

Hertfordshire Constabulary Headquarters Redevelopment

Landscape and Ecology Management Plan

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Quality information

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Introduction

Background

This Landscape and Ecology Management Plan (LEMP) has been prepared by AECOM on behalf of Hertfordshire Constabulary (the Client) in response to Condition 11 of the planning permission granted by Welwyn and Hatfield District Council for the proposed redevelopment of the Hertfordshire Constabulary, Stanborough Rd, Welwyn Garden City, AL8 6XF, hereafter referred to as the Site. The project will provide a new Police Headquarters building comprising office accommodation, restaurant facilities and community engagement areas appropriate for a new headquarters building. The redevelopment is an opportunity for the Police to review and rationalise the current building stock on the existing headquarters site and reflect on new working patterns and practices.

The aim of the LEMP is to capture the landscape planting and habitat creation for biodiversity and the artificial boxes for bats, birds and insects to ensure that the proposed redevelopment achieves a biodiversity net gain of at least 10%.

The LEMP details the scope and timings of the works to be undertaken on the Site for five years, after which a new plan may be required to steer future management.

Our understanding of existing habitats and species on the Site is based on the previous ecological appraisal¹.

Site Location and Setting

The Site (grid reference: TL 232 113) is located on the southern edge of Welwyn Garden City. The Site comprises buildings, car parking, amenity grassland and associated landscaping (Table 1).

Table 1. Summary of Phase 1 habitat types and areas on site recorded in 2020

Habitat type	Description	Total approx. area or length within the Survey Area (ha or m)	% of the Site
Buildings and hardstanding	Six buildings in the Survey Area. Additionally, there were car park areas, roadways and paths/paved areas.	2.04 ha	82%
Amenity grassland	Small areas of amenity grassland including lawns.	0.35 ha	14%
Species poor hedge	Lengths of ornamental close-cropped beech hedge	20 m	-
Ornamental shrubs	A range of species has been planted and maintained in borders by buildings and paths	0.03 ha	2%
Commemorative Garden	A fenced area of formal garden with a range of herbs and shrubs	0.03 ha	2%
Trees	A number of scattered trees and a row of young ash (<i>Fraxinus excelsior</i>), a false cypress (a species of <i>Chamaecyparis</i>), silver birch (<i>Betula pendula</i>), cherry trees and a hybrid poplar (<i>Populus x canadensis</i>)	20 m	-

Proposed Development

The redevelopment of the Site will include the demolition of existing buildings, construction of two new separate buildings and the relocation of the dog handling unit and the memorial garden. The balancing pond (sustainable urban drainage system (SuDS)) is also to be increased in capacity.

In pursuance of the objective within the National Planning Policy Framework (NPPF) and the Environment Act 2021 of providing net gains in biodiversity, consideration has been given to the scope for ecological enhancement

¹ AECOM (2020) Preliminary Ecological Appraisal of Hertfordshire Constabulary Headquarters, Hatfield.

as part of the Proposed Development. This should represent biodiversity gain over and above that achieved through any mitigation and compensation. Appropriate methods of ecological enhancement are listed below.

New green infrastructure within the Site will have multiple and diverse benefits²:

- Surface water management through soil surfaces, which provide very good source-control, covering otherwise impermeable surfaces and absorbing and slowing down stormwater. They can reduce the volume and smooth out peak flows, whilst simultaneously removing some pollutants (supporting flood and water quality regulation).
- Urban cooling, using green infrastructure, which can reduce the temperature of a building's exterior, as well as the rooms within, by shade, insulation, albedo (reflectivity) and evapo-transpirative cooling (the cooling, which occurs when water is evaporated from leaves). These effects can, in turn, reduce energy consumption for cooling and heating.
- Biodiversity, providing habitats that can be colonised by a range of plants and animals (overall invertebrates, birds and bats). Green infrastructure will serve as a stepping-stone, enabling wildlife to move between core areas.
- Air quality, reducing air pollutants by filtering and capturing particulates and absorbing and breaking down gases.
- Health and wellbeing, by being overlooked or by improving the quality of the air and providing tranquillity through noise reduction.
- Noise reduction, by absorbing sound through soils and substrates.
- Climate change mitigation, through storing modest quantities of carbon.
- Cultural service, adding value to the Site with an increase of aesthetic, spiritual values, health and wellbeing benefits.

Biodiversity enhancement will be achieved using two distinct means:

- landscape planting and habitat creation for biodiversity; and
- erection of artificial boxes for birds, bats and insects.

Landscape planting and habitat creation for biodiversity

Providing native species or species of benefit to biodiversity (e.g. suitable for pollinating insects, nesting birds or providing berries as a food source) throughout any new or modified soft landscaping would greatly increase the value of the Site for biodiversity, in particular insects and other invertebrates. These include suitable native species appropriate for a peri-urban setting and also a range of non-native species of benefit for biodiversity as listed within RHS 'Plants for Pollinators'³, Natural England advice notes for wildlife friendly gardening⁴ or other comparable guides to gardening for biodiversity. Distinct landscape areas with biodiversity value are:

Orchard

An orchard will be planted in the northern part of the site which will have significant wildlife benefits:

- understorey of partially shaded grassland with flowering wild plants included in the seed mix;
- the blossom of the fruit trees providing a nectar source in spring (scope to house an apiary in the orchard);
- other insects associated with the fruit trees;
- habitat for bats to feed in and around; and
- trees providing locations to erect nest boxes, using existing trees, e.g. the larger oak trees in the short term with scope to use newly planted trees in the longer term.

² Mayor of London, 2019. Living Roofs and Walls, from policy to practice. 10 years of urban greening in London and beyond.

³ <https://www.rhs.org.uk/science/conservation-biodiversity/wildlife/plants-for-pollinators>

⁴ Berry, S (2007). Plants for Wildlife Friendly Gardens Natural England

Grasslands

A range of grasslands with flowering wild-flower plants at different heights under different mowing regimes:

- providing a nectar source which can be designed to provide nectar and pollen across the seasons;
- target planting to provide food plants for the caterpillars of some butterfly species; and
- developing soil habitat to support a rich invertebrate fauna.

Rain gardens:

- planting providing habitat for specialist insects and other invertebrates; and
- a source of water for birds and other animals.

Tree planting:

- habitat for a range of insects and other invertebrates;
- nesting for birds and scope to erect bird boxes using existing trees, e.g. the larger oak trees in the short terms with scope to use newly planted trees in the longer term; and
- habitat for bats to feed in and around.

Shrubs and hedgerows:

- habitat for a range of insects and other invertebrates;
- nesting for birds;
- habitat for bats to feed in and around;
- creation of continuity of habitat within the Site, a corridor effect.

The soft landscaping, habitat creation and biodiversity enhancements of the proposed redevelopment are summarised in Table 2.

Table 2. Biodiversity enhancement overview

Enhancement	Brief Description	Area / Number
Landscape planting and habitat creation for biodiversity		
Orchard	Orchards to include a variety of fruit trees, including plum, cherry, apple and pear, with contemporary and also traditional varieties used. Wildflower grass areas with spring bulbs and mown grass paths beneath orchard trees.	Areas can be measured off the landscape drawing
A range of grassland	Wildflower grassland Areas to be sown with locally appropriate wildflower grassland seed mix, to include cornflower, cowslip, field scabious, hemp agrimony, knapweed, ox-eye daisy, red campion, St John's wort, wild marjoram and some common poppy for short term effect. Short/ reinforced grass areas	
Rain gardens	Conditions likely to vary from waterlogged during periods of heavy rain to dry at other times, due to free draining nature of soil and substrate. Species therefore to include shrubs and grasses tolerant of intermittent damp conditions, such as dogwood, iris, <i>Ligularia</i> (leopard plant), <i>Miscanthus</i> (silvergrass), <i>Alchemilla</i> (lady's mantel) and <i>Acanthus</i> (bear's breeches), and also those which will tolerate some drought and which will spread by self-seeding, including <i>Verbena bonariensis</i> (purpletop vervain), <i>Euphorbia oblongata</i> (Balkna spurge), <i>Ceanothus</i> , <i>Perovskia</i> 'Blue Spire', lavender, <i>Pennisetum</i> (fountain-grass), <i>Echinacea</i> (coneflower) and <i>Rudbeckia</i> (black-eyed Susan).	

tree sparrow and dunnock, all listed on the list of Birds of Conservation Concern⁵ and have suitable connecting habitat nearby. It is therefore recommended that at least 12 bird boxes are installed across the Proposed Development and within the wider HCHQ site (Zone of Influence”).

- Six boxes can be mounted onto existing smaller trees along the site avenues and boundaries and, in the longer term, on proposed trees such as within the orchard landscaping. Incorporation of these boxes would have a positive impact on the biodiversity of the area by allowing greater abundances of both of these threatened species to breed and nest around the proposed redevelopment. It would also ensure pursuance of the NPPF objective of providing net gains in biodiversity where possible.

Boxes targeting tree sparrow to be erected on existing mature trees. Smaller boxes with 28mm diameter entrance hole for smaller birds would also be suitable for tree sparrow and dunnock, placed on proposed trees and smaller existing trees. The proposed hedging will also provide cover and nesting opportunities for dunnock, linked to the wider semi-rural landscape.

- Six bird boxes for targeting house sparrows include the Schwegler Sparrow Terrace 1SP or other terrace type bricks or boxes incorporating multi-cavities for this colonial nesting species. Bird boxes should be suitable for mounting on, or within the walls of all types of urban buildings. They should be installed 2m or more above ground level and face between north and east to avoid strong sunlight and winds, a clear flight path to the entrance of the box should also be maintained.

Insect boxes

The new and modified soft landscaping will improve the opportunities for insects and invertebrates including those recorded in Hertfordshire such as the red admiral, peacock and comma butterflies, supporting the Hertfordshire Pollinator Plan⁶.

Additional opportunities can be created for invertebrates such as bumblebees, sawflies, lacewings and beetles through the erection of refugia on trees, shrubs or buildings. These artificial refugia can be obtained pre-made with wooden tubes (see Table for examples).

It is recommended that eight artificial insect refugia are erected on trees and buildings (Table 1).

Management Structure

The Hertfordshire Constabulary will have responsibility for the Site and will ensure that the actions set out in this LEMP are implemented including provision of resources and mechanisms to ensure the sustainable long-term delivery of the proposed management.

The management of the habitats and features will generally be carried out through the Hertfordshire Constabulary who will monitor and maintain the habitats and features described in this report and will record actions undertaken.

The LEMP should be updated as necessary in accordance with the action undertaken.

Quality Assurance

All AECOM ecologists involved in the preparation of this LEMP follow the Chartered Institute of Ecology and Environmental Management (CIEEM) code of professional conduct when undertaking ecological work and many are Full or Fellow Members. They are appropriately qualified and conduct their work using all reasonable skill and care. Many senior AECOM ecologists are also Chartered Environmentalists or Ecologists.

Health and Safety

Please note that any consideration of any health and safety implications of the design and implementation of our ecological recommendations must be risk assessed by the client to their own satisfaction. Our recommendations are designed to relate solely to biodiversity and nature conservation.

⁵ Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. and Win, I. (2021) The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds*, 114: 723-747
⁶ <https://www.hertfordshire.gov.uk/media-library/documents/about-the-council/data-and-information/pollinator-strategy.pdf>

A risk assessment must be carried out for all activities undertaken and health and safety considerations must be taken into consideration.

Any advice provided relates to ecology only. Consideration of any health and safety and/or Construction, Design and Management (CDM) implications of the design and implementation of our ecological recommendations must be risk assessed by the Hertfordshire Constabulary to its own satisfaction. Ecological recommendations are designed to relate solely to biodiversity and nature conservation. A risk assessment must be carried out for all activities undertaken and health or safety considerations must take precedence.

Factors Influencing Management

Natural trends

If soft landscaping and semi-natural habitats are left unmanaged or subject to low management inputs, a process of colonisation and succession is likely to occur. This can include establishment of herbaceous, ruderal and scrub species and can change the character of the landscaped area. As the Site's vegetation matures with time, trees and shrubs will become larger and denser. Therefore, management prescriptions will need to take these processes into account. The management outlined below is intended to provide suggestions which are compatible with local environmental conditions (e.g. soil type, local native habitats and species).

Human-induced trends

This LEMP considers positive management for biodiversity whilst maintaining the primary core land use purposes of the Site. However, certain limiting factors may only become apparent through use of the new developed Site. For example, excessive trampling of areas may require appropriate changes in management. Whilst this report is intended to be prescriptive, a pragmatic approach should be taken involving ongoing monitoring so that appropriate management techniques are applied.

External factors

Climate change is a global issue and relevant actions to limit contributing to this issue are largely beyond the scope of this LEMP. However, care should be taken to minimise the use of machinery on Site which emit greenhouse gasses. Wherever possible, consideration of species planted should be given to likely impact on local climatic variables e.g. if prone to flooding or drought. Changes in management may be required in the long-term to reflect the impact of local climatic fluctuations e.g. timing of arboricultural work to avoid breeding birds.

Funding

The owner and developer will ensure that funding is provided for:

- the appropriate installation or creation of targeted features (expected as part of the construction budget);
- maintenance of the features to ensure stable long-term delivery of the proposed management, expected as part of the long-term landscape maintenance budget; and
- monitoring to provide feedback into the maintenance programme.

Potential Threats to Biodiversity

Hertfordshire Constabulary should be aware of the potential threats to biodiversity during the maintenance of the landscaping and act accordingly to ensure a long-term success of the habitats for the biodiversity of the Site. Potential threats to the biodiversity of the Proposed Development and the wider Site biodiversity include:

- disturbance: activity levels, or site management such as lighting regime or inappropriate vegetation clearance, which could potentially cause disruption to species and make the new habitats unsuitable for them;
- neglect: lack of management detrimentally affecting habitats by allowing succession or nutrient enrichment;
- demands for space: future expansion resulting in development on the retained or newly created habitats;

- funds: lack of resources to implement management and monitoring; and
- lack of information: site users may be unaware of the importance of certain habitats and the rationale behind management decisions and, unknowingly, damage important features whereas management contractors and their staff will be fully aware of the importance of habitats and ecological features on the Site.

Responsible Body or Organisation

Table identifies the body or organisation responsible for creation and/or installation of each of the targeted features. The appointed landscape contractor will ensure that an ecologist is consulted with regard the method statement or specifications of the target feature. For each organisation, an individual will be identified and appointed to take on the responsibilities as detailed below.

Table 3. Responsibilities for Management

Organisation	Responsibilities
Owner / Design team / Principal Contractor / Estate Management	Ensuring that all habitat and ecology features are incorporated into the design following the recommendations of this management plan and works are carried out in a timely fashion by the appropriate person according to approved Method Statements and Specifications.
Appointed Contractor for each of the targeted features	Installation and creation of targeted features as described in Table 1. Production of Contractor's Method Statement and Specification for the target features of the management plan. Ensuring this is approved and agreed by relevant parties including the project manager and ecologist. Carrying out these works to a high standard according to an agreed methodology.
Appointed Ecological Consultant	Review of Contractor's Method Statements and Specifications. Provide ecological advice/input.
Owner / Estate Management or Landscape Maintenance Company	Monitoring and maintenance of the target features described in Section Error! Reference source not found. Update of the Management Plan every five years and when necessary due to changes in the target features or incorporation of new features. Keep a record of any notable wildlife and submit to the Hertfordshire Environmental Records Centre or submit via a recording platform e.g. iNaturalist (https://www.inaturalist.org) or iRecord (https://www.brc.ac.uk/irecord/)

Management Instructions

Installation of bird boxes

At least 24 bird boxes for bird species are to be affixed to the trees and proposed structures within the Development Site and the wider Site.

It is recommended that bird boxes targeting urban dwelling species be installed upon the exterior of the new buildings of the Proposed Development; see the table below for numbers required.

It is recommended that house sparrow (*Passer domesticus*) multicavity terraces are installed on buildings or other suitably sized infrastructure and thus management can be continued by a building management company. House sparrow terraces should be installed in clusters, due to the species preference of communal nesting. These boxes are also suitable for other nesting birds associated with urban environments such as great tit (*Parus major*), blue tit (*Cyanistes caeruleus*) and dunnock (*Prunella modularis*). Boxes for dunnock and tree sparrow (*Passer montanus*) should be mounted on trees.



It is recommended that woodcrete material boxes are installed in preference to wooden boxes, as these boxes will have a longer lifespan and require less maintenance. A range of commercially available bird bricks are available for integration into brick or block work for integration into existing render. Example illustrations are included below.

For details of habitat creation and management, see Landscape Management Plan.

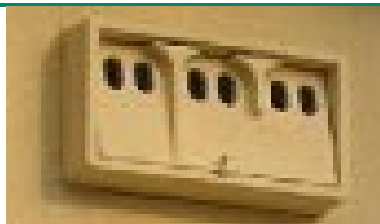
Objective and Management

Management objectives, design specification, suppliers and sources of further information are summarised in Table 4.

Table 4. Bird Box / Brick Objectives and Management

Objective	Installation and Maintenance of Bird Boxes
Establishment instructions	<p>12 Bird boxes will be installed within the Proposed Development:</p> <ul style="list-style-type: none"> - 6 general bird boxes i.e. Schwegler 28mm/32mm hole or oval hole on trees. - 6 house sparrow multicavity terraces on buildings. <ul style="list-style-type: none"> ▪ The box entrance will be in a shade location and sheltered from the prevailing wind and rain and will not be accessible to predators, such as cats and grey squirrels. ▪ The front of boxes will be angled vertically or slightly downwards so that the rain cannot enter through the hole. ▪ North and east facing elevations are preferred for bird boxes. ▪ The box will not be situated in a location which is externally lit at night. ▪ Galvanised or stainless steel screws or nails will be used to erect the boxes on trees if external boxes are used, as these will not rust. ▪ House sparrow boxes will be located more than 2 to 4m high and away from windows. Preferably under the roof/ eaves, in the top course of blockwork. ▪ Trees, ladders or aerials will not obstruct the entrance of the boxes. ▪ Installation of boxes in groups as house sparrow live in colonies, with entrances 60 to 100 cm apart. ▪ Installed on or in close proximity to green infrastructure.
Management Prescriptions	<ul style="list-style-type: none"> ▪ Cleaning of unoccupied bird boxes. It would consist of the removal of nesting material, unhatched eggs or other debris inside the box and use of boiling water to reduce spread of infections. ▪ Replace any damaged boxes by similar box or box for the same target group. ▪ Replace any damaged or degraded fixings. ▪ Fixings will be checked annually or biannually. ▪ The success of the use of the bird boxes by nesting birds will be monitored. Boxes could be monitored by a local bird group and/or by students as part of an outdoor-based learning session. Surveyors would seek to observe birds leaving or returning to the boxes during breeding bird season (March – September inclusive) very early in the morning. Observations will be made using binoculars from a suitably concealed position where presence will not lead to change in birds' behaviour. It may be possible to install nest box cameras to monitor the success of breeding. The results of the surveys will be held on file and submitted to the Local Environmental Records Centre or can be submitted online via a recording platform e.g. iNaturalist (https://www.inaturalist.org) or iRecord (https://www.brc.ac.uk/irecord/). ▪ Any management action undertaken will be recorded on a logbook.
Timing	<ul style="list-style-type: none"> ▪ Bird box can be installed at any time after the construction works, preferably in Autumn, after the breeding season and before the start of the breeding season (generally February). ▪ Cleaning will be done annually after the breeding season in Autumn (October/November) ▪ Replacement of damaged elements will be done as soon as damaged is detected and when boxes are unoccupied.
Legal considerations	<p>Birds and their nests are protected by the Wildlife and Countryside Act 1981 (as amended). Bird boxes used by birds cannot be cleaned, removed or replaced until it is not used by nesting birds and their chicks are fledged.</p>
Example Illustrations	<p>Schwegler 28mm/32mm hole or oval hole</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Schwegler 1SP Sparrow Terrace</p> </div> <div style="text-align: center;">  <p>Habibat Terraced Sparrow Box</p> </div> </div>

Objective **Installation and Maintenance of Bird Boxes**



Further Information	Further bird box installation information is available for a range of sources, including: RSPB http://www.rspb.org.uk/makeahomeforwildlife/advice/helpingbirds/nestboxes/ Gunnell, K., Murphy, B. and Williams, C. (2013) Biodiversity for Low and Zero Carbon Buildings: A Technical Guide for New Build. RIBA Publishing, London.
Example Suppliers	Bird boxes are available commercially from a wide range of suppliers including; NHBS http://www.nhbs.com/ Wildcare http://www.wildcare.co.uk/ The Nestbox Company http://www.nestbox.co.uk/ CJ Wildlife http://www.birdfood.co.uk/

Installation of Bat Boxes

The installation of bat boxes (or integrated brick) would be beneficial for enhancement the Site and provide roosting opportunities within the Proposed Development. This is in line with the regional and local BAPs (Hertfordshire and Welwyn Hatfield), where bats are a targeted species.

A range of commercially available bat bricks are also available for integration into brick, block work or existing render. It is recommended that woodcrete material boxes are installed in preference to wooden boxes, as these boxes are aesthetically superior, will have a longer lifespan and require less maintenance.

It is recommended the installation of a Schwegler 2FR Bat tube (or equivalent) facing south-east to south-west. This box is suitable for bat species which inhabit buildings and is designed to be built into the masonry of an external wall. It can either be built flush with the wall or beneath a rendered surface. Alternatively, other boxes for pipistrelle bats and other small bat species can be installed on buildings or trees such as Schwegler 1FF Bat Box, 2F Bat Box or N27 Bat Box.

Objective and Management

Objectives, establishment instructions, management prescriptions, timing, suppliers and sources of further information are summarised below in Table 5.

Table 5. Bat Box Objectives and Management

Objective	Installation and Maintenance of a Bat Box
Establishment instructions	<p>Eight bat boxes will be installed on the buildings and trees in close proximity to the green infrastructure on Site.</p> <ul style="list-style-type: none"> ▪ The bat boxes will be located: <ul style="list-style-type: none"> - Avoiding prevailing wind/rain - facing in different directions: south, south east or south west (for daytime warming) - Potentially installed on or in close proximity to green infrastructure ▪ The bat box will be placed as high as possible (at least three meters above ground level to deter predation and disturbance) but allow access for maintenance. ▪ Where possible, do not use lighting in areas intended for bats. Where lighting is necessary, it will be directional, using down-lighting to avoid excessive light-spill onto bat boxes and green infrastructure. ▪ If fixings are used, correct fixings will be used. The box will be fixed correctly by an aluminium (tree-friendly, if on trees) long nail (85 mm) at an angle of about 45°. The nail is tapped in half-way (not fully hammered home) and the box is hung from the nail by the wire hanger, with the box resting against the tree/wall.
Management Prescriptions	<ul style="list-style-type: none"> ▪ Replace any damaged boxes.

Objective

Installation and Maintenance of a Bat Box

- Replace any damaged or degraded fixings.
- Fixings will be checked annually or biannually.
- If bat box is fixed on a tree, box will be re-hung every few years as the tree grows. This task might require to be undertaken by a bat license ecologist.
- The success of the use of the bat boxes by bats could be monitored. This could include students as part of an outdoor-based learning session supervised by an ecologist or a bat local group. Surveyors would seek to observe bats leaving or returning to the box during the period. Monitoring that requires the disturbance of a bat box (i.e. inspection) will be undertaken by a bat license registered ecologist. The results of the surveys will be held on file and submitted to the Local Environmental Records Centre (or can be submitted online via a recording platform e.g. iNaturalist <https://www.inaturalist.org>) or iRecord (<https://www.brc.ac.uk/irecord/>).

Any management action undertaken will be recorded on a logbook.

Timing

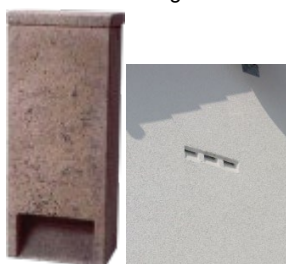
- Bat box can be installed at any time after the construction works.
- Monitoring of the use of the bat box by bats is recommended every five years. Bat emergence / re-entry surveys can only be conducted between May and August.
- Replacement of damaged elements will be done as soon as damaged is detected and box is unoccupied.

Legal considerations

Roosting bats are protected from disturbance under UK legislation. Only bat licensed ecologist will inspect bat boxes. If any boxes need to be removed and, or repaired this must be done immediately after the box is checked by a licensed bat ecologist as there is a possibility of bats being present. Bat emergence/re-entry surveys do not necessitate to be undertaken by bat licensed ecologists.

Example Illustrations

Schwegler 2FR Bat tube



Schwegler 1FF Bat Box



2F Standard Bat Box



Schwegler 27 Brick Box for Bats



Further Information

Further bat box information is available from a range of sources, including:
Bat Conservation Trust (undated). [Bat Box Information Pack](#).
http://www.bats.org.uk/pages/bat_boxes.html
Mitchell-Jones, A.J, and McLeish, A.P. Ed (2004). 3rd Edition [Bat Workers' Manual](#). JNCC
Mitchell-Jones, A.J. (2004). [Bat Mitigation Guidelines](#). English Nature
Gunnell, K. Murphy, B. and Williams, C. (2013) [Biodiversity for Low and Zero Carbon Buildings: A Technical Guide for New Build](#), RIBA Publishing, London.

Example Suppliers

Bat boxes are available commercially from a wide range of suppliers including:
NHBS <http://www.nhbs.com/>
Wildcare <http://www.wildcareshop.com/>
The Nestbox Company <http://www.nestbox.co.uk/>
CJ Wildlife <http://www.birdfood.co.uk/ctrl/node:140;page:16:bats>
Habibat <http://www.habibat.co.uk/>

Installation of Insect Boxes

The use of a number of smaller insect refugia is recommended across the Site rather than large insect refugia to avoid unnatural high aggregations that pose a risk of disease and parasitism to the insects inhabiting in high density inside⁷.

Objective and Management

Objectives, establishment instructions, management prescriptions, timing, suppliers and sources of further information are summarised below in Table 6.

Table 6. Insect Boxes Objectives and Management

Objective	Installation and Maintenance of Insect Refugia
Establishment instructions	<p>At least eight insect refugia will be installed within the Proposed Development, close to green infrastructure such as green roof or green walls.</p> <ul style="list-style-type: none"> ▪ Insect refugia will be sheltered from the prevailing wind, rain and strong sunlight. ▪ Fixed securely to prevent movement of the box. Galvanised or stainless steel screws or nails will be used to erect the boxes, as these will be more resilient to rust. ▪ Preferably being close to food and nesting sources for the adults. ▪ Insect refugia targeting bees (bee hotels) will be installed in full sun, facing south or south-eastern direction at least a metre off the ground. ▪ Refugia will be placed at the height of 0.5 to 1.2 m off the ground to deter terrestrial infiltration by predators, and to reduce the attractiveness to wasps (species of <i>Vespa</i>) which predate on both the adult and larval bees. ▪ While some cover is required for the boxes, its location will provide clear flight lines to and from the tubes into the surrounding environment. Avoiding vegetation in front of the refugia obscuring the entrances to the tunnels. ▪ Use of natural and untreated materials. ▪ Tubes and cuts must be clean, without splinters.
Management Prescriptions	<ul style="list-style-type: none"> ▪ Annual removal and cleaning of dead cells (cells that remain in a walled-up condition from the previous year because no larvae emerged) to prevent mould and mites that would multiply on the dead bees or larvae. They will be unoccupied for proceeding with cleaning. Occupied tubes will not be disturbed. Care must be taken not to damage the plugged holes, as these will contain developing larval or pupal. ▪ Replacement of the insect refugia or parts of it (drilled blocks, tubes) as they can degrade with time and to avoid build up of mould, mites and parasites. If box is occupied at the time of replacing, put the box under a waterproof container with a large hole until the next summer, when young will emerge no further eggs will be laid. Once they are emerged and the box is unoccupied, the box can be disposed⁸. ▪ Replace of materials that are broken checking that no invertebrates are using them. ▪ Replace any damaged or degraded fixings or unoccupied brick.
Timing	<ul style="list-style-type: none"> ▪ Bee hotels inspection and cleaning will be done annually at the end of the summer ▪ Replacement of the insect refugia or parts of it every two years, at the end of summer, after bees have emerged.
Legal considerations	None expected

Example Illustrations

Bee post

Urban Bee Nesting Cube

⁷ https://entomologistlounge.wordpress.com/2017/09/18/insect-hotels-a-refuge-or-a-fad/?utm_content=bufferfd279&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer

⁸ Carlton, M. (2015, November 13). *How to Make and Manage a Bee Hotel: Instructions that Really Work.* <https://www.foxleas.com/make-a-bee-hotel.asp>

Objective

Installation and Maintenance of Insect Refugia



Concrete Bee Brick/Block

Hexagonal Insect refuges



Further Information

<https://www.foxleas.com/make-a-bee-hotel.asp>
https://entomologistlounge.wordpress.com/2017/09/18/insect-hotels-a-refuge-or-a-fad/?utm_content=bufferfd279&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer
https://www.shgroup.org.uk/media/1023120/biodiversity-toolkit-008-final-anna_08022021.pdf
<https://www.rspb.org.uk/get-involved/activities/give-nature-a-home-in-your-garden/garden-activities/build-a-bug-hotel/>

Example Suppliers

Nestbox Company - www.nestbox.co.uk
Wildcare - www.wildcare.co.uk
RHS Plants - www.rhsplants.co.uk
Natural History Book Service (nhbs) - www.nhbs.com
<https://www.wildlifeworlddirect.com/vendors/buglife/>

Five Year Work Programme

The five-year work program outlined below **Error! Reference source not found.** indicates the actions to be taken annually each year following project completion. These are summarised in Table 7 and the details provided in Table 5 and 6.

Ongoing management will be required after the five-year period; it is recommended this management plan is used as a basis for the on-going management of the habitats and features on Site. The plan considers Year 1 to be establishment of a habitat or feature e.g. installation of boxes. Annual management from Years 2 – 5 will be broadly similar each year. Management undertaken in Years 2 – 5 can be used to guide ongoing future management beyond the scope of this management plan.

Monitoring is recommended to follow the condition assessment criteria and application of the condition assessment criteria outlined in Natural England’s Farm Environment Plan (FEP) Manual⁹ types but also referencing the Biodiversity Metric 3.1 – Technical Supplement or relevant DEFRA Biodiversity Net Gain assessment methodology¹⁰ applicable at the time.

Table 7. Summary of five year work programme

Feature	Action	Timing	Year 1	Year 2	Year 3	Year 4	Year 5	Subsequent Years
Orchard	Preparing ground / planting / seeding	As per horticultural specialist advice. Typically: Sowing August-September and March-April, dependent on conditions Tree planting or replacement November-March	✓					None
	Trimming/pruning shrubs / trees	September-February. If within nesting bird season an ecologist will check the area in advance of works for the presence of nesting birds		✓	✓	✓	✓	Once annually
	Management, including monitoring for the presence of invasive non-native species, vegetated cover, check tree stakes and ties.	Twice a year (spring and summer)	✓	✓	✓	✓	✓	Twice annually
	Watering	As per horticultural specialist advice	✓	✓	✓	✓	✓	Annually
A range of grasslands	Planting	Between November and March	✓					None
	Turfing	April/May or September/October	✓					None
	Trimming/pruning	September-February. If within nesting bird season an ecologist will check the area in advance of works for the presence of nesting birds		✓	✓	✓	✓	Annually
	Management, including monitoring of any damaged or failed areas, for the presence of invasive non-native species (in particular docks and thistles,	Twice a year (spring and summer)	✓	✓	✓	✓	✓	Annually and replacement when necessary

⁹ Natural England (2010) Higher Level Stewardship Farm Environment Plan (FEP) Manual Technical Guidance on the completion of the FEP and identification, condition assessment and recording of HLS FEP features. Third Edition. Natural England. Peterborough.

¹⁰ Natural England (2022). The Biodiversity Metric 3.1 – Technical Supplement.

Feature	Action	Timing	Year					Subsequent Years
			Year 1	Year 2	Year 3	Year 4	Year 5	
	which shall be removed). Failed or poor areas to be overseeded.							
Rain gardens	Management, including monitoring for the presence of invasive non-native species which shall be removed, replanting of any dead or failed plants.	Twice a year (spring and summer)	✓	✓	✓	✓	✓	Annually and replacement when necessary
Tree planting	Management, including monitoring of tree stakes and ties, replanting of any dead or failed trees.	Twice a year (spring and summer)	✓	✓	✓	✓	✓	Annually and replacement when necessary
Shrub and hedges	Management, including monitoring for the presence of invasive non-native species which shall be removed, replanting of any dead or failed plants.	Twice a year (spring and summer)	✓	✓	✓	✓	✓	Annually and replacement when necessary
Bird boxes	Installation of nest boxes	Any time after the construction works	✓					None
	Monitor the use of the boxes by nesting birds	March to August inclusive		✓		✓		Biannually
	Maintenance (inspection of box and fixings for damages or degradation), cleaning and replacement.	In autumn (October-November)	✓	✓	✓	✓	✓	Annually inspection and replacement when necessary
Bat Boxes	Installation of nest boxes	Any time after the construction works	✓					None
	Monitor the use of the boxes by roosting bats	March to August inclusive		✓		✓		Biannually
	Maintenance (inspection of box and fixings for damages or degradation), cleaning and replacement.	In autumn (October-November)	✓	✓	✓	✓	✓	Annually inspection and replacement when necessary
Insect Boxes	Installation of bug boxes within suitable habitats	Any time after the construction works	✓					None
	Monitor the use of the boxes by solitary bees and other species	March to August inclusive		✓		✓		Biannually

Feature	Action	Timing	Year 1	Year 2	Year 3	Year 4	Year 5	Subsequent Years
	Maintenance (inspection of box and fixings for damages or degradation), cleaning and replacement.	In autumn (October-November)	✓	✓	✓	✓	✓	Annually inspection and replacement when necessary

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