Red & Yellow Specialist Extra Care

Melliss Avenue - Kew

Biodiversity Strategy

October 2018

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Quality information

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1. Introduction

AECOM Infrastructure and Environment UK Ltd. ("AECOM") was instructed by Melliss Ave Devco Limited ("Client") to prepare a Biodiversity Strategy for a Proposed Development at the former Kew Biothane Site, Melliss Avenue, Kew TW9 4BD (hereafter referred to as the Site) located in the London Borough of Richmond. The Site is approximately 0.7ha in size and is proposed for the demolition of existing buildings and structures, and redevelopment of the Site to provide a Specialist Extra Care facility (C2 Use Class) for the elderly with existing health conditions. This comprises 89 units, with extensive private and communal healthcare, therapy, leisure and social facilities set within a building of ground plus 3 to 5 storeys including set backs. Provision of car and cycle parking, associated landscaping and publicly accessible amenity spaces including a children's play area are also part of the development plan.

The purpose of this report is to detail the recommended specifications of new habitats and ecological enhancement measures to be included within the design of the proposed scheme. All recommendations conform to the policies outlined in the revised National Planning Policy Framework (NPPF, 2018[1]), and within the regional and local planning policy outlined in

[1] Revised National Planning Policy Framework https://www.gov.uk/government/collections/revised-national-planning-policy-framework

Table 3 & Table 4 of Appendix A. In accordance with the NPPF, and the London Plan[2], through this development the provision of ecological enhancements are required to achieve a no net loss of biodiversity. Richmond Council's newly adopted Local Plan[3] encourages the implementation of biodiversity enhancements in areas of new development, and requires the installation of green roofs (see Appendix A). In addition, bat and bird bricks must be incorporated into the build design.

All habitats and ecological enhancement features described in this report have been designed to maximise the Site's biodiversity value whilst providing the necessary space and facilities for the elderly residents of the development. However, the variety of habitats and their associated floristic and vegetative communities proposed will benefit wildlife such as invertebrates, birds, bats and small mammals which, consequently, will also positively contribute to the health and wellbeing of the elderly residents with existing health conditions[4].

If all recommendations are implemented, the creation of new habitats and implementation of ecological enhancements detailed in this report would be expected to cover 4,294 m^2. The habitats assessed to be of value to biodiversity, recorded during the Phase 1 habitat survey, in total comprised 3,586 m^2. Therefore, it is anticipated that the Proposed Development will contribute to a net increase of 708 m^2 of habitats of value to biodiversity. In accordance with local planning policies and to achieve overall biodiversity enhancement through the Proposed Development, the measures outlined within this report have been considered within the Landscape Masterplan. All habitats and enhancement measures have been designed to benefit pollinating insects, bird, bats and small mammals, and also aims to increase local green infrastructure coverage.

It is intended that this Biodiversity Strategy document will be submitted to the London Borough of Richmond upon Thames Council to accompany the Preliminary Ecological Appraisal[5] as part of the planning application for the Proposed Development at Melliss Avenue (former Kew Biothane Site).

[2] The London Plan (March 2016) https://www.london.gov.uk/sites/default/files/the_london_plan_2016_jan_2017_fix.pdf
[3] London Borough of Richmond upon Thames Local Plan (adopted July 2018) https://www.richmond.gov.uk/media/15935/adopted_local_plan_interim.pdf
[4] Gaston, K. J. (2010). *Urban ecology*. Cambridge University Press, Cambridge.

[5] AECOM (August 2018). Melliss Avenue, Kew: Preliminary Ecological Appraisal.

2. Scheme of Measures to Enhance and Promote Biodiversity

The scheme of ecological enhancement measures within this document have been devised with reference to landscape design drawings prepared for the Site. All proposed areas of habitat creation within the Site post-development are illustrated within the Biodiversity Strategy Landscaping (Appendix B). The design is taken from the Melliss Avenue Landscape Package (August, 2018) and includes the following proposed habitats:

- Biodiverse Green Roof, minimum 150mm substrate depth (975 m^2);
- Meadow habitat (339m^2);
- Tall native shrub planting (1110 m^2);
- Low native shrub planting (520 m^2);
- Ornamental shrub planting for pollinators (517 m^2);
- Native trees (621 m^2); and,
- Lawn (191 m^2).

Although listed as a 'biodiverse green roof' within the Landscape Masterplan, it is anticipated that a biosolar living roof is likely to be installed.

In addition to the proposed habitat creation, the following ecological enhancements will are also recommended:

- Bird nest boxes;
- Bat roost boxes;
- Invertebrate habitat boxes; and,
- Deadwood piles & loggeries.

Recommendations to maximise the biodiversity value of these habitats are discussed Section 2.2.

2.1 Habitat creation

2.1.1 Urban meadow

General description

It is proposed that a species-rich wildflower meadow, covering approximately 339 m^2 is created within the east facing resident's garden. This habitat aims to partially mitigate the loss of semi-improved grassland, and in conjunction with other nectar and pollen rich habitats, enhance the Site for invertebrates, with a particular emphasis on pollinating insects. This habitat will benefit insects such as bumblebees, London Biodiversity Action Plan6 (BAP) species. This habitat will also connect with adjacent linear shrub and scrub habitat to provide an un-fragmented habitat to allow for movement of hedgehogs (Erinaceus europaeus), a national and

[6] London Biodiversity Action Plan (Priority Species) - http://www.gigl.org.uk/london-bap-priority-species/

local priority species listed under Section 41 of the Natural Environment and Rural Communities Act (NERC) (2006)7 and London BAP.

It is recommended that Emorsgate EM48 seed mix is sown within this habitat. This seed mix comprises a total of 25 species including 17 wildflowers and eight grasses. Species include yarrow (Achillea millefolium), betony (Stachys officinalis), meadowsweet (Filipendula ulmaria), lady's bedstraw (Galium verum), oxeye daisy (Leucanthemum vulgare), common bent (Agrostis capillaris) and meadow foxtail (Alopecurus pratensis).

Management and maintenance

Sowing is best undertaken in autumn or spring but can be undertaken at other times of year if the soil is sufficiently moist and warm. For successful establishment it is recommended that the Emorsgate Seeds Sowing and Growing Guide is followed9.

Upon establishment, management should be limited to cutting once in spring (75mm height in late April) and once in late September (40mm height) after plants have set seed, and removing all arisings. Cutting can be limited to one cut in late September, however two cuts will be required if unwanted species such as thistles and nettles start become abundant, or if grasses dominate the grassland sward. A range of vegetation heights will maximise the flower diversity and will provide habitat for a range of invertebrate species. During the first year, a single mow should be restricted to a 40-60mm height to help control annual weeds, supress dominance of fast growing grasses and promote growth of wildflowers.

2.1.2 Biosolar Living Roof

General description

Biosolar involves installing photovoltaic solar panels (PVs) on top of a living roof. The placement of the PVs upon the base substrate creates a variety of different light conditions and microclimates which ultimately result in the creation of microhabitats upon the living roof. The shading created by the solar panels is likely to create areas of bare ground suitable for many ground burrowing invertebrates and provides partially shaded areas in which will favour less sun-favouring plant species.

It is proposed that a biosolar roof is installed upon 975 m^2 area of the care centre's roof. The living roof will be designed to provide habitat for invertebrate species (a key food source for many bird species as well as an important ecological resource in itself) through the provision of a range of wildflower species. The wildflower species selected should aim to provide both structural diversity and a variety of nectar rich resources for pollinating insects. Moreover, the addition of the solar PVs will create multiple shaded areas on the living roof, resulting in a range of light conditions and micro-climates which will establish micro-habitats. A planting specification for a potential biosolar roof has been devised; this contains a range of shade tolerant grasses and wildflower species to enable establishment of said micro-habitats.

An extensive (rather than intensive)[10] biodiverse wildflower roof is recommended for installation at Melliss Avenue. This will either be plug planted or seeded. It is also

[7] Natural Environment and Rural Communities Act 2006 https://www.legislation.gov.uk/ukpga/2006/16/contents
[8] Emorsgate Seeds EM4 Meadow Mixture for Clay Soils https://wildseed.co.uk/mixtures/view/5/meadow-mixture-for-clay-soils
[9] Emorsgate Seeds Sowing Guide https://wildseed.co.uk/page/sowing
[10] An extensive green roof is defined as having thin soil, little or no irrigation requirement, low water retention and nutrient poor conditions for plants. An intensive roof is defined as having deep soil, irrigation requirements, high water retention and fertile

recommended that a minimum of 42 species selected from the 54 species listed within the planting specification in Appendix C be planted/sow, regardless of the planting method used. This list comprises a range of 54 grasses, annual wildflowers, biennial wildflowers, perennial wildflowers and non-native, non-invasive perennials beneficial for pollinating insects.

The proposed living roofing system can be provided and installed by a supplier such as Bauder[11] or ANS Global[12].

Management and maintenance

If a seed mix is used on the living roof, 85% of the seed mix should comprise wildflowers, 20% of which should comprise annual wildflowers. The remaining 15% should be sown with grasses. Sowing is best undertaken in autumn or spring but sowing can be undertaken at other times of year if the soil conditions stay warm and moist. The seed mix should be bulked with an inert carrier to make distribution of the seeds easier. Irrigation is likely to be required during dry spells during establishment.

However, if plug plants are used, in order for successful establishment of plants, the maintenance advice provided below[13] (or that of the supplier, if it differs) should be followed:

Substrate and plants must be kept damp for a period of ten weeks post-installation due to the presence of native species plugs; irrigation may be necessary for longer if following a warm, dry spell of weather.

Inspections should be carried out twice in each year to remove any unwanted tree species establishing and outcompeting those planted, and removal of litter that could detract from the roofs biodiversity value (preferably during spring and autumn).

Remove any vegetation encroaching drainage outlets etc.

Once plug plants have established, wildflower seeds can be added to complement the species mixture or increase cover of wildflowers if required. The coverage of plug plants should also aim to achieve 85% coverage of wildflowers and 15% grass coverage.

Upon establishment, in order to maintain a wildflower-rich floral community, management should be limited to cutting once in late April and once in late September after plants have set seed, and removing all arisings. Cutting can be limited to one cut in late September, however two cuts will be required if unwanted species such as thistles and nettles start become abundant, or if grasses dominate the grassland sward. On the whole, the selected species list generally contains low growing species. However, two seasonal cuts may be required if the sward height exceeds that of the solar photovoltaic panels, creating a shading effect.

condition for plants - see CIRIA, 2007. *Building Greener. Guidance on the use of green roofs, green walls and complementary features on building*.

[11] Bauder: Extensive green roof vegetation - http://www.bauder.co.uk/assets/b/a/bauderextensivegreenroofvegetation.pdf

[12] ANS Global GrufeKit green roof system https://www.ansgroupglobal.com/green-roof/about

[13] Bauder: Green roof maintenance http://www.bauder.co.uk/green-roofs/maintaining-your-green-roof

2.1.3 Ornamental Planters for Pollinating Insects

General description

Ornamental plant beds and planters are proposed for both east and west facing gardens, covering a 517m^2 area. A total of 15 species have been chosen for these areas, and will not only provide a fragrant and aesthetically pleasing environment for residents, but also provide a valuable refuge, nectar and pollen resource for invertebrates in conjunction with the other proposed habitats.

The species listed in Table 1 have been selected and includes several pollinator-beneficial sensory species. These plants have been selected for their ability to withstand drought conditions and exposure to harsh weather, and for their potential value to pollinating insects such as bees, butterflies and hoverflies[14].

Table 1 Ornamental planter planting specification

Common name	Binomial nomenclature	Plant type
Star magnolia	*Magnolia stellata*	Shrub
Arrowwood	*Viburnum x bodnantense* 'Dawn'	Shrub
Forsythia 'Lynwood Variety'	*Forsythia intermedia* 'Lynwood'	Shrub
Spotted deadnettle	*Lamium maculatum* 'Beacon Silver'	Perennial herb*
Peppermint	*Mentha x piperita*	Perennial herb
Holly olive	*Osmanthus heterophyllus*	Shrub
Common foxglove	*Digitalis purpurea*	Biennial herb*
Candle larkspur	*Delphinium elatum*	Perennial herb*
Perennial phlox	*Phlox paniculata*	Perennial herb*
Bloody cranesbill	*Geranium sanguineum*	Perennial herb*
Bugle	*Ajuga reptans*	Perennial herb*
Common lavender	*Lavandula angustifolia*	Shrub*
Egyptian lupin	*Lupinus albus*	Perennial herb
Japanese spirea	*Spiraea japonica*	Shrub*
African lily	*Agaphanthus africanus*	Perennial herb

*RHS Plants for Pollinators[15]

[14] Pollinator friendly plants http://www.lbka.org.uk/pollinator_friendly_plants.html
[15] RHS Plants for Pollinators https://www.rhs.org.uk/science/conservation-biodiversity/wildlife/plants-for-pollinators

Management and maintenance

All chosen plants require well drained soil, it is therefore essential that all planters drain appropriately.

During the establishment period it is important that all plants are watered initially, with subsequent frequent watering during dry sunny spells. If there is a risk of frost during the establishment period, plants should be covered with a sheet overnight.

It is recommended that any planter shrubs are cut back in late winter (i.e. February) to prevent individual plants from overgrowing.

2.1.4 Native Transitional Habitat Planting

General description

The landscape proposals include a soft habitat transition from the east garden to the broadleaf woodland habitat adjacent to the Site present along Kew Riverside Walk. Within the Landscape Masterplan, these habitats are labelled as 'Low Native Shrub Plantings' and 'Tall Native Shrub Plantings'. However, it is important to note that these habitats contain a variety of native herbs, shrubs, ferns and woody species typical of woodland and scrubland, many of which are not typical 'shrubs'. These habitats will cover a total area of 1630m2 which comprises 1110m2 of tall native species and 520m2 of low growing species. The 23 species listed in Table 2 have been selected for these habitats.

These habitats aim to protect and enhance the existing green corridor along the River Thames and will continue to allow free movement for animals such as hedgehogs (Section 41 and London BAP Priority Species). Integration of a diverse range of herbaceous, shrubby and woody plant species will provide good habitat for invertebrates in which hedgehogs feed upon and will also provide potential nesting areas1617.

[16] Hedgehog garden creation https://www.britishhedgehogs.org.uk/leaflets/L10-Creating-a-Wildlife-Garden.pdf
[17] Hedgehog habitat enhancements http://www.wildlifetrusts.org/sites/default/files/files/16597%20WAG%20-%20Hedgehog%2016pp%20Booklet16-7.pdf

Table 2 Native transitional habitat planting specification

Common name	Binomial nomenclature	Low/tall growing
Stinking iris	*Iris foetidissima*	Low
Pasqueflower	*Pulsatilla vulgaris*	Low
Wood anemone	*Anemone nemorosa*	Low
Viper's bugloss	*Echium vulgare*	Low
Cow parsley	*Anthriscus sylvestris*	Low
Butcher's-broom	*Ruscus aculeatus*	Low
Bluebell	*Hyacinthoides non-scripta*	Low
Guelder rose	*Viburnum opulus*	Low
Daffodil	*Narcissus pseudonarcissus*	Low
Bugle	*Ajuga reptans*	Low
Hard fern	*Blechnum spicant*	Low
Soft shield fern	*Polystichum setiferum*	Low
Male fern	*Dryopteris filix-mas*	Low
Dogwood	*Cornus sanguinea*	Tall
Elder	*Sambucus nigra*	Tall
Hazel	*Corylus avellana*	Tall
Woolly willow*	*Salix lanata* AGM	Tall
Goat willow	*Salix caprea*	Tall
Common osier	*Salix viminalis*	Tall
Wild privet	*Ligustrum vulgare*	Tall
Spindle	*Euonymus europaeus*	Tall
Wayfaring tree	*Viburnum lantana*	Tall
Holly	*Ilex aquifolium*	Tall

* Non-native exception

Management and maintenance

After full growth has been established, cutting back of woody species is recommended to remove excessive growth. Any management of scrub or tall growing shrub should be undertaken between September and February inclusive,

avoiding the bird nesting season. Where possible, deadwood from cutting should be retained and laid in piles to benefit saproxylic insects and fungi (see Section 2.2.4). Coppicing of species such as hazel (Coylus avellana) and dogwood (Corylus sanguinea) is recommended to promote the regeneration of new stems from the base on the plant, resulting in 'bushier' scrub like growth, which creates suitable nesting conditions for small birds.

2.1.5 Native Trees

General description

Under the landscaping proposals, a total of 68 trees will be planted within the Site's gardens. This includes 29 silver birch (Betula pendula), three alder (Alnus gultinosa), 16 small leaved lime (Tilia cordata 'greenspire') and 20 beech (*Fagus sylvatica* 'Dawyck'). Planting of these trees aims to mitigate the loss of many of the ornamentally planted trees recorded on Site during the Phase 1 habitat survey; the coverage of trees on Site after development will be greater than the baseline. Several silver birch are to be planted within the native shrub layer, providing greater transition from the low shrub and grassland habitats, to the existing woodland.

Management and maintenance

It is recommended that any pruning or cutting back of trees is restricted between September and February inclusive, to avoid the bird nesting season.

2.2 Other Ecological Enhancements

2.2.1 Bird nesting features

General description

It is recommended that a minimum of six externally fitted nest boxes are integrated into the Proposed Development, in appropriate areas of the Site, which aim to target common nesting bird species such as robins (Erithacus rubecula) and blue tits (Cyanistes caeruleus), as well as local Biodiversity Action Plan (LBAP) species such as house sparrow (Passer domesticus) and swift (Apus apus). This includes three swift bricks, a communal box for house sparrows and two for common nesting birds.

House sparrows are listed as Species of Principal Importance in England on Section 41 of the Natural Environment and Rural Communities Act (2006). House sparrow is also a London Biodiversity Action Plan species[18] due to London populations having declined by 60% between 1994 and 2004[19]. House sparrows are social birds that generally forage and roost communally in loose colonies. Terraced nest boxes with an entrance of 32mm diameter are recommended. House sparrow boxes should be placed on or near to buildings, where possible.

Swifts are colonial nesting birds and summer visitors to the Britain. Swifts avoid landing on the ground; for this reason the placement of nest boxes is specific: at a minimum, no fewer than two swift bricks should be placed together, approximately 1m apart at a minimum height of 4m (preferably 5m), and located on buildings using

[18] London Boroughs Biodiversity Forum: House sparrow Species Action Plan http://downloads.gigl.org.uk/website/Sparrow%20Action%20Plan.pdf

[19] http://www.rspb.org.uk/our-work/conservation/conservation-projects/details/198323-causes-of-population-decline-of-urban-house-sparrows-

the guidance notes below. The higher elevation allows for swifts to drop into the air from the nest entrance.

Key factors and guidelines to follow when fitting bird nest boxes are as follows[20]:

- Nest boxes should be placed to avoid prevailing wind/rain and installed with the box face angled slightly downwards to prevent rain from entering;
- Nest boxes should be fitted facing between a north and east orientation, unless away from direct sunlight;
- Allow for a clear flight path; nest boxes should not be placed directly in front of obstructions e.g. vegetation, high walls;
- For house sparrows, multiple nest boxes should be placed near to each other to encourage communal roosting (no closer than 30cm);
- Boxes should be placed high up, away from potential predators (above 2m);
- Swift bricks or boxes must be placed at a second-storey height (minimum 4m), or above, with a clear flight path in front and below the box entrance.

Management and maintenance

It is recommended that bird nest boxes are cleaned between October and February, avoiding the months when birds are likely to be nesting (March to September). Cleaning is required to remove any fleas, fungi or parasites that could potentially infect a new brood the following year. Some species, such as house sparrows, can have multiple broods in a year; it is possible for their young to fledge into September. Absence of nesting birds must, therefore, be confirmed before the box is cleaned.

Most nest bricks will typically incorporate a removable front to facilitate cleaning or monitoring. Nest boxes and bricks designed for swifts, however, should not require any maintenance due to the species' clean nature.

2.2.2 Bat Roosting Features

General description

Bat roosting boxes are also recommended. These boxes can either be bat brick types (e.g. Norfolk bat brick or Ibstock brick bat brick) that can be installed within building design, or external facing types which can be retrofitted to the outside of a building or tree (e.g 1FF Schwegler bat box[21]). These will increase suitable roost sites in the local area and encourage London BAP and locally present species such as common pipistrelles (Pipistrellus pipistrellus) and soprano pipistrelles (Pipistrellus pygmaeus).

- Installation of bat bricks should be informed by the following best practice guidelines:
- Located to avoid prevailing wind and rain;
- Placed facing a south, south-east or south-west orientation to allow for daytime warming;
- Placed to provide a clear flight path allowing for direct access to foraging habitats or commuting routes;

[20] http://www.rspb.org.uk/makeahomeforwildlife/advice/helpingbirds/nestboxes/
[21] NHBS 1FF Schwegler bat box https://www.nhbs.com/equipment/woodcrete-and-woodstone-bat-boxes

- avoid placing above windows, doors and climbing shrubs; and
- Placed at least four metres above ground level to deter predation and disturbance.

It is recommended that a minimum of two bat boxes are installed within the new areas of tree plantings, adhering to the guidelines listed above.

Management and maintenance

The bat boxes specified are not designed to provide entry into a cavity as they are sealed across the back. As such, they require no maintenance other than annual check to confirm there is no damage to the boxes. Due to the potential presence of roosting bats, any works to the bat bricks must be preceded by an inspection by a Suitably Qualified Ecologist who is registered to use the Natural England level 2 bat survey class licences. If bat presence is confirmed, the Suitably Qualified Ecologist will advise on necessary approach to avoid adverse impacts on bats.

2.2.3 Invertebrate habitat features

General description

Invertebrates are known to utilise a large range of materials for nesting and refuge. Artificial habitat provision for invertebrates, such as habitat boxes or 'bug hotels' can be fitted onto walls or be placed in appropriate locations. It is recommended that a variety of habitat boxes are placed around the Melliss Avenue site on and around the proposed living roof, on walls, within or nearby the urban meadow and near to the native tree and shrub planting.

It is recommended that a total of seven small to medium sized habitat boxes are placed around the Site, all of which are available from a range of commercial suppliers[22].

- 2 x bumblebee nest box
- 2 x butterfly box
- 2 x solitary bee nest boxes
- 1 x ladybird box/tower
- 2 x general insect box / hotels

Bumblebee and butterfly habitat boxes are best placed on or near the green roof or urban meadow in association with wildflower habitat[23]. It is recommended that all boxes are placed in areas where they catch the morning sunlight. If placed on a wall, boxes should be placed facing south. Where possible, a warm, shaded location is preferable, although not essential.

Management and maintenance

Little to no maintenance is required once sited, other than annual checks to replace damaged boxes.

[22] NHBS http://www.nhbs.com/ , Wildcare http://www.wildcareshop.com/ , The Nestbox Company http://www.nestbox.co.uk/ , Buglife https://www.buglife.org.uk/shop-categories/bug-houses, Green roof shelters http://greenroofshelters.co.uk/habitat-panels/ and Urban hedgerow custom designed 'bug boxes' http://urbanhedgerow.com/bug-boxes/

[23] See Living roofs (undated). Creating habitat for solitary bees. https://livingroofs.org/creating-habitat-breeding-solitary-bees/

2.2.4 Deadwood piles & loggeries

General description

Deadwood piles should be placed in suitable habitats including the living roof, meadow and shrub habitats. Deadwood should be placed within these habitats or retained for the benefit of saproxylic invertebrates such as the stag beetles (Lucanus cervus), a London BAP species, and as refugia for reptiles, amphibians and small mammals. Where possible, stag beetle loggeries should be created[24]. All deadwood from trees and scrub on site should be kept and placed in piles in direct contact with soil e.g. wildflower meadow.

Management and maintenance

Deadwood or log piles should be allowed to decompose and require little maintenance. Once some of the wood is close to fully decomposing, more deadwood can be placed on top. Log piles are also used by other animals for refuge (reptiles or amphibians may use such features when hibernating). Log piles must not be moved if animals such as newts are found hibernating during the winter.

2.3 Good horticultural practice

Herbicide treatments will be avoided with the exception of the treatment of any invasive non-native plant species listed on Schedule 9 of The Wildlife and Countryside Act 1981 (as amended). No such species have previously been recorded by AECOM within the Site.

Pernicious weeds, such as thistles, will be removed by hand and good horticultural practices will be implemented. This includes minimising pesticide usage and, using leaf mulches and organic fertilisers.

Any cutting back of shrubbery, hedgerows or trees must occur between September and February, outside of the period when birds are likely to be nesting.

3. Conclusion

Under the baseline condition, the Site comprises a former waste treatment facility. Despite its predominant hardstanding nature, the Site has been allowed to fallow resulting in species-rich grassland, dense scrub and several other habitats which provide value to biodiversity when considering the habitats. Considering the habitats present within the local area, these habitats are of interest to local biodiversity. For this reason, and as most of the baseline habitats are to be removed, it is imperative that the habitats within the Landscape Masterplan are designed to have a greater benefit to biodiversity and habitat connectivity. Therefore, the extent and variation in habitats proposed within the Landscape Masterplan are intended to maximise the ecological value of the new building through the installation of an extensive living roof, maximise the Site's importance to pollinating insects and provide a transitional habitat to enhance the existing broadleaved woodland adjacent to the Site.

The recommended scheme of measures to enhance and promote the biodiversity of the Site also includes the inclusion of deadwood piles, multiple nest boxes for house

[24] Buglife (2011). Retaining deadwood. https://www.buglife.org.uk/sites/default/files/Deadwood.pdf

sparrows, common nesting birds and swifts, as well as bat roost boxes and habitat boxes for a variety of invertebrate species.

In line with the NPPF and reginal planning policy (see Appendix A), habitats created within the Site will help strengthen habitat connectivity in an urbanised area of West London. Habitat creation will also offer ecosystem services associated with improved air quality and reduction in the urban heat island effect. In addition, with the Site's designed 'attractiveness' to pollinating insects and common bird species, the elderly residents of the Proposed care facility are likely to reap the health and wellbeing benefits associated with direct, frequent contact with nature[25].

25 [25] Gaston, K. J. (2010). *Urban ecology*. Cambridge University Press, Cambridge.

Appendix A Relevant Policy and Legislation

This appendix provides a summary of legislation, and key regional and local planning policy policies which are relevant to the implementation of green infrastructure and wildlife habitat on Site.

National Planning Policy

The revised National Planning Policy Framework (NPPF) was published in July 2018 and sets out the Government's planning policies for England how these are expected to be applied. This NPPF supersedes the previous NPPF published in March 2012.

The NPPF states the commitment of the UK Government to minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity. It specifies the obligations that the Local Authorities and the UK Government have regarding statutory designated sites and protected species under UK and international legislation and how this is to be delivered in the planning system. Protected or notable habitats and species can be a material consideration in planning decisions and may, therefore, make some sites unsuitable for particular types of development, or if development is permitted, mitigation measures may be required to avoid or minimise impacts on certain habitats and species, or where impact is unavoidable, compensation may be required.

Policies and objectives within the NPPF of relevance to ecology are outlined in Appendix A. For example, paragraph 170 of the revised NPPF states that:

> "*Planning policies and decisions should contribute to and enhance the natural and local environment by… …minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures*".

Regional Planning Policy

Relevant regional planning policies for the London are detailed in the following documents:

- The Mayor's Biodiversity Strategy
- London Plan
- London Environment Strategy[26]

Table 1.1 provides a summary of relevant regional planning policies. For the precise wording of each specific policy please refer back to the source document. This planning policy has been considered when assessing potential ecological constraints and opportunities identified by the desk study, as were any design options and ecological enhancements.

[26] London Environment Strategy 2018 https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf

Table 3 Summary of Regional Planning Policy

	Planning Policy	Purpose
The Mayor's Biodiversity Strategy	5	The Mayor will seek to ensure that opportunities are taken to green the built environment within development proposals and to use open spaces in ecologically sensitive ways. This is particularly important in areas deficient in open spaces and in areas of regeneration.
	13	The Mayor is committed to increasing the funding for biodiversity projects in London, and wishes to ensure that major new development projects include provision for biodiversity.
The London Plan	2.18 Green infrastructure	Development proposals should protect, promote, expand and manage the extent and quality of London's network of green infrastructure (the All London Green Grid).
	5.10 Urban greening	Development proposals should integrate green infrastructure, which could include tree planting; green roofs and walls; and soft landscaping.
	5.11 Green roofs and development site environs	Major development proposals should be designed to include roof, wall and site planting, especially green roofs and walls where feasible, to deliver the enhancement of biodiversity.
	7.19 Biodiversity and access to nature	Wherever possible, development proposals should make a positive contribution to the protection, enhancement, creation and management of biodiversity, prioritise assisting in achieving targets in biodiversity action plans (BAPs) and not adversely affect the integrity of European sites and be resisted where they have a significant adverse impact on designated sites or where priority species of habitat has been identified.
London Environment Strategy	5.1.1 Protect, enhance and increase green infrastructure services	The Mayor will resist development that results in the loss of Metropolitan Open Land. Existing open spaces must be protected. New development proposals should avoid reducing overall amount of green cover and seek to enhance wider green infrastructure network.
	5.1.2 Protect, conserve and enhance the landscape and cultutral value of London's green infrastructure	The Mayor will ensure that opportunities for a complementary relationship between cultural heritage and green infrastructure are fully explored in the interests of good place-making.
	5.2.1 Protect a core network of nature conservation sites and ensure a net gain in biodiversity	The Mayor will develop a biodiversity net gain approach for London, and promote wildlife friendly landscaping in new developments.

Local Planning Policy

Relevant local planning policies for the London Borough of Richmond upon Thames are detailed in the following documents:

- London Biodiversity Action Plan
- London Borough of Richmond Local Development Framework Core Strategy (adopted 2009);
- London Borough of Richmond upon Thames Local Development Framework Development Management Plan (adopted 2011);
- London Borough of Richmond upon Thames Local Plan (Review, Autumn/Winter 2017/2018);
- London Borough of Richmond Biodiversity Action Plan.

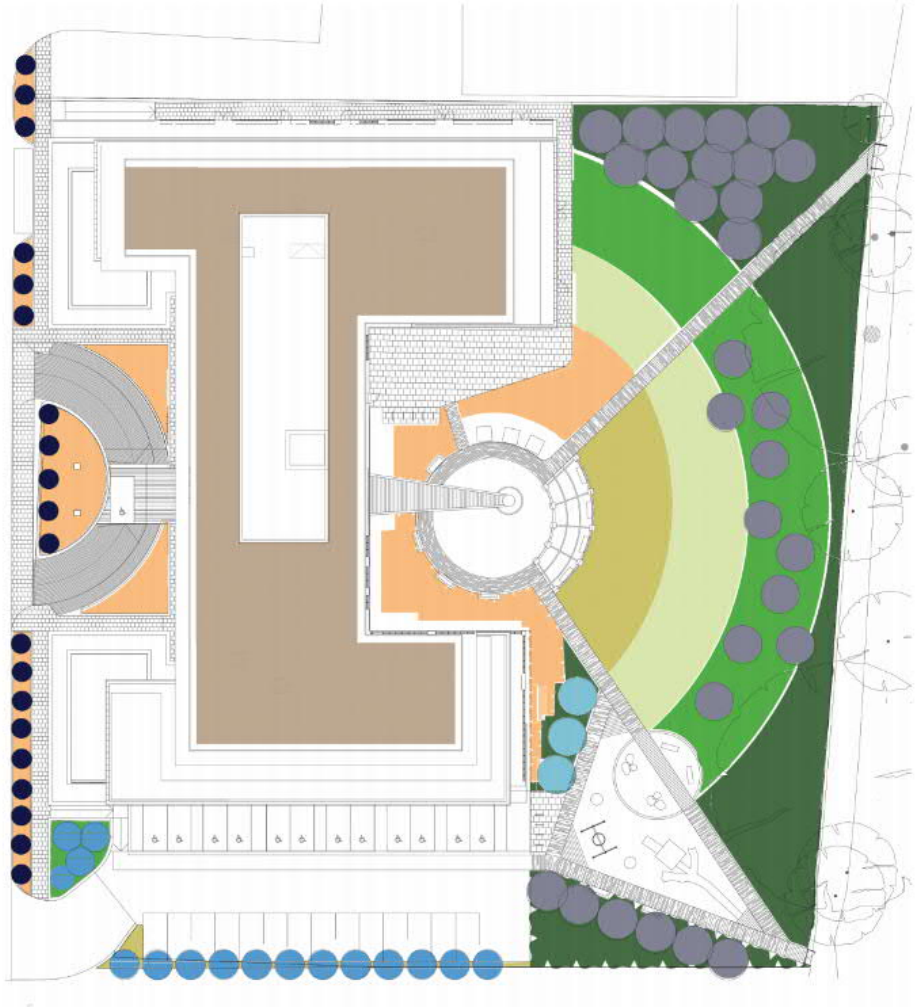
Table 4 provides a summary of relevant local planning policies. For the precise wording of each specific policy please refer back to the source document. This planning policy has been considered when designing all new habitats and ecological enhancements for the Site.

Table 4 Summary of Local Planning Policy

Document	Planning Policy	Purpose
London Biodiversity Action Plan (BAP)	N/A	The London Biodiversity Action Plan details habitats and species that are of importance for biodiversity in London. Priority habitats of relevance to the Site are Parks and Urban Green Spaces, Private Gardens and Wasteland. Priority species of relevance to the Site are the cinnabar moth (Tyria jacobaeae), stag beetle (Lucanus cervus), black redstart (Phoenicurus ochruros), house sparrow (Passer domesticus), dunnock (Prunella modularis), peregrine (Falco peregrinus), song thrush (Turdus philomelos), starling (Sturnus vulgaris) and the common pipistrelle bat (Pipistrellus pipistrellus).
Richmond Core Strategy	CP4 Biodiversity	The Borough's SSSI's and other nature conservation sites will be safeguarded and enhanced. Biodiversity enhancements will be encouraged in areas of deficiency, in areas of new development, and along wildlife corridors and green chains such as the River Thames.
	CP11 River Thames Corridor	The natural environment of the River Thames corridor within the Borough will be protected and enhanced.
Richmond Development Management Plan	DM SD 5 Living Roofs	Living roofs should be incorporated into new developments where feasible. Onus is on the developer for proposals with roof plate areas of 100sqm or more to provide evidence and justification if a living roof cannot be incorporated. The aim is to achieve 70% cover of roof plate area.
	DM OS 5 Biodiversity and New Development	New developments are expected to preserve and where possible enhance existing habitats, including biodiversity features such as trees. All developments will be required to enhance existing and incorporate new biodiversity features into the build design, and in the landscaping scheme. Consideration should be given to the use of native species.
	DM DC 4 Trees and Landscape	Encourages planting of trees. Requires landscape proposals in submission for new development, which retain existing trees and other important landscape features where practicable. Where trees are removed, appropriate planting will

Document	Planning Policy	Purpose
		normally be required.
Richmond Local Plan	LP12 Green Infrastructure	Ensure all development proposals protect, and where opportunities arise enhance, green infrastructure (GI). Green roofs, green walls, swales and new tree planting will all be considered as features that enhance GI networks.
	LP13 Green Belt, Open Land and Local Green Space	The borough's Metropolitan Open Land (MOL) will be protected and retained in predominately open use. Inappropriate development will be refused unless 'very special circumstances' can be demonstrated that clearly outweigh the harm to the MOL. Development will be supported if it is appropriate and helps secure the objectives of improving MOL land and will only be considered if by their nature are open or depend upon open uses for their enjoyment and if they conserve and enhance the open nature, character and biodiversity.
	LP15 Biodiversity	Incorporate and create new habitats or biodiversity features into development sites and into the design build themselves; major developments are required to deliver net gain for biodiversity, through incorporation of ecological enhancements, wherever possible.
	LP16 Trees, Woodlands and Landscape	Council requires the protection of existing trees and provision of new trees, shrubs and other vegetation of landscape significance that complement existing, or create new, high quality green areas which deliver amenity and biodiversity benefits.
	LP17 Green Roofs and Walls	Requires green and/or brown roofs to be incorporated into new major development with roof plate areas of 100sqm or more with the onus on the applicant to justify if such provision cannot be made. The Council will expect a green wall to be incorporated, if a green/brown roof is not feasible.
Richmond Biodiversity Action Plan (BAP)	3.4 Habitats	One of the main aims of the Local Biodiversity Action Plan (LBAP) is to halt further habitat loss, to enhance the quality of what is left through improved management and where possible increase the habitat resource through creation and/or restoration. Priority habitats within the Borough include acid grassland, ancient parkland and veteran trees, broad-leaved woodland, reedbeds and tidal Thames.
	3.5 Species	The protection and appropriate management of a habitat should ensure the survival of individual species associated with that particular habitat. The London Borough of Richmond Biodiversity Action Plan (BAP) targets priority species and habitats within the Borough. The priority habitat, urban wasteland, is relevant to the Site. Relevant priority species include all locally extant bat species, bumblebees (Bombus spp.), hedgehog (Erinaceus europaeus), song thrush, stag beetle and tower mustard (Arabis glabra).

Appendix B Landscape Masterplan



Legend:

Tall Native Shrub Planting 1110m2
- Cornus sanguinea
- Sambucus nigra
- Corylus avellana
- Salix lanata AGM
- Salix caprea
- Salix viminalis
- Ligustrum vulgare
- Euonymus europaeus
- Viburnum lantana
- Ilex aquifolium

Low Native Shrub Planting 520m2
- Iris foetidissima
- Pulsatilla vulgaris
- Anemone nemorosa
- Echium vulgare
- Anthriscus sylverstris
- Ruscus aculeatus
- Hyacinthoides non-scripta
- Viburnum opulus
- Narcissus pseudonarcissus
- Ajuga reptans
- Blechnum spicant
- Polystichum setiferum
- Dryopteris filix-mas

Bisolar Green Roof with P min. 150mm Substrate de 975m2
- Agrostis capillaris
- Poa nemoralis
- Cynosurus cristatus
- Festuca rubra
- Poa pratensis
- Poa trivialis
- Ajuga reptans
- Lunaria annua
- Erysimum sp.
- Primula vulgaris
- Primula vulgaris
- Mentha spicata
- Malva moschata
- Myosotis arvensis
- Origanum vulgare
- Papaver rhoeas
- Scabiosa columbaria
- Tanacetum vulgare
- Verbascum thapsus
- Verbena bonariensis
- Achillea millefolium
- Anthemis tinctoria
- Antirrhinum majus
- Aquilegia vulgaris
- Calendula Cyanus
- Campanula glomerata
- Centaurea cyanus
- Centaurea nigra
- Centaurea scabiosa
- Cleome sp.
- Echium vulgare
- Pulicaria dysenterica
- Geranium pratense
- Knautia arvensis
- Lathyrus latifolius
- Leucanthemum vulgare
- Liastris spicata
- Linaria maroccana
- Linaria purpurea
- Lychnis flos-cuculi
- Anthyllis vulneraria
- Lotus corniculatus
- Prunella vulgaris
- Leontodon hispidus
- Trifolium pratense
- Onobrychis viciifolia
- Rhinanthus minor
- Silene dioica
- Vicia cracca
- Gallium verum
- Agrimonia eupatoria
- Stachys officinalis
- Reseda lutea
- Aster sp.

Meadow Habitat 339m2
- Achillea millefolium
- Betonica officinalis
- Centaurea nigra
- Filipendula ulmaria
- Galium verum
- Lathyrus pratensis
- Leucanthemum vulgare
- Lotus corniculatus
- Plantago lanceolata
- Primula veris
- Prunella vulgaris
- Ranunculus acris
- Rhinanthus minor
- Rumex acetosa
- Silaum silaus
- Silene flos-cuculi
- Trifolium pratense
- Agrostis capillaris
- Alopecurus pratensis
- Anthoxanthum odoratum
- Briza media
- Cyosurus cristatus
- Festuca rubra
- Hordeum secalinum
- Phleum bertolonii

Ornamental Shrub Planting with Plants for Pollinators 517m2
- Magnolia stellata
- Viburnum x bodnantense 'Dawn'
- Forsythia intermedia 'Lynwood'
- Lamium maculatum 'Beacon Silver'
- Mentha x piperita
- Origanum vulgare
- Osmanthus heterophyllus
- Digitalis purpurea
- Delphinium elatum
- Phlox paniculata
- Geranium sanguineum
- Ajuga reptans
- Lavandula angustifolia
- Lupinus albus
- Spiraea japonica
- Agapanthus africanus

Native Trees
- Tilia cordata 'Greenspire'
- Betula pendula
- Alnus glutinosa
- Fagus sylvatica 'Dawyck'

Lawn 191m2

This diagram shows the proposed biodiversity strategy overlaid on the proposed scheme. We are demonstrating here how we plan to replace or compensate the impacted habitats with new planting or other habitats such as meadow or lawn.

The trees that are removed will be compensated by the introduction of a variety of new species, acting as screening for the carpark, playground and also introduced on the embankment. Ornamental planting will be used around the entrance of the building and the terrace with the intention to make a feature of the garden for residents and other visitors and then there will be layers of lawn, meadow habitat, native planting and more to frame the landscape from the towpath down to the building.

Appendix C Biosolar Living Roof Planting Specification

The following list of grass and herbaceous species represents a planting list suitable for biosolar roofs. The list comprises a total of six grass species and 48 herbaceous species. The list has been designed for pollinating insects, with many wildflower species selected for their high pollen/ nectar production (i.e. attractiveness to pollinators) and considering a composition which is able to provide throughout much of the year.

A total of 54 species are listed. This list in not exhaustive; many species may be removed and or included into the biosolar roof design depending on the availability of seed mixtures or plug plants.

Grasses:

Common name	Binomial nomenclature	Annual, Biennial, Perennial	Flowering season	Partial shade tolerance
Common bent	*Agrostis capillaris*	Perennial	June - August	Yes
Wood meadow grass	*Poa nemoralis*	Perennial	June - July	Yes
Crested dog'stail	*Cynosurus cristatus*	Perennial	June - August	No
Red fescue	*Festuca rubra*	Perennial	June - August	Yes
Smooth meadow grass	*Poa pratensis*	Perennial	May - July	Yes
Rough meadow grass	*Poa trivialis*	Perennial	June - July	Yes

Herbaceous plants:

Common name	Binomial nomenclature	Annual, Biennial, Perennial	Flowering season	Partial shade tolerance
Bugle	*Ajuga reptans*	Perennial	March – May	No
Honesty	*Lunaria annua*	Biennial	March – May	No
Wallflower	*Erysimum sp.*	Perennial	March – May	No
Cowslip	*Primula vulgaris*	Perennial	March – May	Yes
Primrose	*Primula vulgaris*	Perennial	March – May	Yes
Spearmint	*Mentha spicata*	Perennial	June – August	Yes
Musk mallow	*Malva moschata*	Perennial	June – August	No
Field forget-me-not	*Myosotis arvensis*	Varied	June - August	No

Common name	Binomial nomenclature	Annual, Biennial, Perennial	Flowering season	Partial shade tolerance
Wild marjoram	*Origanum vulgare*	Perennial	June – August	Yes
Common poppy	*Papaver rhoeas*	Annual	June – August	No
Small scabious	*Scabiosa columbaria*	Perennial	June – August	No
Tansy	*Tanacetum vulgare*	Varied	June – August	No
Great mullein	*Verbascum thapsus*	Varied	June – August	Yes
Purple top	*Verbena bonariensis*	Varied	June – August	No
Yarrow	*Achillea millefolium*	Perennial	June – August	Yes
Dyer's chamomile	*Anthemis tinctoria*	Perennial	June – August	No
Snapdragon	*Antirrhinum majus*	Annual	June – August	No
Columbine	*Aquilegia vulgaris*	Perennial	June – August	Yes
Common marigold	*Calendula cyanus*	Annual	June – August	No
Clustered bellflower	*Campanula glomerata*	Perennial	June – August	No
Cornflower	*Centaurea cyanus*	Annual	June – August	No
Common knapweed	*Centaurea nigra*	Perennial	June – August	No
Greater knapweed	*Centaurea scabiosa*	Perennial	June – August	No
Spider flower	*Cleome sp.*	Annual	June – August	No
Viper's bugloss	*Echium vulgare*	Annual	June – August	No
Common fleabane	*Pulicaria dysenterica*	Perennial	June – August	No
Meadow cranesbill	*Geranium pratense*	Perennial	June – August	Yes
Field scabious	*Knautia arvensis*	Perennial	June – August	Yes
Broad leaved everlasting pea	*Lathyrus latifolius*	Perennial	June – August	No
Ox-eye daisy	*Leucanthemum vulgare*	Perennial	June – August	Yes
Button snakewort	*Liastris spicata*	Perennial	June – August	No
Annual toadflax	*Linaria maroccana*	Annual	June – August	No
Purple toadflax	*Linaria purpurea*	Perennial	June – August	No
Ragged robin	*Lychnis flos-cuculi*	Biennial/Perennia	June – August	Yes

Common name	Binomial nomenclature	Annual, Biennial, Perennial	Flowering season	Partial shade tolerance
		I		
Kidney vetch	*Anthyllis vulneraria*	Perennial	June – September	No
Bird's-foot trefoil	*Lotus corniculatus*	Perennial	June – August	Yes
Selfheal	*Prunella vulgaris*	Perennial	June – August	Yes
Rough hawkbit	*Leontodon hispidus*	Perennial	June – August	No
Red clover	*Trifolium pratense*	Perennial	June – August	No
Sainfoin	*Onobrychis viciifolia*	Perennial	June – August	Yes
Yellow rattle	*Rhinanthus minor*	Annual	June – August	Yes
Red campion	*Silene dioica*	Perennial	June – August	Yes
Tufted vetch	*Vicia cracca*	Perennial	June – August	Yes
Lady's bedstraw	*Gallium verum*	Perennial	June – August	Yes
Common agrimony	*Agrimonia eupatoria*	Perennial	June – August	Yes
Betony	*Stachys officinalis*	Perennial	July – September	Yes
Wild mignonette	*Reseda lutea*	Perennial	June – August	Yes
Michaelmas daisy	*Aster sp.*	Perennial	September – October	No

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