential dwellings (approximately 70m / 0.05ha). The remaining woodland belt to the south will be trimmed back but retained overall (approximately 140m). In total, the amount of woodland (tree belt) to be removed in full equates to approximately 150m / 0.1ha. These tree lines / woodland belts provide connectivity across the site, and suitability for dormice varies, the eastern belt considered to have the greatest value.
- 3.63 The entirety of the cherry laurel shrub (0.2ha) will be removed.

Protection and Working Method Statement

- 3.64 A European Protected Species Mitigation (EPSM) Licence will be required from Natural England to legitimise the vegetation removal onsite. The losses proposed will affect the locations where the dormouse nests were found and so mitigation measures will be adopted to ensure the works are legally compliant, using the methods detailed below.

- 3.65 Persuasion techniques as stated in The Dormouse Conservation Handbook¹¹ and Natural England's standing advice¹² are to be used to ensure, if dormice are present, that they are displaced appropriately from areas of habitat loss. Two methods of vegetation clearance are to be employed, comprising summer clearance and two-phased winter clearance, and completion of these will be dependent on the amount to be lost and its suitability.

Summer Clearance

- 3.66 In line with Standing Advice, for clearance within areas of low quality habitat or a short length of vegetation, summer vegetation clearance can be completed in summer (May to late-September), excluding July and August to minimise disturbance to dormice with dependent young.
- 3.67 The development will be completed in three phases, with more detail on the phasing provided in the EPSM licence. However, this methodology will apply to the following areas of vegetation clearance:
- Hedgerows H3, H4, H6, H9 and H10
 - Scrub to south of H6
 - Woodland plantation in the north-west corner of the site
 - Southern woodland belt (running through site north – south)
 - Trimming back of southern woodland belt
- 3.68 This method will involve the removal of vegetation in small amounts on successive days during the summer when animals are active and able to respond immediately to habitat changes.
- 3.69 Prior to any habitat removal, permanent dormouse nest boxes will be installed along linear features, particularly where habitat loss is to take place. A box will be installed either end of each area of vegetation loss, it is anticipated that approximately 12 boxes would be installed. This will aim to persuade dormice to use habitats to the north-east, east and south of the site where habitats will be retained and enhanced.
- 3.70 The removal of vegetation in summer will take place during optimal weather conditions, where temperatures are constant. This will avoid times when dormice are in hibernation/topor, however timing of removal in the summer should avoid such circumstances. There has been an indication of breeding within the site therefore restrictions regarding the breeding period (July /August) should be avoided.
- 3.71 The process that will facilitate habitat removal is described below:
- All vegetation removal, where considered necessary by the ecologist, will be completed under the supervision of an ecologist who holds a dormouse licence;
 - Vegetation clearance works will take place before autumn (October / November) (weather and temperature dependant);
 - Immediately prior to any operations the entire working area and surrounding 10m will be carefully inspected by an experienced / licenced ecologist to ensure that no natural dormouse

¹¹ English Nature (2006) The Dormouse Conservation Handbook 2nd Edition

¹² Standing Advice: Hazel or common dormice: surveys and mitigation for development projects [online, accessed 17.05.17] www.gov.uk/guidance/hazel-or-common-dormice-surveys-and-mitigation-for-development-projects#mitigation-and-compensation-methods

nests are present. Operations will only proceed once the ecologist has confirmed this area is free of nests;

- Once dormice have been confirmed to be absent vegetation removal will then be undertaken in a phased and controlled manner using only hand tools, with small sections removed daily from the large habitat losses;
- The woody vegetation removed each day will be retained in situ overnight and next to the closest adjacent dormouse habitat. This vegetation will then be disposed of appropriately the following day or utilised to create habitats elsewhere on site;
- In the event that dormice or dormice nests are identified during clearance, then works will cease in the immediate area, and further advice sought.
- During all habitat removal, the supervising ecologist will also be checking for nesting birds, if these are found within the immediate area then works will cease until young have fledged.

Two-phased winter clearance

- 3.72 For clearance of large areas or within habitats of moderate to high quality for dormice, a two-phased clearance will be completed in winter (November to March).
- 3.73 The development will be completed in two phases, with more detail on this provided in the EPSM licence. However, this methodology will apply for the following areas of vegetation clearance:
- Hedgerows H2, H7 & H8
 - Woodland belt along the western boundary
 - Central dense scrub belt
- 3.74 This method will involve the removal of the canopy during winter with subsequent removal of the roots and coppiced stools in summer. This should remove enough vegetation to persuade dormice emerging in April or May to move to more appropriate habitat nearby. The following applies to this two-stage process:
- All vegetation removal will be completed under the supervision of an ecologist who holds a dormouse licence;
 - Immediately prior to any operations the entire working area and surrounding 10m will be carefully inspected by an experienced / licenced ecologist to ensure that no hibernating dormice are present (where possible). Operations will only proceed once the ecologist has confirmed this area is free of hibernating dormice (where possible);
 - The canopy of the section of vegetation will be cut down between November and March inclusive which avoids the bird breeding season and the period where dormice might be found in nests above ground;
 - Vegetation removal will be undertaken in a phased and controlled manner by hand, with small sections removed daily;
 - The process of removing the cut material should be designed to protect dormice hibernating on the ground, using techniques such as directional felling to minimise ground impact;
 - The cut stems will be left either directly adjacent to the retained roots, or on top of the roots to ensure that, should any dormice be hibernating within the roots of the area to be removed, these

will have adequate means of dispersal to more suitable habitat elsewhere once they have emerged from hibernation in April or May;

- For isolated areas such as the scrub belt in the centre of the site, the dead hedge will extend to the north, to allow any hibernating dormice to move into the offsite woodland to the north; and
- Following careful inspection of the area by a licensed ecologist, the coppiced stools and roots, along with any 'dead hedges' will be dug up and removed no earlier than May the following season (timing will be decided upon by a licensed ecologist).

General Protection

- 3.75 To avoid disturbance of habitats that could potentially be used by dormice, the RPAs will be fenced off (see paragraph 3.19). This will avoid damage through material storage and accidental encroachment.
- 3.76 All on-site workers will be made aware of the presence of dormice through ecological toolbox talks, which will detail habitats / areas to avoid disturbance, identification of the species and reporting suspected sightings.
- 3.77 To avoid indirect disturbance from construction lighting, nocturnal work during the summer will be avoided (May to September / October); where this is needed, directional lighting should be used that does not illuminate habitats. During works in winter dormice will be in hibernation as the temperatures drop, therefore nocturnal construction will not have a significant effect on dormice, if required.
- 3.78 To compensate for the loss of short sections of hedgerows there will be significant hedgerow planting within the existing hedgerows as well as new hedgerows within the GI and behind visibility plays, which will strengthen existing habitats and provide additional linkages. Where required, these will be incorporated pre-construction, before any vegetation clearance works commence. Further details on the enhancements for dormice are provided in Objective 2.

Reptiles

- 3.79 All five native species of terrestrial reptile are protected by Law. The common lizard *Zootoca vivipara*, slow worm *Anguis fragilis*, adder *Vipera berus* and grass snake *Natrix natrix* are protected from killing, injury and trade under Section 9 of the WCA 1981 (as amended). These three species are the most widespread and are encountered in a wide range of habitats.
- 3.80 The site is largely made up of large intensively managed improved grassland habitats which are unsuitable for reptile species. However, the unmanaged field margins, scrub, tall ruderal and semi-improved grassland habitats provide suitable habitat onsite for foraging, resting and commuting reptile species.
- 3.81 Consultation records received from SBRC concluded that common reptile species were in the local area of the site, including slow worm, common lizard and grass snake. However, the majority of these records were concentrated at least 1km south and east of the site. Seven specific reptile surveys were completed onsite during 2014, recording a single adult grass snake, along the northern boundary of the site, concluding a low population of grass snakes is present onsite. The habitats within the north-eastern extent of the site where grass snake were identified will largely be retained with exception of small amounts of scrub clearance. To prevent an offence under the

Wildlife & Countryside Act 1981 (as amended); a period of supervised passive displacement will be undertaken where suitable habitats are to be removed, as detailed below.

Protection and Working Method Statement

- 3.82 Passive displacement will involve two cuts of vegetation, the first to 200mm and the second 1-2 hours later to 50mm. This will be completed for suitable vegetation in the north-eastern extent of the site, where reptiles are known to be present. This technique will affectively 'push' individuals away from the construction area into the retained habitats around the peripheries. Grassland and other ground flora will be managed to encourage displacement by strimming directionally from the centre of the working areas in the direction of retained habitats.
- 3.83 Once displacement measures have been completed, the topsoil/grassland will be removed/managed to make those areas unsuitable for future colonisation. This will be maintained as unsuitable for the duration of the works. All spoil will be removed from the immediate area. All potential hibernation sites present within the working area shall be removed carefully by hand. Any individuals found will be immediately placed in areas of retained habitat to the north and south.
- 3.84 The passive displacement will be undertaken during the active period for reptiles, between late March to early-October and during suitable weather conditions when the daytime temperature is above 10°C.
- 3.85 The peripheries will be retained and managed for reptiles. During construction works the retained areas will be left uncut and heras fencing will be installed around the perimeter to prevent machinery or materials being moved within this area which may cause injury or death to reptiles.
- 3.86 The site manager and other relevant staff undertaking construction work will be briefed on the possible presence of reptiles in the area. Staff will be provided with information relating to the legislation and the procedures to be implemented in the event that reptiles are found within the working area. This will be undertaken by nominated site personnel.

Breeding Birds

- 3.87 All birds, their nests and eggs are protected under the Wildlife and Countryside Act 1981 (as amended). It is an offence to:
- intentionally kill, injure or take any wild bird;
 - intentionally take, damage or destroy the nest of any wild bird whilst it is in use or being built;
 - intentionally take or destroy the egg of any wild bird;
 - intentionally or recklessly disturb any wild bird listed on Schedule 1 while it is nest building, or at a nest containing eggs or young, or disturb the dependent young of such a bird.
- 3.88 The overall breeding bird assemblage recorded was typical of edge-of-settlement farmland, with only common and widespread generalist woodland / garden species present. The hedgerows, trees and woodlands offer the greatest opportunities for breeding birds on site with the majority of species recorded in association with these features.

Protection and Working Method Statement

- 3.89 Where possible, vegetation clearance will take place outside of the bird breeding season. However, due to the possible occurrence of dormice, some areas of vegetation clearance will be undertaken in the summer, during the bird breeding season, in accordance with mitigation measures addressed in section 3.70. It is therefore possible that breeding birds might be encountered.
- 3.90 Where vegetation within the hedgerows is to be removed during the bird breeding season (March to August / September inclusive), it will be inspected by a suitably qualified ecologist / licenced dormice worker prior to removal, this is to ensure no offence is committed under the Wildlife and Countryside Act 1981 (as amended). If an active nest is discovered, the vegetation containing the nest will remain in situ and an appropriate buffer stipulated by the ecologist adopted until the young have fledged.
- 3.91 The retained hedgerows, trees and woodlands will be protected with RPA Heras fencing, as detailed above.

Badger / Mammals

- 3.92 Whilst no evidence of badgers was found on site, due to their highly mobile nature precautionary measures are to be implemented during the construction phase to ensure that badgers and other mammals are not indirectly harmed, such as falling into excavations or becoming trapped within piping. The following precautionary measures should be implemented.
- A badger survey of the site will be completed 6 - 8 weeks prior to the commencement of each phase of works to monitor the status of badgers within the site.
 - During construction any pipes greater than 250mm in diameter will need to be capped where left overnight, thereby preventing badgers/mammals from becoming trapped;
 - Any pits or trenches will similarly need to be covered overnight, or left with a suitable means of escape, e.g. wooden plank;
 - During the construction phase, operations shall be restricted to daylight hours where possible, if lighting is required this should be focused on specific working areas, avoiding vegetation, thus limiting disturbance to badger and other nocturnal / crepuscular wildlife; and
 - All waste materials are to be appropriately stored, in particular domestic waste from welfare units, as this may attract badgers but also other mammals such as foxes and rats.

Table 5: Summary of timings for vegetation removal / building demolition

Works	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Bats												
Creation of artificial bat roost												
Pending receipt of Natural England Licence - supervised demolition of B5*												
Supervised demolition of non-licensable buildings B1, B4, B6 & B7*												
Removal of trees with bat potential*												
Dormice												
Pending receipt of NE Licence - Summer vegetation removal for hedgerows H3, H4, H6, H9 & H10, scrub to the south of H6, woodland plantation in north-west corner of the site and southern woodland belt (including trimming back)*												
Vegetation removal under two-phased winter clearance for hedgerows H2 & H7, woodland belt along the western boundary and area of dense scrub within the centre of the site	Canopy removal				Root removal				Root removal		Canopy removal	
Reptiles												

[illegible]

* nesting bird checks will also be required for any vegetation removal or building demolition during the active bird breeding season (March - September, inclusive)

Objective 2: Habitat Enhancement, Creation and Management

- 3.93 The scheme has incorporated a sensitive design to ensure new habitats can be created to increase the biodiversity value of the site and provide connective corridors to existing habitats, and those within the immediate vicinity. It is proposed that the following habitats, as shown in *Figure 2*, will be created / enhanced:
- Hedgerows;
 - Tree / Scrub / Shrub / Orchard Planting;
 - Grassland; and
 - Attenuation Basins
- 3.94 These habitats will provide appropriate mitigation for the protected and notable species identified on site. Further details of this, and the planting to be incorporated are found below, and illustrated on the Landscape Masterplan DE-352-01-001 Rev. G (Define, 24.01.20).

Hedgerows

Enhancement of Existing Hedgerows

- 3.95 Native species whips will be planted throughout the existing hedgerow networks that run through / around the site (see Figure 1). This will increase diversity and structure, enhancing connectivity across the site, and provide additional opportunities for forage and refuge.
- 3.96 A range of species will be planted that provide flowers, fruits and nuts throughout the year. The following woody species have been selected:
- Hawthorn, *Crataegus monogyna*
 - Blackthorn, *Prunus spinosa*
 - Field maple, *Acer campestre*
 - Hazel, *Corylus avellana*
 - Holly, *Ilex aquifolium*
- 3.97 Standard trees are a beneficial feature of hedgerows, as mentioned previously these can provide 'hop-overs' and habitat linkages for bats and dormice. The number should be limited to avoid over shading but these should be planted and managed either side of gaps to be created for access through existing features, if such specimens are absent.

Hedgerow Creation

- 3.98 Fourteen hedgerows will be created throughout the GI, with the majority situated in the large area of GI in the northern extent of the site. A new hedgerow will also be planted behind the visibility splay on the western boundary (treeline) to compensate for the losses in this area and ensure connectivity is maintained in the long term.
- 3.99 The species planted will be the same as those mentioned above; hawthorn, blackthorn, field maple, hazel and holly.

- 3.100 Hedgerow planting will follow appropriate guidance and recommendations, such as those suggested by Wildlife Trusts¹³, which are summarised below:
1. The native shrub and tree standards should be planted between October and March with suitable support and weed control in place. Planting should not be undertaken in very cold or wet weather conditions, this is to minimise the risk of damage to roots before they become established;
 2. Mark out two parallel lines with string, about 50cm apart along the line of the new hedgerow;
 3. Clear any vegetation between the two lines (depending on the time of year / area, this may need to be supervised by an ecologist for breeding birds);
 4. Use 20-30cm lengths of cane to mark out the distances between specimens, creating a zig-zag pattern;
 5. Plant 60-90cm shrub whips in groups of roughly five of the same species;
 6. During the first spring, the shrubs will need to be cut to approximately 45 – 60cm above ground level to encourage the shrubs to develop a bushy structure, thus creating a thick hedgerow;
 7. The shrubs and trees should be annually assessed for the first five years to ensure plants remain viable. Any which die during this period must be replaced.
- 3.101 It is important that any new planting is protected during the early growth from grazers for approximately 3-4 years. Tree guards should be used to protect the leading shoots of trees from deer, which also speeds up the growth process. Chicken wire fencing (600mm high, with maximum 30mm mesh size¹⁴) fixed to a wooden post and rail fence should be used to limit grazing by rabbits/deer but also avoid disturbance by members of the public.
- 3.102 Weed / grassland encroachment and lack of water will need to be monitored by designated contractors, this is to ensure successful establishment; mulching material can help in such circumstances.

Management

- 3.103 Retained and newly planted (once established) hedgerows should be managed using standard hedgerow management practices such as flailing, trimming, coppicing, gapping-up, and grubbing-out; however, where possible hedgerow laying should be used, especially on new hedgerows that can be manipulated easily. Hedgerows are dynamic habitats that change over time and have varying management requirements depending on their management history. With this in mind they will be managed according to a regular assessment of their condition and where they are on the Hedgerow Management Scale as shown in Natural England's and Hedgelink's *The Hedgerow Management Cycle*¹⁵. This scale has been reproduced below in *Table 6* in full.

Table 6: The Hedgerow management scale

¹³ Adapted from Suffolk Wildlife Trust. (2016). Planting a hedgerow for wildlife (online). <http://www.suffolkwildlifetrust.org/hedgerow-planting>

¹⁴ PTES. (2014). Hedgerows a guide to wildlife and management (online). <http://ptes.org/wp-content/uploads/2014/06/Hedgerow-guide-web-version.pdf>

¹⁵ Hedgelink and Natural England (NO DATE); The Hedgerow Management Cycle. http://www.hedgelink.org.uk/cms/cms_content/files/78_hedgelink_a5_12pp_leaflet_7.pdf

1	Heavily over-trimmed with many gaps and sparse stems, their bases gnarled or rotting. May be invaded by elder, sycamore or other invasive species. ACTION: Coppice and re-plant gaps. Grub out or poison invasive species.
2	Over-trimmed, infrequent stems too far apart to be 'let up' for laying, perhaps evidence of laying in the past. Hard knuckle at trim line, shrubs developing mushroom shaped growth form. ACTION Coppice and re-plant gaps.
3	Over-trimmed, frequent stems. Stems still healthy but require more height. Hard knuckle may be starting to form at trim line. ACTION Allow incremental height gain at each cut or 'let up' up for laying.
4	Recently layed, coppiced, or planted hedgerow. ACTION Trim lightly for first few years, then cut on a two or preferably three or more year rotation, allowing height to increase a little each time.
5	Healthy, dense, hedgerow with frequent stems and more than 2m in height. ACTION Trim on a two or preferably a three or more year rotation. Raise cutting height if hard knuckle forming at trim line.
6	a) Hedgerow more than 3m high and trimmed on rotation. b) May also be non-intervention hedge, having intentionally been left un-trimmed for several years. ACTION a) Enter hedge into non-intervention period. b) Re-shape with circular saw then return to rotational trimming or non-intervention period.
7	Hedgerow with frequent healthy stems more than 4m high. ACTION Lay or reduce height and width with circular saw blade. Would also respond well to coppicing.
8	Mature tall hedgerow with spreading tops. Stems still healthy (although they may be infrequent) but too large (more than 18cm in diameter) for laying. ACTION Either reduce in height and width with circular saw blade or coppice and re-plant gaps if necessary.
9	Over-mature hedgerow with tops dying back, collapse possible. Perhaps becoming dominated by tree species such as oak, ash or sycamore. ACTION Coppice, retaining a few selected healthy trees, and plant up gaps.
10	Hedge developed into line of trees. ACTION Manage as a line of trees, if necessary undertake selective thinning. If shrubs still exist beneath trees raise height of tree canopy to allow in more light.

- 3.104 The ideal position on the scale for the hedgerows should be cycling between 3 and 8, but also kept at 5 or 6 on the scale for as long as possible where achieved. Hedgerows on site will require assessment prior to management to ensure the most appropriate methods are used.
- 3.105 Hedgerows at the optimal 5 on hedgerow scale will be cut / trimmed every two to three years to an 'A' profile to encourage growth of healthy hedgerow bases which are more beneficial to wildlife.
- 3.106 Trimming of all hedgerows within the same year will be avoided to ensure retention of adequate foraging habitats for dormice and birds every year. All planned hedgerow management works should take place outside the nesting bird season and when trees are in their dormant phase during the winter months (October to March). Light trimming where branches are causing obstruction to footpaths and the processing of storm damaged / fallen trees can take place as and when required throughout the year.

Tree / Scrub / Orchard Planting

- 3.107 A large resource of young, semi-mature and mature trees are present throughout the hedgerows and site boundaries, providing good conditions for invertebrates, bats, dormice and birds. The majority of the trees are to be retained; however, a small number are to be lost to facilitate access / visibility splays.

- 3.108 To compensate for the loss of small numbers of trees, native standard trees will be planted which, in the long term, will support a variety of invertebrates as well as potential to provide features suitable for refuge and navigational linkages.

Creation

- 3.109 Small clusters of native broadleaved trees will be planted throughout the grassland within the GI to create a parkland setting and promote habitat diversity. The trees within this open space will be planted with a diverse range of maturity with heavy standards 14-16cm girth and younger bare rooted 'whips' at approx. 60-120cm tall, which will provide a degree of structural diversity at an early stage.
- 3.110 Tree and shrub planting will take place within the GI connecting with retained hedgerows to provide a wildlife corridor and suitable habitat for species such as dormice. To maximise the value of this area for dormice, a large proportion of species known to be beneficial for this species will be included, these include hazel, wayfaring tree, honeysuckle and yew.
- 3.111 The following species are recommended for use in tree and shrub planting (and where appropriate in landscaping / garden planting schemes) as they are mostly native with many being fruit and nut bearing species which will benefit local wildlife:
- Blackthorn, *Prunus spinosa*
 - Hawthorn, *Crataegus monogyna*
 - Field maple, *Acer campestre*
 - Holly, *Ilex aquifolium*
 - Hazel, *Corylus avellana*
- 3.112 Due to the potential risk of spreading ash dieback *Chalara fraxinea*, no ash trees will be planted (Statutory Instrument No. 2707 – The Plant Health (Forestry) (Amendment) Order 2012 effectively prohibits the internal movement of plants or seeds of ash).
- 3.113 The native species should be planted between October and March but avoid freezing and waterlogged conditions and assessed annually for the first five years to ensure plants remain alive and healthy. Any which die during this period must be replaced. Irrigation may be required during drier periods of the first year.
- 3.114 A community orchard will be created in the northern extent of the GI. A mixture of apple, plum and cherry species of Sussex origin will be planted. The mixture of standards will be planted with stakes in a square grid pattern where the distance between rows is the same as the distance between each tree. Planting distances varies between species with apples generally planted 8-10m apart (min 4m), pears and cherries 10-20m apart (min 5/6m).
- 3.115 Planting will take place in late-autumn or early winter to allow the trees to establish a network of feeder roots before the onset of spring.
- 3.116 The maintenance of the community orchard to be encouraged by local community groups to increase community ownership and engagement with the landscape. Establishment of local community management groups should involve the provision of appropriate horticulture training.
- 3.117 Information will be provided to residents and users about how the fruiting species within the community orchard can be utilised.
- 3.118 All trees will be planted with suitable stakes and substrate to allow the specimens to establish effectively. The newly planted specimens (whips) will be protected from rabbit grazing by the use

of spiral guards. Mulch or mulch mats will be used on all specimens for effective weed control as appropriate. Trees should be assessed annually for weeds for the first three years to ensure the weed control mulch and mat is effective. Further weed control may be required through repairs, hand weeding or careful spot treatment with herbicide.

Management

- 3.119 Any standard trees to be felled as part of management will be assessed for their suitability as a bat roost by a licensed bat ecologist.
- 3.120 Dead and diseased plants will be replaced in the first five years. All scrub and shrub planting will be left to develop untouched for the first five-year period. After this time some thinning may be required and this should be assessed by the site manager. Scrub will be controlled by annual clearance to prevent encroachment into the grassland. Glyphosate based herbicide should be used on stumps to help prevent re-growth.
- 3.121 Natural England Technical Information Notes: TIN015: Traditional orchards: an introduction to pruning; TIN16: Traditional orchards: formative pruning of young trees and TIN17: Traditional orchards: maintenance pruning gives detailed practical advice on the pruning methods required for each species planted. These guidelines should be consulted by local community groups before any works are conducted.
- 3.122 Management within the community orchard will involve the maintenance of grassland, and this will be maintained on a rotational basis to ensure tussock grassland establishes (for reptiles). The grass cuttings will be left in situ to provide additional nutrients to the trees. Standard fruit trees do not need continuous pruning, but annual pruning will encourage greater fruit production and thinning will produce larger fruit.

Grassland

- 3.123 To maximise the biodiversity value and species diversity of the site, four types of grassland are to be created. Details of each, including management are provided in *Table 7* below with areas as indicated on *Figure 2*.
- 3.124 The development of unwanted species or spread of scrub will be monitored with appropriate control measures taken to ensure that such species do not become too dominant. Tree saplings and scrub can be controlled either during the winter by cutting and spot treatment with herbicide, or any time of year by the pulling out saplings.
- 3.125 Where arisings are to be removed they should be placed in a designated composting area or raked into piles away from public access paths to benefit local wildlife.

Table 7: Grassland creation (see Figure 2)

TYPE	GENERAL MANAGEMENT
Species Rich Neutral Grassland If required - Emorsgate EN1 special pollen and nectar meadow mixture The grassland will be managed to form two mosaics, the first to encourage the development of species rich grassland to provide a rich nectar source for invertebrates, whilst also being attractive for recreational use and the second will provide a tussock structure will be encouraged along hedgerows to provide commuting and cover opportunities for small mammals, reptiles and amphibians.	Wildflower Meadow 1. During autumn or spring, scarify the areas to be enhanced and then sow with a species-rich seed mix (similar to Emorsgate Seeds EN1) or spread species-rich hay from a local source. Protect newly seeded areas. 2. First year: cutting will be undertaken to remove annual weeds, this will be done late summer before annuals set seed and die, avoid leaving cuttings on site; Persistent unwanted perennial weeds may require frequent topping or occasional spot treatment with a suitable herbicide 3. Entire area should be mown twice a year, in the early spring and late summer to a minimum of 150mm and arisings left to dry for 1-5 days before removal to allow seeds to drop. Tussock Grassland 1. During autumn or spring, the area should either be scarified, or ploughed, and sown with a species-rich seed mix (similar to Emorsgate Seeds EN1). 2. In the first-year annual weeds to be removed via mowing and or topping (as above). Persistent unwanted perennial weeds may require frequent topping or occasional spot treatment with a suitable herbicide 3. Once established tussock areas to be cut every 2-3 years in Autumn to a minimum height of 150mm. This will be done on a rotational basis so that no more than half of the area is cut in any one year. 4. All arisings will be left in situ for 48 hours to allow for the dispersal of invertebrates and mammals into the surrounding habitats. Arisings will then be removed to prevent enrichment of the soil through decomposition.
Wet / Marshy Grassland Emorsgate EM8 meadow mixture for wetlands A grassland mix tolerant of wet / damp conditions around attenuation pond. Will add to the species diversity and habitat mosaic and provide foraging opportunities for a range of species	1. Scarified/ploughed and sown with a wet grassland seed mix (similar to Emorsgate Seed mix EM8), during autumn or spring after pond creation 2. In the first-year annual weeds to be removed via mowing and or topping (as above). Persistent unwanted perennial weeds may require frequent topping or occasional spot treatment with a suitable herbicide 3. Should be mown on a rotational basis every other year in either early spring OR late summer with no more than 50% of the area cut each year to a minimum height of 150mm. During very wet years a full cut may not be necessary depending on inundation levels. 4. Arisings should be left in situ for 1-5 days, and then removed from site. 5. Spot treatment of pernicious weeds should be undertaken using glyphosate based herbicide. Care should be taken not to remove broad-leaved species intentionally sown and generally, when using herbicide adjacent to aquatic habitats.

TYPE	GENERAL MANAGEMENT
Amenity Grassland Emorsgate EL1 Flowering Lawn mixture Disturbance tolerant grassland mix suited for public areas with added floral diversity to provide a nectar source for invertebrates.	1. Scarified / ploughed and sown with flowering lawn mixture seed mix (similar to Emorsgate Seeds EL1) during autumn or spring post construction. 2. Once established, a series of cuts will take place after germination (see Table 5), after which cutting can be as often as required as species mix is tolerant to frequent cutting. Leaving it longer will allow more flowering species to establish. Arising to be removed to prevent enrichment of the soil through decomposition.

Attenuation Pond

- 3.126 An attenuation pond is proposed within the south-western corner of the site, within the GI. This will be sensitivity designed to include features that maximise biodiversity value, which will include shallow draw down zones, scalloped edges and central deep water.
- 3.127 A dense reed bed system for pollutant filtration will be incorporated into the design, but a diverse range of native marginal and aquatic vegetation will be planted to provide diversity. Species to be planted include sedges, rushes, purple loosestrife *Lythrum salicaria* and branched bur reed *Sparganium erectum*. To make the pond more visually attractive flowering plants such as yellow flag iris *Iris pseudacorus*, yellow water-lily *Nuphar lutea*, water mint *Mentha aquatica* and marsh marigold *Caltha palustris* are also to be included.
- 3.128 The newly created attenuation pond will be linked to surrounding habitats by the succession of vegetation types, leading from aquatic to marginal onto marshy / wet grassland, with new shrub and hedgerow planting beyond which will provide refuge, hibernation and commuting opportunities for a range of species.

Management

- 3.129 Whilst a reed bed is vital for water filtration it is important that frequent management is undertaken to ensure the waterbody does not silt / vegetate up, as these species have a tendency to spread vigorously. Marginal and emergent aquatic vegetation should not be allowed to engulf open water and should be managed by physical removal. As a guideline at least 50% of the water should be managed as open and free from marginal vegetation.
- 3.130 It will take a number of years for marginal species to start to dominate, during which period management measures will need to be sensitively implemented. Once mature, to ensure sufficient vegetation is left as refugia / nesting habitat, no more than one third of the vegetation should be removed on a yearly rotational basis during the winter months outside the bird breeding season (March to September / October), ideally in December when reed stems have dried.
- 3.131 The species assemblage should be monitored and the management plan adjusted as necessary to control species which become over dominant or conversely reduce the cutting regime as required. Similarly, prompt action should be taken if any non-native invasive species are recorded in the water body such as floating pennywort *Hydrocotyle ranunculoides*, parrot's feather *Myriophyllum aquaticum* and water fern *Azolla filiculoides*.
- 3.132 All species removed from the water should be left on the banks for 48 hours to allow aquatic invertebrates to return to the water.
- 3.133 The edge habitats around the attenuation pond will be managed to ensure that scrub and less favourable species are controlled and that encroachment and loss of mosaics is avoided. Scrub will be managed through a bi-annual rotational cut, which will limit spread and promote new growth and increased fruiting bodies.

Enhancements Beneficial for Local FaunaBats

- 3.134 The GI will create a mosaic of habitats, including a variety of grasslands, native tree / shrub planting and an attenuation basin which will be designed to enhance the area for invertebrate's therefore providing increased foraging resources for bats. The inclusion of an attenuation pond, designed for biodiversity, and associated marginal vegetation would provide additional foraging habitats for bats.
- 3.135 Dark corridors will be maintained around the peripheries of the site and within the large area of GI to the north through a sensitive lighting scheme.
- 3.136 Roosting opportunities for bats will be enhanced through the installation of bat boxes on retained trees or incorporated on to selected new buildings. The provision of such features would be in accordance with National and Local Planning Policy helping to enhance biodiversity within the local area. Those to be installed will differ in design, providing suitable conditions for the different species / colony types, as specified below:
- 7 x Schwegler 2F - suitable for small bat species
 - 3 x Schwegler 2FN - suitable for larger bat species
 - 1 x Schwegler 1FD – suitable for maternity roosts for small bat species
 - 1 x Schwegler 1 FF – suitable for maternity roosts
- 3.137 Bat boxes will be installed on suitable mature trees, in groups of 3 facing different directions to provide a variety of microclimates. They are to be installed c. 4 – 6m height, on corridors of vegetation, ideally sheltered from strong winds but partially exposed to the sun (generally facing south or south-west)¹⁶.
- 3.138 The bat boxes will be installed in the first year of development. The presence and condition of the boxes will be checked from the ground bi-annually for ten years and suitably replaced as necessary. The bat boxes are also to be checked for the presence of bat occupation by a licenced bat worker every other year.
- 3.139 A newly created bat loft will be incorporated into the roof void of a garage, close to the existing maternity roost. The roost will be designed to support the brown long-eared maternity colony found within an on-site building to be removed under proposals. This has been sited next to the eastern boundary which will continue to provide a dark corridor. Additional trees will be planted adjacent to the garage to ensure safe access in and out of the roost. This roost will be monitored under the EPS License.

Birds

- 3.140 Features that will deliver compensation and enhancement for birds will include:
- New tree, scrub and hedgerow planting around the site and within areas of public open space (POS);

¹⁶ http://www.bats.org.uk/pages/bat_boxes.html#Putting up your box

- Provision of additional species-rich, tussock and amenity grassland planting, using specific seed mixes to provide enhanced foraging opportunities;
 - Attenuation basin and associated wetland planting; and
 - Bird boxes.
- 3.141 The inclusion of additional tree, hedgerow, scrub and grassland planting will add structural and species diversity. Mature trees will be retained providing a range of differing age structures. Scrub edges will be managed in all greenspaces to create habitat gradients to encourage “edge effects” and micro-habitats. This will favour, among other wildlife, invertebrates and therefore feeding opportunities for birds.
- 3.142 In retained or seeded “semi-improved” grassland, a mosaic of swards at differing heights will be managed to benefit invertebrates and provide foraging opportunities for birds. Where grassland suitable for small mammals and reptiles develops, this may also provide feeding opportunities for larger bird species such as owls and other raptors.
- 3.143 Aquatic and marginal planting around the margins of the attenuation pond will also increase the amount of available habitat to wetland species, such as reed bunting.
- 3.144 Hedgerows will be managed and enhanced to create thick structures, this will involve trimming on a three-year rotational basis once established, with any existing gaps planted up with native berry bearing tree and shrub species.
- 3.145 The addition of bird boxes will increase nesting opportunities for species that find it hard to establish nests as current house designs allow for no gaps or crevices. A number of boxes will be installed on buildings to increase nesting opportunities, the different designs will encourage a more diverse range of species; those to be provided include:
- 3 x 25mm hole – suitable for small passerine species such as blue tit
 - 3 x 32mm hole – suitable for larger passerine species such as great tit
 - 3 x 45mm hole – suitable for starlings
 - 4 x open fronted – suitable for robins, blackbirds, wrens etc.
 - 2 x house sparrow terraces (similar to Schwegler 1SP)
- 3.146 All boxes, with the exception of the house sparrow terraces, are to be installed on suitable mature trees / hedges. The two sparrow terraces will be installed, as indicated in *Figure 2*, on a building in the south east of the development which has strong connective links with the GI. All the boxes will be oriented between north and east and be at least 3m from ground level.

Dormice

- 3.147 Dormouse nests were identified in the scrub in the north-eastern extent of the site and a small section of this will be trimmed back but overall the scrub will be retained and enhanced through additional planting of native species, as mentioned above. Planting up and management of the hedgerows will help improve the linear structure and improve their function as commuting corridors.
- 3.148 The tree and shrub planting around the site will incorporate a variety of nut and fruit bearing tree and shrub species. The hedgerows and shrub areas will provide a dense structure to provide refuge, foraging and commuting habitat for dormice around the peripheries of the site.

- 3.149 A number of dormouse nesting boxes will be installed around the peripheries of the site, within the retained woodland and hedgerows, with a higher density of boxes situated within the north-east corner of the site, where evidence was found. These will be installed in proximity to floral species that can act as a foraging resource and approximately 1.5m above ground; where there are no suitable specimens capable to hold such boxes, suitable posts will be used, these will be installed as soon as possible, but not within sections where losses may occur. Boxes should be attached with the hole facing inwards to reduce occupation by birds. Wire loops can be used to attach boxes to the tree or support post.
- 3.150 The scheme has the potential to be entered into the National Dormouse Monitoring Programme, (NDMP). This involves a minimum of two box checks carried out during the year, one in either May or June (pre-breeding) and then one in either September or October (post-breeding). Checks will need to be done by a suitably qualified and licenced ecologist and the data submitted to the NDMP and local record centre; this will also form part of the licence requirements.
- 3.151 The condition of the boxes will be checked on monitoring visits, with damaged and missing boxes replaced as necessary.

Reptiles

- 3.152 Under the current proposals, the site will be greatly enhanced for reptiles through provision of additional suitable habitat within the GI. These new habitats will continue to provide links across the site and into the wider area and will increase opportunities for common and widespread reptile species in the local area.
- 3.153 The proposed development will include substantial areas of GI which will be delivered as green buffers around the peripheries of the site along with the creation of a large area providing a mosaic of habitats within the northern extent of the site. The majority of existing suitable habitat, including hedgerows, scrub and grassland, will be retained, buffered and enhanced, with specific measures for reptiles including:
- Creation of tussock (species-rich) grassland, shrub and scattered tree habitats providing a mosaic of habitats and micro-climates for basking and foraging;
 - Linear features such as hedgerow and tree/shrub planting around boundaries will provide cover for migration around the site into surrounding areas;
 - Creation of several log piles to provide increased refuge availability;
 - Creation of an attenuation basin, surrounded by GI, providing enhanced foraging opportunities through increasing the diversity and extent of invertebrate prey; and
 - Long term management to ensure the site continues to provide suitable habitat for reptiles.
- 3.154 Grass snakes use a wide area and variety of habitats including gardens. They primarily feed on amphibians and fish so are often associated with water. The retention and enhancement of the hedgerow buffers, as well as inclusion of gardens and attenuation facilities will increase the available habitats for this species.
- 3.155 A summary of the measures detailed within objectives 1 and 2 is provided in *Table 8* below with indications as to when they should be completed / implemented.

Table 8: Summary of habitat protection, creation, enhancement and management strategy

DESCRIPTION OF WORKS	PRE CONSTRUCTION	DURING CONSTRUCTION	POST CONSTRUCTION
GENERAL MEASURES			
1. Set up and maintain Heras fencing around retained hedgerows / trees	✓	✓	
2. Implement and maintain best practice construction procedures with regards to possible pollution sources / run-off and badgers	✓	✓	
3. Formulate and implement suitable construction and operational lighting scheme for nocturnal wildlife such as bats and dormice	✓	✓	✓
HEDGEROW CREATION AND MANAGEMENT			
1. Obtain permission from the Local Authority to remove 'Important' hedges	✓		
2. The new hedgerows should be planted between November and March pre-construction with suitable safeguards for early growth, support and weed control in place.	✓		
3. New hedgerows should be annually assessed for the first five years and any which die must be replaced.		✓	✓
4. Access routes to be created through the hedgerows to be completed under ecological supervision and following 'persuasion' / avoidance methods due to presence of dormouse, nesting birds and reptiles. Other vegetation on site may also require supervision during removal.	✓	✓	
5. Retained (and once established, new) hedgerows to be assessed individually according to the Hedgerow Management Scale. Hedgerows should be cycling between 3 and 8 but kept at 5 on the scale for as long as possible.	✓	✓	✓
6. Suitable native woody species should be used for gapping-up or replanting hedgerows to an average diversity of woody species of five species or more per 100m.	✓	✓	✓
7. Retained (and once established, new) hedgerows to be managed using standard hedgerow management practices such as trimming, coppicing, gapping-up, grubbing-out, re-planting and laying according to grade on the habitat scale including provision of 'hop overs for bats' on access routes post construction		✓	✓
8. Hedgerows to be rotationally managed in the winter (October to March) every 1 to 3 years avoiding cutting all hedgerows within the same year aiming for a '5' on the hedgerow scale and an 'A' profile to encourage growth of healthy hedgerow bases. Includes provision of 'hop overs for bats' on access routes post construction.		✓	✓
NATIVE TREE / SHRUB / ORCHARD PLANTING			

DESCRIPTION OF WORKS	PRE CONSTRUCTION	DURING CONSTRUCTION	POST CONSTRUCTION
1. The native tree / scrub / shrub / orchard standards within the GI should be planted between October and March during or post construction, with suitable support and weed control in place.	✓	✓	✓
2. New trees / scrub should be annually assessed for the first five years and any which die during this period replaced.		✓	✓
3. Trees to be assessed annually for weeds for the first three years to ensure the weed control is effective. Further weed control may be required through repairs, hand weeding or careful spot treatment with herbicide.		✓	✓
WATERBODY ENHANCEMENTS AND CREATION			
1. Creation of attenuation pond	✓	✓	
2. Monitor reed bed and implement rotational management through physical removal as necessary once established.			✓
3. Monitoring and removal of encroaching scrub around attenuation pond			✓
GRASSLAND			
1. Sow areas with appropriate seed mix (as indicated in <i>Figure 1</i>) during autumn or spring	✓	✓	
2. Establish suitable mowing regime, height and frequency of mowing will depend on type of grassland - full details in <i>Table 7</i> .		✓	✓
3. Monitor and remove saplings and scrub. Spot treatment of unwanted perennial weeds with glyphosate.		✓	✓
OTHER ENHANCEMENTS			
1. Installation of 15 bird boxes	✓	✓	
2. Installation of 12 bat boxes	✓	✓	
3. Installation of 12 dormouse boxes	✓		
4. Biannual monitoring presence and condition of bat boxes and compensatory roost by licenced bat worker.		✓	✓
5. Biannual monitoring presence and condition of dormouse boxes by licenced dormouse worker.		✓	✓
6. Boxes should be replaced if lost or in poor condition within the first 10 years.		✓	✓
REVIEW OF WORK PROGRAM			
1. Site walkover by management team to assess if the management objectives are being achieved for each habitat	✓	✓	✓
2. Create further five year work program			✓

Objective 3: Balancing Recreational use with Wildlife Interests

- 3.156 It is the intention for the GI to be accessible through informal routes of surfaced pathways through amenity grassland and neutral species rich grassland (see *Figure 1* for indicative routes). The use of designated pathways means recreational use can be directed away from more sensitive habitats such as those present around the paddock area where dormice have been recorded. These paths will however provide an interaction with wildlife through movement between different habitats (orchard, woodland, grassland).
- 3.157 The GI will provide opportunities for off lead exercise areas for dogs which will be enclosed in the long-term by hedgerows and trees. The circular routes and areas of open grassland will provide opportunities for family play and enjoyment of wildflower assemblages.
- 3.158 Potential nutrient enrichment from dog's waste within the site will be avoided via the strategic placement of dog waste bins along the routes. Litter bins will also be installed on the approach and exit from the GI, and also around the play areas; this will limit the potential for material to damage the more sensitive areas of site. Litter should be promptly removed from the site on a regular basis, as part of the general management and maintenance visits.
- 3.159 Interpretation boards will be installed within the GI by the sides of the footpaths, highlighting the importance of the retained habitats, and explaining how to protect it e.g. take away litter, not picking flowers, keeping dogs under control.

4.0 MONITORING

- 4.1 In order to ensure that the habitats created within the site reach and maintain their maximum biodiversity gains in the long term, all habitats should be monitored on a regular basis.
- 4.2 The results of monitoring should be used to inform possible revisions of the Ecological Management Plan, particularly after the initial construction phase and again after c. 5 years to allow habitats to establish. A further five-year work programme would then be implemented. The prescriptions provided here should not be set in stone and can be altered if required under agreement with a suitably qualified and experienced ecologist. Flexibility is essential and the management regime should be altered in order to respond promptly to changing circumstances.

Table 9: Five year management and monitoring program

Description of Works	Years with Priority				
	1	2	3	4	5
EXISTING HEDGEROWS / NEW HEDGEROW / ORCHARD & TREE PLANTING					
1. Gapping up of existing hedgerows and new tree planting. Plant native hedgerow species between October and March with rabbit protection. Trees to be planted either side of habitat gaps.	✓				
2. Management of hedgerows on a rotational basis (2-3 years) to provide a continuous supply of fruiting bodies during the winter months. First year new specimens to be cut to approx. 45-60cm.	✓		✓		✓
3. Remove all stems and limbs which are unsafe or are in danger of falling or breaking during gales. Prune back any diseased or rotten wood.	✓	✓	✓	✓	✓
4. Following planting, water trees in periods of extreme drought (2 or more weeks without substantial rainfall) and remove competing species such as grass/scrub.	✓				
5. Top up mulch levels around new specimens where necessary.	✓				
6. Examine specimens to ensure stake supports and ties are effective and required. If the specimens are yet to establish, replace or adjust ties, spacers and stem tubes as appropriate. If the specimens have established well, then remove all stakes, ties, spacers, tubes etc. and make good surfaces disturbed, filling any holes with suitable topsoil.	✓	✓	✓	✓	✓
7. Replace failed specimens on a like-for-like basis.	✓	✓	✓	✓	✓
8. Allow grassland along the hedgerow bases to grow to provide a graduated sward height and habitat.	✓	✓	✓	✓	✓
AMENITY GRASSLAND					
1. Plough or rotovate and rake (or harrow) the soil to produce a medium fine, firm tilth. Sow areas as per the manufacturer's instructions. Protect newly seeded areas.	✓				
2. Mow to a height of 50mm two weeks after germination, to 35mm four weeks after germination, and to 30mm six weeks after germination. Subsequently cut to a height of 25mm at 10-14 day intervals throughout the growing season or whenever the grass reaches a height of 60mm. Remove arising's.	✓				
3. Cut to a height of 25mm at 10-14 day intervals throughout the growing season or whenever the grass reaches a height of 60mm. During periods of prolonged wet weather or drought adjust cutting rate accordingly. Collect and remove all litter, stones or other debris prior to grass cutting operations. Remove arising's.		✓	✓	✓	✓
4. Following planting, water amenity grassland in periods of extreme drought (2 or more weeks without substantial rainfall).	✓				
5. Selective weed killer and moss retardant in May and September.	✓	✓	✓	✓	✓
6. Replace failing areas of grassland.		✓	✓	✓	✓

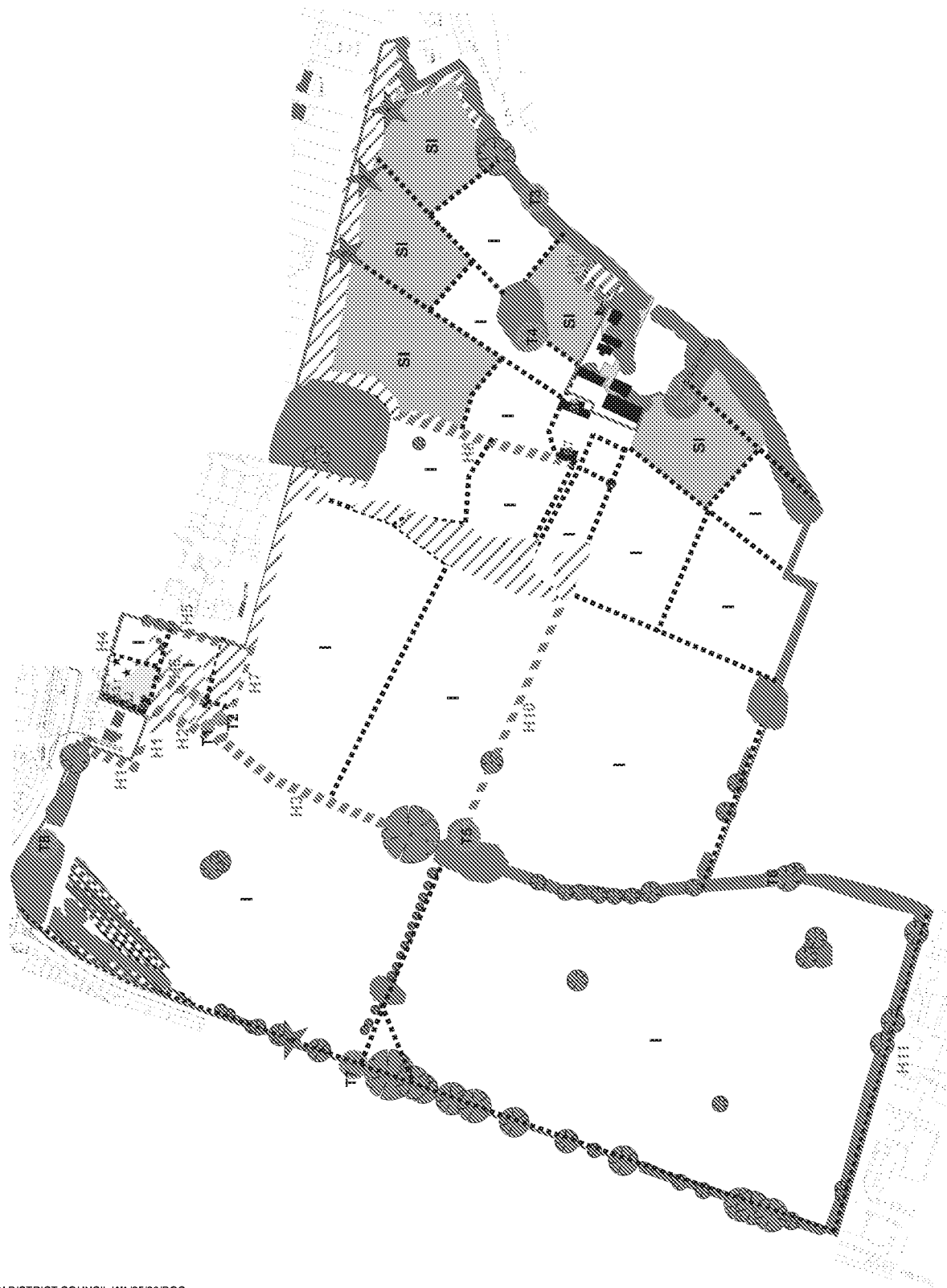
7. Remove all litter and debris at each visit, leaving the site clean and tidy.	✓	✓	✓	✓	✓
SPECIES RICH NEUTRAL GRASSLAND					
1. During autumn or spring, mow the areas to be enhanced as close as possible then scarify/harrow and either sow areas with a species-rich seed mix or spread species-rich hay from a local source. Protect newly seeded areas.	✓				
2. Mow from mid-July onwards after most plants have flowered and set-seed; this date may change depending on weather conditions. Mow again in late October and/or early spring.		✓	✓	✓	✓
4. All arising's will be left to dry for 1-5 days to allow seeds to drop (if cut late summer). Arisings should then be removed from site.		✓	✓	✓	✓
5. Monitor for coarse / rank communities, if these occur harrow or scarification in late autumn with additional seed mixes added		✓	✓	✓	✓
6. Monitor scrub, leave areas to develop but controlled via cutting or treatment of glyphosate.			✓	✓	✓
TUSSOCK GRASSLAND					
1. Mow the areas to be repaired as close as possible, then scarify/harrow and sow areas with species-rich seed mix in autumn or spring, or as per the manufacturer's instructions. Protect newly seeded areas.	✓				
2. First year annual weeds removed via mowing and/or topping. If weeds are more persistent then treat with herbicide via a spot treatment. Collect and remove all litter, stones or other debris prior to grass cutting operations. Do not mow the grassland at the bases of hedgerows / woodland / shrub planting.	✓				
3. Once developed, areas to be cut to approximately 150mm on a rotational basis on a 2-3 year regime, with no more than half the area cut in a year. Cutting to be undertaken in autumn.			✓	✓	✓
4. All arisings will be left in situ for 48 hours to allow for the dispersal of invertebrates. Arisings will then be removed to prevent enrichment of the soil through decomposition.			✓	✓	✓
5. Monitor scrub, leave areas to develop but controlled via cutting or treatment of glyphosate.		✓	✓	✓	✓
WET / MARSHY GRASSLAND					
1. Plough or rotovate and rake (or harrow) the soil to produce a medium fine tilth. Sow areas with native wet grassland seed mix during autumn / spring or as per the manufacturer's instructions. Protect newly seeded areas.	✓				
2. Mow on a rotational basis every other year in spring or late summer, with no more than a 50% cut per year to 150mm. Cutting frequency will be dependent on development of the habitat, to be assessed by an ecologist.		✓	✓	✓	✓
3. All arising's will be left to dry for 1-5 days to allow seeds to drop (if cut late summer) and invertebrates to move away. Arisings should then be removed from site.		✓	✓	✓	✓
4. Monitor scrub, leave areas to develop but control via cutting or treatment of glyphosate.			✓	✓	✓
SCRUB					
1. Planting of woody species between October and March, avoiding periods of inundation or prolonged ground frost.	✓				
2. Selective 'spot' spraying or strimming of weeds.		✓	✓	✓	✓
3. Like for like replacement of failed specimens.		✓	✓	✓	✓
4. Regular monitoring for pests and diseases will also be needed on an on-going basis and any necessary control measures undertaken as soon as possible.		✓	✓	✓	✓
5. Rotational coppice regime.		✓	✓	✓	✓
ATTENUATION POND					
1. Following creation of the basin and stabilisation of the substrates/ water levels planting of marginal species to be undertaken in the growing season. Protect newly planted/ seeded areas.	✓				
2. Marginal and emergent habitats will be monitored on an annual basis to ensure that these do not engulf the newly created attenuation basin.	✓	✓	✓	✓	✓

3. Removal of up to 1/3 of marginal/aquatic vegetation annually during autumn on a rotational basis to maintain 50% open water (If required).					✓
4. Replace failed specimens on a like-for-like basis.		✓	✓	✓	✓
5. Monitor presence and dominance of blanket weeds (<i>Cladophora</i> sp. <i>Rhizoclonium</i> sp., <i>Enteromorpha</i> sp. & <i>Spirogyra</i> sp.) and duckweed <i>Spirodela polyrhiza</i> & <i>Lemna</i> sp. Physical removal where required or advice on management.	✓	✓	✓	✓	✓
6. All arising's from emergent and marginal vegetation will be left next to the open water for at least 48 hours in order to allow invertebrates to return to the water. Depending on the volume of material removed, this can be left to decompose naturally, providing microhabitat for invertebrate species or removed to a designated composting area.					✓
7. Spot treatment of pernicious weeds with chemical appropriate for use near water.		✓	✓	✓	✓
LOG PILES					
1. Supplement the wood when maintenance is undertaken throughout the development.		✓	✓	✓	✓
LITTER CLEARANCE					
1. Litter picks and general litter clearance should be carried out on a regular basis. Litter picks should be undertaken prior to grass cutting operations.	✓	✓	✓	✓	✓
BAT, DORMICE AND BIRD BOXES & COMPENSATORY BAT ROOST					
1. Monitor the use and condition of mitigation boxes and compensatory bat roost in the garage of Plot 407. Where boxes need to be replaced this will be done, and all debris removed, if target species are not present. If work needs to be done to the bat roost, this will be discussed with a licenced bat worker and undertaken under supervision.			✓		✓

This drawing is the property of FPCR Environment and Design Ltd and is issued on the condition it is not reproduced, retained or disclosed to any unauthorised person either wholly or in part without written consent of FPCR Environment and Design Ltd. Ordnance Survey material is used with the permission of The Controller of HMSO. Crown copyright 100018896.

KEY

	Site boundary
	Broad-leaved woodland / tree group
	Dense laurel shrub
	Tree
	Tree with low-moderate bat roost potential (Category 2b)
	Tree with low bat roost potential (Category 2c)
	Semi-improved grassland
	Tall ruderal
	Fence
	Native Species Hedgerow
	Building
	Hardstanding
	Ephemeral /
	Scrub
	Dormouse Nest Location



Dandara Ltd.

Land East of Fontwell Avenue

PHASE 1 HABITAT PLAN

NTS @ A3

HES

February 2020

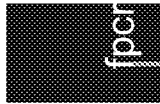
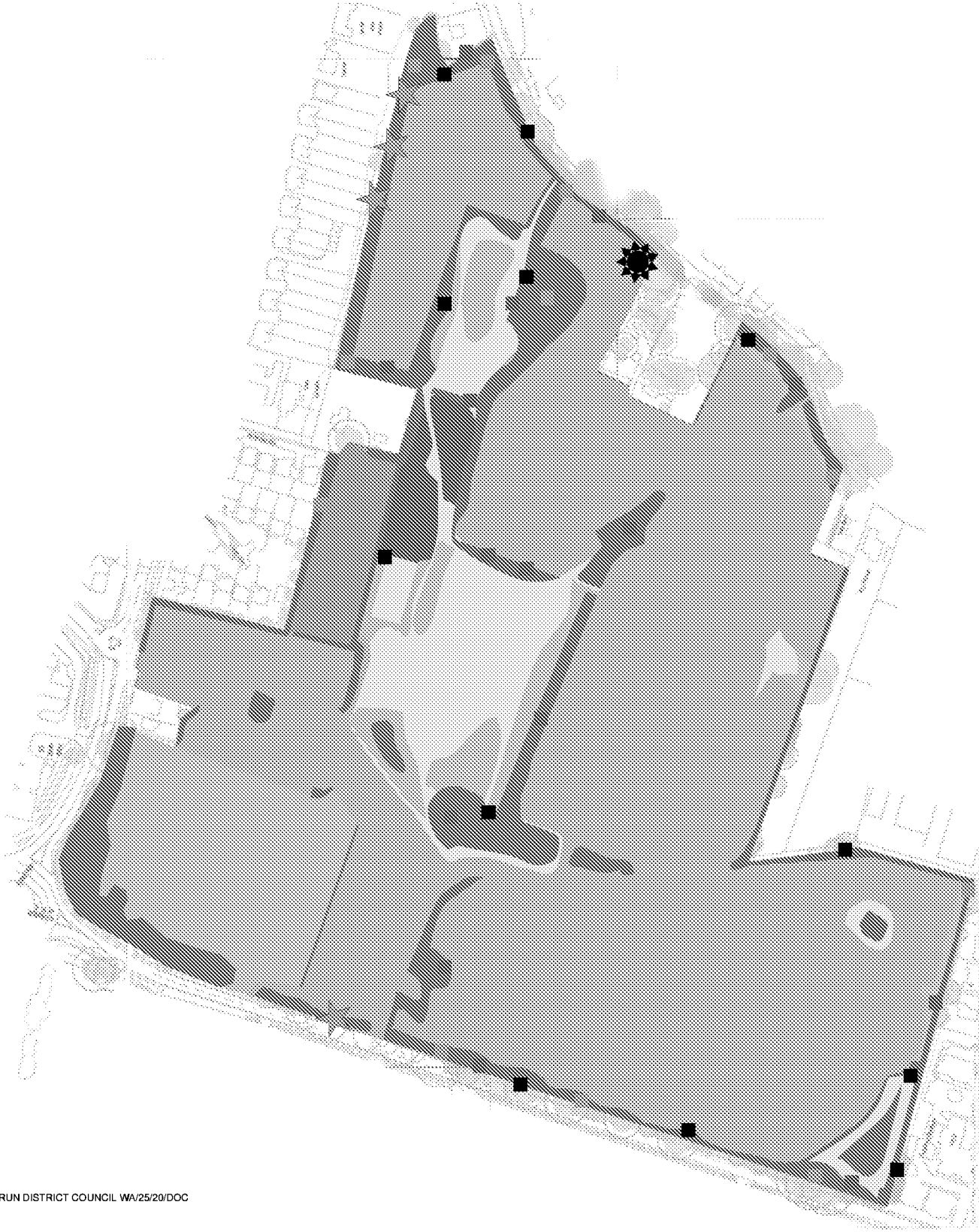


Figure 1

This drawing is the property of FPCR Environment and Design Ltd and is issued on the condition it is not reproduced, retained or disclosed to any unauthorised person either wholly or in part without written consent of FPCR Environment and Design Ltd. Ordnance Survey material is used with the permission of The Controller of HMSO. Crown copyright 100018896

KEY

	Built development: buildings, gardens and roads - with areas of ornamental shrub and hedgerow planting
	Employment area: buildings and roads - with areas of ornamental shrub and hedgerow planting
	Native hedgerow: scrub, shrubs, trees and woodland: native holly, hawthorn, holly, ivy, etc.
	Wildflower meadow with scattered native trees native herb planting in some areas
	Amenity grassland: tracks, play areas and recreation facilities
	Native woodland: hedgerow
	Paddocks: retained grassland
	Traditional orchard with a variety of woodland
	Allotments
	Confirmed dormouse nest
	Location of existing and proposed new bat roost
	Indicative dormouse box location
	Indicative bird box location
	Indicative bat box location

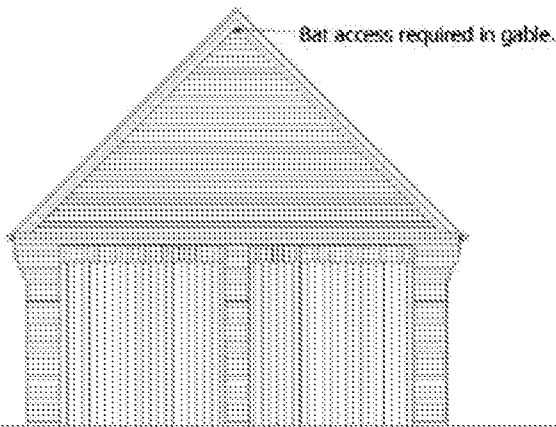


Dandara Ltd
Land East of Fontwell Avenue
Ecological Mitigation Plan

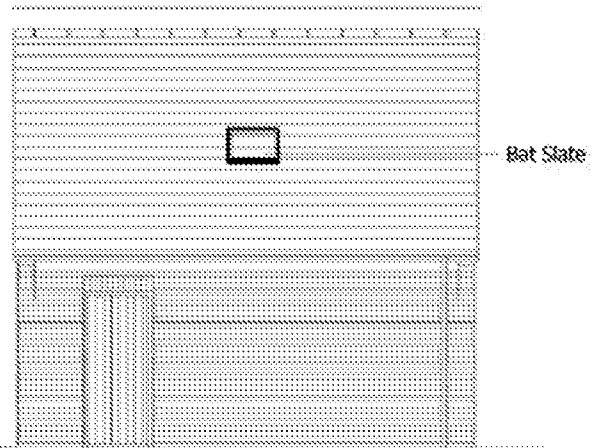
NTS @ A3 HES January 2020

Figure 2

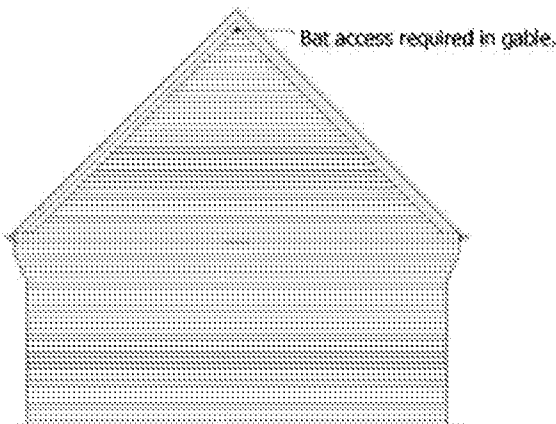
Please note: This diagram is a general bat roost and as such indicative only. Therefore some specifics may differ to the final design, but access points and dimensions of the roof void will remain the same



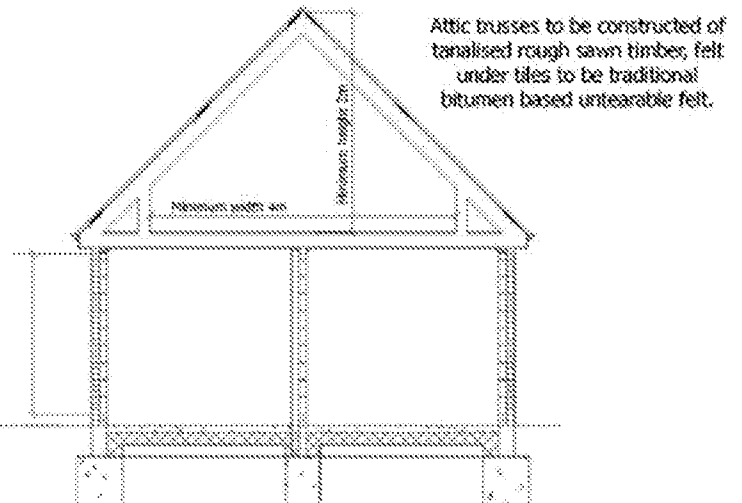
FRONT ELEVATION



SIDE ELEVATION



REAR ELEVATION



INTERNAL CROSS SECTION

This drawing is the property of FPCR Environment and Design Ltd and is issued on the condition it is not reproduced, retained or disclosed to any unauthorised person, either wholly or in part without written consent of FPCR Environment and Design Ltd.

Ordnance Survey material is used with the permission of The Controller of HMSO, Crown copyright 100018896.

J:\6233\ECO\Ecological Mitigation and Enhancement Strategy\Figure 3 - Artificial Bat Roost Construction.cdr

FPCR Environment and Design Ltd, Lockington Hall, Lockington, Derby, DE74 2RH x t: 01509 672772 x f: 01509 674565 x e: mail@fpcr.co.uk x w: www.fpcr.co.uk x
master planning > environmental assessment > landscape design > urban design > ecology > architecture > arboriculture



Dandara

Land East of Fontwell Avenue
Fontwell

ARTIFICIAL BAT ROOST
CONSTRUCTION

NTS @ A4

HES

10.10.2019

Figure 3

Mound capped with layer (50-100mm thick) of topsoil, turf or moss

The addition of a geotextile membrane beneath the capping layer may be used to prevent soil, or other loose material from collapsing into the voids.

Mound construction from piled up rocks, logs, dead wood and other suitable rubble. Soil can be loosely filled between layers during construction.

Minimum
1000mm

500 -
1000 mm

Gaps left in capping material at ground level to allow reptiles access.

This drawing is the property of FPCR Environment and Design Ltd and is issued on the condition it is not reproduced, retained or disclosed to any unauthorised person, either wholly or in part without written consent of FPCR Environment and Design Ltd.

Ordnance Survey material is used with the permission of The Controller of HMSO, Crown copyright 100018896.

J:\6233\ECO\Ecological Mitigation and Enhancement Strategy\Figure 4 - Indicative Hibernacula Design.cdr

FPCR Environment and Design Ltd, Lockington Hall, Lockington, Derby, DE74 2RH x t: 01509 672772 x f: 01509 674565 x e: mail@fpcr.co.uk x w: www.fpcr.co.uk x
master planning > environmental assessment > landscape design > urban design > ecology > architecture > arboriculture



Dandara

Land East of Fontwell Avenue
Fontwell

INDICATIVE HIBERNACULA
DESIGN

NTS @ A4

HES

10.10.2019

Figure 4