

Condition 18 Landscape and Ecology Management Plan

Arborfield Green: Parcel O2 Reserved Matters Application

Crest Nicholson Chiltern

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Quality information

Prepared by	Checked by	Verified by	Approved by
RW BSc (Hons) MSc Graduate Ecologist	CF BA (Hons) MSc Senior Ecologist ACIEEM	MW BSc (Hons) PhD Technical Director (Ecology)	MW BSc (Hons) PhD Technical Director (Ecology)

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-	Y	Crest Nicholson Chiltern

Prepared for:

Crest Nicholson Chiltern
Building 2,
Abbey View,
St Albans,
AL1 2QU

Prepared by:

AECOM Limited
Saltom Suite, Fleswick Court
Westlakes Science & Technology Park
Moor Row CA24 3HZ
United Kingdom

T: +44 (161) 237 6970
aecom.com

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1. Executive Summary

AECOM was commissioned by Crest Nicholson Chiltern to deliver environmental services in support of the Reserved Matters Application (RMA) for the development of Parcel O2 (hereby referred to as the Proposed Development) as part of Arborfield Green (formerly Arborfield Garrison) within the Strategic Development Location (SDL).

This included the production of a Landscape and Ecology Management Plan (LEMP) in order to meet the relevant planning condition (Condition 18) in the planning decision notice as follows:

“The reserved matters for any phase of the development shall include a detailed Landscape and Ecological Management Plan. Each detailed Landscape and Ecological Management Plan shall be in accordance with the mitigation, contingency and enhancement measures contained within table 13.23 of the submitted Environmental Statement Reference AGLC/HPA/DOC/5 (AECOM, October 2014) and the submitted Arborfield Garrison –BAP (AECOM, October 2014). The detailed Landscape and Ecological Management Plans shall include all the mitigation, compensation and enhancement measures contained within table 13.23 of the submitted Environmental Statement Reference AGLC/HPA/DOC/5 (AECOM, October 2014) and shall be implemented in accordance with the approved plan unless otherwise approved in writing by the local planning authority.”

A modified version of the original Environmental Statement¹ Table 13.23 is provided below (Table 1), with a summary response of the mitigation and enhancement recommended for Parcel O2.

Table 1. Parcel O2 Mitigation / Enhancement Summary (Source: Table 13.2.3 Environmental Statement)

Ref. No	Mitigation Item	Parcel O2 Summary Response
1	General Construction Mitigation – Construction Environmental Management Plan (CEMP)	A CEMP will be produced for the Proposed Development and ecology mitigation measures will be included.
2	Arboricultural Impact Assessment and Method Statement	Arboricultural Impact and Method Statement has been produced.
3	Stag Beetle / Reptile Mitigation – Retained Dead Wood Piles	Dead wood habitat will be created from the felled trees and deadwood within the Site.
4	Reptile Mitigation – Hibernacula and Refugia	Hibernacula and refugia will be included within the Site in the form of deadwood.
5	Bird Mitigation – Mitigation for Veteran Tree Loss	No veteran trees are to be lost as part of the Proposed Development. Bird boxes will be installed in mature trees adjacent to the Site.
6	Bird Mitigation – Existing Swift Colony Replacement	Not applicable, no nesting swifts were previously present within Parcel O2.
7	Bird Mitigation – Priority Bird Species Construction Mitigation – Red Kite Noise and Disturbance Mitigation Strategy	No Schedule 1 ² species have been recorded nesting within Parcel O2.
8	Bat Mitigation – Alternative Roost Provision: Bat Barns	A bat barn was constructed in the adjacent Hazebrouck Meadows SANG (Suitable Alternative Natural Greenspace) as part of mitigation for previous works. This forms part of the bat mitigation measures for the Proposed Development.
9	Bat Mitigation – Alternative Roost Provision: Bat Bricks / Boxes on Buildings	Bat bricks will be incorporated into the completed development.
10	Bat Mitigation – Alternative Roost Provision: Bat Boxes on Trees	There are five existing bat boxes installed on retained trees to the west of the Site as part of the mitigation for the Rowcroft bat mitigation licence.
11	Hedgehog Mitigation – Hedgehog Boxes	Hedgehog boxes will be provided within Parcel O2..
12	Badger Mitigation – Bait Marking and Monitoring	No badger setts have been recorded within Parcel O2.
13	Badger Mitigation – Construction Phase Badger Sett Closure	Pre-commencement monitoring will be carried out prior to enabling works.

¹ AECOM (2014) Arborfield SDL Environmental Statement Table 13.23

² Birds listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) are additionally protected against disturbance while nesting.

Ref. No	Mitigation Item	Parcel O2 Summary Response
14	Invasive Non-native Plant Species Mitigation Strategy	Invasive Non-native Plant Species Mitigation Strategy to deal with Rhododendron and Wall Cotoneaster is included in Section 6 of Condition 23 RMA report.
15	Habitat Creation – Woodland	Refer to Item 16.
16	Habitat Enhancement – Tree Lines and Hedgerows	A retained hedgerow in the north of the Site will be retained and enhanced. The existing stream edge woodland will be retained and enhanced. Any landscape planting within the Proposed Development will include native and / or wildlife friendly species.
17	Habitat Creation – Hedgerow	An ~130m long species-poor hedgerow will be removed. A new 230m long native hedgerow will be added along the western and south boundaries ³ . It will comprise native species. It will provide ecological connectivity to Linear Park and Hazebrouck Meadows SANG.
18	Habitat Enhancement – Semi-improved Grassland	It is proposed that the semi-natural grassland topsoil on Site is translocated to the western boundary areas, around the two new SuDS ponds within the Proposed Development.
19	Habitat Creation – Ponds	Two SuDS drainage ponds will be created within Parcel O2. Along the west of the site, two SuDS ponds will be created in previously grassland areas.
20	Watercourse Mitigation – SUDS (Sustainable Urban Drainage System) Installation	Permeable paving will be included within the development, alongside the SuDS pond described in Item 19 above.
21	Habitat Mitigation – Green Corridor Retention and Management	Green corridors (Linear Park to the west, hedgerows, trees and the SANG to the east) will be retained and managed for biodiversity to provide secondary habitat linkages to the wider landscape.
22	Habitat Mitigation – Dark Corridor Management	The Primary dark corridor present around Parcel O2 will be conserved as described in Condition 23 RMA report ⁴ .
23	Bird Mitigation – Urban Bird Boxes (Starling / House Sparrow / House Martin / Swift / Widespread Species)	Bird bricks / boxes are to be installed on suitable buildings across the Site.
24	Hedgehog Mitigation – Hedgehog Friendly Fencing	Hedgehog friendly fencing will be installed in the back gardens of houses.
25	Badger Mitigation – Provision of Road Crossing Tunnels	No crossing tunnel is required due to the minor residential roads within Parcel O2 and the lack of proximity to any main setts.

This LEMP describes the ecological baseline applicable to each mitigation item, proposed enhancement, contingency, compensation and mitigation measures and a prescription for their long-term maintenance and monitoring.

³ Murdock Wickham (2023) *Landscape Masterplan Parcel O2*

⁴ AECOM (2024) *Arborfield Parcel O2 Reserved Matters Application. Conditions 19-23 Ecology Report*

2. Introduction

2.1 Overview

AECOM was commissioned by Crest Nicholson Chiltern to deliver environmental services in support of Parcel O2 (otherwise referred to as the Proposed Development) as part of the Arborfield Green (formerly Arborfield Garrison) within the Strategic Development Location (SDL).

This Landscape and Ecology Management Plan (LEMP) has been produced to meet the requirements of Condition 18 of Outline Planning Decision O/2014/2280 (Wokingham Borough Council) which reads as follows:

“The reserved matters for any phase of the development shall include a detailed Landscape and Ecological Management Plan. Each detailed Landscape and Ecological Management Plan shall be in accordance with the mitigation, contingency and enhancement measures contained within table 13.23 of the submitted Environmental Statement Reference AGLC/HPA/DOC/5 (AECOM, October 2014) and the submitted Arborfield Garrison – BAP (AECOM, October 2014). The detailed Landscape and Ecological Management Plans shall include all the mitigation, compensation and enhancement measures contained within table 13.23 of the submitted Environmental Statement Reference AGLC/HPA/DOC/5 (AECOM, October 2014) and shall be implemented in accordance with the approved plan unless otherwise approved in writing by the local planning authority.”

2.2 Proposed Development

Parcel O2 (the Proposed Development in Figure 1) falls within the overall Arborfield Strategic Development Location (SDL) which has outline planning and demolition consent to facilitate delivery for the development of residential units, road infrastructure and soft landscaping. The Proposed Development involves the construction of 135 dwellings as a mixture of 2-bedroom flats and a range of 2-4 bedrooms houses including affordable units.

2.3 Site Location and Setting

Currently within the Site are two buildings, a large warehouse (the Aviation Training International Limited (ATIL) training building / Building NW43) and a small outbuilding in the north of the site previously housing electrical infrastructure. The Site is primarily meadow grassland containing a mixture of native and ornamental trees, with some lying deadwood and one bund immediately north of the ATIL building. There is an earthen bank running along the eastern edge of the Site and two smaller rubble mounds to the southwest within the same fenced enclosure but outside of the red line boundary. Immediately northwest of the Site red line boundary is an unused ex-residential building in significant disrepair, within the boundary fence of Parcel O2.

The wider Arborfield SDL (grid reference: SU 767 652) lies approximately 4 km south-west of Wokingham town centre, 5 km south of the M4 junction 11. The overall SDL will include residential units, schools, a commercial centre, Sustainable Drainage Systems (SuDS), Suitable Alternative Natural Green Spaces (SANGs), footpaths and cycleways. The nearby settlements of Arborfield and Arborfield Cross lie to the north-west. Barkham lies to the north-east and Finchampstead to the east. Lower Common lies to the south and Farley Hill to the west. Land uses in the area include the former military garrison, large areas of farmland and small nucleated villages such as Barkham and Arborfield Cross.

2.4 Management Structure

The owner, developer or long leaseholder will take overall responsibility to 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 by the management company responsible for the Site. The management company 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.

2.5 Quality Assurance

All AECOM ecologists 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 will conduct their work using all reasonable skill and care. Many senior AECOM ecologists are also Chartered Environmentalists or Ecologists.

2.6 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.

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 CDM implications of the design and implementation of our ecological recommendations must be risk assessed by their Client to their 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.

3. Purpose and Objectives

This section of the report outlines the purpose and objectives of the measures set out within this document.

A proportion of the Proposed Development to be developed as part of the proposals has ecological value for a number of key habitats and species, including those targeted within the outline Environmental Statement BAP⁵. The purpose of the measures outlined in this report is to implement appropriate compensation, enhancement and mitigation for general biodiversity, in order to ensure:

- the biodiversity value of the Proposed Development is maintained and enhanced; and
- any key habitats to be lost are replaced elsewhere within the Parcel or the wider SDL Site.

Table 13.23 of the Environmental Statement (AECOM, 2014)⁶ details the mitigation, compensation and enhancement measures recommended for the Arborfield Garrison development as numbered mitigation Items. These are shown in full in Appendix A.

The following mitigation measures (items within Appendix A (and following the numbering within the Environmental Statement)) applicable to the Proposed Development are included within this document:

- Item 3: Stag Beetle / Reptile Mitigation – Retained Wood Piles;
- Item 5: Bird Mitigation – Mitigation for Veteran Tree Loss;
- Item 9: Bat Mitigation – Alternative Roost Provision: Bat Bricks / Boxes on Buildings and Trees;
- Item 11: Hedgehog Mitigation – Hedgehog Boxes;
- Item 14: Non-native Invasive Species Mitigation Strategy;
- Items 16 & 17: Habitat Creation – Hedgerows and Trees;
- Item 18: Habitat Enhancement – Semi-Improved Grassland;
- Item 19: Habitat Creation – Ponds;
- Item 20: Watercourse Mitigation – SUDS (Sustainable Urban Drainage System) Installation;
- Item 22: Habitat Mitigation – Dark Corridor Management;
- Item 23: Bird Mitigation – Urban Bird Boxes (Starling / House Sparrow); and
- Item 24: Hedgehog Mitigation – Hedgehog Friendly Fencing.

A summary of justification for inclusion or exclusion of items within Table 13.23 is provided within Appendix A.

The current status of key habitats and species already present within the Site is described within the Arborfield Parcel O2 Reserved Matters Application Conditions 19-23 Ecology Report⁷. The strategy for mitigation described in outline within the Arborfield Garrison Biodiversity Action Plan⁸ (BAP) is provided in further detail within this document.

⁵ AECOM (2014) *Arborfield Garrison – Biodiversity Action Plan. Environmental Statement Appendix 13.10*

⁶ AECOM (2014) *Arborfield Garrison Strategic Development Location. Arborfield Environmental Statement*

⁷ AECOM (2024) *Arborfield Parcel O2 Reserved Matters Application. Conditions 19-23 Ecology Report*

⁸ AECOM (2014) *Arborfield Garrison – Biodiversity Action Plan. Environmental Statement Appendix 13.10*

4. Detailed Design and Materials

4.1 Introduction

This section of the report provides recommendations and references to sources for the design of each of the mitigation items and the methods for their creation or installation.

Recommended materials, planting palettes, illustrations, required management and examples of suppliers and sources of further information are given where appropriate. Outline recommendations for locations of items are provided but exact locations are to be confirmed, dependent on design, Health and Safety and Construction Design Management (CDM).

A summary of ecological information and reference sources where relevant is included below⁹. This will be used for input into contractors' method statements for habitat design and creation.

4.2 Item 3: Stag Beetle / Reptile Mitigation – Retained Wood Piles

Trees felled on Site will have suitable felled limbs and stems retained for incorporation within the SANGs and green corridors as habitat features e.g. flat-placed large trunk sections, 'loggeries' of multiple vertically positioned wood sections sunk into the ground, or log piles. It is recommended that at least four of these are included within or adjacent to the Site near to the Site boundaries, to provide benefits for invertebrates such as stag beetle, reptiles, and hedgehogs. Retained dead wood can be secured with wire mesh, fenced off or hidden within vegetation if required.

4.3 Item 5: Bird Mitigation – Mitigation for Veteran Tree Loss

No veteran trees will be lost as a result of the Proposed Development. Several semi-mature trees within the Site boundary¹⁰¹¹ are expected to be removed. The mature trees along the western and northern boundaries will be retained. The trees present within the Site comprise a range of species, ages, sizes, and health conditions and provide opportunities for nesting birds across the Site.

No mitigation is required for replacement nesting boxes (for species such as tawny owl, kestrel, and woodpecker). General bird boxes will be erected to mitigate for the loss of trees, mounted on trees adjacent to the Site, or within the adjacent SANGs. See Table 5. Urban Bird Box Provision for details.

4.4 Item 9: Bat Mitigation – Alternative Roost Provision: Bat Bricks / Boxes on Buildings

Bat mitigation is to be provided in line with the 2014 Environmental Statement Bat Mitigation Strategy¹² through provision of bat bricks or boxes incorporated into completed structures. Management objectives, design specification, suppliers and sources of further information are summarised below.

It is not necessary to install additional tree bat boxes; this could confuse future Natural England European Protected Species Mitigation Licence monitoring through licenced and non-licenced boxes being in close proximity to one another. There are already five tree bat boxes to the southwest of the parcel in Linear Park as part of the Rowcroft mitigation licence.

Bat bricks / boxes should be distributed throughout the Proposed Development, installed on or within the post-development buildings.

Light spill should be avoided onto the dark corridors as far as reasonably possible (lighting levels below 1 lux, as specified within the 2014 Environmental Statement Bat Mitigation Strategy¹³) which the Site is surrounded by.

A lighting assessment is required to demonstrate the scheme complies with the low lighting levels within the dark corridors, noting that some light spill is acceptable. This can be achieved with the use of appropriate lighting columns, restricted to 5 m height and with light shields to minimise light spill on the adjacent landscape.

⁹ Any advice provided relates to ecology only. Consideration of any Health and Safety and/or CDM implications of the design and implementation of our ecological recommendations must be risk assessed by the Client to their 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 and safety considerations must take precedence.

¹⁰ SJA Trees (2018) *Tree Constraints Plan 18212-01 Parcel O2*

¹¹ SJA Trees (2022) *Tree Protection Plan 22550-041 Parcel O2*

¹² AECOM (2014). *Arborfield Garrison – Bat Mitigation Strategy. Environmental Statement Appendix 13.4*

¹³ AECOM (2014) *Arborfield Garrison Bat Mitigation Strategy. Environmental Statement Appendix 13.4*

Boxes should also be installed as far as reasonably possible away from external lights sources, especially road lighting columns.

A range of commercially available bat bricks / boxes are 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 will have a longer lifespan and require less maintenance. Example illustrations are included below in Table 2.

Table 2. Bat Box/Brick Objectives and Management

Management Objective	Summary Design Specifications or Principles	Required Management
A minimum of 7 bat bricks/boxes are to be fitted in or onto suitable infrastructure or trees, with a minimum of 1 bricks/boxes per selected building.	Bat bricks/boxes on buildings are for small crevice dwelling bats such as pipistrelle bat species. The bat boxes should be located facing in different directions: - avoiding prevailing wind/rain - south, south-east or south-west (for daytime warming) Bat bricks / boxes should be placed as high as possible (at least three metres above ground level to deter predation and disturbance) but allow access for maintenance. Where possible do not use lighting in areas intended for use by bats. Where lighting is necessary, it should be directional using down-lighting to avoid excessive light-spill onto bat boxes and trees, shrubs and hedges on and neighbouring the Site. If fixings are used, the 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.	As necessary for bat bricks. Replace any damaged or degraded fixings. Roosting bats are protected from disturbance under UK legislation, so if any boxes need to be removed this must be done by a licensed bat worker if there is a possibility of bats being present.

Example illustrations

Bat boxes shown cater for a range of different species. Schwegler 1FR Bat Tube



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). 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/>

4.5 Item 11: Hedgehog Mitigation – Hedgehog Boxes

Hedgehog boxes can be located under hedgerows, incorporated into brash piles, or in purpose-built mounds (British Hedgehog Preservation Society, undated) within the Proposed Development.

It is recommended that a minimum of two hedgehog boxes should be incorporated within the Proposed Development. They can be placed near the SuDS ponds. Examples are given in Table 3 below.

Table 3 Hedgehog Boxes Objectives and Management

Management Objective	Summary Design Specifications or Principles	Required Management
Hedgehog boxes (minimum two) to be installed within log piles, under hedgerows or within mounds. This action will create a valuable habitat for Hedgehogs within the Site.	These should be concealed as deep as possible within a perimeter feature to avoid interference by members of the public. It may be necessary to cover the boxes with logs or other natural substrate. Care should be taken to ensure the entrance to the box is not blocked. Boxes may need to be covered in roofing felt to protect from the weather and prevent leaks. Reptile mitigation such as log / brash piles will create additional habitat suitable for sheltering / hibernating hedgehogs.	Maintain continued effectiveness of hedgehog boxes. Visual inspection of the condition of each hedgehog box prior to winter (before October if possible). Make any necessary repairs to each box.

Example Illustrations

Example log pile showing a range of log sizes present. Log piles should be situated so that they will partially vegetate to enhance their value as reptile habitat.	Hedgehog Hogitat 	Hedgehog Bothy 	Hedgehog House with hinged lid 
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Further Information

Further hedgehog box information is available for a range of sources, including;

British Hedgehog Preservation Society (undated). Hedgehog Homes. Part of the *Know your hedgehogs* series. Ludlow

The Peoples Trust for Endangered Species <http://ptes.org/campaigns/hedgehogs/>

Example Suppliers

Hedgehog 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/>

The Hedgehog <http://thehedgehog.co.uk/>

4.6 Item 14: Non-native Invasive Species Mitigation Strategy

A stand of *Rhododendron (Rhododendron ponticum)* is present adjacent to the northwest site boundary and is beginning to grow through into the Site. A single wall cotoneaster (*Cotoneaster horizontalis*) specimen is present north of the ATIL building entrance. Both are listed on Schedule 9 of the Wildlife and Countryside Act (1981) (as amended) making it an offense to plant them or cause them to grow in the wild.

A detailed Invasive Non-native Species Management Plan for the Proposed Development was produced in accordance with the Arborfield Garrison Site Wide Invasive Species Management Plan¹⁴ and the submitted Non-Native Invasive Species Strategy¹⁵ to deal with the cotoneaster and rhododendron on Site. The plan is included in the Reserved Matters Report¹⁶.

An overview of mitigation methods is provided below.

Rhododendron is an extremely invasive plant species, forming dense impenetrable thickets. The deep shadow cast by the plants and toxic leaf litter accumulating underneath rhododendron produces a dark sterile environment, which suppresses regeneration of native species and reduces biodiversity. Removal involves cutting to ground

¹⁴ AECOM (2017) *Arborfield Green Invasive Non-native Species Management Plan*.

¹⁵ AECOM (2014) *Arborfield Garrison – Non-Native Invasive Species Strategy. Environmental Statement Appendix 13.11*

¹⁶ AECOM (2024) *Arborfield Parcel O2 Condition 19-23 Ecology Report*

level with all materials chipped or removed from site, with stumps addressed by either complete removal (manually or using machinery) or direct treatment with herbicides through painting of freshly cut stumps or using a 'drill and drop' method. Should there be any stump regrowth, these and any seedlings can be effectively killed by spraying regrowth with a herbicide or, in the case of seedlings, hand pulling. The rhododendron should be fenced off including a 2 m zone around the plants and left *in situ* for the soil to recover over time. The fencing will prevent the spread of seeds present in the soil. If this approach is not practical, the soil to a depth of 200 mm should be scraped off and either placed in a part of the Site where it can be fenced off and left for at least 2 years, buried on the Site at a depth of 500 mm or more, or taken off-site as controlled waste.

Wall cotoneaster is less hazardous than rhododendron but, should it be spread into grasslands, e.g. one of the SANGs, it could reduce biodiversity and present a management problem. It should be controlled in the same way rhododendron.

4.7 Items 16 and 17: Habitat Creation – Hedgerows and Trees

4.7.1 Hedgerows

One ~130m long species-poor hedgerow is present on Site, south of the ATIL building boundary fence, composed of blackthorn (*Prunus spinosa*), English oak (*Quercus robur*), dog rose (*Rosa canina*), and field maple (*Acer campestre*). This will be lost to make way for the Proposed Development.

A second hedgerow comprised of blackthorn, dog rose, English oak and field maple is present running along the northern redline boundary, but

It is recommended that any vegetation removal is carried out under supervision outside of the breeding bird season (March to August inclusive). Should vegetation clearance works have to take place within the bird breeding season, a recommencement check should be carried out. If nesting birds are found within the areas to be cleared, then a 5 m buffer zone should be established around the nest. Monitoring of the nest should be carried out to determine if the chicks have fledged and have left the nest.

As outlined in the Hedgerow Mitigation Strategy¹⁷, any lost sections of hedgerow be mitigated for by new hedgerow by planting 1.5x times the length of hedgerow lost using native and wildlife friendly species, either on site or within the three SANGs at Arborfield.

There is the opportunity to create new hedgerow within the Proposed Development. A new 230m native hedgerow will be added along the western and south boundaries¹⁸. It will comprise native species. It will provide ecological connectivity to Linear Park and Hazebrouck Meadows SANG.

Any new hedgerows will be included in a two-year management program to include weed management, mammal protection and a watering regime to ensure successful establishment. Ongoing management will be carried out to ensure that hedgerow structure and diversity is maintained.

Newly planted hedgerows should be trimmed lightly for the first few years, then cut on a two (but preferably three or more) year rotation, slowly increasing the overall hedge height after each cut until the desired height is attained.

Detailed management information for hedgerows is available from a number of sources, including the Reserved Matters Report¹⁹ and Hedgeline²⁰.

4.7.2 Trees and Shrubs

Any planting of new trees and shrubs will be native species recommended for habitat creation and enhancement²¹, particularly along the boundaries that will be adjacent to the dark corridor and near to the SuDS pond. Further detail can be found in the landscape masterplan.

The trees planted will be of native or near native species wherever possible, though this may include cultivars to meet growth or size requirements. It is recommended that native species or species with value to wildlife should also be planted within areas of soft landscaping within the development.

¹⁷ AECOM (2014) Arborfield Garrison – Hedgerow Survey Report and Strategy

¹⁸ Murdock Wickham (2023) Landscape Masterplan Parcel O2

¹⁹ AECOM (2024) Arborfield Parcel O2 Reserved Matters Application. Conditions 19-23 Ecology Report

²⁰ The Hedgerow Management Cycle http://www.hedgeline.org.uk/assets/docs/Hedgeline%20A5%2012pp%20leaflet_7.pdf

²¹ AECOM (2014) SANG Strategy ES Appendix 13.9

4.8 Item 18: Habitat Enhancement – Semi-Improved Grassland

The future loss of species-rich meadow of high biodiversity value should be mitigated through translocation (preferred) or replacement planting. Partial translocation of the meadow to the future West Courts SANGs would establish a new area of grassland in a similar manner to that already successfully implemented on the Hazebrouck Meadows SANG. This would result in an area of meadow retaining species of local provenance with potential to expand.

It is proposed that the semi-natural grassland topsoil on Site is translocated to the western boundary areas, around the two new SuDS ponds within the Proposed Development.

If translocation is not feasible, it is recommended that an area of the West Court SANGs of at least 1.5x the area to be lost from Parcel O2 is identified for future enhancement as semi-improved grassland through seeding²².

4.9 Items 19 and 20: Habitat Creation – Ponds and Watercourse Mitigation – SUDS (Sustainable Urban Drainage System) Installation

Two new SuDS ponds will be created in the northwest and southwest corners of the Proposed Development²³, adjacent to the Primary dark corridor and pre-existing stream. A planting palette (Table 4) to encourage nocturnal pollinating insects such as moths is recommended to benefit foraging bats and will form a component of bat foraging habitat mitigation. Refer to Table A1 in the SANG Strategy ES Appendix 13.9 for a more general pond design principal and planting schedule.

Table 4. Aquatic Habitat Planting Palette for Bats

Species	Scientific Name
Angelica	<i>Angelica sylvestris</i>
Bog bean	<i>Menyanthes trifoliata</i>
Bugle	<i>Ajuga reptans</i>
Flag iris	<i>Iris pseudacorus</i>
Marsh marigold	<i>Caltha palustris</i>
Lady's smock	<i>Cardamine pratensis</i>
Hemp agrimony	<i>Eupatorium cannabinum</i>
Meadow sweet	<i>Filipendula ulmaria</i>
Creeping Jenny	<i>Lysimachia nummularia</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Water mint	<i>Mentha aquatica</i>
Water forget-me-not	<i>Myosotis scorpioides</i>
Fringed water lily	<i>Nymphoides peltata</i>
Water avens	<i>Geum rivale</i>

Source: AECOM (2014) Bat Mitigation Strategy ES Appendix 13.4

Also present along the western edge of the Site is a running ditch. Ditch vegetation should be managed to ensure the maintenance of a multi-functional drainage network suitable for aquatic associate species and flood alleviation. Negative indicator and dominant species including bramble, nettle, thistles, and broad-leaved dock should be removed, and emergent vegetation cleared if the ditch vegetation becomes successional and water flow impeded. Refer to Table A1 in the SANG Strategy ES Appendix 13.9²⁴ for a detailed planting schedule.

Permeable paving materials are planned to be included within Parcel 02.

²² Defra (2012) Biodiversity Offsetting Pilots: Guidance for developers. <http://www.defra.gov.uk/publications>

²³ Parcel O2 Enabling Works FW Drainage 60312043/CIV/337

²⁴ AECOM (2014) Arborfield Garrison SANG Strategy. Environmental Statement Appendix 13.9

4.10 Item 22: Habitat Mitigation – Dark Corridor Management

The Site is surrounded on the east, west, and south sides by primary dark corridor (recommended lighting levels should be below 1 lux, as specified within the 2014 Environmental Statement Bat Mitigation Strategy²⁵). In addition, a strip of primary dark corridor runs through the northern part of the Site including the ex-MOD building (outside red line boundary) and bell mouth Site entrance through which all traffic will be passing through.

Light spill should be avoided onto the dark corridors as far as reasonably possible. A lighting assessment is required to demonstrate the borders of the Proposed Development complies with the low lighting levels within the dark corridors, noting that some light spill is acceptable. This can be achieved with the use of appropriate lighting columns, restricted to 5 m height and with light shields to minimise light spill on the adjacent landscape. A lighting scheme should be developed in liaison with a suitably qualified ecologist.

4.11 Item 23: Bird Mitigation – Urban Bird Boxes (Swift / Starling / House Sparrow)

Parcel O2 contains trees which provide suitable nesting habitat for several bird species, including a number of BAP species and Birds of Conservation Concern. Several trees within the Site are planned to be removed.

It is recommended that bird boxes targeting urban dwelling species be installed upon the exterior of the post-development buildings with minimum box density provisions based on recommendations from the Environmental Statement (AECOM, 2014)²⁶; see Table 5 for details.

It is recommended that the house sparrow (*Passer domesticus*), house martin (*Delichon urbicum*), and swift (*Apus apus*) boxes are installed upon the post-development buildings, with starling (*Sturnus vulgaris*) and widespread species boxes installed on buildings and trees.

Table 5. Urban Bird Box Provision

Species	Location	Minimum Box Density Provision	Notes
Swift	Residential Buildings	Provision for seven nest sites (seven groups of 1-4 boxes)	Swift boxes should be installed in groups of 1-4 on a house, these may be in the form of multicavity boxes.
House Martin	Residential Buildings	One group of 2 or 3 boxes on one building	As house martins nest in colonies, boxes will be installed in groups of two or more to meet the required provision.
Widespread Bird Species	Residential Buildings and Trees	6	It is recommended to use a mixture of general bird boxes; 2 with 28mm entrances, 2 with 32mm entrances, and 2 open-fronted.
House Sparrow	Residential Buildings	3 terrace type boxes	As house sparrows nest in colonies, multiple terrace type boxes will be placed in close proximity to one another
Starling (<i>Sturnus vulgaris</i>)	Residential Buildings and Trees	1	Starling boxes are large and can be installed on buildings and trees

It is recommended that woodcrete material boxes are installed in preference of 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. Examples are provided in Table 6 along with management objectives, design specification, suppliers and sources of further information.

Table 6 Bird Box/Brick Objectives and Management

Management Objective	Summary Design Specifications or Principles	Required Management
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²⁵ AECOM (2014) *Arborfield Garrison Bat Mitigation Strategy. Environmental Statement Appendix 13.4*

²⁶ AECOM (2014) *Arborfield Garrison Strategic Development Location. Arborfield Environmental Statement*

Bird boxes are to be installed to create new nesting locations for birds of conservation concern. Boxes will also replace lost nesting features. Boxes should be BTO or RSPB approved.

Boxes should be for the following species:

- Swift (minimum seven nest sites, >5 m in height, single or multi-cavity boxes) on buildings.
- Starling (minimum one nest box, can be building or tree mounted).
- House martin (minimum one group of 2 or 3 boxes on one building).
- House sparrow (minimum 3 nest sites, 2-4 m height, preferably fixed in groups) on suitable buildings; and
- Widespread species boxes (minimum 2x28mm opening, 2x32mm opening, 2x open fronted) can be tree mounted.

The box entrance should be sheltered from the prevailing wind, rain and strong sunlight and should not be accessible to predators, such as cats and grey squirrels. The front of the box should be angled vertically or slightly downwards so that rain cannot enter through the hole. North and east facing elevations are preferred for bird boxes. Galvanised or stainless-steel screws or nails should be used to erect the nest boxes, as these will not rust.

Replace any damaged bird boxes.

Replace any damaged or degraded fixings.

Cleaning of boxes should be carried out outside the main breeding bird season (ideally September to January).

Example Illustrations

Bird internal bricks / external boxes shown for house martin, house sparrow and starling

Schwegler Triple Cavity Swift Nest Box



Zeist Swift Nest Box



External / Internal 1SP Schwegler Sparrow Terrace



Internal Habitat Sparrow Brick Terrace



Schwegler Nest Box 1B for small cavity nesters (blue tit / great tit)



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.wildcareshop.com/>

The Nestbox Company <http://www.nestbox.co.uk/>

CJ Wildlife <http://www.birdfood.co.uk/>

4.12 Item 24: Hedgehog Mitigation – Hedgehog Friendly Fencing

It is recommended that one or two hedge gravel boards are installed within the fencing of each residential garden to allow the movement of hedgehogs across the Proposed Development.

The Hedgehog Friendly Gravel Board allows hedgehogs and other wildlife to roam freely between gardens in their search for food and mates. The gravel board is similar to a standard fence panel gravel board, but it has a hole at one end, large enough to allow hedgehogs free passage, with a reinforcing strip along the top of the board to ensure it is not weakened by the hole.

Gravel boards are recommended to be installed in fencing throughout the Site to facilitate hedgehog movement and foraging.

Table 7. Hedgehog Gravel Boards Objectives and Management

Objective	Installation and Management of Hedgehog Gravel Boards
Establishment instructions	Hedgehog Gravel Boards will be installed in the rear garden fences of the post-development buildings during construction.
Management Prescriptions	Monitoring of boundary fence conditions and whether access hole has been blocked.
Remedial Actions	Repair or replace as required.
Timing	At least once per year, at any time.
Example Suppliers	 https://www.jacksons-fencing.co.uk/product/sc_667610/hedgehog-gravel-board-for-use-with-slotted-posts-1.83m-x-150-x-28mm-incl.1-x-end-packer-1-x-length-packer-jakcured

5. Extent and Location of Proposed Works

5.1 Introduction

This section of the report outlines the extent (by area or number) and approximate recommended location of the habitat features described in the sections above.

5.2 Extent and Location of Proposed Ecological Works

For indicative locations of habitat features to be installed within the Site see Figure 1. These will be concentrated within the retained landscape boundaries as well as residential areas (i.e. hedgehog friendly fencing and bird boxes in buildings). Table 8 provides details of the extent and location of each habitat feature.

Table 8. Extent and Location of Proposed Habitat Features

Item No.	Habitat Feature	Number	Location
Item 3	Stag Beetle/ Reptile Mitigation – Retained Wood Piles	4	Along eastern, southern, or western edges of Parcel O2, or within close proximity to the SuDS pond areas.
Item 5	Bird Mitigation – Mitigation for Veteran Tree Loss	None	No veteran trees are to be lost as part of the Proposed Development. General bird boxes on trees will be installed (see item 23)
Item 9	Bat Boxes/Bricks	7 bat bricks to be incorporated within the Parcel.	Incorporated into the exterior of the post-development buildings and trees within Parcel O2. The bat bricks/boxes should be located facing in different directions, avoiding prevailing wind/rain, and facing the dark corridor if installed on buildings.
Item 11	Hedgehog Mitigation – Hedgehog Boxes	2	Under hedgerows, incorporated into brash piles, or in purpose-built mounds. Concealed as deep as possible within a perimeter feature to avoid interference by members of the public.
Items 16 & 17	Hedgerows and Trees	See landscape masterplan	A new native hedgerow will be planted along the western and southern boundaries. New trees will be planted throughout the Proposed Development.
Item 18	Habitat Enhancement – Semi-Improved Grassland	N/A	Semi-natural grassland topsoil on Site will be translocated to the western boundary areas, around the two new SuDS ponds within the Proposed Development. Enhancement of any areas of non-amenity grassland in the post-development Site.
Item 19	Habitat Creation – Ponds	2	Within SuDS drainage area.
Item 20	Watercourse Mitigation – SUDS (Sustainable Urban Drainage System) Installation	N/A	Permeable paving to be included in development and SuDS ditch already present on western boundary.
Item 23	Urban Bird Boxes	Swift: seven boxes (providing at least two nesting cavities/multi-cavity) at appropriate height. General bird boxes: six minimum general bird boxes, 2x28mm opening, 2x32mm opening, 2x open fronted. House Sparrow: three terrace-types boxes minimum (can include nest boxes with multiple cavities to meet provision and encourage colonial nesting.) House Martin: one group of two or three boxes on one building	Bird box recommendations are provided in Table 6. General bird boxes can be tree mounted.

Item No.	Habitat Feature	Number	Location
		Starling: one box on a tree or building	
Item 24	Hedgehog Fencing	One or two per garden	In fencing throughout the residential gardens of the Proposed Development to facilitate hedgehog movement and foraging.

6. Implementation Timetable

6.1 Introduction

This section outlines a recommended timetable for the habitat enhancement and replacement works within Parcel O2.

6.2 Timings for Creation and Installation of Habitat Features

The table below provides details of recommended timings for ecological works, and how these relate to the development works where applicable²⁷.

Table 9. Table: Timing of Creation / Installation of Habitat Features

Item No.	Habitat Feature	Timing of Creation / Installation
Item 3	Stag Beetle/ Reptile Mitigation – Retained Wood Piles	During initial vegetation clearance.
Item 5	Bird Mitigation – Mitigation for Veteran Tree Loss	At any stage of development.
Item 9	Bat Bricks / Boxes ²⁸	Bat bricks/roosting features designed to be integral to buildings or structures will be installed at the time of construction. It is recommended that externally mounted bat boxes are installed during the autumn or winter months in order to minimise any potential disturbance to nesting birds.
Item 11	Hedgehog Mitigation – Hedgehog Boxes	After construction phase.
Items 16 & 17	Hedgerows and Trees	Whips, saplings and immature tree standards will be planted mid-November to mid-March.
Item 18	Habitat Enhancement – Semi-Improved Grassland	During vegetative installation.
Item 19	Habitat Creation – Ponds	During the winter months, excavate a pond with a central area up to about 1.5m in depth and with gently shelving margins (remove silt from the site). Pond profile plans can be seen in Table A1 ²⁹ . Plant suitable emergent and aquatic plants within the pond. Plants should be native and varied, providing egg laying material for amphibians. Around each pond 3m wide unmanaged strips of grassland should be maintained.
Item 20	Watercourse Mitigation – SUDS (Sustainable Urban Drainage System) Installation	At the time of construction.
Item 23	Urban Bird Boxes	Bird boxes designed to be integral to buildings or structures will be installed at the time of construction. Install externally fitted bird boxes in the autumn, in preparation for use the following spring.
Item 24	Hedgehog Boxes	Hedgehog box installation recommended prior to late summer/early autumn to allow hedgehogs to utilise the box for winter hibernation or spring breeding.

²⁷ Recommendations made are based on optimal times of year for the ecological works and should be subject to review by an ecologist should the timing of development works affect the timings recommended here.

²⁸ Bat Conservation Trust (2014) Bat Box Information Pack, available for download at:

http://www.bats.org.uk/pages/bat_boxes.html

²⁹ AECOM (2014) *Arborfield Garrison SANG Strategy. Environmental Statement Appendix 13.9*

7. Responsible Persons

7.1 Introduction

This section outlines the responsible body or organisation in relation to the habitat creation and enhancement works across the Site.

7.2 Responsible Body or Organisation

The table below identifies the body or organisation responsible for creation and installation of each of the habitat enhancement and replacement features. Any appointed contractor is to provide a summary of their lines of communication for review.

Table 10. Habitat Features & Responsible Persons

Item	Habitat Feature	Details	Organisation	Responsible For
All	All	All Biodiversity Enhancement and Creation Works across the Site.	Developer and Principal Contractor	Ensuring that all habitat works are carried out in a timely fashion by the appropriate persons according to approved Method Statements & Specifications.
All	All	Ecological Input	Appointed Ecological Contractor	Review of Contractor's Method statements and specifications. Review and summary of contractor's lines of communication
Item 3	Stag Beetle/ Reptile Mitigation – Retained Wood Piles	Installation	Appointed Contractor/Landscape Management Team TBC	Production of Contractor's Method Statement or Specification for installation of boxes/species specific habitat features. Ensuring this is approved and agreed by relevant parties including project manager and ecologist. Carrying out these works to a high standard according to methodology.
Item 5	Bird Mitigation – Mitigation for Veteran Tree Loss			
Item 9	Bat Boxes/Bricks			
Item 11	Hedgehog Mitigation – Hedgehog Boxes			
Item 23	Urban Bird Boxes			
Item 24	Hedgehog Boxes			
All	All	Maintenance	Appointed Contractor/Landscape Management Team TBC	Production of Contractor's Method Statement or Specification for installation of boxes/species specific habitat features. Ensuring this is approved and agreed by relevant parties including project manager and ecologist. Carrying out these works to a high standard according to methodology.
Item 3	Stag Beetle/ Reptile Mitigation – Retained Wood Piles			
Item 4	Reptile Mitigation – Hibernacula and Refugia			
Item 5	Bird Mitigation – Mitigation for Veteran Tree Loss			
Item 9	Bat Boxes/Bricks			
Item 11	Hedgehog Mitigation – Hedgehog Boxes			
Item 23	Urban Bird Boxes			
Item 24	Hedgehog Boxes			
Item 16	Woodland/Tree Lines	Installation	Appointed Contractor/Landscape Management Team TBC	Production of Contractor's Method Statement and Specification for planting of
Item 17	Hedgerows			

Item	Habitat Feature	Details	Organisation	Responsible For
Item 18	Habitat Enhancement – Semi-Improved Grassland		Management Team TBC	trees, shrubs, ground preparation and any seeding.
Item 19	Habitat Creation – Ponds			Ensuring this is approved and agreed by relevant parties including project manager and ecologist.
Item 20	Watercourse Mitigation – SUDS (Sustainable Urban Drainage System) Installation			Carrying out these works to a high standard according to methodology.
Item 16	Woodland/Tree Lines			
Item 17	Hedgerows	Maintenance	Appointed Contractor/Landscape Management Team TBC	Production of Contractor's Method Statement and Specification for planting of trees, shrubs, ground preparation and any seeding.
Item 18	Habitat Enhancement – Semi-Improved Grassland			Ensuring this is approved and agreed by relevant parties including project manager and ecologist.
Item 19	Habitat Creation – Ponds			Carrying out these works to a high standard according to methodology.
Item 20	Watercourse Mitigation – SUDS (Sustainable Urban Drainage System) Installation			

8. After Care, Maintenance, Monitoring and Remedial Measures

8.1 Introduction

This section outlines an ecological management plan for the proposed habitat enhancement and replacement features, summarising recommendations for ecological maintenance, monitoring and remedial measures.

8.2 Maintenance, Monitoring and Remedial Measures

Table 11 provides a summary of recommendations for maintenance, monitoring and enhancement of habitat features for Parcel O2.

Table 11. Ecological Maintenance, Monitoring and Remedial Measures for Habitat Features

Habitat Feature	Work Type	Recommendations	Year of Implementation				
			1	2	3	4	5
Item 3: Stag Beetle / Reptile Mitigation – Retained Wood Piles	Management	Any trees felled on site as part of Arboriculture Strategy will have their felled limbs and stems retained for incorporation within the SANG. - The largest felled trunk sections placed flat on the ground in appropriate locations; 'Loggeries' of multiple vertically positioned trunk or stem sections (10-15cm diameter) sunk into the ground together to an approximate depth of 60cm ; and - Log piles, preferably incorporating leaf litter. - Invertebrate shelters to be erected 1.5ms from the ground on appropriate trees. Retained dead wood can be secured with wire mesh, fenced off or hidden within vegetation if required.	At the time of tree removal				
	Monitoring	Condition of deadwood loggeries and shelters should be monitored. If large amounts of wood have been removed (by human activity) this should be replaced. Check degradation level of wood within loggeries.		✓	✓	✓	✓
	Remedial Measures	Replace any removed wood. Once the wood or shelter has become overly degraded, this should be replaced.		✓	✓	✓	✓
Item 5: Bird Mitigation – Mitigation for Veteran Tree Loss	Management	Nesting boxes should be erected to mitigate for the loss of semi-mature trees.	✓				
	Monitoring	Fixings should be inspected annually to ensure the nest boxes are present, firmly fixed and are not damaged. Any issues should be rectified as outlined above. This check should be made when the boxes are being cleaned.		✓	✓	✓	✓
	Remedial Measures	All bird boxes should be cleaned out once a year (outside the nesting season March to August inclusive) to get rid of any lingering parasites, to remove any unhatched eggs and old nest material. They should then be put back in place ready for the following nesting season. Hole-fronted boxes should be cleaned out in October. Open-fronted boxes should be cleaned out in late winter (February) as boxes may be used over-winter as roosting sites for smaller birds such as wrens so should be left undisturbed during this time. Any old nests should be removed entirely, and the box should preferably be cleaned with boiling water to kill-off any remaining parasites. Any damaged or missing boxes should be repaired or replaced as necessary. The boxes should then be replaced in their original positions.		✓	✓	✓	✓
Items 9: Bat Bricks / Boxes	Management	The bricks recommended above have been selected to be low maintenance, with entrance holes at the bottom of the bat box so that droppings do not build up within the box. Routine maintenance is not required.	At time of building construction				

Habitat Feature	Work Type	Recommendations	Year of Implementation				
			1	2	3	4	5
		Bat bricks will be owned by the owners of the buildings into which they are incorporated.					
	Monitoring	Fixings will be visually inspected non-intrusively to ensure that bat boxes are firmly fixed in place and that boxes are not damaged.		✓	✓	✓	✓
	Remedial Measures	Any damaged fixings or boxes will be replaced as necessary. Remedial works which involve any contact with the bat box will be undertaken by, or under the supervision of, a licensed bat worker ³⁰ .	Bat bricks should constitute a permanent feature and are unlikely to require replacement. If a brick does require maintenance the advice of a licenced bat worker should be sought.				
Item 11: Hedgehog Mitigation – Hedgehog Boxes	Management	Hedgehog boxes can be incorporated into brash piles (see reptile mitigation) or purpose built mounds (British Hedgehog Preservation Society, undated)	✓				
	Monitoring	The condition of hedgehog boxes should be monitored yearly		✓	✓	✓	✓
	Remedial Measures	Any damaged or missing boxes should be repaired or replaced as necessary. The boxes should then be replaced in their original positions.		✓	✓	✓	✓
Item 14: Non-native Invasive Species Mitigation Strategy	Management	Cotoneaster and Rhododendron to be removed and correctly disposed of.	✓				
	Monitoring	Monitoring for return of these species and the presence of other INNS to be carried out yearly.		✓	✓	✓	✓
	Remedial Measures	If INNS species are found, removal will be carried out according to recommendations		✓	✓	✓	✓
Items 16 and 17: Trees and Hedgerows	Management	Tree/hedge standards will be kept well-watered. Weeds should be controlled around the base of each tree using a mulch layer of minimum 75mm depth. Mulch should be free of live seeds or pathogens. Newly planted hedgerows will be trimmed 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 until a desired height is reached. Detailed management information for established hedgerows is available from a number of sources, including Hedgelink. Pruning will be undertaken during dormant season as required to remove dead, dying and diseased wood and suckers to promote healthy growth and natural shape. Pruning of trees will be undertaken to favour a single central leading stem. Pruning will be carried out in accordance with BS 3998 ³¹ and good horticultural practice using sharp hand-held secateurs.	✓	✓	✓	✓	✓
	Monitoring	Stakes, ties, and guards will be monitored on an annual basis.	✓	✓	✓	✓	✓
	Remedial Measures	Any broken, missing or damaged stakes, ties and guards will be replaced as necessary. Trees / hedge standards that have failed to thrive during the 5 year maintenance program will be replaced with equivalent trees/shrubs of a size to match original specification. Replacement planting will take place during the next suitable planting season. Over mature hedgerows may require coppicing, pollarding or other intervention, retaining a few selected healthy trees, and plant up any gaps.	As necessary				

³⁰ Roosting bats are protected from disturbance under UK and EU legislation. Bat boxes require minimal maintenance but if any boxes need to be removed or inspected, this must be done by a licensed bat worker if there is a possibility of bats being present.

³¹ British Standard for Tree Work.

Habitat Feature	Work Type	Recommendations	Year of Implementation				
			1	2	3	4	5
Item 18: Semi-natural Grassland	Management	Establish the habitat by seeding the area with translocated top soil or a suitable commercial meadow mix, preferably using native, local provenance seed material). Seed should be sown when the weather and soil conditions are suitable during autumn or spring. No seed to be sown in dry or frosty weather or in other unsuitable conditions. No management or mowing in the first two years to allow the sward to develop. Maintenance will be pesticide free. It will vary between establishment phases. For general wildflower meadow after two years - cut in in late summer / early autumn after flowering and again in late autumn / early winter. Do not cut during periods of drought or wet ground conditions. Once established, areas should be cut twice annually to maintain habitat diversity. Remove cuttings as part of mowing to avoid soil becoming overly nutrient rich.	✓	✓	✓	✓	✓
	Monitoring	Monitoring should be biannual and should consist of: - Check for diversity – identifying areas for control of large stands of single species scrub (i.e. bramble); - Ensuring any ruderal is not overly encroaching (e.g. more than 10%) onto grassland to maintain the desired mosaic of habitats; - Identification of planting damaged by animals or human activity; and Identification of any invasive or non-native species for removal.	✓	✓	✓	✓	✓
	Remedial Measures	Removal of any unwanted scrub by hand on an annual basis in January/ February if possible.	As necessary				
Items 19 and 20: Habitat Creation – Ponds and Watercourse Mitigation – SUDS (Sustainable Urban Drainage System) Installation	Management	Where possible, pond maintenance should take place in rotation, so that not all ponds are managed in the same year.		✓		✓	
	Monitoring	Monitoring should be annual, and should ensure: - Adequate water depth (ca. 50% of planned maximum) during summer within each pond. - Ponds are not degraded through colonisation by non-native aquatic invasive species; - Ponds are not degraded through over-dominance/choking by aquatic/marginal vegetation; - Ponds are not degraded through excessive shading by bankside scrub/trees. Targets for individual species can be seen in Table A1³². Monitoring for ditches is as for ponds.		✓	✓	✓	✓
	Remedial Measures	If pond is too shallow or becoming infilled, general aquatic vegetation removal should be undertaken in January to maintain silt level below 500mm from original pond base. Removal of non-native aquatic vegetation should take place annually. Undertake clearance of emergent vegetation on a rotational basis (5-7 years or as required) to maintain clear areas within the ponds. Remove scrub in early September to ensure shading of pond is not excessive. Maintenance for ditches is as for ponds. Vegetation clearance will likely be required from Year 5.	As necessary, alternating with other nearby pond management if possible.				

³² AECOM (2014) *Arborfield Garrison SANG Strategy. Environmental Statement Appendix 13.9*

Habitat Feature	Work Type	Recommendations	Year of Implementation				
			1	2	3	4	5
Item 23: Urban Bird Boxes	Management	All bird boxes/bricks will be cleaned out once a year (outside the nesting season March to August inclusive) to get rid of any lingering parasites, to remove any unhatched eggs and old nest material. They will then be put back in place ready for the following nesting season. Any old nests will be removed entirely, and the box should preferably be cleaned to prevent parasites from persisting over the winter. Any damaged or missing boxes should be repaired or replaced as necessary. The boxes should then be replaced in their original positions. Bird bricks will be owned by the owners of the buildings into which they are incorporated.	✓	✓	✓	✓	✓
	Monitoring	Fixings will be inspected annually to ensure the nest boxes are present, firmly fixed and are not damaged. Any issues should be rectified as outlined above. This check should be made when the boxes are being cleaned.	✓	✓	✓	✓	✓
	Remedial Measures	Any damaged bird boxes will be replaced, in suitable locations as outlined above.	As necessary.				
Item 24: Hedgehog Boxes	Management	Hedgehog boxes should be cleaned out once a year (in March/April or September/October – outside of the hibernation and breeding seasons) to get rid of any lingering parasites and remove old nest material. Boxes can be part refilled with hay as nesting material. They should then be put back in place Any damaged or missing boxes should be repaired or replaced as necessary. The boxes should then be replaced in their original positions.	✓	✓	✓	✓	✓
	Monitoring	Boxes should be inspected annually to ensure boxes are present, firmly fixed and are not damaged. Any issues should be rectified as outlined above. This check should be made when the boxes are being cleaned.	✓	✓	✓	✓	✓
	Remedial Measures	Any damaged boxes should be replaced, in suitable locations as outlined above.	As necessary				

9. Conclusion

This report has been produced to meet the requirements of Condition 18 of the Outline Planning Decision O/2014/2280 (Wokingham Borough Council) for the Proposed Development.

This detailed Landscape and Ecology Management Plan for the Proposed Development follows the mitigation, contingency and enhancement measures contained within Table 13.23 of the Environmental Statement³³ and the submitted Arborfield Garrison Biodiversity Action Plan³⁴.

Assuming that the Local Planning Authority approves the detailed mitigation, contingency and enhancement measures described in this report, they will be implemented in accordance with the approved plan.

This report therefore has addressed the requirements of Condition 18 and it may be used to discharge this condition.

³³ AECOM (2014) *Arborfield Garrison Strategic Development Location. Arborfield Environmental Statement*

³⁴ AECOM (2014) *Arborfield Garrison – Biodiversity Action Plan. Environmental Statement Appendix 13.10*

Appendix A Figures

Figure 1: Arborfield Parcel O2 Ecological Enhancements

Species	Enhancement	Minimum Provision
Bats	Bat bricks	7
Swifts	Triple cavity swift box	7
House martin	House martin colony box	1
House sparrow	House sparrow terrace box	3
Starling	Starling box	1
Birds (widespread species)	Woodcrete bird box	6
Stag beetle / Reptile	Retained log pile	4
Hedgehog	Hedgehog box	2
Hedgehog	Boundary fence portals	1 per length of garden boundary

Hedgehog box
Concealed as dap as possible within the perimeter
May need to be covered in roof felt to protect from weather
Near log / brash piles



Log piles
Located near the perimeter
Wood from felled trees and scrub
Secured with wire and fenced off from public



Hedgehog fence gravel boards
Installed within wooden garden fencing
Gap under fence door
Gap under fence door





Starling box Entrance 45mm Install externally on trees (semi-mature / heavy standard) Hanging on nail from trunk At least 3m height North and east aspects (out of direct sunlight)	Woodcrete bird box Entrance 32/28mm Install externally on trees (semi-mature / heavy standard) Hanging on nail from trunk At least 3m height North and east aspects (out of direct sunlight)	Schwegler 1FR Bat Tube Install externally on buildings At least 3m in height South and south east aspects for daytime warming
		
Schwegler Triple Cavity Swift Nest Box Install externally on buildings At least 5m in height, under the eaves North and east aspects (out of direct sunlight)	House martin colony box Install externally on buildings At least 5m in height, under the eaves North and east aspects (out of direct sunlight)	Vivara Pro Woodstone House Sparrow Terrace Install externally on buildings At least 4m in height, under the eaves North and east aspects (out of direct sunlight)
		

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NOTES
Aerial Imagery: Maxar, Microsoft

- LEGEND
- Red Line Boundary
 - Starling Box
 - House Sparrow Terrace Box
 - General Bird Box
 - Swift Colony Box
 - Hedgehog Box
 - Integral Bat Brick
 - Retained Wood Piles

CONSULTANT
AECOM Limited
Aldgate Tower
2, Leman Street
London, E1 8FA
United Kingdom

PROJECT
Arborfield Green - Parcel O2

PROJECT NUMBER
60728610

FIGURE TITLE
Arborfield - Parcel O2 – Ecological Enhancements – Landscape and Habitat Management Plan

FIGURE NUMBER
Figure 1



Appendix B Environmental Statement Reference AGLC/HPA/DOC/5 (AECOM, October 2014) and Parcel O2 Response

Table 12: Mitigation Items Summary

Mitigation Ref No.	Mitigation Item	Receptor(s)	SDL Description	Proposed Development Response
Construction				
1	General Construction Mitigation – Construction Environmental Management Plan (CEMP)	All Ecological Receptors	The CEMP will specify general construction phase mitigation applicable to ecological receptors such as reptiles, breeding birds, hedgehog, bats and badger. It will provide specific recommendations (such as Reasonable Avoidance Measure) linking to the Reptile and Bat Mitigation Strategies and will link to the requirements of any Natural England licences in place. The CEMP will also function as a tool for workforce education through inductions and toolbox talks. The CEMP will also contain recommendations for prevention of pollution and other environmental considerations.	CEMP to be produced independently.
2	Arboricultural Impact Assessment and Method Statement	Broadleaved woodland Hedgerow Veteran trees Hogwood Shaw LNR	Arboricultural Impact Assessment and Method Statement will be employed concurrently with the CEMP to ensure the protection of all trees to be retained across Site. Protection of the ground, canopy and roots will be ensured through a variety of measures such as the adherence to Root Protection Areas (RPAs) according to BS 5837:2012	Arboricultural Impact and Method Statement to be produced independently.
3	Stag Beetle / Reptile Mitigation – Retained Dead Wood Piles	Stag beetle Reptiles	Any trees felled on Site as part of the Arboricultural Method Statement will have suitable felled limbs and stems retained for incorporation within the SANGS and green corridors as three different habitat features; - The largest felled trunk sections placed flat on the ground in appropriate locations; - Loggeries of multiple vertically positioned trunk or stem sections (10-15cm diameter) sunk into the ground together to an approximate depth of 60cm ; and - Log piles, preferably incorporating leaf litter. This will create dead wood habitat that will primarily benefit stag beetle but will also act as refugia for reptiles and hedgehogs as well as benefiting other dead wood dependent invertebrates. Retained dead wood can be secured with wire mesh, fenced off or hidden within vegetation if required.	Retained dead wood piles are to be incorporated into the completed development.
4	Reptile Mitigation – Hibernacula and Refugia	Reptiles	Suitable hibernacula and refugia for reptiles will be installed throughout the SANGS, the exact number and location to be specified by the Reptile Mitigation Strategy. Hibernacula and refugia will provide additional hibernation and sheltering sites for reptiles across the Site, improving the value of this habitat. The following types are proposed: - hibernacula; - log piles (see stag beetle); - brash piles; and - egg laying sites.	No specific egg laying or hibernacula are recommended in the residential parcel as Hazebrouck Meadows SANG provide opportunities immediately east. Dead wood and brash piles are to be incorporated into the completed development.

Brash piles and egg laying sites will also act as suitable refugia / hibernacula for hedgehogs.

5	Bird Mitigation – Mitigation for Veteran Tree Loss	Breeding birds Priority bird species	Where trees are to be lost, suitable replacement nesting boxes should be erected to mitigate for the loss of large cavities, hollows or confirmed nests. The type and number of boxes will be guided by the results of ecological surveys but are likely to be nest boxes for species such as tawny owl, kestrel and woodpeckers.	No veteran trees to be lost. General replacement nest boxes are to be incorporated into the completed development.
6	Bird Mitigation – Existing House Martin Colony Replacement	Breeding birds	The existing swift colonies within Hazebrouck and Rowcroft Barracks (B40a and B41a) should be maintained through encouraging these colonies to become established on other buildings. Prior to demolition swift boxes should be installed on any suitable nearby buildings to be retained (such as the Moat House, B42) where possible. This will provide mitigation throughout the construction phase. Audio calls of swifts should also be played during May to July to encourage box use (Swift Conservation Trust, 2013). At least two new public buildings should have replacement nest boxes installed to maintain the presence of these colonies with 10 to 20 boxes (Williams, 2010) installed per building. These should preferably be as swift bricks integral to the building but swift boxes under the eaves can also be used.	No swift colony previously present within Parcel O2.
7	Priority Bird Species Construction Mitigation – Red Kite Noise and Disturbance Mitigation Strategy	Priority bird species	The potential for construction phase disturbance upon nesting red kite will be addressed through the provision of a 'Noise and Disturbance Mitigation Strategy'. These will be specific recommendations additional to those within the CEMP. This is likely to include additional monitoring surveys and will require consultation with Natural England	N/A - No Schedule 1 species have been recorded nesting within the Proposed Development.
8	Bat Mitigation – Alternative Roost Provision: Bat Barns	Roosting Bats Foraging and Commuting Bats	The primary alternative roost provision across the Site will be provided by the provision of a minimum of three bespoke bat barns. One bat barn will be provided within each unit of SANG (2 in the northern SANG, 1 in West Court); with their design and location specified within the Bat Mitigation Strategy, exact design to be confirmed by the principal contractor. Each barn will provide alternative roosting provision for any building roosting species on site with more specific targeting towards the rarer, light sensitive or roof void dependent species. The existing cricket pavilion and potentially the stable building (adjacent to the north of Rowcroft) have been identified for possible enhancement as bat barns. Due to the stables status as a listed building, enhancement features will be through internal enhancement only.	Bat bricks / boxes are to be incorporated into the Proposed Development.
9	Bat Mitigation – Alternative Roost Provision: Bat Bricks / Boxes on Buildings	Roosting Bats Foraging and Commuting Bats	Additional alternative roost provision will be provided throughout the development in the form of bat bricks installed within some of the retained or newly built public buildings. Bricks are the preferred option, but boxes can be used where brick installation is not feasible. These bat bricks will provide alternative roosting provision for the more urban and light tolerant species that roost in crevices and spaces within the existing garrison buildings.	Bat bricks / boxes are to be incorporated into the Proposed Development.
10	Bat Mitigation – Alternative Roost Provision: Bat Boxes on Trees	Roosting Bats Foraging and Commuting Bats	Additional alternative roost provision will be provided throughout the green corridors across the Site in the form of bat boxes. These will be installed on trees within the green corridors and will also mitigate for loss of any trees with roosting features across the Site. Boxes will also be installed within the SANGS areas where appropriate.	No bat boxes on trees will be incorporated into the completed development as there are 5 existing bat boxes for Rowcroft mitigation licence adjacent west of Parcel O2.

11	Hedgehog Mitigation – Hedgehog Boxes	Hedgehog	Hedgehog boxes can be incorporated into brash piles (see reptile mitigation) or purpose-built mounds (British Hedgehog Preservation Society, undated) within the SANGS and green corridor areas.	Hedgehog boxes are to be incorporated into Parcel O2.
12	Badger Mitigation – Bait Marking and Monitoring	Badger	Use of bait marking to monitor the extent of habitat use by badger social groups will determine which habitats badger are utilising for foraging. This will assist in refining habitat area and corridors mitigation to ensure these areas continue to be used by badgers. Sett status can also be monitored as part of these surveys. Badger surveys for newly established setts and bait marking to monitor social group territory use will be conducted. This will record any new setts that may be affected by development and to monitor the known main sett to inform any further mitigation work required.	N/A - no badger setts are known to be present within Parcel O2.
13	Badger Construction Mitigation – Construction Phase Badger Sett Closure	Badger	Badger sett closure will be carried out under Natural England development licence with the use of one way gates, 21 days minimum monitoring and ecological supervision as required by Natural England guidance (Natural England, 2011)	N/A - no badger setts are known to be present within Parcel O2.
14	Non-Native Invasive Plant Species Mitigation Strategy	Non-Native Invasive Plant	This strategy will specify RAMS for the avoidance of the spread on non-native invasive plant species such as Japanese knotweed, rhododendron, cotoneaster and cherry laurel and provide recommendations for the control and disposal of these species. This is further detailed within Appendix 13.11. Management of these species is also recommended.	Rhododendron and cotoneaster removal recommended as described above and in Non-Native Invasive Species Strategy Recommendations are given within the Reserved Matters Report.

Operational

15	Habitat Creation - Woodland	Broadleaved woodland Breeding Birds Priority Bird Species Foraging and Commuting Bats Hedgehogs Badger	Creation of additional woodland habitat and tree lines will be implemented within the SANGS areas. This habitat will be native and of local provenance and designed by an ecologist in conjunction with a landscape designer benefiting multiple species.	N/A - no woodland to be lost and Parcel O2 is not proposed for woodland creation.
16	Habitat Enhancement - Tree Lines and Hedgerows	Broadleaved woodland Hedgerow Breeding Birds Priority Bird Species Foraging and Commuting Bats Hedgehogs Badger	Enhancement will be implemented using native, and of local provenance, trees and designed by an ecologist in conjunction with a landscape designer. Mitigation target will be to increase species diversity where appropriate and also improve tree line / hedgerow connectivity and structure benefiting multiple species.	130m of species-poor hedgerow to be lost from Parcel O2. Replacement native hedgerow will be planted within Proposed Development. Any garden/ ornamental hedgerow and tree planting should include species from the recommended native planting list.
17	Habitat Creation - Hedgerow	Hedgerow Breeding Birds Priority Bird Species Foraging and Commuting Bats Hedgehogs	Creation of additional hedgerow will be implemented within the SANGS area, primarily within West Court SANGS. This habitat will be native and of local provenance and designed by an ecologist in conjunction with a landscape designer benefiting multiple species.	130m of species-poor hedgerow to be lost from Parcel O2. Replacement native hedgerow will be planted within the Proposed Development. Any garden/ ornamental hedgerow and tree planting should include species from the recommended native planting list.

18	Habitat Enhancement – Semi-Improved Grassland	Improved grassland Poor semi-improved grassland Reptiles Breeding Birds Priority Bird Species Foraging and Commuting Bats	Enhancement by management of grassland within the SANGS will be implemented using native, and of local provenance, trees and designed by an ecologist in conjunction with a landscape designer. Enhancement will be achieved by the appropriate management and planting of existing grassland for conversion to semi-improved grassland of greater wildlife value. Habitat enhancement will target an increase of species diversity, improvement in habitat structure benefiting multiple species.	Proposed Development is not within a SANG.
19	Habitat Creation – Ponds	Waterbodies – Ponds Foraging and Commuting Bats Water Vole	Creation of additional ponds across both SANGS and the site will greatly increase the prevalence of this habitat type. Pond design, creation and management will be designed by an ecologist in conjunction with a landscape designer. A central 'mill pond' as part of the new 'village green' near the former stables (B47) will also enhance this area for a number of species. Long term management will be designed to retain the value of this habitat for wildlife through factors including management of vegetation, water depth and habitat succession.	Two SuDS ponds to be incorporated within the Proposed Development.
20	Watercourse Mitigation – SUDS (Sustainable Urban Drainage System) Installation	Waterbodies – Ponds Waterbodies – Streams Waterbodies – Lake Foraging and Commuting Bats Water Vole	Permanent SUDS and settlement ponds will prevent operational pollution from entering the watercourses via surface water runoff. Some ponds forming part of the SUDS will be permanently water filled, created additional pond habitat to benefit species such as bats. The creation and maintenance of a complex riparian zone can reduce the disturbance impact of the proposed scheme and will also form part of the Site's green infrastructure. SUDS implementation will be undertaken by a landscape designer in liaison with an ecologist.	SuDS pond to be incorporated within the Proposed Development.
21	Habitat Mitigation - Green Corridor Retention and Management	Broadleaved woodland Hedgerows Waterbodies - Streams Waterbodies - Ditches Waterbodies – Lake Reptiles Breeding Birds Priority Bird Species Roosting Bats Foraging and Commuting Bats Water vole Hedgehogs Badger	The implementation and maintenance of the Green Corridor network as part of the Green Infrastructure Strategy will benefit biodiversity across the Site as a whole. The linear park throughout the centre of the Site maintains links between key habitats (lake, woodland, ditches, hedgerows) across the Site, maintaining their function as foraging, breeding and commuting habitat for a wide range of species. Green corridor retention links to a number of further specific mitigation items detailed separately including: • Reptile Mitigation • Bat Mitigation; • Badger Mitigation; and • Habitat Mitigation	A hedgerow will be provided within the Proposed Development.
22	Habitat Mitigation – Dark Corridor Management	Breeding Birds Priority Bird Species Roosting Bats Foraging and Commuting Bats Hedgehogs Badger	A dark corridor network will be implemented across the Site to provide nocturnal species such as bats and badger with a foraging and commuting corridor across the Site. This will be designed and implemented as a lighting strategy within the bat mitigation strategy. This will interlink with the Green Infrastructure Strategy to identify areas to be maintained with a level of no, or very low, artificial light.	A Primary dark corridor surrounds the Site and composes part of the northern section of Parcel O2. Mitigation measures will be taken to minimise light spill in the boundary areas.
23	Bird Mitigation - Urban Bird Boxes	Breeding Birds Priority Bird Species	The installation of bird boxes on public buildings throughout the development will provide	Bird boxes are to be installed on suitable buildings (and trees) across

	(Starling / House Sparrow/ Swift)		compensatory nesting habitat for urban associated bird species. Bird boxes for the following species should be installed across the Site at a density that meets the following provision: • house martin: 1 box per 50 buildings; • swift: 1 box per 20 buildings; • house sparrow: 1 'terrace' type box per 40 buildings; • starling: 1 box per 100 buildings either on buildings or trees.	the Site for Starling, Swift, House Martin, and House Sparrow.
24	Hedgehog Mitigation – Hedgehog Boxes	Hedgehog	Hedgehog boxes will be installed to provide valuable habitat, being installed within log piles, under hedgerows or within mounds. This will provide opportunities for shelter and hibernation.	Hedgehog friendly boxes to be installed within Parcel O2 where/if required.
25	Badger Mitigation – Provision of Road Crossing Tunnels	Badger	The provision of two appropriately designed road tunnels / underpasses in conjunction with badger fencing will provide badgers with a preferred road crossing route to avoid the risk of road traffic accidents. The tunnels will also help to maintain a degree of habitat connectivity, allowing badgers to commute across the Site. Note that badger fencing does NOT need to be badger proof, as this is a higher specification of fencing for the exclusion of badgers which is not required.	N/A - due to the small residential roads planned as part of Parcel O2 development and proximity away from main setts.

AECOM Limited
Saltom Suite, Fleswick Court
Westlakes Science & Technology Park
Moor Row CA24 3HZ
United Kingdom

T: +44 (161) 237 6970