



Peveril Securities

Napier Court, Reading

ECOLOGICAL APPRAISAL

June 2024

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1.0 INTRODUCTION

- 1.1 This report has been prepared by FPCR Environment and Design Ltd on behalf of Peveril Securities for the Napier Court site in Reading, hereafter referred to as ‘the Site’.

Site Location and Context

- 1.2 The Site is located to the north of central Reading (OS Grid Reference SU 72022 73854), to the south of Napier Road. Current vehicle access to the Site is from Napier Road in the west and the east of the Site. The Site comprised three 2-storey office blocks with associated hardstanding, amenity grassland, introduced shrub and trees.
- 1.3 The Site is 1.26 ha in size and stretches east to west along Napier Road, bound by the railway line to the south, Napier Road and Kings Meadow to the north, Thames Quarter to the west and a Network Rail site to the east. The site is located within the administrative boundary of Reading Borough Council and is very well connected to the train station, bus services and town centre facilities.

Site Proposals

- 1.4 Full planning application for demolition of the existing three office buildings, and construction of new 11 storey buildings, with amenity space at roof level (part indoor and set back), to provide 576 residential dwellings consisting of 1, 2 and 3-bedroom apartments. The development will include ancillary facilities for residents, such as a residents’ lounge, gym and communal workspace. The buildings will be set in landscaping to the front and between the buildings together with roof terraces. Parking is proposed for 39 cars and 6 motorbikes. Three internal storage spaces are proposed at ground floor for 289 bicycles and an additional 20 cycle spaces are provided externally for visitors.

Aims and Objectives

- 1.5 The scope and objectives of this report were to:
- Summarise the results of the consultation exercise, Extended Phase One Habitat survey, internal / external building inspections, nocturnal bat surveys and the Biodiversity Net Gain (BNG) Assessment.
 - Discuss any ecological mitigation and enhancements recommended for the Site in support of the application.
 - Consider the design of the scheme and undertake a biodiversity net gain assessment.

2.0 METHODOLOGY

Desk Study

- 2.1 To compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:
- Multi Agency Geographic Information for the Countryside (MAGIC) website
 - Thames Valley Environmental Records Centre (TVERC)
- 2.2 The search area for biodiversity information was related to the significance of sites and species and potential zones of influence, as follows:
- 10km around the application area for sites of International Importance (e.g., Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites).
 - 2km around the application area for sites of National or Regional Importance (e.g., Sites of Special Scientific Interest (SSSIs)
 - 1km around the application site for sites of County Importance (e.g. Sites of Importance for Nature Conservation (SINC)/Local Wildlife Sites (LWS); Local Nature Reserves (LNR), any current or previously granted European Protected Species Licences, and.
 - any SSSI impact zones which overlapped the site.
- 2.3 Further inspection of colour 1:25000 OS base maps (www.ordnancesurvey.co.uk) and aerial photographs from Google Earth (www.maps.google.co.uk) was also undertaken to provide additional context and identify any features of potential importance for nature conservation in the wider countryside.

Habitats/Flora

- 2.4 The site was surveyed on 3rd July 2023 by a suitably experienced ecologist (J Warren, 8-years industry experience, FISC level 5). Survey methods followed the standard Phase 1 Habitat Survey technique (JNCC, 2010)¹. Broad habitat types present within the survey area were identified and their distribution mapped. A list of the botanical species present within each habitat was also made, and the relative abundance of each species within these habitats recorded using the DAFOR scale (Appendix A).
- 2.5 The Site was also assessed using the UKHAB Survey technique² as recommended by Natural England³ and the Chartered Institute of Ecology and Environmental Management⁴. Condition assessments for each habitat following the stated criteria within the Statutory Biodiversity Metric User Guide⁵.

¹ Handbook for Phase 1 habitat survey, a technique for environmental audit, JNCC, 2010

² UK Habitat Classification Working Group. (2019). UK Habitat Classification. Available at: <http://ecountability.co.uk/ukhabworkinggroup-ukhab/> [Accessed 01/11/2019].

³ Natural England, 2014. Protected species and development: advice for local planning authorities. (updated 2021) [online] Available at: <https://www.gov.uk/guidance/protected-species-how-to-review-planning-applications> [Accessed 05/03/2021]

⁴ CIEEM (2017) Guidelines for Preliminary Ecological Appraisal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester

⁵ Natural England, The statutory biodiversity metric (2023) Available at: <https://publications.naturalengland.org.uk/publication/6049804846366720>

- 2.6 Any 'Habitats of Principal Importance' (HPI) for the conservation of biodiversity as listed under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006⁶ and any Local Biodiversity Action Plan (BAP) priority habitats that were present on or adjacent to the site were also recorded during the survey.
- 2.7 During the survey, any evidence of non-native/invasive plant species, as listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) was also noted. It is an offence to plant these species or otherwise cause them to grow in the wild.

Protected Species

- 2.8 During the extended Phase 1 Habitat survey, observations, identification, and signs of any species protected under the following list of Acts and Regulations were noted:
- The Conservation of Habitats and Species Regulations 2017 (as amended)⁷;
 - Part 1 of the Wildlife and Countryside Act 1981 (as amended)⁸;
 - The Protection of Badgers Act 1992⁹; and
 - The Natural Environment and Rural Communities (NERC) Act 2006 – S41 Species of Principal Importance (SPI) for the conservation of biodiversity.
- 2.9 In addition, the actual or potential presence of any notable species, such as those listed in the Birds of Conservation Concern 4 (red or amber listed species)¹⁰, or the local BAP was recorded.
- 2.10 Any noteworthy protected species data collected during surveys are sent to the relevant local biodiversity records centre.

Bats

Building Assessments

External and Internal Surveys

- 2.11 On the 25th August 2023, buildings B1 – 3 were surveyed by two suitably experienced ecologists accredited under a Level 1 bat licence.
- 2.12 Internal assessments of the three buildings with voids consisted of a systematic search of potential features inside the buildings, including all surfaces, window ledges, floors etc., using high powered torches and endoscopes (where possible and required). During these surveys evidence of bat roosts was sought. This included the presence of live or dead bats, or associated evidence which included droppings, urine staining, feeding remains, and potential roosting/access points.
- 2.13 External building assessments were undertaken from ground level with the aid of a torch and binoculars (where appropriate). During these surveys Potential Roosting Features (PRF) for bats including (but not limited to) the following were sought:

⁶ The Natural Environment and Rural Communities Act 2006. [Online]. London: HMSO Available at: <http://www.legislation.gov.uk/ukpga/2006/16/contents>

⁷ The Conservation of Habitats and Species Regulations 2017 [Online]. London: HMSO Available at <http://www.legislation.gov.uk/uksi/2017/1012/contents/made>

⁸ The Wildlife and Countryside Act 1981 (as amended). [Online]. London: HMSO Available at <http://www.legislation.gov.uk/ukpga/1981/69> [Accessed 30/10/2018]

⁹ The Protection of Badgers Act 1992 (as amended). [Online]. London: HMSO Available at: <http://www.legislation.gov.uk/ukpga/1992/51/contents> [Accessed 30/10/2018].

¹⁰ Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746.

- Broken and missing roof tiles, verge tiles, ridge tiles and crevices between hanging tiles;
- Access points behind soffits, fascia boards and barge boards;
- Gaps beneath lifted roofing felt and lead flashing;
- Openings in to roof voids, such as through eaves and gable ends;
- Loose mortar between bricks, tiles or cracks in rendering;
- Crevices between windows and lintels;
- Chimney stacks, cracks in mortar or lead flashing;
- Spaces between downpipes or guttering;
- Timber cladding that may be warped, lifted or have knot holes present;
- Roof joists and gaps between support beams.

- 2.14 The buildings were then classified as offering negligible, low, moderate, or high potential dependent on the features and / or evidence observed, which is based on Table 4.1 within the Bat Conservation Trust's Guidelines¹¹.

Nocturnal Building Survey

Nocturnal Surveys

- 2.15 Single nocturnal bat surveys were undertaken on buildings B1 – 3 by suitably experienced ecologists from FPCR in August 2023 which were determined as being of low roosting suitability (Table 7.3, BCT Guidance 2016). The nocturnal surveys were conducted in appropriate conditions, i.e. with ambient temperature exceeding 10°C, little wind, and no rain (Table 1), in line with best practice guidelines.
- 2.16 Surveyors were positioned to cover all aspects of the building with features that could potentially support roosting bats. The dusk surveys began approximately 15 minutes prior to sunset and lasted two hours after sunset. The dawn survey began approximately two hours before sunrise and lasted 15 minutes after sunrise. The number and species of bat observed emerging from, entering, or passing the buildings were recorded. Surveyors used Wildlife Acoustic Inc. Echo Meter Touch bat detectors in conjunction with Echo Meter Touch app and Samsung Galaxy phones during these surveys to aid species identification.

Table 1: Nocturnal Survey Time and Conditions

Ref / Date	Sunrise / Sunset	Conditions
Building B1 30 th August 2023 Dusk Emergence	19:55	17°C, 30% cloud cover, light breeze, no rain
Building B2 30 th August 2023 Dusk Emergence	19:55	17°C, 30% cloud cover, light breeze, no rain
Building B3 31 st August 2023 Dawn Re-entry	06:14	10°C, 30% cloud cover, light breeze, no rain.

¹¹ Collins, J. (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edn). The Bat Conservation Trust, London.

3.0 RESULTS

Desk Study

- 3.1 After consultation from the council following a screening request, it has been confirmed that this application is not an EIA development.
- 3.2 Summary results from the desk study are illustrated in Figure 1.

Internationally Designated Sites of Nature Conservation Importance

- 3.3 No internationally designated statutory sites of nature conservation importance were located within the 10km search area.

Nationally Designated Statutory Sites of Nature Conservation Importance

- 3.4 No nationally designated statutory sites of nature conservation importance were located within the 2km search area.

Non-Statutory Sites

- 3.5 Two locally designated sites were identified within 1km of the Site and are detailed in Table 2 below.
- 3.6 Local Wildlife Sites (LWS) are local non-statutory nature conservation sites, formerly called County Wildlife Site and equivalent to Sites of Importance for Nature Conservation.

Table 2. Non-Statutory Sites

Site	Designation	Location	Description
The Coal, Kennetmouth and Kings Meadow East	LWS	c.370m east	The site is a combination of two sites that were previously notified separately (The Coal and Kennetmouth West) and an area of land in the east of Kings Meadow. The site comprises a central and riverside woodland area, an open wayleave at the foot of a steep railway embankment, a section of riverbank and an area of woodland, scrub, tall herb, and rough grassland mosaic.
Henley Road Gravel Pit	LWS	c.848m east	A large pit next to the Thames where gravel was extracted in the past. The site supports a range of wildfowl that winter in the UK as well as some nationally scarce insects.

Protected/Notable Species

- 3.7 Four records of bat licences were returned within 1km of the search area. Details are provided within Table 3 below and are illustrated on Figure 1.
- 3.8 No other European Protected Species Licences were returned within the 1km search area.
- 3.9 Several notable species records were returned within 1km of the Site. Details are provided within Table 3 below and are illustrated on Figure 1.
- 3.10 Many records of bird species were returned within 1km of the Site, not illustrated in Figure 1, including common and widespread species and some more notable species such as dunnock, greenfinch, house sparrow, swift and whitethroat.

- 3.11 Some moth records were returned within 1km of the site, not illustrated in Figure 1. These included widespread and common species, and some listed under the NERC S41 such as brindled beauty, buff ermine, dusky thorn, rustic and white ermine.

Table 3. Notable and Protected Species (1km search area)

Species Record	Most Recent Record Year	Record Abundance	Closest Record Distance from Site (m)
Bats			
Bat species	2019	1	437
Brown Long-eared Bat	2019	1	670
Common Pipistrelle	2020	25	311
Common Pipistrelle Licence	2021	2	100
Common Pipistrelle and Soprano Pipistrelle Licence	2020	1	427
Daubenton's Bat	2019	7	127
Daubenton's Bat Licence	2022	1	94
Leisler's Bat	2016	1	807
Long-eared Bat species	2018	1	787
Myotis species	2019	7	437
Nathusius's Pipistrelle	2019	8	213
Noctule Bat	2020	14	432
Pipistrelle species	2019	3	437
Serotine	2019	3	670
Soprano Pipistrelle	2020	18	127
Western Barbastelle	2016	1	807
Herpetofauna			
Common Toad	2020	1	957
Grass Snake	2008	1	545
Great Crested Newt	2017	1	332
Slow worm	2018	4	398
Invertebrates			
Stag Beetle	2022	58	37
Mammals (Excluding Bats)			
Eurasian Otter	2022	11	215
West European Hedgehog	2022	9	574
Invasive Species			
Japanese Knotweed	2016	2	311

Field Survey – Habitats

- 3.12 The Site predominantly comprised hardstanding and the 3 office buildings. Strips of amenity grassland were present around the peripheries of the site and small pockets of introduced (ornamental) shrub were present throughout the centre representing established landscape planting. Two hedgerows and a line of trees were also present.
- 3.13 The habitats described below correspond to those mapped in Figure 2 Phase 1 Habitat Plan. A species list can be found in Appendix A: Botanical Species List.

Amenity Grassland

- 3.14 Linear stretches of amenity grassland were present around the edges of the site. At the time of the survey, the grass was being regularly managed through mowing. The grass had a short structure with a species composition typical for this type of grassland, supporting a limited number of grass species including perennial rye grass *Lolium perenne*, annual meadow grass *Poa annua* and red fescue *Festuca rubra*. Herb species included yarrow *Achillea millefolium*, doves foot cranesbill *Geranium molle*, field forget me not *Myosotis arvensis* and ragwort *Senecio jacobaea*.

Introduced Shrub (Ornamental Planting)

- 3.15 Small pockets of introduced/ornamental shrubs were present throughout the centre of the site associated with carparks & areas of hardstanding. Species comprised mainly non-native species such as cherry laurel *Prunus laurocerasus*, fuchsia, *Fuchsia* (most likely *F. magellanica*), rhododendron *Rhododendron*, lilac *Syringa vulgaris* and snowberry *Symphoricarpos albus*.

Hardstanding

- 3.16 Most of the site comprised hardstanding in the form of the access road, car parking and paved walkways.

Buildings

- 3.18 A total of three buildings were present within the site boundary (Buildings B1 – B3, Figure 2). They were all brick-built, two-storey office buildings. Details of the buildings' external and internal features can be found in the *Field Survey – Protected/Notable Species, Bats* section below.

Hedgerows and Line of Trees

- 3.19 Two short, unconnected, intensively managed beech hedgerows were identified in the north of the Site, lining the car park.

- 3.20 A short line of non-native broadleaved trees was present in the east of the Site.

Japanese Knotweed

- 3.22 Two records of Japanese knotweed were returned within 1km of the site boundary (Figure 1); however, no evidence was found on Site during the survey.

Field Survey – Protected/Notable Species**Badger**

- 3.23 No records of badger were returned within 1km of the Site during the consultation exercise.
- 3.24 There was no significant habitat on site suitable for badgers to create setts, forage, and commute and no evidence of badger was found during the survey.

Bats

- 3.25 Several records of bat species and bat licences were returned within 1km of the Site during the consultation exercise.
- 3.26 The small areas of amenity grassland and the hedgerows on site provide some sub-optimal foraging and commuting habitat for bat species in the local area.

- 3.27 None of the trees present on the site supported features considered suitable as potential roost sites.

Buildings External Inspection

- 3.28 Buildings B1 – B3 were brick-built 2-storey office buildings with pitched roofs with clay tiles (Image 1). The middle sections of the roofs were made of corrugated metal with flashing around the edges. Soffits boxes were present with small vents within them.
- 3.29 Building B3 differed slightly from B1 and B2 by having a glass fronted section on the southern aspect in the centre of the building (Image 2).
- 3.30 B2 and B3 were currently in tenancy occupation at the time of the survey with B1 being disused, however all buildings were in good condition.
- 3.31 The brick mortar was in good condition with no cracks or crevices identified suitable for roosting bats and the soffits were generally well sealed. On all the buildings there were some areas of slightly lifted flashing around the central portions of the roof. Weep holes were present on all aspects of the buildings, most were cobwebbed, and no staining was identified indicative of roosting bats.



Image 1(left): Exterior of buildings B1 and B2. Image 2 (right): Different exterior of building B3

- 3.32 Cables were coming out of the wall on the eastern aspect (Image 3) and a broken vent was present on the western aspect of B2 (Image 4) providing a potential access point to the wall cavity.
- 3.33 On the western, northern, and eastern aspect of B3 there were panels missing on the soffit boxes providing potential access points for bats (Image 5).



Image 3 (left): Cables coming out of wall on B2. Image 4 (middle): Broken vent on B2. Image 5 (right): Missing soffit box panels on B3.

Building Internal Inspection

- 3.34 All the buildings had roof voids with the middle sections being separated from the rest of the void with breezeblock walls. These sections were accessed via fixed ladders and housed piping and boilers for the buildings (Image 6). Internally, the middle sections of the void were clean and regularly used by staff. Wooden and metal support beams were present, and the loft was insulated between the beams and secured by plastic (Image 7). There were no gaps identified in the mortar between the breezeblocks or between the beams apart from a single small hole in the mortar in B3 (Image 8). There was some light ingress through external fans and vents, however these were all covered with small mesh (Image 9).



Image 6 (left): Middle section of roof voids. Image 7 (right): Insulation between support beams



Image 8 (left): Hole in mortar in breezeblock wall in B3. Image 9 (right): Light ingress through vents

- 3.35 The remainder of the roof void spaces were accessed by surveyors by ladders through the tiles of the false ceiling. The void in these sections also had metal and wooden support beams present with insulation secured by plastic. The voids were generally clean, with no gaps or crevices identified suitable for roosting bats (Image 10).



Image 10: Internal environment within the west and east sections of the roof voids.

- 3.36 No droppings or other evidence of bats was identified in any of the roof voids in the buildings.
- 3.37 In conclusion, there was a low number of external features on the buildings suitable for roosting bats limited to the slightly lifted lead flashing. There was external lighting pointing at all aspects of the buildings.
- 3.38 There were also a low number of potential bat access points features identified on the buildings. Even though there was potential access to the wall cavity through the weepholes and the other

holes in B2, the excellent condition of the brick mortar externally meant that it is unlikely there would be any cracks and crevices on the inside of the cavity for roosting bats. Even though there was potential access into the void through the soffits in B3, there was a lack of internal features in the roof void suitable for roosting bats.

- 3.39 For the above reasons, all three buildings were categorised as having low bat roosting potential.

Birds

- 3.40 Several records of locally common birds were returned within 1km of the Site boundary during the consultation exercise.
- 3.41 Some of the introduced shrubs, the hedgerows, and the line of trees on Site provides potential as nesting habitat for breeding birds, with the amenity grassland also providing limited opportunities for foraging.

Great Crested Newt *Triturus cristatus* (GCN)

- 3.42 There was one record of great crested newt and no European Protected Species licenses (EPSLs) within 1km of the Site returned during the consultation exercise. There were no waterbodies identified within 250m of the Site except for the River Thames and the Thames Lido which are unsuitable for GCN. The site therefore provides negligible suitability for this species and therefore is not considered further in this report.

Hazel Dormice

- 3.43 No records of hazel dormice were returned within 1km of the Site boundary during the consultation exercise. There was no suitable habitat present within the Site boundary and therefore this species is not considered further in this report.

Invertebrates

- 3.44 58 records of stag beetle were returned within the 1km search area. Onsite trees are of insufficient maturity and support only negligible amounts of deadwood which would not be suitable for stag beetles.

Mammals

- 3.46 11 records of otter were returned within the 1km search area which were all confined to the River Thames to the north and the River Kennet to the south of the Site. There were no watercourses running through or adjacent to the site and therefore this species is not considered further in this report.
- 3.47 9 records of hedgehog were returned within the 1km search area. Although no field evidence of them were identified during the survey, the amenity grassland, line of trees and hedgerows provide some limited opportunities for commuting and foraging hedgehogs.

Reptiles

- 3.48 There was one grass snake and four slow worm records returned within the 1km search area, all within or near to Local Wildlife Sites.
- 3.49 Under the current management regime, it is considered the amenity grassland, introduced shrub and hedgerows have negligible potential to be utilised by common reptile species for foraging,

commuting, and basking, especially due to the habitats being unconnected to suitable habitat in the wider environment.

Additional Protected Species

- 3.50 No evidence of, or suitable habitat for additional protected species was observed onsite.

4.0 DISCUSSION AND RECOMMENDATIONS

- 4.1 Ecological input was sought before the Site layout was fixed, enabling biodiversity to be an influencing factor in the design process.
- 4.2 Construction works are also planned far enough in advance to enable delivery of all pre-construction actions for ecology.
- 4.3 The best-practise approach ‘mitigation hierarchy’ was followed at all stages during the design process to cause little biodiversity loss as possible. The four stages followed in order are: avoidance, minimisation, restoration, and offsetting.

Designated Sites

- 4.4 No internationally or nationally designated sites were identified within 10km or 2km from the site respectively.
- 4.5 The Coal, Kennetmouth and Kings Meadow East LWS is the closest locally designated site at approximately 385m due east. It is separated from the site by Napier Road and Kings Meadow public park or residential housing. If residents from the application Site wanted to visit an area of greenspace, they would be more likely to use the Kings Meadow public park which is closer. Moreover, since the LWS is next to the park, it likely has a high level of public disturbance already and therefore effects from the application Site are likely to be negligible.
- 4.6 Henley Road Gravel Pit LWS is separated from the site by the River Thames and therefore there is no short, direct journey for residents of the application Site to visit this LWS a significant amount.

Habitats

- 4.7 The degree to which habitats receive consideration within the planning system relies on a number of mechanisms, including:
- Inclusion within specific policy (e.g. veteran trees, ancient woodland, and linear habitats in NPPF (National Planning Policy Framework), or non-statutory site designation),
 - Identification as a habitat of principal importance for biodiversity under Natural Environment and Rural Communities Act (NERC) 2006 and consequently identification as a priority habitat in England, or identification as a priority habitat within the Local Biodiversity Action Plan (LBAP)
- 4.8 The value of on-site habitats is considered negligible owing to their condition, lack of species diversity and current management. As such, it is not considered that any loss of this habitat would pose a constraint.
- 4.9 Retained trees on the site will be sufficiently protected during construction activities to avoid accidental damage.

- 4.10 The amenity grassland introduced shrub and hedgerow / individual tree habitats have some limited potential to provide resources to invertebrates, herpetofauna, birds and land mammals. Where it is not feasible that these habitats are retained and enhanced where possible, the proposals for redeveloping the Site offer good opportunities to enhance and create new habitats for biodiversity.
- 4.11 A biodiversity net gain assessment was undertaken using the Statutory Biodiversity Metric based on the Landscape Reference Plan (Stantec, 2023, RG-LD-200). The results of the assessment demonstrate that a 51.84% net gain in habitats and a 192.41% net gain in hedgerows is achievable. More details about the Biodiversity Net Gain Assessment can be found in Appendix B.

Protected Species

Badger

- 4.12 Badgers are protected under the Protection of Badgers Act 1992. This act is based on the need to protect badgers from baiting and deliberate harm or injury. The act makes it an offence to:
- Wilfully kill, injure, take possess or cruelly ill-treat a badger, or attempt to do so;
 - To intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access routes.
- 4.13 No evidence of badger activity was recorded onsite. If an active badger sett is identified prior to commencement of works (during any pre commencement check), then the relevant legislation will have to be taken into consideration, with appropriate mitigation to protect the area of badger interest.
- 4.14 During construction, excavations are to be covered and pipes capped overnight to avoid any wildlife, including badgers, from becoming trapped.

Bats

- 4.15 Bats and their habitats are protected under the Wildlife and Countryside Act 1981 (as amended) and by the Conservation of Habitats and Species Regulations 2010. In summary this makes it an offence to damage destroy or obstruct any place used by bats for breeding and shelter, disturb a bat, or kill, injure, or take a bat. Seven bat species (not including common pipistrelle) are listed as Species of Principal Importance under the provisions of the NERC Act 2006.
- 4.16 Several bat records were returned from the record centre within 1km of the Site boundary.
- 4.17 During the habitat survey, no potential bat roost sites were recorded in any of the periphery trees.
- 4.18 The three onsite buildings (B1 – B3) had low bat roosting potential and therefore one nocturnal survey was undertaken on each building. An emergence dusk survey was undertaken on buildings B1 and B2 on the 30th August 2023 and a re-entry dawn survey was undertaken on building B3 on the 31st August 2023. Low numbers of common bat species including common and soprano pipistrelles and noctule bats were identified passing through the site however no bats were seen emerging or re-entering any of the buildings during the surveys.
- 4.19 The proposed lighting scheme is to meet the guidelines published by the Institute of Lighting Professionals and the Bat Conservation Trust (2018) to avoid impacts on wildlife, including bats.

- 4.20 No significant impacts to foraging or commuting habitats are anticipated from the proposals. It is therefore considered that presence of bat species is not a statutory ecological constraint to development of the Site.

Birds

- 4.21 The Wildlife and Countryside Act 1981 (as amended) is the principal legislation affording protection to UK wild birds. Under this legislation all birds, their nests and eggs are protected by law and it is an offence, with certain exceptions to recklessly or intentionally:
- Kill, injure or take any wild bird;
 - Take, damage or destroy the nest of any wild bird while in use or being built;
 - Take or destroy the egg of any wild bird.
- 4.22 Species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) are specially protected at all times.
- 4.23 Some records of birds were returned within 1km of the Site boundary during the consultation exercise. Mostly these were common and widespread, but there were some more notable species. Most of these records came from within or near to the LWS designated sites which provide much better habitat than those within the Site boundary. Many of the notable birds are extremely unlikely to be supported by habitats within the site boundary, such as moorhen, mallard and lesser black-backed gull who prefer to be near waterbodies.
- 4.24 No significant impacts to foraging or nesting habitats are anticipated from the proposals, with the minimal habitat loss, such as removal of introduced shrub, being of negligible value in the context of the wider landscape.
- 4.25 A pre-commencement check of the Site should be undertaken if works are to start within the breeding bird season. Any removal of suitable habitat should be undertaken outside the breeding season or will require checking by an ecologist prior to removal between March and August inclusive.

Reptiles

- 4.26 All common reptiles are protected from killing or injury under the Wildlife & Countryside Act 1981 (as amended) and are priority species on the NERC list.
- 4.27 One grass snake and four slow worm records were returned within 1km of the Site during the consultation exercise.
- 4.28 The amenity grassland, introduced shrub, and hedgerow habitats onsite provide negligible suitable habitat for reptiles. However, if the habitats are left unmanaged for a significant amount of time, it is recommended that another walkover survey by an ecologist is undertaken prior to any habitat removal to ensure no offence takes place.
- 4.29 Invertebrates
- 4.30 Several moth species and stag beetle records were returned within 1km of the site boundary. Most of the moth species were limited to within or nearby the LWS designated sites. The stag beetle records were more spread out throughout the 1km search area.

- 4.31 It is considered that the extend and lack of diversity and structure of habitats on site being largely of a limited and ornamental nature would limit the value of the site for invertebrates. Measures for increasing biodiversity net gain as part of landscape planting proposals could significantly increase the opportunities currently available.

Additional Protected/Notable Species

- 4.32 Local records for hedgehog were provided within 1km of the Site. Given the nature of onsite habitats, it is considered that the Site provides overall low suitability for foraging and hibernating hedgehogs. Considering the suitable habitat available within the wider landscape, such as Kings Meadow Park, it is considered that the planned development is unlikely to affect the local hedgehog population.
- 4.33 It is considered extremely unlikely that other protected species are present within the survey and development areas and, as such, they are not considered to provide a statutory constraint to the proposals.

Mitigation and Biodiversity Enhancements

- 4.34 Proposals for biodiversity enhancements within the Site boundary include:
- Two distinct greenspace areas in the south of the Site are to be created, including a landscaped courtyard garden and a pocket park. Hedgerows and urban trees provide some connectivity between the two parcels and around the site.
 - Use of native species, preferably of local origin within the planting scheme.
 - Where possible, species which will provide foraging opportunities for bird populations (fruit, berry, and nectar bearing species).
 - Inclusion of tree standards in areas of open space to provide a degree of connectivity and sheltering habitat within the Site. Planting should be primarily native trees (including fruit trees).
 - Three native species-rich hedgerows are proposed in the south of the Site which should have a mixture of a minimum of five woody species and added honeysuckle to provide nectar and berries to wildlife. Example of native species appropriate for the site include field maple, hazel, spindle *Euonymus europaea*, hawthorn, wild cherry *Prunus avium*, wild apple *Malus sylvestris*, lime *Tilia spp.*, and English oak.
 - Several single species hedgerows are proposed along the northern aspects of the buildings, and along the edges of the central pocket park, providing connectivity between the north and south of the Site.
 - Species-rich flowering lawn mixtures will be sown within the courtyard garden, pocket park and along the northern boundary of the site. Diverse meadow grassland mixes will be sown within the pocket park and managed to create a varied sward beneficial to wildlife including birds and invertebrates.
 - Integrated bird and bat boxes are to be included within the new flat blocks – three bat and three bird boxes on each of the two buildings. Boxes are to be general purpose and self-maintaining. They are to be positioned in line with manufactures instructions and in agreement with an ecologist. Generally, they should be >1m away from any opening doors or windows. Boxes will be at a minimum height of 3m above ground, away from artificial light sources, sheltered from

strong winds and exposed to the sun for part of the day (usually south, south-east or south-west). Bird boxes should avoid south facing aspects unless shaded during the day (i.e., by eaves). Normally bird boxes should face between north and east, thus avoiding strong sunlight and the wettest winds.

- Invertebrate housing to be included within the scheme to encourage invertebrate diversity within the Site.
- Extensive Biodiverse Green Roofs (for further design considerations refer to Appendix C of this document) providing additional habitats. The wildflower rich habitats that can be created can provide important wildlife stepping-stones for invertebrates and can provide foraging and nesting potential for birds and bats. Dry habitats created on biodiverse green roofs can also provide important sites for invertebrate specialists of dry environments including several rare species and those of principle conservation importance. The insect biomass on green roofs is dominated by *diptera*, the principal food source for bats. The potential to attract foraging bats, is increased if several roofs are in the same area. In conjunction with artificial roosting sites at roof level biodiverse roofs can provide suitable habitat for bats on urban sites as wildlife stepping stones.

4.35 The BNG assessment demonstrates that there will be a 51.84% net gain for onsite habitats and a 192.41% net gain for hedgerows. The Site currently comprises mostly buildings / hardstanding with small areas of low-quality habitat. Habitats will greatly improve in area and quality under the proposals as demonstrated by the BNG assessment.

4.36 Following the receipt of a successful planning permission, a Habitat Management and Monitoring Plan will be produced in conjunction with this Ecological Appraisal and will ensure the long-term success of the habitats on Site. The plan will be updated where appropriate over the course of the monitoring period.

5.0 SUMMARY

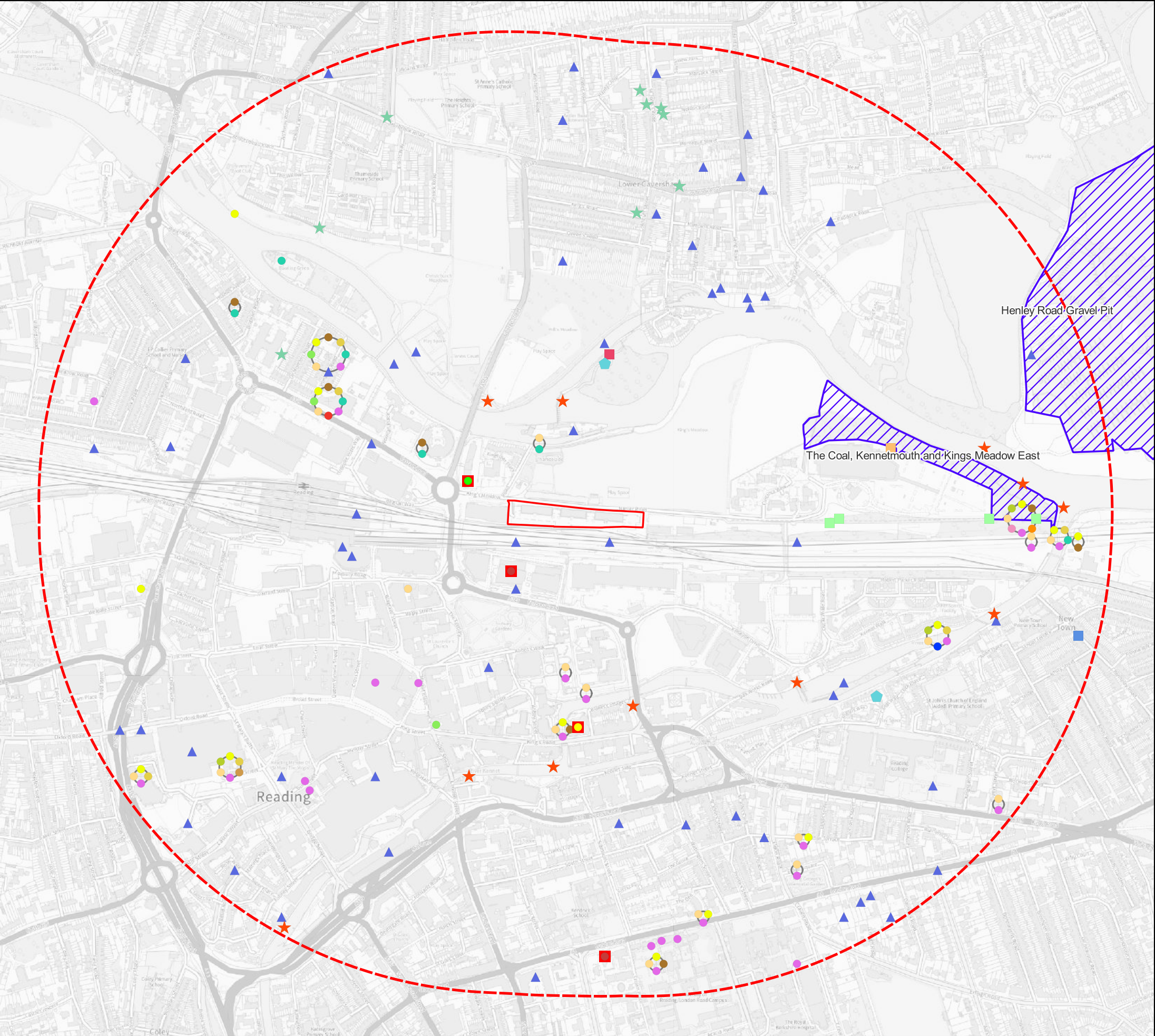
5.1 The Site currently offers very low value habitats, with limited connectivity to the wider landscape and designated sites. The site proposals offer good potential for enhancing wildlife opportunities through new landscape planting and green roofs incorporating native species and new habitats. Further habitat value will be attained by including nest boxes for species such as swifts and suitable ledges for peregrine falcons.

5.2 Prior to site redevelopment consideration should be given to the potential for nesting birds. A pre-commencement Site check should be undertaken if demolishing and construction works are proposed to commence within the breeding season. Similarly, any vegetation clearance works should be undertaken outside of the breeding season, or if this is not feasible, working areas will need to be checked by an experienced ecologist.

5.3 If the work has not commenced within one year of this report being written, a walkover survey should be undertaken by an ecologist to ensure habitats have not significantly changed and there are no new protected species issues.

5.4 Any proposed lighting scheme should be designed to minimise light spill onto both retained and newly planted habitats where possible, which will make new habitats more attractive to light sensitive faunal species such as bats.

- 5.5 Significant biodiversity enhancements have been included within the landscape strategy with landscape design including native plant species, which would provide foraging and sheltering resources for birds, bats, invertebrates, and other wildlife along with the potential to provide stepping stone habitat for urban wildlife whilst improving the wildlife habitat resource locally.



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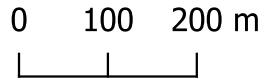
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Key

- Site Boundary
- 1km buffer
- Local Wildlife Site (with ref)

Notable / Protected Species Records

- Unidentified Bat
- Brown Long-eared Bat
- Common Pipistrelle
- Common Toad
- Daubenton's Bat
- Eurasian Otter
- Grass Snake
- Great Crested Newt
- Japanese Knotweed
- Lesser Noctule
- Long-eared Bat species
- Myotis Bat species
- Nathusius's Pipistrelle
- Noctule Bat
- Pipistrelle Bat species
- Serotine
- Slow-worm
- Soprano Pipistrelle
- Stag Beetle
- West European Hedgehog
- Western Barbastelle
- Common Pipistrelle Licence
- Common and Soprano Pipistrelle Licence
- Daubenton's Bat Licence





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project
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Key

 Site Boundary

Phase 1 Habitats

 Buildings (with ref.)

 Built Environment: Buildings/hardstanding

 Cultivated/disturbed land - amenity grassland

 Introduced shrub

Phase 1 Lines

 Broadleaved trees (with ref.)

 Intact hedge - species-poor (with ref.)

Phase 1 Points

 Broadleaved tree



Appendix A – Botanical Species List

Scientific Name	Common Name	Amenity Grassland	Introduced Shrub	Hedgerows
<i>Poa annua</i>	Annual meadow grass	✓		
<i>Fagus sylvatica</i>	Beech			✓
<i>Buddleja</i>	Buddleja		✓	
<i>Hypochoeris radicata</i>	Cats ear	✓		
<i>Prunus laurocerasus</i>	Cherry laurel		✓	
<i>Clematis</i>	Clematis	✓	✓	
<i>Dactylis glomerata</i>	Cocks foot	✓		
<i>Stellaria media</i>	Common chickweed	✓		
<i>Cerastium fontanum</i>	Common mouse ear	✓		
<i>Senecio jacobaea</i>	Common Ragwort	✓		
<i>Ranunculus repens</i>	Creeping buttercup	✓		
<i>Potentilla reptans</i>	Creeping cinquefoil	✓		
<i>Cirsium arvense</i>	Creeping thistle	✓		
<i>Bellis perennis</i>	Daisy	✓		
<i>Taraxacum officinale</i>	Dandelion	✓		
<i>Geranium molle</i>	Doves foot cranesbill	✓		
<i>Myosotis arvensis</i>	Field forget me not	✓		
<i>Fuchsia</i>	Fuchsia		✓	
<i>Vitis</i>	Grape		✓	
<i>Epilobium hirsutum</i>	Great willowherb	✓		
<i>Plantago major</i>	Greater plantain	✓		
<i>Quercus ilex</i>	Holm oak		✓	
<i>Syringa vulgaris</i>	Lilac		✓	
<i>Lapsana communis</i>	Nipplewort	✓		
<i>Acer platanoides</i>	Norway maple		✓	
<i>Lolium perenne</i>	Perennial Rye Grass	✓		
<i>Sonchus arvensis</i>	Perennial sow thistle	✓		
<i>Sonchus asper</i>	Prickly sowthistle	✓		
<i>Festuca rubra</i>	Red fescue	✓		
<i>Rhododendron</i>	Rhododendron		✓	
<i>Plantago lanceolata</i>	Ribwort plantain	✓		
<i>Rosa sp.</i>	Rose		✓	
<i>Prunella vulgaris</i>	Selfheal	✓		
<i>Potentilla fruticosa</i>	Shrubby cinquefoil		✓	
<i>Symphoricarpos albus</i>	Snowberry		✓	
<i>Viburnum</i>	Viburnum		✓	
<i>Hordeum murinum</i>	Wall barley	✓		
<i>Trifolium repens</i>	White clover	✓		
<i>Epilobium sp(p)</i>	Willowherb	✓		
<i>Achillea millefolium</i>	Yarrow	✓		



Peveril Securities

Napier Court, Reading

APPENDIX B - BIODIVERSITY NET GAIN ASSESSMENT

June 2024

FPCR Environment and Design Ltd

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-	Final Rev C	LM / 12.06.24	SMM / 12.06.24	SMM / 12.06.24

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Figure 2: Baseline Habitat Condition & Distinctiveness

Figure 3: Habitat Retention

Figure 4: Proposed Habitats

Figure 5: Proposed Habitat Condition & Distinctiveness

APPENDIX

Appendix A: Statutory Biodiversity Metric Calculations

1.0 INTRODUCTION

- 1.1 The following technical report has been prepared by FPCR Environment and Design Ltd (FPCR) on behalf of Peveril Securities for the Napier Court site in Reading, herein referred to as ‘the Site’. The report provides an Appendix to, and should be read in conjunction with, the Ecological Appraisal (FPCR, March 2024) prepared for the Site.

Site Location and Context

- 1.2 The Site is located to the north of central Reading (OS Grid Reference SU 72022 73854), to the south of Napier Road. Current vehicle access to the Site is from Napier Road in the west and the east of the Site. The Site comprised three 2-storey office blocks with associated hardstanding, amenity grassland, introduced shrub and trees.
- 1.3 The Site is 1.26 ha in size and stretches east to west along Napier Road, bound by the railway line to the south, Napier Road and Kings Meadow to the north, Thames Quarter to the west and a Network Rail site to the east. The site is located within the administrative boundary of Reading Borough Council and is very well connected to the train station, bus services and town centre facilities.

Site Proposals

- 1.4 Full planning application for demolition of the existing three office buildings, and construction of new 11 storey buildings, with amenity space at roof level (part indoor and set back), to provide 576 residential dwellings consisting of 1, 2 and 3-bedroom apartments. The development will include ancillary facilities for residents, such as a residents’ lounge, gym and communal workspace. The buildings will be set in landscaping to the front and between the buildings together with roof terraces. Parking is proposed for 39 cars and 6 motorbikes. Three internal storage spaces are proposed at ground floor for 289 bicycles and an additional 20 cycle spaces are provided externally for visitors.

Aims and Objectives

- 1.5 This Biodiversity Net Gain Report is based on the Chartered Institute of Ecology and Environmental Management (CIEEM) guidance¹. The scope and objectives of this report are to:
- Present the results of the onsite baseline UKHab Survey undertaken on the site and to present the results of habitat condition assessment surveys following the Statutory Biodiversity Metric Technical Guidance.
 - Provide an overview of the proposed onsite habitats following completion of the scheme.
 - Present the results of the Statutory Biodiversity Metric assessment completed for the proposals.
 - Assess the feasibility of the proposals to achieve a net gain in biodiversity through the Statutory Biodiversity metric.
 - Provide recommendations for the proposals to maximise their biodiversity potential.
- 1.6 This report has been prepared to support an Ecological Appraisal prepared for the site, which provides a detailed description of the habitats present. This report provides only a summary description of the habitat baseline, and this report should be read in conjunction with the Ecological

¹ CIEEM (2021) Biodiversity Net Gain Report and Audit Templates Chartered institute of Ecology and Environmental Management, Winchester, UK.

Appraisal (FPCR, March 2024) and Appendix C – Biodiverse Roof Design Considerations (FPCR, January 2024)

Legislative and Policy Context

- 1.7 The UK Government, as signatory to the Rio Convention on Biological Diversity, is committed to conserving and enhancing biodiversity. This commitment is further enforced in the Natural Environment and Rural Communities Act (NERC) 2006 and the Natural Environment White Paper (June 2011).

The Environment Act 2021

- 1.8 The Environment Act requires all development schemes in England to deliver a mandatory 10% biodiversity net gain, to be maintained for 30 years. The Environment Act passed into law on 12th February 2024, and therefore it is now a legal requirement for developments to deliver at least 10% net gain for habitat, hedgerows and watercourses (where present).

National Planning Policy (NPPF) (2023)

- 1.9 The NPPF (2023) seeks to ensure that the planning system contributes to and enhances the natural and local environment, protect and enhance biodiversity and geodiversity by:

“180. d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

184. b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.”

Measurable Net Gain

- 1.10 Biodiversity Net Gain seeks measurable improvements for biodiversity, by enhancing habitats or creating better ones. Statutory Biodiversity Net Gain Metric is used to measure changes in biodiversity, by assigning habitats a ‘unit value’ according to their relative value for biodiversity.

- 1.11 Reading Borough Council's Local Plan 2019, Policy EN12 states: *“On all sites, development should not result in a net loss of biodiversity and geodiversity, and should provide a net gain for biodiversity wherever possible. Development should:*

- *Protect and wherever possible enhance features of biodiversity interest on and adjacent to the application site, incorporating and integrating them into proposals wherever practicable; and*
- *Provide new tree planting, wildlife friendly landscaping and ecological enhancements (such as wildlife ponds, bird and bat boxes) wherever practicable.*

In exceptional circumstances where the need for development clearly outweighs the need to protect the value of the site, and it is demonstrated that the impacts cannot be: 1) avoided; 2) mitigated or 3) compensated for on-site; then new development will provide off-site compensation to ensure that there is “no net loss” of biodiversity. Provision of off-site compensation shall be calculated in accordance with nationally or locally recognised guidance and metrics. It should not replace existing alternative habitats and should be provided prior to development.

2.0 METHODOLOGY

Baseline Habitat Assessment

- 2.1 This report accompanies the Ecological Appraisal (FPCR, June 2024) for the Site which has been undertaken to inform the development proposals and to provide recommendations for mitigation and enhancement (of which measurable biodiversity net gain will form a part).
- 2.2 Full details of the survey methodologies employed during the Phase 1 habitat and UK Habitat Classification System (UKHab) surveys are provided in the accompanying Ecological Appraisal (FPCR, June 2024).

DEFRA's Statutory Biodiversity Net Gain Metric

- 2.3 DEFRA's published biodiversity net gain metric is an MS Excel spreadsheet that is used to quantify the predicted net-change in biodiversity value ("biodiversity units") of a proposed development site before and after development. It treats the flat "habitats" and linear features "hedgerows" separately, and is based on pre-determined values, along with published written guidance, set by a Natural England-led team of experts. The latest version of this metric is the statutory metric, last updated in February 2024.
- 2.4 To facilitate this, the site has been mapped and digitised using QGIS, with the existing habitats identified and areas automatically generated. In accordance with the Statutory Metric User Guide, habitats have been defined under UK Habitat Classification. The Landscape Reference Plan (Stantec, 2023, RG-LD-200) for the Site was then uploaded into the QGIS template, and the proposed habitats mapped and digitised to generate areas for each of the habitats proposed for creation.
- 2.5 These pre- and post-development habitat areas were then inputted into the Statutory Metric Calculation tool. Pre-development habitats were grouped into their habitat type and condition based on the results of the UKHab and condition assessment surveys, while post-developments were classified into their UKHab type as identified through the classification of proposed habitats within landscaping plans into appropriate UKHab types and their target condition scores. The metric then provides a habitat distinctiveness score for each of the baseline and proposed habitats which are pre-assigned scores based on the habitat type.
- 2.6 The strategic significance of the habitats was also assessed for both the pre-and post-development habitats based on the location of the site, its proximity to existing areas of biodiversity interest and its setting within wider habitat corridors.
- 2.7 The metric then assigns a range of pre-assigned factors to each of the proposed habitats. These have been advised by subject knowledge experts and are universal multipliers generated by the metric itself for the following variables relevant to habitat creation, enhancement, or restoration proposals:
- Difficult of creating or restoring/enhancing a habitat: This pre-assigned score is based on how difficult a particular habitat type is to create or restore/enhance.
 - Temporal risk: This is the 'time to target condition' for any particular habitat and determines how long a particular habitat type is likely to take to reach the condition score that the desired condition score assigned to it.

- Spatial Risk: This score is based on the distance between the site of habitat loss and any habitats creation or enhancement proposals at any offsite offsetting solutions.

2.8 Full details of the calculation methodology used is provided in the Statutory biodiversity metric – User Guide².

Limitations

2.9 The UKHab habitat map has been reproduced from detailed field notes and informed by aerial imagery, OS mapping and site maps provided by the client. The accuracy of this figure is therefore ultimately guided by the accuracy of these sources and can only be relied upon to a certain degree of resolution.

2.10 The aim of biodiversity offsetting is to compensate for significant adverse impacts on biodiversity identified after appropriate avoidance, minimisation and on-site rehabilitation measures have been taken, according to the mitigation hierarchy as required by the NPPF.

3.0 BASELINE CONDITIONS

Strategic Significance

3.1 This Site does not sit within any nature/green corridors identified within the Local Plan with residential environs dominating the wider area, it is considered that **the Site is of low strategic significance**.

Biodiversity Units

Habitats

3.2 The onsite baseline habitats consist of developed land: sealed surface, modified grassland, introduced shrub and urban trees. The locations of these are shown in *Figure 1 and Figure 4* and summarised in *Table 1*.

² Natural England, The statutory biodiversity metric (2023) Available at: <https://publications.naturalengland.org.uk/publication/6049804846366720>

Table 1: Summary of Onsite Baseline Habitats

Metric Habitat Type	Description	Area (ha)	Condition	Distinctiveness	Biodiversity Units
Developed land: sealed surface	Most of the Site comprised the three office buildings and associated hard standing for car parking and pedestrians.	1.0249	N/A	V.Low	0.00
Modified grassland	This habitat type was situated along the northern boundary of the site between the office buildings and the offsite pedestrian walkway along Napier Road. There were also pockets of modified grassland to the west, east and south of the car park. The grassland was kept under a strict management regime of mowing at the time of the survey and so had a short sward throughout. Species diversity was limited and comprised species typical of this habitat type including perennial rye grass <i>Lolium perenne</i> , annual meadow grass <i>Poa annua</i> and red fescue <i>Festuca rubra</i> . Herb species included yarrow <i>Achillea millefolium</i> , doves foot cranesbill <i>Geranium molle</i> , field forget me not <i>Myosotis arvensis</i> and ragwort <i>Senecio jacobaea</i> .	0.1783	Poor	Low	0.36
Introduced shrub	Small pockets of introduced/ornamental shrubs were present throughout the centre of the site associated with car parks & areas of hardstanding. Species comprised mainly non-native species such as cherry laurel <i>Prunus laurocerasus</i> , fuchsia, <i>Fuchsia</i> (most likely <i>F. magellanica</i>), rhododendron <i>Rhododendron</i> , lilac <i>Syringa vulgaris</i> and snowberry <i>Symphoricarpos albus</i> .	0.0361	N/A	Low	0.07
Individual trees	There were several individual trees scattered around the site within the modified grassland or introduced shrub habitat types. Species included holm oak <i>Quercus ilex</i> and Norway maple <i>Acer platanoides</i> .	0.0611	Poor	Medium	0.24

Hedgerows

- 3.3 Three hedgerows were present along the northern boundary of the Site during the UKHab survey undertaken in July 2023. A summary of the biodiversity units for the hedgerows have been calculated and are presented in *Table 2*.

Table 2: Summary of Baseline Hedgerows

Hedgerow Type	Length (km)	Condition	Distinctiveness	Biodiversity Units
Line of trees	0.033	Poor	Low	0.07
Native hedgerow	0.018	Poor	Low	0.04
Native hedgerow	0.018	Poor	Low	0.04

4.0 PROPOSED DESIGN

Proposals

- 4.1 Full planning application for demolition of the existing three office buildings, and construction of new 11 storey buildings, with amenity space at roof level (part indoor and set back), to provide 576 residential dwellings consisting of 1, 2 and 3-bedroom apartments. The development will include ancillary facilities for residents, such as a residents' lounge, gym and communal workspace. The buildings will be set in landscaping to the front and between the buildings together with roof terraces.

Created Habitats

- 4.2 Habitat retention is shown in *Figure 3*.
- 4.3 The created habitats for the site are shown in *Figure 4 and Figure 5* and detailed in *Table 3*.
- 4.4 The biodiversity units for the created habitats on the site have been calculated from Landscape Reference Plan (Stantec, 2023, RG-LD-200) and Roof Plan (Stantec, 2023, RG-LD-200) and are presented in *Table 3* along with a description of the management recommendations that will be employed to achieve the target conditions for each habitat type. Condition targets have been set based on what is considered achievable on the Site given the size of the habitats, management requirements and professional judgement.

Table 3: Summary of Proposed Habitat Creation

Landscaping Plan Reference	Metric Habitat Type	Description	Area (ha)	Target Condition	Distinctiveness	Biodiversity Units
Emorsgate EL1 (all habitat excluding the northern parcels)	Modified grassland	These parcels of grassland are proposed within the development area including the courtyard garden and pocket park. Sowing of an appropriate seed mix to achieve a minimum of 6species per m2. These should be cut not more than once per month with no mowing between April and May to allow a more diverse sward to establish. This will also prevent scrub and/or bracken encroachment.	0.016	Moderate	Low	0.06
Emorsgate EL1 Flowering Lawn Mixture (along northern boundary)	Modified grassland	These parcels of grassland are proposed along the northern boundary of the site between the development and Napier Road. Management to be the same as the above, except grass may be mowed more regularly to a shorter level due to its location next to the offsite pavement along Napier Road; hence its target condition is 'poor' rather than 'moderate'.	0.0952	Poor	Low	0.18
Emorsgate EM3 General Purpose Meadow Mix	Other neutral grassland	This seed mix will be planted within the courtyard garden and pocket park. 'Moderate' condition will be achieved by over-seeding with a species-rich mix and cut-and-collect mowing to achieve a diverse sward height and ensure nutrients are removed from the grassland. Grassland diversity should be monitored to ensure uptake of species is successful, and additional seeding and/or harrowing undertaken if necessary.	0.0023	Moderate	Medium	0.02
White Areas	Developed land: sealed surface	Most of the centre of the Site will become apartment buildings and associated hard standing which do not hold any ecological value.	1.0528	N/A - Other	V.Low	0.00
Proposed Ornamental Planting Mix 1, 2 and 3.	Introduced shrub	Introduced shrub planting is proposed throughout the Site. This habitat has an amenity function and so can be created as per landscaping guidance.	0.07041	Condition Assessment N/A	Low	0.14

Landscaping Plan Reference	Metric Habitat Type	Description	Area (ha)	Target Condition	Distinctiveness	Biodiversity Units
Green roofs on Roof Plan	Biodiverse Green Roof	Green roofs are proposed on Floor 1, 7 and 9 incorporating a mixture of annual, biennial and perennial wildflowers and grasses that are drought tolerant, via a combination of plug planting and seeding. Annual maintenance will be undertaken including reporting and rectifying any problems on plant establishment, removing unwanted weeds and following an ecologically appropriate cutting regime for the particular sward on each roof; this will enable 'moderate' condition to be achieved.	0.0281	Moderate	Medium	0.13
Proposed Trees	Urban tree	A range of tree standards are throughout the Site. When established, the trees will not undergo a regular pruning regime so the trees can retain more than 75% of their expected canopy for their age and height. Grassland vegetation will be present under the oversailing canopy.	0.1384	Moderate	Medium	0.42

Hedgerows

- 4.5 There are currently two hedgerows and one line of trees within the application site. New hedgerow planting will be undertaken along the northern and southern boundaries of the site as well as through the centre through the courtyard garden. These 0.31km of hedgerows will collectively provide 0.40 hedgerow units. These are summarised in *Table 4*. All the hedgerows will be managed appropriately to improve the health and function of these linear habitats.

Table 4: Summary of Created Hedgerows

Hedgerow Type	Length (km)	Condition	Distinctiveness	Biodiversity Units
Non-native and ornamental hedgerow	0.269	Poor	V.Low	0.26
Native hedgerow	0.043	Moderate	Low	0.14

5.0 BNG METRIC ONSITE

- 5.1 The habitat creation proposals highlighted within this report have all been inputted into the Statutory Biodiversity Metric. *Table 5* provides a summary of the headline results of the Statutory Biodiversity Metric assessment completed for the proposals. The full metric has been provided in *Appendix A*.

Table 4: Statutory Biodiversity Metric Headline Results

Baseline	0.67 Habitat Units
	0.14 Hedgerow Units
Post-Intervention	1.02 Habitat Units
	0.40 Hedgerow Units
Total Net Unit Change	+0.35 Habitat Units
	+0.27 Hedgerow Units
Total Net Percentage Change	+51.84 % Habitats
	+192.41 % Hedgerows

- 5.2 As shown in *Table 5*, the assessment has demonstrated proposals will lead to a gain of 0.35 habitat units, representing a 51.84% net gain.

Habitat Trading

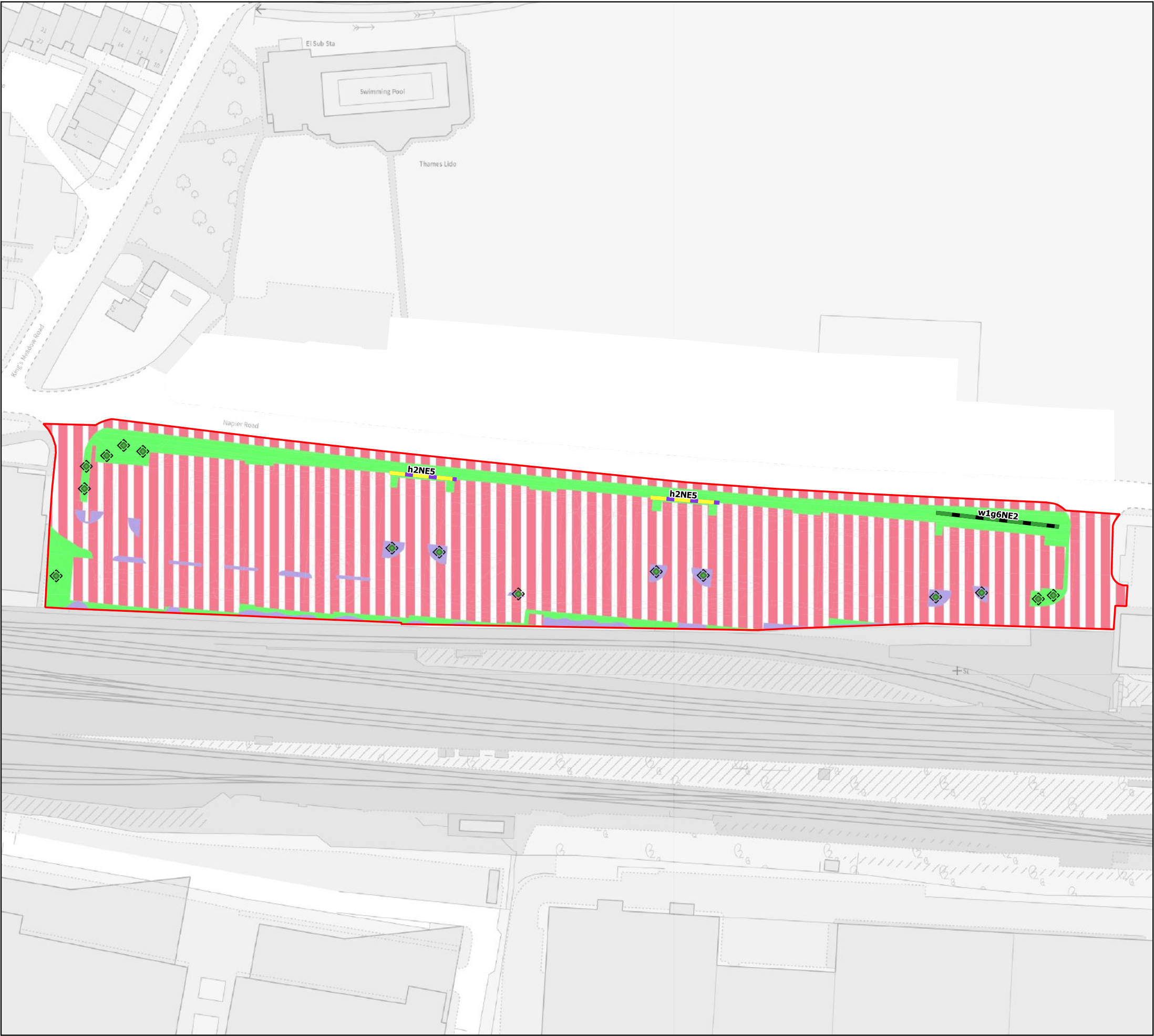
- 5.3 The habitats to be lost from the site are low distinctiveness habitats, except for a few urban trees. Under the trading rules these habitats are required to be replaced by ones of the same or higher distinctiveness. Habitats to be created include other neutral and modified grassland, introduced shrub and urban trees which are all low and medium distinctiveness habitats, thereby satisfying the trading rules. A summary is provided in *Table 5* below.

Table 5: Habitat Trading Summary

Trading Summary		
Distinctiveness Group	Trading Rule	Trading Satisfied?
Very High	Bespoke compensation likely to be required	N/A
High	Same habitat required	N/A
Medium	Same broad habitat or a higher distinctiveness habitat required	Yes
Low	Same distinctiveness or better habitat required	Yes

6.0 CONCLUSION

- 6.1 The approach to habitat creation has aimed to maximise biodiversity value within the proposals for green infrastructure. Biodiversity Net Gain has then been used to inform the habitat creation proposals for the scheme and to guide decisions around additional habitat provision.
- 6.2 The results of the assessment demonstrate that the habitats proposed within the Landscape GA Plan will currently lead to a 51.84% gain of habitat units and 192.41% gain of hedgerow units.



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Key

Site Boundary

Baseline Habitats

Developed land; sealed surface

Introduced shrub

Modified grassland

Baseline Hedgerows

Line of trees (w1g6NE2)

Native hedgerow (h2NE5)

Baseline Trees

◆ **Small Urban Tree**



client
Peveril Securities
project
Napier Court, Reading

drawing title
BASELINE HABITATS

scale @ A3
1:1,100

drawn
LG / LM

issue date
6/6/2024

drawing / figure number
Figure 1



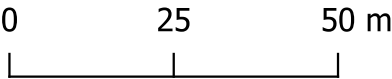
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Key

- Site Boundary
- Proposed Habitats**
 - Biodiverse green roof
 - Developed land; sealed surface
 - Introduced shrub
 - Modified grassland
 - Other neutral grassland
- Proposed Hedgerows**
 - Non-native and ornamental hedgerow
 - Native hedgerow
- Proposed Trees**
 - Small Urban Tree





client
Peveril Securities

project
Napier Court, Reading

drawing title
PROPOSED HABITATS

scale @ A3
1:1,150

drawn
DS / JW

issue date
12/6/2024

drawing / figure number
Figure 2



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Key

Site Boundary

Habitat Retention

Habitat Lost

Hedgerow Retention

Hedgerow Lost

Tree Retention

● **Tree Retained**

○ **Tree Lost**



client
Peveril Securities
project
Napier Court, Reading

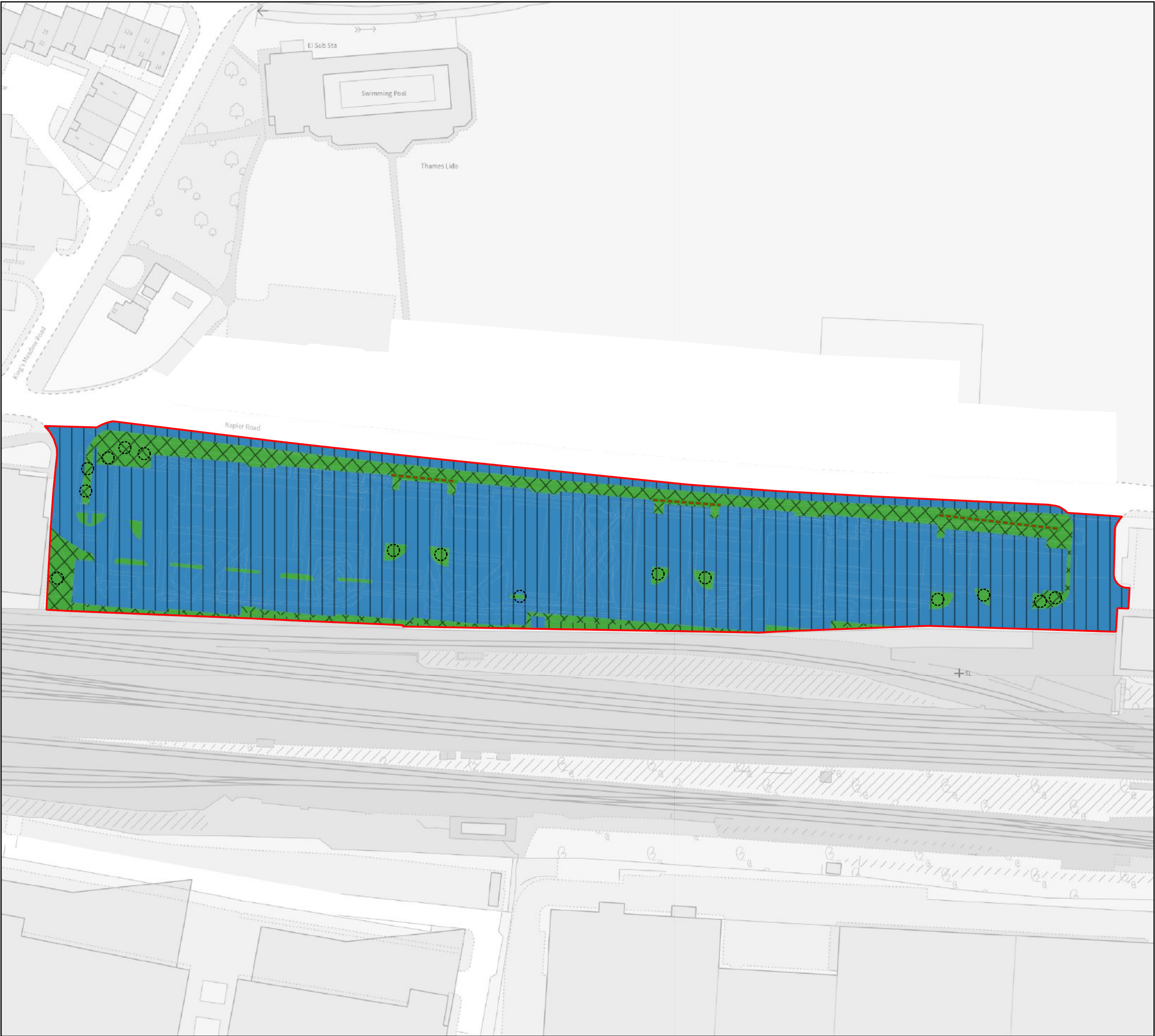
drawing title
HABITAT RETENTION

scale @ A3
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drawn
DS / JW

issue date
7/6/2024

drawing / figure number
Figure 3



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Key

 **Site Boundary**

Baseline Habitat Condition

 **Poor**

 **N/A - Other**

 **Condition Assessment N/A**

Baseline Habitat Distinctiveness

 **Low**

 **V.Low**

Baseline Hedgerow Condition

 **Poor**

Baseline Hedgerow Distinctiveness

 **Low**

Baseline Tree Condition

 **Poor**



client
Peveril Securities
project
Napier Court, Reading

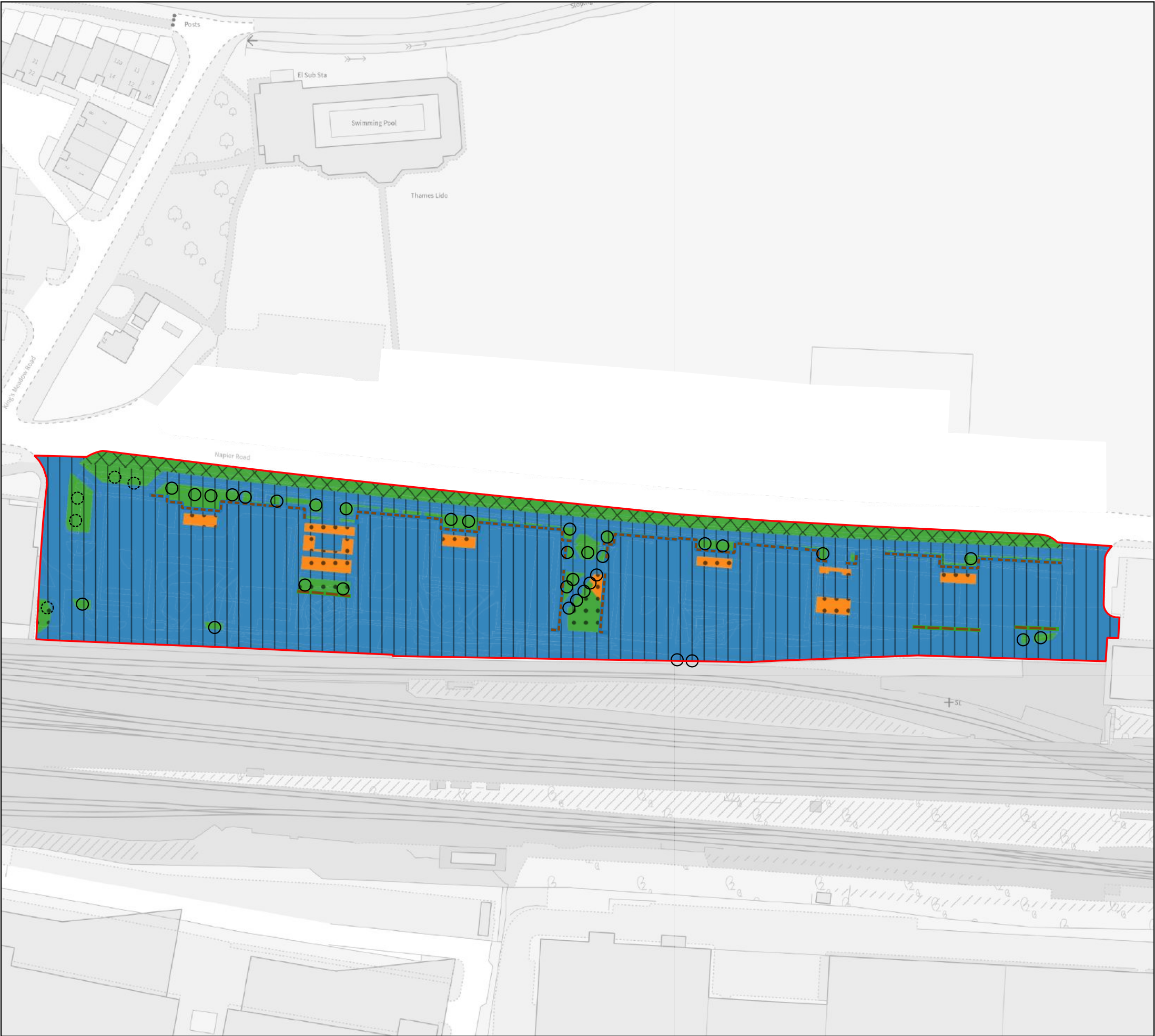
drawing title
**BASELINE HABITAT CONDITION /
DISTINCTIVENESS**

scale @ A3
1:1,100

drawn
LG / LM

issue date
6/6/2024

drawing / figure number
Figure 4



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Key

Site Boundary

Proposed Habitat Condition

Moderate

Poor

N/A - Other

Condition Assessment N/A

Proposed Habitat Distinctiveness

Medium

Low

V.Low

Proposed Hedgerow Condition

Moderate

Poor

Proposed Hedgerow Distinctiveness

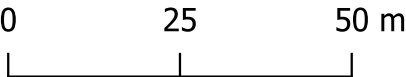
Low

V.Low

Proposed Tree Condition

Poor

Moderate





client
Peveril Securities

project
Napier Court, Reading

drawing title
PROPOSED HABITAT CONDION /
DISTINCTIVENESS

scale @ A3
1:1,100

drawn
DS / JW

issue date
12/6/2024

drawing / figure number
Figure 5



Peveril Securities Ltd.

Napier Court, Reading

APPENDIX C - BIODIVERSE ROOF DESIGN CONSIDERATIONS

June 2024

FPCR Environment and Design Ltd

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Rev	Issue Status	Prepared / Date	Approved / Date
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	Final Rev B	LM / 12.06.23	SMM / 12.06.24

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FIGURES

Figure 1: Sketch Example of Biodiverse Green Roof Layers

1.0 INTRODUCTION

- 1.1 This document provides a design specification for proposed biodiverse green roofs for Peveril Securities Ltd, Napier Court, Napier Road, Reading site. The Proposed Scheme occupies approximately 1.26 ha. of land, currently three office buildings, located in Central Reading, Berkshire. The Site stretches east to west along Napier Road, bound by the railway line to the south, Napier Road and Kings Meadow to the north, Thames Quarter to the west and a Network Rail site to the east.
- 1.2 This comprises an application for the demolition of the existing three office buildings, and construction of new 11 storey buildings, with amenity space at roof level (part indoor and set back), to provide 576 residential dwellings consisting of 1, 2 and 3-bedroom apartments. The development will include ancillary facilities for residents, such as a residents' lounge, gym and communal workspace. The buildings will be set in landscaping to the front and between the buildings together with roof terraces. Lower-level roof tops of selected buildings are proposed to support several biodiverse green roofs.
- 1.3 Biodiverse green roofs are a variety of roof garden finish offering a more natural, urban feature and can attract and support a greater diversity of floral and faunal species and opportunities for prolonged foraging for insects, in particular.
- 1.4 Biodiverse roofs and brown roofs are two different things: Biodiverse roofs are where seed or plants are introduced into the substrate at the time of construction. A brown roof is where the substrate surface is left to self-vegetate from windblown and bird lime seed dispersal to naturally increase biodiversity, rather than planting specific types of sedum or wildflowers. There is no cultivation of vegetation. The roof is setup with adequate waterproofing, drainage, and substrate.
- 1.5 Biodiverse roofs are entirely manmade. The plants and vegetation layer are planted to specifically encourage certain species.
- 1.6 To install a biodiverse roof, it is necessary to provide (in order of layers from the roof up) a:
- Waterproofing layer
 - Root barrier
 - Drainage membrane
 - Filter fleece
 - Substrate
- 1.7 The depth of substrate will depend on the type of plants selected. Larger plants will require more substrate, which will add greater weight to the roof.
- 1.8 Green roof is the overall term for any vegetated roof system and there are a few different types and terms used to describe these different systems. The substrate depth and type and the plant communities that can establish on these mediums define the type of green roof.
- 1.9 **Extensive** roofs are the simplest type of green roof and are primarily focussed on environmental benefits. Extensive or Biodiverse roofs are shallow lightweight systems that can support a diverse assemblage of native wildflowers and grasses. The diversity of vegetation and substrates will create ecological habitats for wildlife. The substrate depth varies from 80-150mm. and can support a range of sedum, wildflowers and grasses that naturally occur in drier environments and environments associated with green roofs.

- 1.10 **Intensive roofs** can be significantly more complex because of the plant quantity, quality, and size, though can be made more aesthetic and allow for garden interactivity.
- 1.11 **Semi-intensive** roofs are a combination of the two. The potential of green roofs to replace hard infrastructure with something both aesthetically pleasing and environmentally beneficial is significant.
- 1.12 Improving the quality of life in urban settlements is an important consideration. The integration of nature-based solutions (NBS) and green infrastructure (GI) aims towards re-naturing towns and cities and increased climate resilience and offers a more sustainable solution. The challenge is to transform the built environment through the inclusion of NBS and taking advantage of the existing space in the top of buildings. The integration of green roofs will support a town or cities' transition towards circularity and resilience. Green roofs can provide several ecosystem services and can act as multifunctional areas.
- 1.13 *Quaranta et al. (2021)*, have shown that greening 35% of the EU's urban surface (i.e., more than 26,000 km²) would avoid up to 55.8 Mtons per year of CO₂ equivalent of greenhouse gas emissions, reducing energy demand for the cooling of buildings in summer by up to 92 TWh per year. It is also indicated that it would also transpire about 10 km³ year⁻¹ of rainwater, turning into "green" water about 17.5% of the "blue" water that comprises urban runoff, helping reduce pollution of the receiving water bodies and urban flooding.
- 1.14 The greening of urban surfaces would decrease their summer temperature by 2.5–6 °C, with a mitigation of the urban heat island effect. The monetized benefits could cover less than half of the estimated costs of greening. The additional benefits of urban greening related to biodiversity, water quality, health, wellbeing, and other aspects is a societal benefit.

Planning and Consideration

- 1.15 By considering each benefit at the earliest stages of the design process it should be possible to create a green/brown roof which is multi responsive.
- 1.16 Involving a specialist in the early stages of the green roof design process will ensure that the right green roof system is specified to meet the objectives of the project. A structural engineer and or architect must be involved in designing a green roof to calculate weight-loading capacities of the selected green roof system. Horticultural specialist companies providing seed and/or nursery stock will need to work closely with these specialists to provide expert horticultural and ecological advice on native species planting, substrates, and maintenance.
- 1.17 An assessment of the prevailing environmental conditions expected on the green roofs must be undertaken such as the prevailing wind direction and strength, average rainfall and shading to determine the vegetation suitable for the roof. Biodiverse roofs will often experience a period of browning off during dry spells in the summer and therefore it is important to manage expectations and determine the requirement for a more aesthetic green roof versus a biodiverse roof.
- 1.18 There are seasonal constraints when establishing vegetation on a green roof and therefore adequate planning is essential.
- 1.19 Weights and depths of substrates can vary, and a suitably qualified structural engineer will need to be consulted on weight bearing loads of different roof designs. Weight and depth of substrates vary across different green roof systems.

2.0 DESIGN CONSIDERATIONS

- 2.1 A short list of references is given below but are not intended to be exhaustive.
- 2.2 *GRO Grow Green Roof Guide 2021 Green Roof Code of Best Practice is a detailed helpful guide. It is intended to be used to guide behaviour relating to green roof design, specification, installation, and maintenance. Relevant complementary documentation can also be found in this guide.*
- 2.3 *BS 8616 (31st August 2019 Technical Committee AW/20 ISBN 978 0 539 00312 3) is a British standard on green roof substrates which explains specification for its performance parameters and test methods. BS 8616 specifies requirements for the testing of substrates (the growing medium) for constructed green roofs intended to provide long-term support for specified plant communities. This includes extensive and intensive green roof substrates.*
- 2.4 *Methodologies for testing green roof substrates are provided covering the complete application range, and recommended specifications for physical and chemical characteristics considered to be optimal for extensive substrates. The Standard does not address the wider range of other design considerations such as the supporting structure construction, planting options or post build maintenance.*
- 2.5 *Refer also to the NHBC Standard 2023-7 Chapter 7.1.12 Green and biodiverse (brown roofs) – including roof gardens and the GRO Code of Practice and CIRIA C753 SuDS Manual 2015.*
- 2.6 *Fire Performance of Green Roofs and Walls August 2013, Department for Communities and Local Government. Other documents may also be available.*
- 2.7 The green roof system best suited for the planning application at Napier Court would be a biodiverse/ extensive green roof which would be installed on lower-level roof areas not used for the purposes of supporting solar panels.
- 2.8 Biodiverse green roofs should be suitable for their intended use and should be designed with a finished fall at the waterproofing layer of 1:60 (1°) minimum and have a certified waterproofing system that is endorsed by the manufacturer as fully suitable to be specified for a Green sustainable roof design (NHB Standard 2023-7).
- 2.9 The roof design should take account of wind uplift and flotation and have supporting data to demonstrate compliance with relevant material standards and codes of practice. The design should include a waterproofing layer suitable for use in the biodiverse green roof system. As a matter of best practice rainwater outlets also need to be accessible and have a visible inspection hatch.
- 2.10 The waterproofing layer should be either comprise a reinforced bitumen membrane, mastic asphalt, single-ply membrane, or a liquid applied system (cold or hot melt). The system should be installed in accordance with the design and the waterproofing layer manufacturer's recommendations and integrity tested prior to covering. Both the green/biodiverse roof system and the waterproofing layer should also be installed by a contractor trained and approved by the system supplier.
- 2.11 A root barrier or the waterproofing layer should also be resistant to root penetration in accordance with BS EN 13948. Terrestrial plant communities require adequate water, nutrients, drainage, and air circulating around the roots to survive. This is recreated in the green roofing engineered layering system. This makes the waterproofing membrane one of the most important factors to consider prior to installation and its integrity must be confirmed prior to installation. The root barrier membrane is a protective layer preventing any damage to the water proofing from plant roots. A drainage board provides water storage capacity and allows excess water to drain away, and a filter

fleece installed above the drainage board prevents substrate from entering the drainage board. Drainage outlets are also an important component of green roof systems and vegetation barriers composed of large pebbles will prevent vegetation growing beyond the desired areas.

- 2.12 The substrate type and depth are the most important factors when determining what vegetation can establish on the green roof. Evidence has shown that substrates designed specifically for green roofing purposes than meet industry standards (FLL Guidelines and Green Roof Code of Best Practice 2011), perform better, and have the following properties:
- Fire clay based\mineral substrate.
 - Circumneutral pH Lightweight
 - Good drainage characteristics
 - Porous (absorbs water)
 - Low nutrient (10% organic content)
 - Avoids compaction (large granular)
- 2.13 Biodiverse roofs should aim for a minimum substrate depth of 80mm but can vary up to 200mm to create different microclimates where thinner areas will be less well vegetated and deeper areas will be able to hold more moisture creating structurally diverse vegetation.
- 2.14 It is recommended that UK native, UK provenance plant species are used on biodiverse roofs as they are adapted to the local environment and have evolved with native pollinators and wildlife providing more valuable foraging resources.
- 2.15 The vegetation that will establish well in the dry, shallow soils and low nutrient environments on an extensive green roof are those species that occur in similar dry environments in natural habitats. These are the drought tolerant plant species (referred to as *Xerophytes*) of dry grasslands, brownfield sites and coastal shingle occurring in the UK.
- 2.16 Recommended plants for biodiverse roofs include a mixture of annual, biennial, and perennial wildflowers and grasses that are drought tolerant. Plants that self-seed readily such as kidney vetch (*Anthyllis vulneraria*) and viper's bugloss (*Echium vulgare*) are useful as plant communities can re-establish after vegetation die back following periods of prolonged drought. Plants with long flower tubes such as red clover (*Trifolium pratense*) and viper's bugloss provide valuable nectar sources for native long tongued bumblebee species. Bird's-foot trefoil (*Lotus corniculatus*) is a larval food plant for many butterfly species. White flowers of bladder campion and sea campion (*Silene vulgaris/uniflora*) provide good nectar sources for moths, and the seed heads of many wildflowers provide potential refuge and overwintering sites for invertebrates. Composite flowers such as ox-eye daisy (*Leucanthemum vulgare*) and yarrow (*Achillea millefolium*) and hawkbits provide good nectar sources for more generalist pollinators such as flies, butterflies, and beetles. Planting a diverse mix of species will provide nectar and pollen from spring to autumn with plants such as wild pansy (*Viola tricolor*) and common daisy (*Bellis perennis*) flowering as early as March and Lady's bedstraw (*Galium verum*), scabious species and knapweeds flowering well into September. Stonecrops (*Sedum* species) can be a valuable addition to a biodiverse roof but should not exceed 20% cover. They will provide vegetation cover in more exposed areas of shallower substrate and can aid the establishment of a diverse wildflower mix. Native Stonecrop's are recommended on biodiverse roofs as non-native species will not support the same wildlife diversity.

- 2.17 A combination of plug planting and seeding is the most effective way to establish a biodiverse roof. However, the pros and cons of different planting methods are described below:
- 2.18 Natural Colonisation It is not recommended to allow roofs to colonise naturally as this can take a long time, relying on having a good seed source nearby and the bare substrate is likely to become colonized by undesirable weed species such as Buddleia.
- 2.19 Seeding is a cost-effective method to vegetate a green roof (particularly suitable for larger roofs over 1500m²). There is a wide choice of species available from seed and the installation is relatively straightforward involving hand broadcasting or over larger areas employing hydro-seeding methods or a mechanical spreader. Substrates specifically designed for seeding are available that have a smaller particle size and higher organic content and should be spread as a top dressing on the main substrate.
- 2.20 With seeding only, the roof can however, take up to 2 years to establish. In addition, most perennial species will not flower until the second growing season and therefore seeding should be used in combination with plug planting.
- 2.21 The optimum combination is therefore to install plug plants with a seed mix to ensure successful establishment of a biodiverse mix of wildflowers. Some species of wildflower are difficult to establish from seed i.e., those that need vernalisation (cold exposure) or do not withstand competition and therefore plug plants are preferable however and annuals are more successful from seed. Plug plants will help to stabilize the soil and prevent potential erosion of substrate and wildflower seed. This combination will provide greater diversity of plants and improved short-term and long-term establishment of vegetation. It also ensures the client achieves their sustainability credits through biodiverse planting in the first year and avoids having to return to replant roofs that have failed through seeding alone.
- 2.22 Additionally, an annual mix should be sown with a perennial mix to provide colour in the first season.
- 2.23 Sowing in August/September, but dependent on prevailing weather conditions, is recommended to ensure that seedlings will germinate in favourable conditions and are exposed to chilling to break dormancy. *BritishFlora*¹ (the UK's premier grower of guaranteed native provenance wildflowers and aquatics but other suppliers may be available) can advise on the timing, seeding rates, substrates, and seed carrier required to sow with a seed mix to ensure even and effective establishment of green roofs.
- 2.24 Plug planting is an effective way of quickly establishing a green roof and a wide range of suitable drought tolerant species for green roofing are also available from *BritishFlora*¹ as plug plants (other sources of plug plants will also be available but should be as far as feasible local provenance).
- 2.25 Extensive lightweight substrates between 80-150mm are suitable for wildflower plug plants, with some plants requiring deeper substrates than others. Ideally plug plants should be planted at the beginning or the end of the growing season (March/April, or September/October) to allow plants to establish. *BritishFlora*¹ or any alternative suitable supplier can advise on planting densities, suitable substrates, and additional growing materials.
- 2.26 Sedum and wildflower blankets or pre-established systems (pre-established sedum or wildflower turf) provides an instant effect but is not generally recommended for biodiverse roof applications. The plant mixes available are limited and grass species are likely to dominate over wildflowers. In areas where a blanket is installed the substrate cannot be undulating and does not provide open

areas for burrowing invertebrates or natural plant colonisation. This is also an expensive solution and daily irrigation of turf during establishment and dry spells is required to keep vegetation alive.

Wildlife Value of Green Roofs

- 2.27 Monitoring and research on biodiverse roofs have shown that these wildflower rich habitats can provide important wildlife stepping-stones for invertebrates and can provide foraging and nesting potential for birds and bats. They should not replace habitat at ground level but in a built-up environment providing habitat at roof level can be very beneficial for biodiversity. The habitats provide important sites for invertebrate specialists of dry environments including several rare species and those of principal conservation importance.
- 2.28 The insect biomass on green roofs is dominated by flies (*Diptera*), the principal food source for bats and therefore can attract foraging bats, particularly if several roofs are in the same area. In conjunction with artificial roosting sites at roof level biodiverse roofs can provide suitable habitat for bats in urban areas as wildlife stepping stones.
- 2.29 The seeds and invertebrate biomass present on a green roof (ground dwelling, flying and soil invertebrates such as earth worms and larvae) provide foraging for bird species. The old flower stems left *in situ* provide nesting material and nesting habitat can be provided on site at roof level through artificial nest boxes or within the building design. Perching provided at different heights can provide singing and hunting opportunities for priority species such as black redstart, *Phoenicurus ochruros*. The roof environment also provides habitat for other bird species of conservation concern such as starling, house sparrow, herring gull and ringed plover.
- 2.30 With regards to substrates other substrate types can include sand mounds, pea gravel, shingle, pebbles, wood piles and boulders to provide damper areas and cover for ground dwelling invertebrates. Substrate features should be considered where loading capacity allows on the building (this will need to be discussed with the project architect/engineer). Where wind erosion is a problem a heavier substrate can be used effectively to weigh down the substrate and allow plants to establish by creating sheltered areas behind stone piles. Water features can also provide an invaluable habitat and can increase insect biomass and provide bathing opportunities for birds. Insect hotels can also provide additional habitat for priority invertebrate species and can be added after initial installation.
- 2.31 Fertilizers can be beneficial to plant establishment but would need to be discussed with the specialist appointed to help installing the green roof. Fertilizer makeup and application rates can then be agreed if needed. After initial establishment further fertilization and watering should not be required but should be assessed by the maintenance contractor. Ongoing maintenance on biodiverse roofs should include at least two annual visits by a suitably qualified specialist green roof maintenance contractor.
- 2.32 *BritishFlora*¹ can provide a full maintenance service to ensure the green roof performs to expectations, but other providers may offer a similar service. The tasks required in annual maintenance could include Inspection of vegetation and reporting any problems on plant

¹ Plant and Seed Supply *BritishFlora* are the largest suppliers of UK Native wildflowers in the U.K and are a recommended *FloraLocale* British Provenance nursery. Plug plants are grown in a 64cc jumbo plug (84 plants per tray) in green roof substrate, which are an optimum size for shallow substrates and easy to plant. The larger jumbo plug plants grown in green roof substrate ensure that the plant will be acclimatized to green roof conditions and have robust root systems for quick establishment in green roof environments.

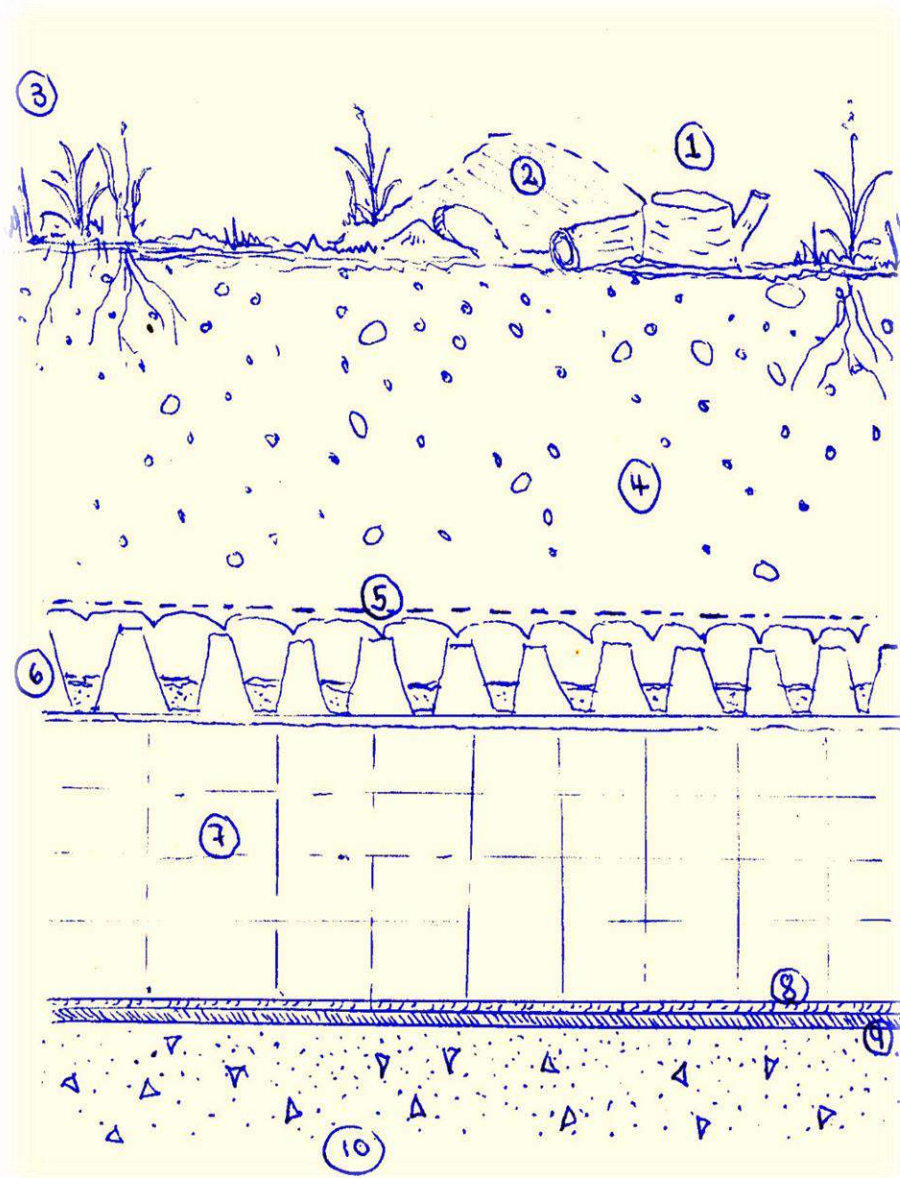
establishment. It may also be necessary to remove unwanted weeds such as Buddleia, Canadian fleabane, sow-thistles, and docks. Clearance may be required of drainage pits and vegetation barriers around perimeters.

- 2.33 Old seeds heads should be left to overwinter to provide foraging opportunities for birds and overwintering sites for invertebrates. Cutting of wildflower turf and removal of this vegetation may be required on turfed roofs or those with more vigorous grass growth.
- 2.34 Invertebrate/wildlife monitoring may be a requirement under BREAAAM, as part of Landscape and Ecology Management Plans. This could provide valuable information on green roof ecology and help inform future green roof design. (Consideration should be given to share any data with the local records centre).

Green Roofs and BREEAM

- 2.35 BREEAM - Building Research Establishment's Environmental Assessment Method is an assessment method (updated 2018) based on performance to set standards for best practice in sustainable design. Credits are awarded in 10 categories and then added together to produce a single overall score which is then given a rating of Unclassified, Pass, Good, Very Good, Excellent or Outstanding. Green roof installation in general can directly assist in getting credits in a number of categories:
 - 1. POL5: FLOOD RISK - To encourage development in low flood risk areas or to take measures to reduce the impact of flooding on buildings in areas with a medium or high risk of flooding.
 - 2. LE4: MITIGATING ECOLOGICAL IMPACT - To minimise the impact of a building development on existing site ecology
 - 3. LE5: ENHANCING SITE ECOLOGY - To recognise and encourage actions taken to maintain and enhance the ecological value of the site because of development.
 - 4. LE6: LONG TERM IMPACT ON BIODIVERSITY - To minimise the long-term impact of the development on the sites and surrounding area's biodiversity.
- 2.36 Green roofs can also have a more indirect impact on other sections of BREEAM.

2.37 Figure 1 Sketch Example of Biodiverse Green Roof Layers



1. Biodiversity elements- log and rock piles
2. Localised mounding up to 200mm depth
3. Wildflower planting
4. Extensive crushed brick substrate
5. Filter fleece
6. Drainage board
7. Insulation
8. Root barrier membrane
9. Waterproofing layer
10. Structural slab

3.0 CONCLUSIONS

- 3.1 A biodiverse green roof typically comprises an intentionally vegetated roof or platform disconnected from the ground. Substrate is a key component of any green roof and directly contributes to its success. The suitability of a green roof substrate can be assessed by measuring key performance

parameters. Green roof substrates are typically a combination of organic and inorganic materials. Organic materials are usually kept to a minimum of 20%.

- 3.2 A green roof has many benefits at economic, ecological, and societal levels, providing a rainwater buffer, capacity to purify the air, reducing ambient temperature, regulating indoor temperature, energy saving and supports biodiversity in urban areas and cities. Green roofs are part of climate proof construction which can provide urban communities with a greener environment.
- 3.3 Green roofs can help to create new wildlife habitats within urban environments or recreate habitats lost during development. The type of system chosen can be designed to provide a habitat to encourage a broad range of species to flourish. It could also be created to support more specific species of flora or fauna for conservation purposes. Extensive green roofs of the sort considered appropriate for this application are designed not to be trafficked and are therefore relatively undisturbed, can offer a very good habitat for plants, birds, and insects. With the right design, green roofs can encourage ground nesting birds such as plovers. Green roofs can also create a green corridor or reinforce existing green corridors and create stepping stone habitat through an urban environment helping the movement and dispersal of wildlife.

4.0 SPECIFICATION FOR NAPIER COURT

- 4.1 Biodiverse green roofs have been selected as appropriate for the current application. Refer to Roof Plan by Stantec drawing no. 35206 RG-LD-200. This plan shows proposed biodiverse green roofs on Floor 1, 7 and 9.
- 4.2 Roof construction will be based on the above design section to meet all necessary industry standards. A structural engineer and/ or architect will be involved in the ongoing design of the biodiverse green roof, along with calculating weight-loading capacities of the selected green roof system. A horticultural specialist company will provide seed and/or nursery stock, provide expert horticultural and ecological advice on native species planting, substrates, and maintenance.

Example Species List

- 4.3 There are numerous suppliers of biodiverse green roof mixes, ranging from all herbs to herbs and a limited range of grasses. All are selected on their drought tolerance and ease of management. The following mix is available from British Flora BFS 12 – green roof wildflower seed mix. Similar mixes can be obtained from other sources though species can vary depending on availability. Species given are site appropriate and can be expected to provide a high spec mix which achieves the requirements for the proposed biodiverse roofs for the current application. Considerations of alternatives can be made at the point of construction but will be selected based on their similar high specification.

Wildflowers

- 2% *Achillea millefolium* – (Yarrow)
- 6% *Agrimony eupatoria* – (Agrimony)
- 8% *Anthyllis vulnearia* – (Kidney vetch)
- 4% *Daucus carota* – (Wild carrot)
- 4% *Echium vulgare* – (Viper's bugloss)

- 8% *Galium verum* – (Lady's bedstraw)
- 1% *Hippocrepis comosa* – (Horseshoe vetch)
- 1% *Hypericum perforatum* – (Perforate st. John's wort)
- 5% *Leontodon hispidus* – (Rough hawkbit)
- 4% *Leucanthemum vulgare* – (Oxeye daisy)
- 2% *Linaria vulgaris* – (Common toadflax)
- 7% *Lotus corniculatus* – (Bird's-foot trefoil)
- 3% *Plantago media* – (Hoary plantain)
- 3% *primula veris* – (Cowslip)
- 6% *Prunella vulgaris* – (Selfheal)
- 2% *Rumex acetosa* – (Common sorrel)
- 6% *Sanguisorba minor* – (Salad burnet)
- 1% *Scabiosa columbaria* – (Small scabious)
- 5% *Silene vulgaris* – (Bladder campion)
- 1% *Thymus praecox* – (Wild thyme)
- 3% *Trifolium pratense* – (Red clover)
- 3% *Origamum vulgare* – (Wild marjoram)

Grasses:

- 3% *Anthoxanthum odoratum* – (Sweet vernal grass)
- 2% *Briza media* – (Common quaking grass)
- 10% *Cynosurus cristatus* – (Crested dog's-tail)