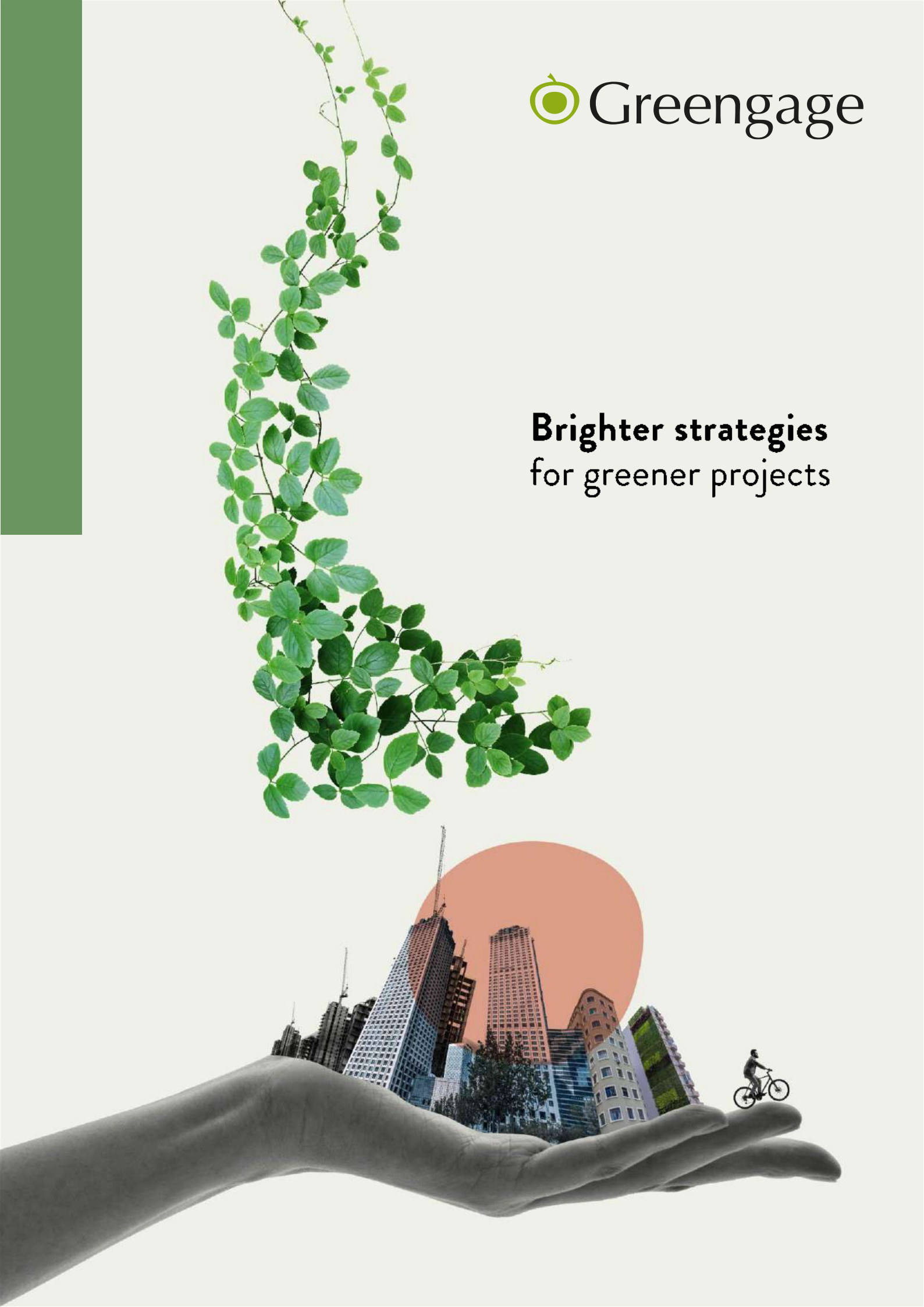
HARBOUR VIEW BRISTOL

Biodiversity Net Gain Assessment

June 2024

Greengage

Brighter strategies
for greener projects



Client: Canada Life Limited

Project: Harbour View - Bristol

Report: Biodiversity Net Gain Assessment

QUALITY ASSURANCE

Issue/Revision:	Draft	Final
Date:	June 2024	June 2024
Comments:		
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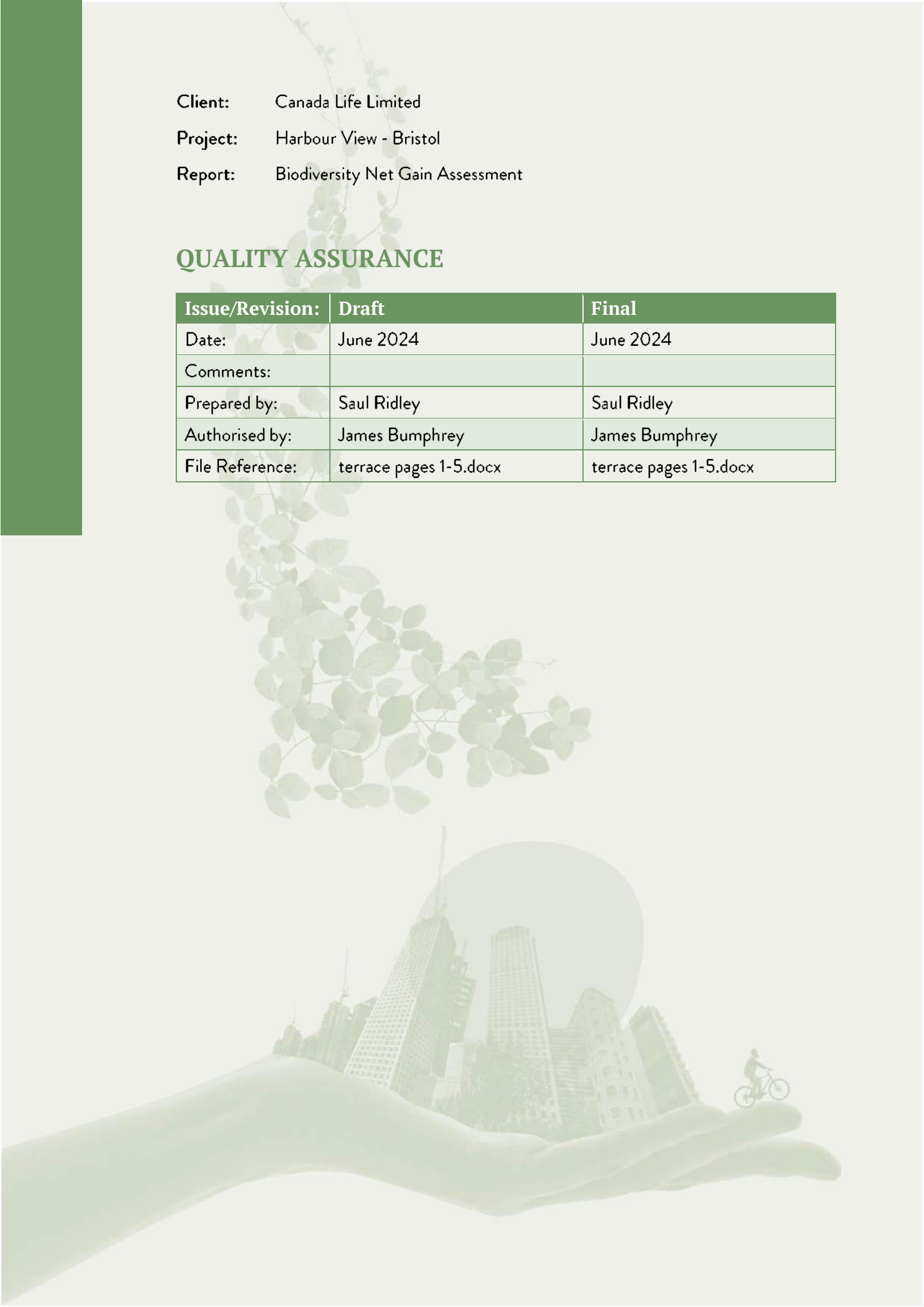
File Reference:	terrace pages 1-5.docx	terrace pages 1-5.docx



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1.0 EXECUTIVE SUMMARY

Greengage Environmental Ltd (Greengage) was commissioned by Canada Life Limited in May 2024 to undertake a Biodiversity Net Gain Assessment (BNGA), using the Statutory Biodiversity Metric (SBM), for a scheme known as Harbour View, Bristol (on Explore Ln, Bristol BS1 5TY).

The BNGA aims to quantify the predicted change in biodiversity value of the site in light of the proposed development to assess compliance against national and local planning policy and against the BNG mandate set out in the Environment Act 2021, which states that all planning permissions granted in England (with a few exemptions) will have to deliver at least 10% biodiversity net gain.

The site extends to 0.077 hectares (ha) and comprised existing building and hardstanding alongside sections of sedum and wildflower turf green roof. These are classified as 'Developed Land; Sealed Surface' and 'Other Green Roof' in the SBM. These habitats were identified from a site walkover undertaken on 28th April 2024 and in the existing Engain Ecological Assessment (REF: eg211249-ETN-REV02). .

Proposed habitat creation includes enhancement of 0.0199 ha of the existing sedum roof on level 4 to create a biodiverse green roof.

The locations and extents of the pre-development (baseline) and post development habitats are mapped in Figure A.1 and Figure B.1.

The pre-development baseline values are 0.13 Habitat Units (HU).

The post-development design proposals are predicted to deliver 0.17 HU. This is a net gain of 0.04 HU (equivalent to +31.12% for HU).

The design proposals meet the BNG Trading Rules.

In accordance with the Council's online guidance a Habitat Management and Monitoring Plan (HMMP) for the habitat retention/enhancement, creation and long term management over 30 years (minimum) will be required for submission to the Local Planning Authority (LPA). When these recommendations are adhered to, the proposals stand to be compliant with legislation and current planning policy. Draft management and monitoring actions are included within the report.

Upon receiving planning permission, the submission of a Biodiversity Gain Plan (BGP) to the LPA will be required. This BGP must include details of the proposed off-site BNG compensation, including the Biodiversity Gain Site Register Reference.

Alongside the BNGA, qualitative ecological enhancement recommendations have also been provided within the Engain Ecological Assessment which would contribute to further increasing the ecological value of the scheme.

2.0 INTRODUCTION

Greengage Environmental Ltd (Greengage) was commissioned by Canada Life Limited in May 2024 to undertake a Biodiversity Net Gain Assessment (BNGA), using the Statutory Biodiversity Metric (SBM), for a scheme known as Harbour View, Bristol (on Explore Ln, Bristol BS1 5TY), hereafter referred to as 'the site'.

Under the Environment Act 2021, developments are mandated to achieve a 10% biodiversity net gain (BNG. This is determined through assessing the condition of pre-development habitats on the site i.e. calculating the baseline, followed by comparison against the anticipated changes in biodiversity value based on the development proposals.

This BNGA has been undertaken in June 2024. Any further changes to the design will impact upon the BNG score and the SBM calculations will need to be updated to reflect such changes. This also carries forward throughout the entire lifetime of the project, including after planning permission has been granted, in and throughout the construction phase. BNG aims to give an accurate reflection of the changes happening on site.

2.1 SITE DESCRIPTION

The site extends to 0.077 hectares (ha) and is centred on Ordnance Survey National Grid Reference (OS NGR): ST 58282 72462, OS Co-ordinates 358282, 172462. The site can be seen in Appendix A.

The site is located at Explore Lane, BS1 5TY, within Harbourside in the City of Bristol. It consists of a rooftop space on a pre-existing urban development, surrounded by buildings and hard standing. This consists of a section on the face of the building and includes part of the roof top on level 3.5 incorporating a wildflower green roof and part of the roof level on level 4 which includes an existing sedum green roof. There are few scattered urban trees surrounding the site, and some shrub hedging.

2.2 PROPOSED DEVELOPMENT

A detailed planning application is being submitted for;

'Detailed planning application for use of part of the roof area as an outdoor terrace, comprising the provision of a metal canopy frame with retractable sun shade, glass balustrade and acoustic screen and provision of a biodiverse green roof to part of roof top plant room.'

Proposed habitat creation includes enhancement of 0.0199 ha of the existing sedum roof on level 4 to create a biodiverse green roof.

The site plans (3716-HAR-SRA-XX-XX-DR-A-PL-230 - Level 3 Mezzanine Proposed and 3716-HAR-SRA-XX-XX-DR-A-PL-231 - Level 4 Proposed) produced by SRA Architects, dated June 2024, has been used as the basis for information regarding the proposed post-development habitats and has been used to inform the comparison against the baseline values. Proposed habitats are mapped at Appendix B.

3.0 METHODOLOGY

3.1 PRE-DEVELOPMENT (BASELINE)

Habitat Data

An ecological site walkover was undertaken by Engain and updated by Greengage in May 2024.

Statutory Biodiversity Metric Calculation Tool

This BNGA uses the government mandated methodology within the 'Statutory Biodiversity Metric User Guide' (SBM User Guide), distributed by Department for Food Environment and Rural Affairs (Defra), February 2024[1].

BNG uses habitat type and condition as a proxy for overall biodiversity value, measured in Biodiversity Units (BU) which are calculated using the SBM. The BU are separated into area-based Habitat Units (HU), linear-based Hedgerow Units (HeU) and aquatic linear-based Watercourse Units (WU), as applicable to a site, respectively. For this site, HU are applicable.

The following information on each habitat type are the required SBM inputs:

- Type;
- Area/length;
- Condition; and
- Strategic significance.

The areas of each habitat parcel are measured, with each habitat parcel assigned a 'Distinctiveness', 'Condition' and 'Strategic Significance' score. Distinctiveness is a default score for the habitat classification, representing its inherent biodiversity value, whereas condition refers to the state each habitat parcel is in relative to a predetermined set of criteria outlined in the SBM User Guide.

Strategic significance draws upon priorities and objectives within local plans and strategies, and is measured by providing habitats with a score from low to high as follows:

- Low - "area / compensation not in local strategy";
- Medium - "location ecologically desirable but not in local strategy"; and
- High - "formally identified in local strategy".

To calculate the pre-development (baseline) BU value, habitat data collected during the site walkover has been used. A map has been created based on the data collected in the field. The area extents for each habitat type shown in the map were then measured using Quantum Geographical Information System (QGIS) software. See Appendix A.

Distinctiveness values were automatically calculated for the site and habitat conditions were assessed both in the field, and retrospectively using site photos.

Type and Area/Length

The SBM uses a classification system based mainly on the UKHab Classification System but with input also from other systems including the Water Framework Directive (WFD) Lakes Typology[2], the European Nature Information System (EUNIS) habitat definitions[3], Habitats Directive Annex 1 definitions[4].

As such, UKHab classifications used in the site walkover do not always translate directly into the SBM habitat types that are available for selection within the pre-set drop-down menus. Occasionally UK Hab secondary codes provide the key information to be able to allocate the SBM 'best fit' selection for the UKHab habitat type. Habitat conversions that are applicable to the site are listed in Table 3.1 below. The SBM classifications are hereafter used throughout the report.

Table 3.1 UKHab to SBM habitat conversions

UKHab Habitat Type	SBM Habitat Type
Urban – Buildings	Developed land; sealed surface
Urban – Developed land; sealed surface	Developed land; sealed surface

Habitat Condition

Where applicable, habitats were subject to a condition assessment in accordance with the SBM Condition Assessments. Formalised copies of the Condition Assessments for the Baseline and Proposed habitats are provided as Appendix C.

Habitats must be quantified using criteria set out by the SBM Condition Assessments to determine their relative condition.

The condition of a habitat is a measure of the biological 'working-order' of a habitat type judged against the perceived ecological optimum state for that particular habitat.

The condition of each habitat type was assessed against pre-set criteria and categorised as either 'Good', 'Fairly Good', 'Moderate', 'Fairly Poor' or 'Poor'. Where a habitat type varies in condition within the site this was recorded and mapped.

Strategic Significance

The SBM calculation tool accounts for whether the habitat is situated in an area locally identified as significant for nature.

Data on areas and habitats locally identified as significant for nature were obtained from the following:

- Multi-Agency Geographical Information for the Countryside (MAGIC) website for mapped statutory designated sites;
- Habitats listed within the Local Ecological Emergency Plan for Bristol, and the Bristol Local Plan 2023;
- Local Nature Recovery Strategies;

- River Basin Management Plans;
- Catchment Plans;
- National Character Area profiles; and/or,
- Priority Habitats for Restoration.

Using the SBM calculation tool, habitat values have been calculated based on whether they occur commonly or whether they are rare, their area (ha) (or length (km) for linear features such as hedgerows), condition and importance within the local area, usually identified from local relevant planning policies or documents.

3.2 POST- DEVELOPMENT (PROPOSED)

To calculate the post-development BU value, the area extents for each habitat type were measured based on the site (3716-HAR-SRA-XX-XX-DR-A-PL-230 - Level 3 Mezzanine Proposed and 3716-HAR-SRA-XX-XX-DR-A-PL-231 - Level 4 Proposed) using Quantum Geographical Information System (QGIS) software. See Appendix B.

Habitat types were inferred from a discussion with SRA Architects. Where justification for habitat types is required, this has been included in Section 4.0.

Targeted condition scores were assigned by Greengage, using the SBM habitat condition criteria, whilst considering the likely future use of each area on the site plans (3716-HAR-SRA-XX-XX-DR-A-PL-230 - Level 3 Mezzanine Proposed and 3716-HAR-SRA-XX-XX-DR-A-PL-231 - Level 4 Proposed) and what was considered feasible to reach.

Design guidance is provided in Appendix G.

The definition of 'significant enhancements', in accordance with government guidance (www.gov.uk) is 'areas of habitat enhancement which contribute significantly to the proposed development's BNG, relative to the biodiversity value before development'.

Retention of existing habitat does not count as an on-site enhancement.

What counts as a significant enhancement will vary depending on the scale of development and existing habitat, but these would normally be:

- habitats of medium or higher distinctiveness in the biodiversity metric;
- habitats of low distinctiveness which create a large number of biodiversity units relative to the biodiversity value of the site before development;
- habitat creation or enhancement where distinctiveness is increased relative to the distinctiveness of the habitat before development;
- areas of habitat creation or enhancement which are significant in area relative to the size of the development;
- enhancements to habitat condition, for example from poor or moderate to good.

3.3 COMPETENICES

In accordance with 'British Standard: 8683 (BS:8683) Process for designing and implementing biodiversity net gain – Specification', this BNGA and all associated condition assessments have been completed by competent, suitability trained and qualified ecologists.

Table 3.2 Site Ecologists

Ecologist	Role	Experience
James Bumphrey	Review of Report	Holds an undergraduate degree in Environmental Sciences (BSc Hons), a Master's degree in Environmental Consultancy and a Natural England Great Crested Newt Licence. James has over 11 years' experience in ecology survey and consultancy
Saul Ridley	Author of Report	Has an undergraduate degree in Zoology BSc (Hons) and a postgraduate degree in Conservation Biology MRes from the University of Sussex.

This report was written by Saul Ridley, reviewed and verified by James Bumphrey who confirms in writing (see the QA sheet at the front of this report) that the report is in line with the following:

- Represents sound industry practice;
- Reports and recommends correctly, truthfully and objectively;
- Is appropriate given the local site conditions and scope of works proposed; and
- Avoids invalid, biased, and exaggerated statements.

3.4 ASSUMPTIONS

Statutory Biodiversity Metric Calculation Tool

The condition of the habitats, either for the baseline or that a habitat is considered to be able reach post-development, has been assessed using information within the SBM User Guide and based upon the ecologist's judgement of the habitats/input from the landscape architect.

Where there was no suitable UKHab or SBM habitat classification for a habitat, a 'best fit' alternative has been used with an explanation given to justify its use.

Note the sum of the values shown in columns within the Biodiversity Units tables may differ from the total units stated. This is due to rounding and is not considered significant. The totals stated reflect those calculated within the SBM calculation tool, based on the SBM User Guide.

4.0 RESULTS

4.1 PRE-DEVELOPMENT (BASELINE)

Statutory Biodiversity Metric Calculation Tool

Using the SBM calculation tool the baseline biodiversity value of the site has been identified to be 0.13 HU.

A breakdown of the baseline calculations for HU is provided in Table 4.1 below:

Table 4.1 Baseline Habitat Units

Broad Habitat	Habitat Type	Area (Hectares)	Distinctiveness	Condition	Habitat Units
Urban	Developed Land; Sealed Surface	0.0152	V-Low	N/A- Other	0.00
Urban	Other Green Roof	0.0162	Low	Condition Assessment N/A	0.04
Urban	Other Green Roof	0.0194	Low	Condition Assessment N/A	0.04
Urban	Other Green Roof	0.0199	Low	Condition Assessment N/A	0.05
Total					**0.13**

The above table has been completed based on the methodologies detailed in Section 3.0 and on application of the below points:

- 'Developed land; sealed surface' relates to all areas of hardstanding, building and impermeable surfaces within the proposed development design. The habitat has a pre-set condition within the SBM and does not contribute any biodiversity units to the calculation.
- In accordance with the SBM User Guide, 'Other green roof', has no condition assessment.

4.2 POST-DEVELOPMENT (PROPOSED)

Using the SBM calculation tool, the proposed development is predicted to deliver **0.17 HU** as shown in Table 4.2 below.

Table 4.2 Post-Development Habitat Units

Broad Habitat	Habitat Type	Area (Hectares)	Distinctiveness	Condition	Habitat Units
Retained					
Urban	Developed Land; Sealed Surface	0.0152	V-Low	N/a - Other	0.00
Urban	Developed Land; Sealed Surface	0.0162	V-Low	N/a - Other	0.00
Urban	Developed Land; Sealed Surface	0.0005	V-Low	N/a - Other	0.00
Urban	Other Green Roof	0.0194	Low	Condition Assessment N/A	0.04
Enhanced					
Urban	Other Green Roof	0.0199	Low	Condition Assessment N/A	0.12
***Rounding present**				**TOTAL**	**0.17**

The above table has been completed based on the methodologies detailed in Section 3.0 and on application of the below points:

- The metric calculation reflects area-based habitats only as no linear, or river habitats are proposed within the post-development design.
- 'Developed land; sealed surface' relates to all areas of hardstanding, building and impermeable surfaces within the proposed development design. The habitat has a pre-set condition within the SBM and does not contribute any biodiversity units to the calculation.
- To compensate for the loss of an area of existing wildflower green roof on level 3.5 ('Other green roof') the existing sedum green roof ('Other green roof') will be enhanced to create a 'Biodiverse green roof' additional substrate will be included on the roof to provide a range of depths from 100mm to 150mm. A mix of wildflowers will also be sown on this enhanced section of roof. The relevant condition criteria targeted are set out below (Moderate condition anticipated):
    - Vegetation structure is varied, providing opportunities for vertebrates and invertebrates to live, eat and breed. A single structural habitat component or vegetation type does not account for more than 80% of the total habitat area. (Targeted)

- The habitat parcel contains different plant species that are beneficial for wildlife, for example flowering species providing nectar sources for a range of invertebrates at different times of year. (Targeted)
- Invasive non-native plant species (listed on Schedule 9 of WCA) and others which are to the detriment of native wildlife (using professional judgement) cover less than 5% of the total vegetated area. Note - to achieve Good condition, this criterion must be satisfied by a complete absence of invasive non-native species (rather than <5% cover). (Targeted, but as a precaution not considered to be achieved)
- The roof has a varied depth of 80 - 150 mm; at least 50% is at 150 mm and is planted and seeded with wildflowers and sedums or is pre-prepared with sedums and wildflowers. Note - to achieve Good condition some additional habitat, such as sand piles, stones, logs etc are present. (Targeted)

A high level of strategic significance has been applied to the proposed biodiverse green roofs as they are formally identified in the local plan.

Design guidance for the green roof is provided in Appendix G.

Further qualitative enhancements will be delivered on site in accordance with those set out in Engain's report (Appendix D). These include bird boxes and bee bricks/blocks.

5.0 EVALUATION AND DISCUSSION

Under the proposals, as set out in drawings site plans (3716-HAR-SRA-XX-XX-DR-A-PL-230 - Level 3 Mezzanine Proposed and 3716-HAR-SRA-XX-XX-DR-A-PL-231 - Level 4 Proposed) and in the absence of additional enhancement measures and habitat creation, the development is predicted to deliver 0.17 HU, which is an increase of 0.04 HU. This corresponds to an equivalent +31.12% BNG.

All BNG Trading Rules have also been satisfied. A copy of the SBM calculation tool outputs is provided as Appendix E. The proposals are therefore in compliance with local and national planning policy (see Appendix F).

Table 5.1 below evaluates whether the habitat types that will be present post-development will contribute 'significant enhancements'.

Table 5.1 Significant Enhancements Evaluation

Criteria	Present/Absent	Comments
Habitats of medium or higher distinctiveness in the biodiversity metric (created)	Absent	Existing green roofs are of low distinctiveness.
Habitats of low distinctiveness which create a large number of biodiversity units relative to the biodiversity value of the site before development	Absent	The proposed enhancement will create a medium distinctiveness habitat.
Habitat creation or enhancement where distinctiveness is increased relative to the distinctiveness of the habitat before development	Present	Pre = Low, Very Low Post = Medium, Very Low, Low
Areas of habitat creation or enhancement which are significant in area relative to the size of the development	Absent	Enhancement covers 0.0199 ha of existing green roof
Enhancements to habitat condition, for example from poor or moderate to good	Present	The proposed enhancement will create a medium distinctiveness habitat from a low distinctiveness habitat.

In accordance with the Council's online guidance a Habitat Management and Monitoring Plan (HMMP) for the habitat retention/enhancement, creation and long term management over 30 years (minimum) will be required for submission to the Local Planning Authority (LPA). Draft management and monitoring actions are included within Appendix G.

A detailed HMMP document will be produced as a condition of planning. Proposed planning condition is set out below:

'No development shall take place on any part of the site until a written 30 year Habitat Monitoring and Management Plan (HMMP) for the site has been submitted to and approved in writing by the Local Planning Authority. The approved HMMP shall be strictly adhered to and implemented in full for its duration and shall contain the following;

a) Description and evaluation of the features to be managed;

b) Ecological trends and constraints on site that may influence management;

c) Aims, objectives and targets for management - links with local and national species and habitat action plans;

d) Description of the management operations necessary to achieving aims and objectives;

e) Prescriptions for management actions;

f) Preparation of a works schedule, including annual works schedule;

g) Details of the monitoring needed to measure the effectiveness of management;

h) Details of the timetable for each element of the monitoring programme; and

i) Details of the persons responsible for the implementation and monitoring;

j) mechanisms of adaptive management to account for necessary changes in work schedule to achieve the required targets;

k) Reporting on year 1, 2, 5, 10, 20 and 30, with biodiversity reconciliation calculations at each stage.'

6.0 SUMMARY AND CONCLUSIONS

This BNGA has been completed to identify the pre-development (baseline) biodiversity value of the site and compare against the predicted post-development biodiversity value.

The baseline value for the site has been calculated as 0.13 HU.

The post-development design proposals are predicted to deliver 0.17 HU. This is a net gain of 0.04 (equivalent to + 31.12% for HU).

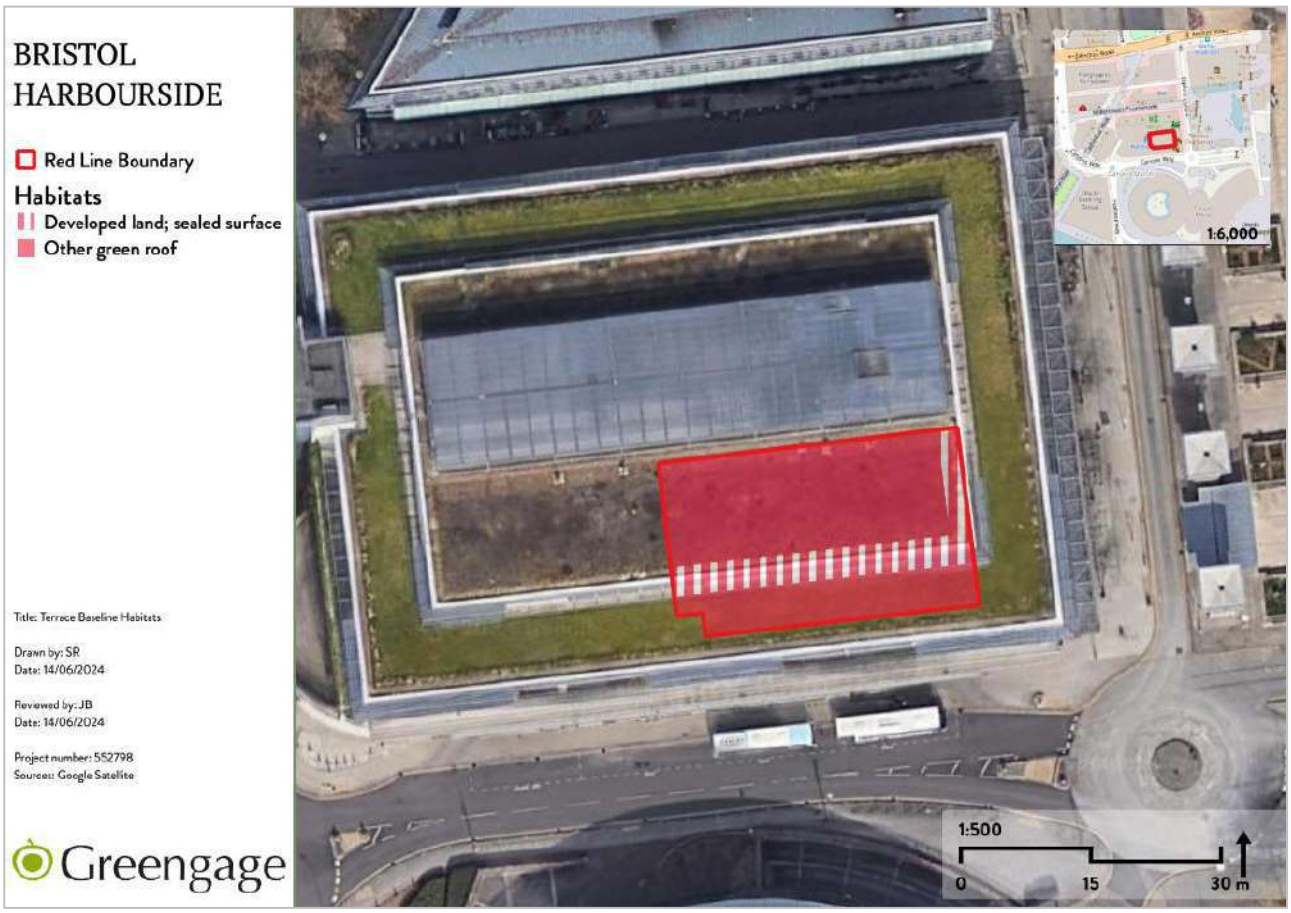
The design proposals meet the BNG Trading Rules.

In accordance with the Council's online guidance a Habitat Management and Monitoring Plan (HMMP) for the habitat retention/enhancement, creation and long term management over 30 years (minimum) will be required for submission to the Local Planning Authority (LPA). When these recommendations are adhered to, the proposals stand to be compliant with legislation and current planning policy. Draft management and monitoring actions are included within this report.

Upon receiving planning permission, the submission of a Biodiversity Gain Plan (BGP) to the LPA will be required. This BGP must include details of the proposed off-site BNG compensation, including the Biodiversity Gain Site Register Reference.

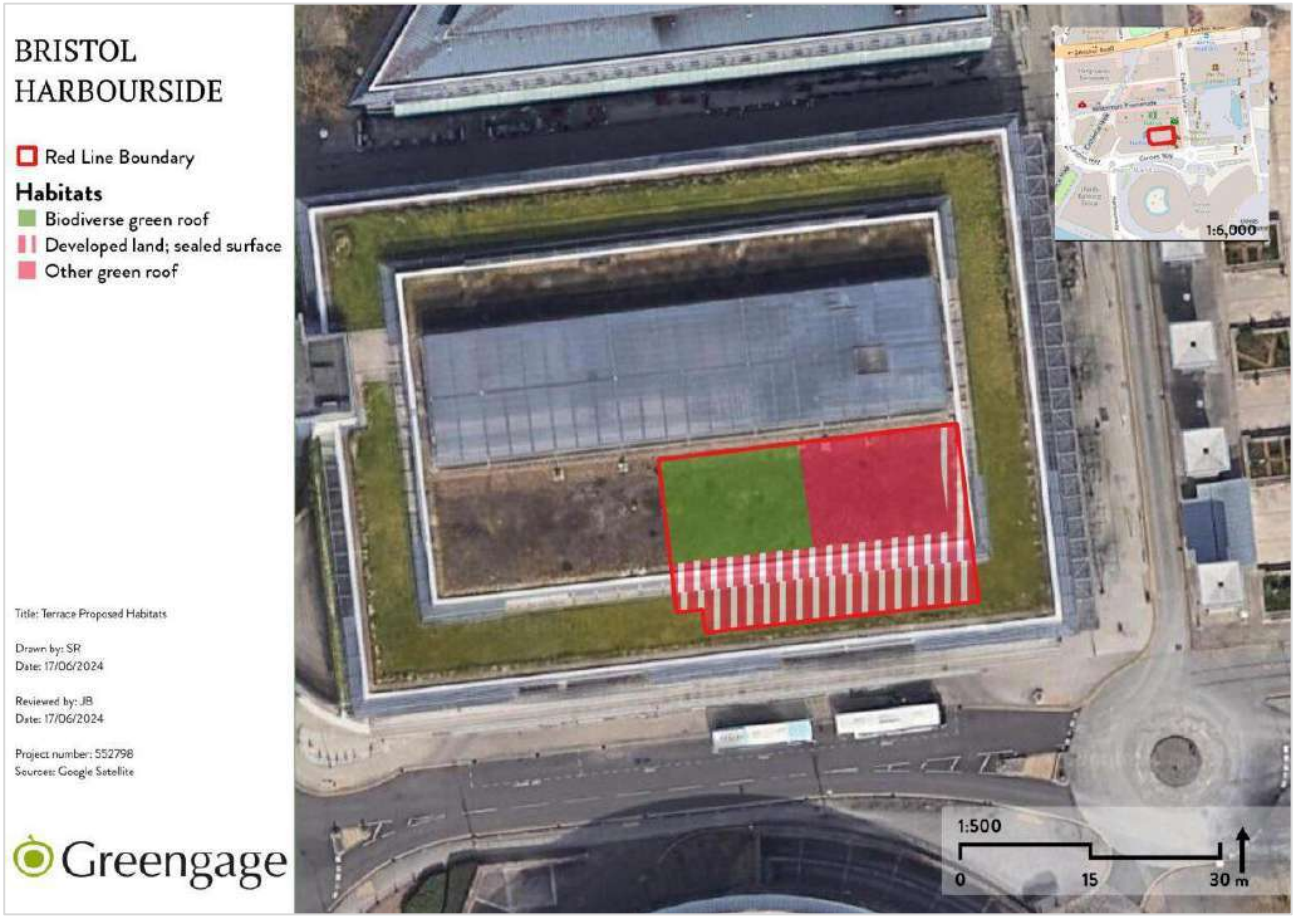
APPENDIX A PRE-DEVELOPMENT (BASELINE) HABITAT MAP

Figure A.1 Pre-development (Baseline) Habitat Map



APPENDIX B POST-DEVELOPMENT HABITAT MAP

Figure B.1 Post-development Habitat Map



APPENDIX C CONDITION ASSESSMENTS

Baseline Habitats

Urban - Developed Land; Sealed Surface

No assessment is required for this habitat as the condition is fixed within the SBM as N/A.

Urban - Other green roof

No assessment is required for this habitat as the condition is fixed within the SBM as N/A.

Proposed Habitats

Urban - Developed Land; Sealed Surface

No assessment is required for this habitat as the condition is fixed within the SBM as N/A.

Urban - Other green roof

No assessment is required for this habitat as the condition is fixed within the SBM as N/A.

Urban - Biodiverse Green Roof

Condition Assessment Criteria		Pass
Core Criteria - must be assessed for all urban habitat types:		
A	Vegetation structure is varied, providing opportunities for vertebrates and invertebrates to live, eat and breed. A single structural habitat component or vegetation type does not account for more than 80% of the total habitat area.	Y
B	The habitat parcel contains different plant species that are beneficial for wildlife, for example flowering species providing nectar sources for a range of invertebrates at different times of year.	Y
C	Invasive non-native plant species (listed on Schedule 9 of WCA1) and others which are to the detriment of native wildlife (using professional judgement)2 cover less than 5% of the total vegetated area3. Note - to achieve Good condition, this criterion must be satisfied by a complete absence of invasive non-native species (rather than <5% cover).	Y
Additional Criteria - must be assessed for Open mosaic habitat on previously developed land only:		
D1	The parcel shows spatial variation and forms a mosaic of at least four early successional communities (a) to (h) PLUS bare substrate.	N/A

Condition Assessment Criteria		Pass
	(a) annuals; (b) mosses/liverworts; (c) lichens; (d) ruderals; (e) inundation species; (f) open grassland; (g) flower-rich grassland; (h) heathland.	
D2	The parcel contains pools of water such as permanent and ephemeral waterbodies.	N/A
Additional Criteria - must be assessed for Bioswale and SuDS habitat types only:		
E1	Plant species are mostly native. If non-native species are present, they should not be detrimental to the habitat or native wildlife4.	N/A
E2	The vegetation is comprised of plant species suited to wetland or riparian situations.	N/A
Additional Criterion - must be assessed for Intensive green roofs only:		
F	The roof has a minimum of 50% native and non-native wildflowers. 70% of the roof area is soil and vegetation (including water features).	N/A
Additional Criterion - must be assessed for Biodiverse green roofs only:		
G	The roof has a varied depth of 80 - 150 mm; at least 50% is at 150 mm and is planted and seeded with wildflowers and sedums or is pre-prepared with sedums and wildflowers. Note - to achieve Good condition some additional habitat, such as sand piles, stones, logs etc are present.	Y

Condition Assessment Result	Condition Assessment Score
Results for habitats requiring assessment of 3 core criteria only (all listed urban habitats except Open mosaic habitat on previously developed land, Bioswale, SuDS and Green roofs):	
Passes all 3 criteria; AND Meets the requirements for Good condition within criterion C	Good (3)
Passes 2 of 3 core criteria; OR Passes 3 of 3 core criteria but does not meet the requirements for Good condition within criterion C.	Moderate (2)
Passes 0 or 1 of 3 core criteria.	Poor (1)
Results for Green roofs (requiring assessment of 4 criteria only - core criteria plus additional criterion specified for habitat type):	
Passes all 3 core criteria; AND	Good (3)

Condition Assessment Result	Condition Assessment Score
Meets the requirements for Good condition within criterion C; AND Passes additional criterion relevant to specific habitat type (F or G).	
Passes 2 or 3 of 4 criteria; OR Passes 4 of 4 criteria but does not meet the requirements for Good condition within criterion C.	Moderate (2)
Passes 0 or 1 of 4 criteria.	Poor (1)
Results for Open mosaic habitat on previously developed land, Bioswale or SuDS (requiring assessment of 5 criteria - core criteria plus additional criteria specified for habitat type):	
Passes all 3 core criteria; AND Meets the requirements for Good condition within criterion C; AND Passes all additional criteria relevant to specific habitat type (Group D or Group E)	Good (3)
Passes 3 or 4 of 5 criteria; OR Passes 5 of 5 criteria but does not meet the requirements for Good condition within criterion C.	Moderate (2)
Passes 2 or fewer of 5 criteria.	Poor (1)

APPENDIX D ENGAIN ECOLOGICAL ASSESSMENT

Harbour View Bristol

Ecology Assessment

February 2023

HARBOUR VIEW (UNIT 7), BRISTOL

Ecological Technical Note

eg211249-ETN-REV02

22nd February 2023

Client: Canada Life Asset Management

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Introduction

This Ecological Technical Note (ETN) sets out the likely ecological constraints and opportunities for development of a site located in Unit 7, Harbourside Bristol. It is based on a UK Habitats Classification field survey, an assessment of the site's suitability for protected and notable species, a review of existing ecological data available from online resources such as MAGIC Map, and a BRERC data search from the surrounding area.

The ETN also provides a suggested approach to Green Infrastructure and Biodiversity Net Gain and it provides initial recommendations in line with the mitigation hierarchy and reflective of local and national planning policy and legislation.

Relevant Planning Policy, Guidance and Legislation

The following planning policy and guidance is considered relevant to this site:

- NPPF - Paragraph 110.
- West of England Joint Green Infrastructure Strategy 2020-2030[i]
- Bristol Core Strategy BCS9 – Green infrastructure[ii]
- Bristol Core Strategy BCS15- Sustainable Design and Construction[iii]
- British Standard BS 42020:2013 Biodiversity — Code of practice for planning and development[iv]
- British Standard BS 8683:2021 Process for designing and implementing Biodiversity Net Gain. Specification[v]
- Biodiversity Net Gain: Good practice principles for development[vi]
- Site Allocations and Development Management Policies Policy DM19 – Development and Nature Conservation[vii]

The following legislation is considered relevant to this assessment:

- *EU Habitats Directive (1992)*[viii]
- *Conservation of Habitats and Species (Amendment) Regulations 2017*[ix];
- *The Wildlife and Countryside Act 1981* (as amended)[x];
- *The Natural Environment and Rural Communities Act 2006*[xi]; and
- *Environment Act 2021*[xii].

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Baseline Ecological Conditions

Habitats

The site consists of a rooftop space on a pre-existing urban development, surrounded by developed sealed surface (buildings and hard standing) (u1b). It consists of a section on the east and south faces of the building and includes the first roof top named the 'green roof' where majority of the development is to occur, and the roof above this named 'the main plant roof'. The green roof is made up of urban greening (1100) which included species like Bitter Dock (*Rumex obtusifolias*), Curly Dock (*Rumex crispus*), St John's wort (*Hypericum perforatum*), Oxeye Daisy (*Leucanthemum vulgare*), Cow parsley (*Anthriscus sylvestris*), Common sowthistle (*Sonchus oleraceus*) and Dove's-foot Crane's-bill (*Geranium molle*) and red dead-nettle (*Lamium purpureum*). The main plant roof is primarily made up of urban ruderal/ephemeral vegetation, including species like Greater Plantain (*Plantago major*), Creeping Thistle (*Cirsium arvense*) and dandelion (*Taraxacum officinale*) which are scattered amongst a gravel-based ground. There are few scattered urban trees surrounding the site, and some shrub hedging. The photos of these features can be found in **Table 2.**

Designated Sites

There is one European designated site within 2km of the site; the Avon Gorge Woodlands (SPA/SAC/SSSI). This site's border is approximately 1.7km north-west of the proposed development site. The development will not have any impact on this site, and no qualifying features are found on or surrounding the site.

There are three more statutory designated sites within 2km of the site. The border of the Avon Gorge SSSI is approximately 1.7k north-west and is designated for its number of nationally rare plants and for its exposures of Carboniferous Limestone, which are of great geological interest. Ashton Court SSSI is approximately 1.7k south-west and is designated for the saproxylic invertebrate fauna associated with the woodlands and ancient trees in the historic parkland. the border of Leigh Woods NNR/SSSI is approximately 1.8km west of the proposed development site and is designated for having *Tilio-Acerion* forests of slopes, screes and for its semi-natural dry grasslands and scrubland facies on calcareous substrates. None of these sites or their qualifying features will be directly or indirectly affected by the proposed development.

The non-statutory designated sites within 1km of the site include Brandon Hill SNCI which is approximately 400m north-west of the proposed development site. It is designated for its Exposures of Carboniferous Quartzitic Sandstone Public which support acid-loving grassland species on the summit and for the park with semi-natural and planted broadleaved woodland, ponds, grassland and recreated wildflower meadow. Brandon Hill SNCI includes an Avon Wildlife Trust Reserve. The River Avon SNCI is designated as a wildlife corridor and is approximately 400m south of the proposed development site. Clifton Wood SNCI is designated for its broadleaved woodland including ivy broomrape, its importance as a feeding ground for bats. The Alfred Quay in Phoenix Warf RIGS (approx. 500m), Redcliffe Caves RIGS (approx. 600m), the Hermitage RIGS (approx. 700m) are all south-east of the proposed development site and are all designated for their geological sandstone features in the form of Cliffs and Caves. The Bristol Harbour and Clifton Wood are classified as a Wildlife Network Sites. None of these sites or their features will be directly or indirectly affected by the proposed development.

Bats

The BRERC data search returned twenty seven records of bat roosts within 1km of the proposed development site in the last ten years, including one record of serotine (*Eptesicus serotinus*) in 2016, one record of Daubenton's bat (*Myotis daubentonii*) in 2016, fifteen records of Leisler's bat (*Nyctalus leisleri*) with the most recent being in June of 2022, two records of Noctule (*Nyctalus noctule*) in 2016, and six records of pipistrelle bats (*Pipistrellus*) with the most recent being in 2018. The closest Granted European protected species licence for a bat roost was approximately 345m west of the site (MAGIC).

Preliminary Roost Assessment

The Preliminary Roost Assessment (PRA) was carried out on the 2nd of December 2022 by an experienced ecologist on both the green roof and the main plant roof (top two floors of the building). The methodology of the PRA followed the Bat Conservation Trust (BCT) Bat Surveys: Good Practice Guidelines (Collins, 2016) and the Joint Nature Conservation Committee (JNCC) Bat Workers' Manual (Mitchell-Jones & McLeish, 2004). The site consists of a portion to the east and south of the outdoor space on the top two stories of a large modern building.

The buildings were inspected visually during daylight hours for potential roosting features (PRFs) such as broken tiles, lifted lead flashing and gaps in the soffits and any evidence of previous or current usage by bats. This included searching for evidence of bats such as urine or oil stains and droppings.

Based on the results of the PRA, the building was assigned a bat roosting potential suitability based on **Table 1** below (extract from Collins, 2016):

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TABLE 1, *GUIDELINES FOR ASSESSING THE BAT ROOSTING SUITABILITY OF STRUCTURES*

Roosting suitability	Description of structure
Confirmed	Bats, or evidence of bats, found within the structure.
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat
Moderate	A structure with one or more potential roost sited that could be used by bats due to their size, shelter, protection, condition and surrounding habitat, but unlikely to support a roost of high conservation status.
Low	A structure with one or more potential roost sited that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis by large numbers of bats.
Negligible	Negligible features likely to be used by roosting bats.

Due to the lack of potential roosting features, the general urban environment and lack of any evidence of bats, the building was deemed Negligible suitability for roosting bats (see photos and details in **Table 2**)

Breeding Birds

The data search returned numerous records of birds within 1km of the site boundary.

The site offers potential for nesting birds such as gulls and feral pigeons (*Columba livia domestica*), and offers potential for some foraging birds, such as passerines.

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TABLE 2, DESCRIPTION OF ECOLOGICAL FEATURES AND PHOTOGRAPHS

Ecological Features	Findings site visit December 2022	Photos
Habitats	**Green Roof** Modified grassland greenroof with species of dead-nettle, Dock (*Rubmex obtusifolias*), Curly Dock (*Rumex crispus*), St John's wort (*Hypericum perforatum*), Oxeye Daisy (*Leucanthemum vulgare*), Cow parsley (*Anthriscus sylvestris*), Common sowthistle (*Sonchus oleraceus*), Dove's-foot Crane's-bill (*Geranium molle*)	     

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Main Plant Roof

Gravel ground with introduced vegetation, moss and weeds.

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Bats	The building is quite modern and well-maintained, and from the inside there are seemingly no gaps or access junctions for bats from either the green roof or the main plant roof. The external features have no access points or suitability for roosting bats. The only potential access points are active vents covered with grates, pipes and fans which cause a lot of noise disturbance and are most likely not used by bats. Offsite, there are a few features like a green wall which is part of the same building on the western side, and a few urban scattered trees and shrubs, however, due to the lack of connectivity and linear features, these would not be potential commuting/foraging habitat for bats. Furthermore, due to the lighting and general urban disturbance it is unlikely that bats would forage or commute in this area or use this building for roosting.	        

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Breeding birds	The green roof and main plant roof both have potential for breeding birds such as gulls and feral pigeons. There are some scattered urban trees and introduced shrub hedge offsite which also have potential for nesting birds.	   

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Great Crested Newts

There are no ponds on or adjacent to the site. The site is also elevated and therefore not accessible by great crested newts. It is therefore concluded that great crested newts are not present on this site.

Reptiles

There is no habitat suitable for reptiles within the site. It is therefore concluded that there are no reptiles on site.

Badgers

There were no signs of badgers around the site, and it is not possible for any badger setts to be dug on site as the site area is raised (5 & 6 stories).

Potential IEFs Scoped Out

- Habitats for breeding birds
- Habitats for invertebrates

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CONSTRAINTS AND OPPORTUNITIES

General

A Construction Ecological and Management Plan (CEcMP) will be written, following the principles of BS42020:2013 'Biodiversity — Code of practice for planning and development'. It will set out how negative effects during the site clearance and construction phase are managed, following the mitigation hierarchy and include any reasonable avoidance measures as required.

Green Infrastructure and Biodiversity Net Gain

The development of this green roof site will remove areas of a common and widespread habitat type of limited ecological value. The greatest opportunity for biodiversity enhancement is the re-instatement of species-rich mosaic green roof with native species could be created on the main plant roof, and diversifying plant species. The client has agreed to enhance the same area of habitat being lost on the existing green roof which will enrich the site for invertebrates and bird species.

Bats

Based on the habitats recorded on site, it is unlikely likely bats are using the site. Measures should be incorporated across the site using best practice principles (BCT and Institute of Lighting Professionals, 2018) to reduce the impact of artificial lighting on wildlife. Those measures include (but are not limited to) using warm white spectrum lights (<2700Kelvin), bollards or low-level downward directional luminaires and the use of LED bulbs.

Breeding Birds

No significant impacts are anticipated because of development. The building construction should proceed with caution regarding nesting birds which should include a nesting bird check prior to any works commencing by a suitably qualified ecologist and this should be included in the CEcMP.

The development will include two 1SP Schwegler Sparrow boxes and two Swift boxes.

Terrestrial Invertebrates

The proposed development will include four bee bricks or bee blocks either onsite or offsite (surrounding retained green roof). The inclusion of plants (especially night scented) to attract invertebrates on the enhanced main plant green roof will further enhance the site. The following plant species could be included; star jasmine (*Trachelospermum jasminoides*) and tobacco plant (*Nicotiana sylvestris*).

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APPENDIX E SBM CALCULATION OUTPUTS

Baseline

	Existing area habitats				Distinctiveness		Condition		Strategic significance			Required Action to Meet Trading Rules	Ecological baseline						
Ref	Broad Habitat	Habitat Type	Irreplaceable habitat	Area (hectares)	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic significance multiplier		Total habitat units	Area retained	Area enhanced	Baseline units retained	Baseline units enhanced	Area habitat lost	Units lost
1	Urban	Other green roof	No	0	Low	2	Condition Assessment	1	Formally identified in local strategy	High strategic significance	1.15	Same distinctiveness or better habitat required≥	0.00	0	0	0.00	0.00	0.00	0.00
2	Urban	Other green roof	No	0	Low	2	Condition Assessment	1	Formally identified in local strategy	High strategic significance	1.15	Same distinctiveness or better habitat required≥	0.00	0	0	0.00	0.00	0.00	0.00
3	Urban	Developed land; sealed surface	No	0.0152	V.Low	0	N/A - Other	0	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Compensation Not Required	0.00	0.0152	0	0.00	0.00	0.00	0.00
4	Urban	Other green roof	No	0.0162	Low	2	Condition Assessment N/A	1	Formally identified in local strategy	High strategic significance	1.15	Same distinctiveness or better habitat required≥	0.04	0	0	0.00	0.00	0.02	0.04
5	Urban	Other green roof	No	0.0194	Low	2	Condition Assessment N/A	1	Formally identified in local strategy	High strategic significance	1.15	Same distinctiveness or better habitat required≥	0.04	0.0194	0	0.04	0.00	0.00	0.00
6	Urban	Other green roof	No	0.0199	Low	2	Condition Assessment N/A	1	Formally identified in local strategy	High strategic significance	1.15	Same distinctiveness or better habitat required≥	0.05	0	0.0199	0.00	0.05	0.00	0.00
7																			
8																			
9																			
10																			
11																			

Proposed – Creation

		Post intervention habitats																				
					Distinctiveness		Condition		Strategic significance			Temporal multiplier						Difficulty multipliers				
	Ref	Broad Habitat	Proposed habitat	Area (hectares)	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic significance multiplier	Standard time to target condition (years)	Habitat created in advance (years)	Delay in starting habitat creation (years)	Standard or adjusted time to target condition	Final time to target condition (years)	Final time to target multiplier	Standard difficulty of creation	Applied difficulty multiplier	Final difficulty of creation	Difficulty multiplier applied	Habitat units delivered
11	1	Urban	Developed land; sealed surface	0	V.Low	0	N/A - Other	0	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	0	0	0	Standard time to target condition applied	0	1.000	Low	Standard difficulty applied	Low	1	0.00
12	2	Urban	Developed land; sealed surface	0.0162	V.Low	0	N/A - Other	0	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	0	0	0	Standard time to target condition applied	0	1.000	Low	Standard difficulty applied	Low	1	0.00
13	3	Urban	Developed land; sealed surface	0.0065	V.Low	0	N/A - Other	0	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	0	0	0	Standard time to target condition applied	0	1.000	Low	Standard difficulty applied	Low	1	0.00
14	4																					
15	5																					
16	6																					

Proposed - Enhancement

	Baseline habitats										Proposed Habitat (Broad habitat pre-populated but can be overridden)		Change in distinctiveness and condition	
Baseline ref	Baseline habitat	Total habitat area (hectares)	Baseline distinctiveness band	Baseline distinctiveness score	Baseline condition category	Baseline condition score	Baseline strategic significance category	Baseline strategic significance score	Baseline habitat units	Required Action to Meet Trading Rules	Proposed Broad Habitat	Proposed habitat	Distinctiveness change	Condition change
6	Urban - Other green roof	0.0199	Low	2	Condition Assessment N/A	1	High strategic significance	1.15	0.05	Same distinctiveness or better habitat required≥	Urban	Biodiverse green roof	Low - Medium	Lower Distinctiveness Habitat - Moderate

Post intervention habitats																
					Strategic significance			Temporal risk multiplier						Difficulty risk multipliers				
Area hectares)	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic significance multiplier	Standard time to target condition (years)	Habitat enhanced in advance (years)	Delay in starting habitat enhancement (years)	Standard or adjusted time to target condition	Final time to target condition (years)	Final time to target multiplier	Standard difficulty of enhancement	Applied difficulty multiplier	Final difficulty of enhancement	Difficulty multiplier applied	Habitat units delivered
0.0199	Medium	4	Moderate	2	Formally identified in local strategy	High strategic significance	1.15	5	0	0	Standard time to target condition applied	5	0.837	Medium	Standard difficulty applied	Medium	0.67	0.12

APPENDIX F RELEVANT LEGISLATION AND POLICY

F.1 LEGISLATION

The BNGA has been compiled with reference to the following relevant nature conservation legislation, planning policy and the UK Biodiversity Framework from which the protection of sites, habitats and species is derived in England including:

- UK Government's 25 Year Environment Plan (DEFRA, 2018);
- Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services (DEFRA, 2011);
- National Planning Policy Framework (NPPF) (MHCLG, 2023);
- The Natural Environment and Rural Communities (NERC) Act (HMSO, 2006); and
- The Environment Act (DEFRA, 2021).

The Environment Act, 2021

Under the Environment Act, 2021, as of 12th February 2024 and 2nd April 2024, it is mandatory in England for new developments (with a small number of exceptions) to deliver a minimum 10% biodiversity net gain (BNG), as measured by the Statutory Biodiversity Metric or Small Sites Metric (SSM) respectively, secured through planning condition as standard (as per schedule 14 of the Act). Approach to the delivery of BNG must follow the mitigation hierarchy, with avoidance of impact and on-site compensation/gains prioritised, ahead of the use of off-site compensation, or the purchase of statutory credits.

The Act introduces the condition that no development may begin unless a Biodiversity Gain Plan (BGP) has been submitted and approved by the LPA.

The Act also amends requirements of the NERC Act, 2006, adding the need to not just conserve, but enhance biodiversity through planning projects. Furthermore, it introduces the need for the LPA to have regard to relevant local nature recovery strategies and relevant species/protected site conservation strategies, when making their decision.

Under the Act, the enhancements must be maintained for at least 30 years.

F.2 PLANNING POLICY

National

National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2023[5] sets out the Government's planning policies for England, including how plans and decisions are expected to apply a presumption in favour of sustainable development. Chapter 15 of the NPPF focuses on conservation and enhancement of the natural environment, stating plans should 'identify and pursue opportunities for securing measurable net gains for biodiversity'.

It goes on to state: 'if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused'. Alongside this, it acknowledges that planning should be refused where irreplaceable habitats such as ancient woodland are lost.

Regional

West of England Joint Green Infrastructure Strategy 2020-2030[6]

All four West of England Unitary Authorities (UAs) and the West of England Combined Authority (WECA) have declared a climate emergency. The Joint Green Infrastructure Strategy (JGIS) through providing a multi beneficial approach to strategy, policy and delivery will contribute to addressing:

- inequalities in provision of GI and health.
- achieve well designed, attractive and healthy places that deliver economic benefits and community resilience.
- respond positively to the climate and ecological emergency.

It states that invertebrate populations can be increased by protecting existing habitats; linking and managing flower-rich and over-wintering habitat; incorporating natural open space, allotments, green roofs, green walls within the design of new places and spaces; including lower-rich verges as part of footpath and cycle networks; and reducing use of pesticides.

Local

Bristol Local Plan (Review 2023)[7]

Bristol's new Local Plan is currently under review and will set out how Bristol will develop up to 2040. This will help deliver new homes and jobs needed, and safeguard the environment valued. The publication version of the new plan was agreed and published in November 2023.

Policy BG1: Green infrastructure and biodiversity in new development

The integrity and connectivity of the Nature Recovery Network and wider network of green and blue infrastructure across the city will be maintained, protected, enhanced and restored. Development proposals will be expected to incorporate appropriate multifunctional green infrastructure and provision for nature.

The provision of green infrastructure in new development should:

- Integrate features which support nature and encourage wildlife such as swift bricks and other nesting assistance, hedgehog holes and other wildlife movement features, accommodation for pollinators, and wildlife friendly landscape treatments;
- Integrate green infrastructure into the design of new development including nature-rich landscape treatment and features such as green roofs, living walls or water features linked to SuDS;

- Retain and incorporate important existing green infrastructure such as trees (Policy BG4 'Trees'), hedgerows and water features;
- Take all available opportunities to deliver multifunctional benefits including habitat creation, flood protection, water quality, recreation, food-growing, improved air and water quality and reduced urban heating;
- Take all available opportunities to connect to, or enhance the integrity of the Nature Recovery Network and wider ecological networks;
- Provide appropriately for recreational access and use; and,
- Enhance opportunities to access nature, through connecting public rights of way and extending access to active travel links where possible.

Policy BG2: Nature Conservation and Recovery

Development in Bristol will be expected to take all available opportunities to connect to or enhance the integrity of the Nature Recovery Network and wider ecological networks and promote the restoration of priority habitats and the recovery of priority species, including through the provision of new and the enhancement of existing green and blue infrastructure.

Policy BG3: Achieving Biodiversity Net Gains

In accordance with Policy BG1 'Green infrastructure and biodiversity in new development', new development will be expected to incorporate provision for nature resulting in a biodiversity gain.

Development proposals subject of the provisions of the Environment Act 2021 will be required to achieve a minimum of 10% biodiversity net gain. Developments will be encouraged to secure greater than the minimum level. Using the Defra Biodiversity Metric, or latest nationally endorsed metric, proposals must demonstrate their ability to achieve biodiversity net gain through a Biodiversity Gain Plan which is required to be submitted alongside a planning application. This will set out;

- Steps taken to avoid and minimise the adverse effects of the development on habitats;
- Identification of pre- and post-development onsite biodiversity value;
- Details of registered offsite biodiversity value allocated to the development and biodiversity credits purchased; and
- Other information that may be required by other and/or prevailing regulations.

The Biodiversity Gain Plan will set out how the condition of any habitat creation and enhancement will be maintained for at least 30 years after development is completed.

Policy BG4: Trees

The provision of additional and/or improved management of existing trees will be expected as part of the landscape treatment of new development. The size, species and placement of trees provided as part of the landscape treatment will be expected to take practicable opportunities to:

- Ensure that any new streets created as part of the development are tree lined;

- Assist in reducing or mitigating run-off and flood risk on the development site; and
- Increase canopy cover and assist in providing shade and shelter. Proposals will be expected to set out appropriate measures to secure the long-term maintenance of newly-planted trees.

Bristol Ecological Emergency Action Plan[8]

The Ecological Emergency Action Plan sets out action being taken by the council in the four years up to 2025 to embed nature into all decisions. The plan that will deliver in partnership with communities, organisation and businesses. Its purpose is to:

Integrate best ecological practice into each area of the council's activity, allowing us to lead the city by example

- Demonstrate the council's commitment to the One City Ecological Emergency Strategy alongside the One City Climate Strategy and its objectives
- Support and influence action by partners and through partnerships
- Support and enable action by citizens
- Develop existing evidence and knowledge to support decision making and innovation in addressing nature-related issue.

APPENDIX G DRAFT HABITAT MANAGEMENT AND MONITORING

1.0 DRAFT HABITAT MANAGEMENT AND MONITORING

The following management actions and information have been prepared with reference the template for Habitat Management and Monitoring Plans (HMMP) produced by Natural England.

A detailed document will be produced as a condition of planning.

A proposed planning condition is set out below:

'No development shall take place on any part of the site until a written 30 year Habitat Monitoring and Management Plan (HMMP) for the site has been submitted to and approved in writing by the Local Planning Authority. The approved HMMP shall be strictly adhered to and implemented in full for its duration and shall contain the following;

a) Description and evaluation of the features to be managed;

b) Ecological trends and constraints on site that may influence management;

c) Aims, objectives and targets for management - links with local and national species and habitat action plans;

d) Description of the management operations necessary to achieving aims and objectives;

e) Prescriptions for management actions;

f) Preparation of a works schedule, including annual works schedule;

g) Details of the monitoring needed to measure the effectiveness of management;

h) Details of the timetable for each element of the monitoring programme; and

i) Details of the persons responsible for the implementation and monitoring;

j) mechanisms of adaptive management to account for necessary changes in work schedule to achieve the required targets;

k) Reporting on year 1, 2, 5, 10, 20 and 30, with biodiversity reconciliation calculations at each stage.'

1.1 BASELINE

Site Description

The site is located at Explore Lane, BS1 5TY, within Harbourside in the City of Bristol. It consists of a rooftop space on a pre-existing urban development, surrounded by buildings and hard standing. Externally this consists of the roof top on level 3.5 incorporating an existing wildflower green roof ('Other green roof') and the roof level on level 4 which includes plant and an existing sedum green roof ('Other green roof'). The non vegetated sections of the buildings are classified as 'Developed Land; Sealed Surface'.

Site Photos

Plate 1.1 Existing wildflower green roof

Plate 1.2 Existing sedum green roof

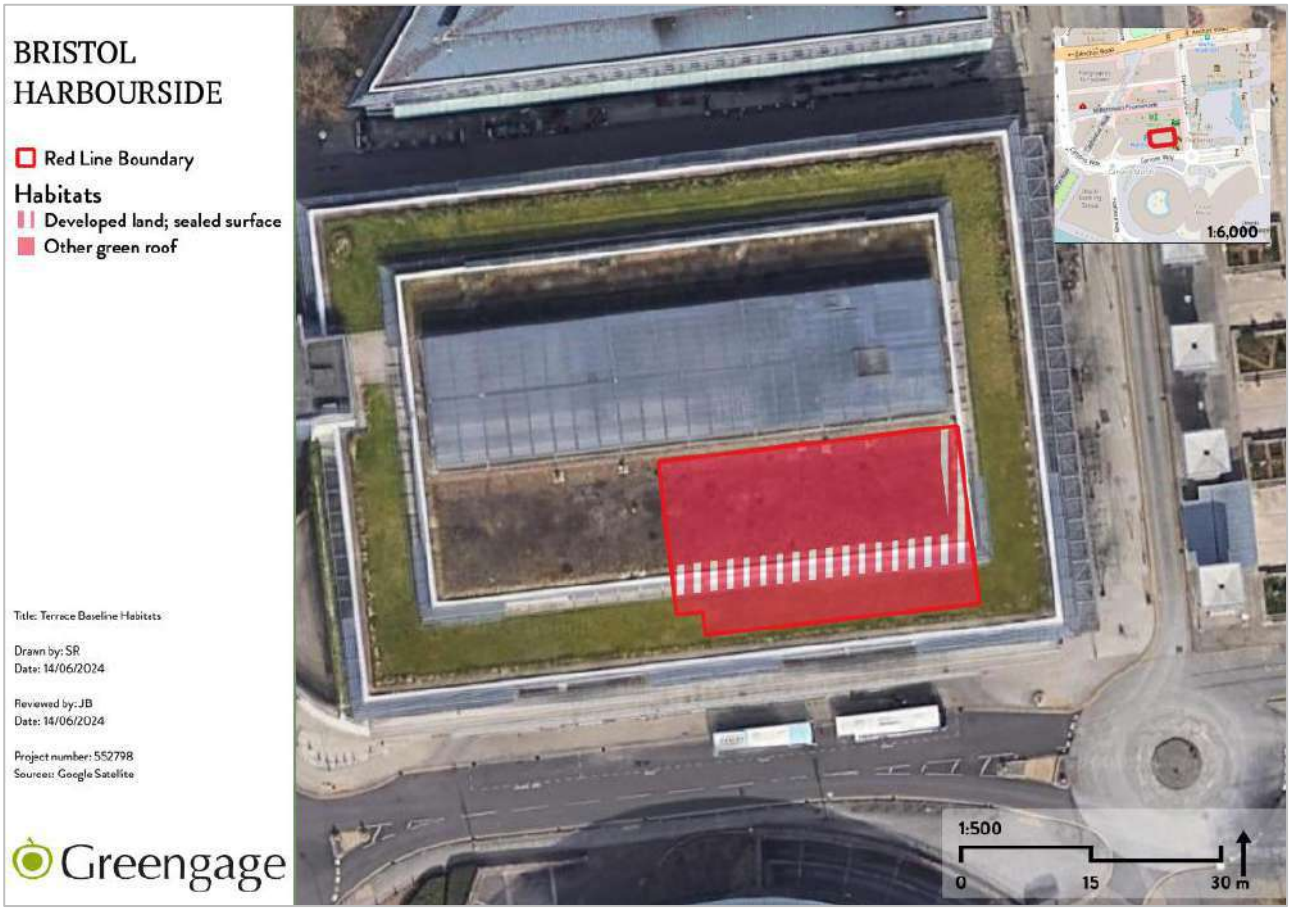
Existing Site Habitats

Pre-development habitat units are set out below:

Table 1.1 Baseline Habitat Units

Broad Habitat	Habitat Type	Area (Hectares)	Distinctiveness	Condition	Habitat Units
Urban	Developed Land; Sealed Surface	0.0152	V-Low	N/A- Other	0.00
Urban	Other Green Roof	0.0162	Low	Condition Assessment N/A	0.04
Urban	Other Green Roof	0.0194	Low	Condition Assessment N/A	0.04
Urban	Other Green Roof	0.0199	Low	Condition Assessment N/A	0.05
Total					**0.13**

Figure 1.1 Existing site plan



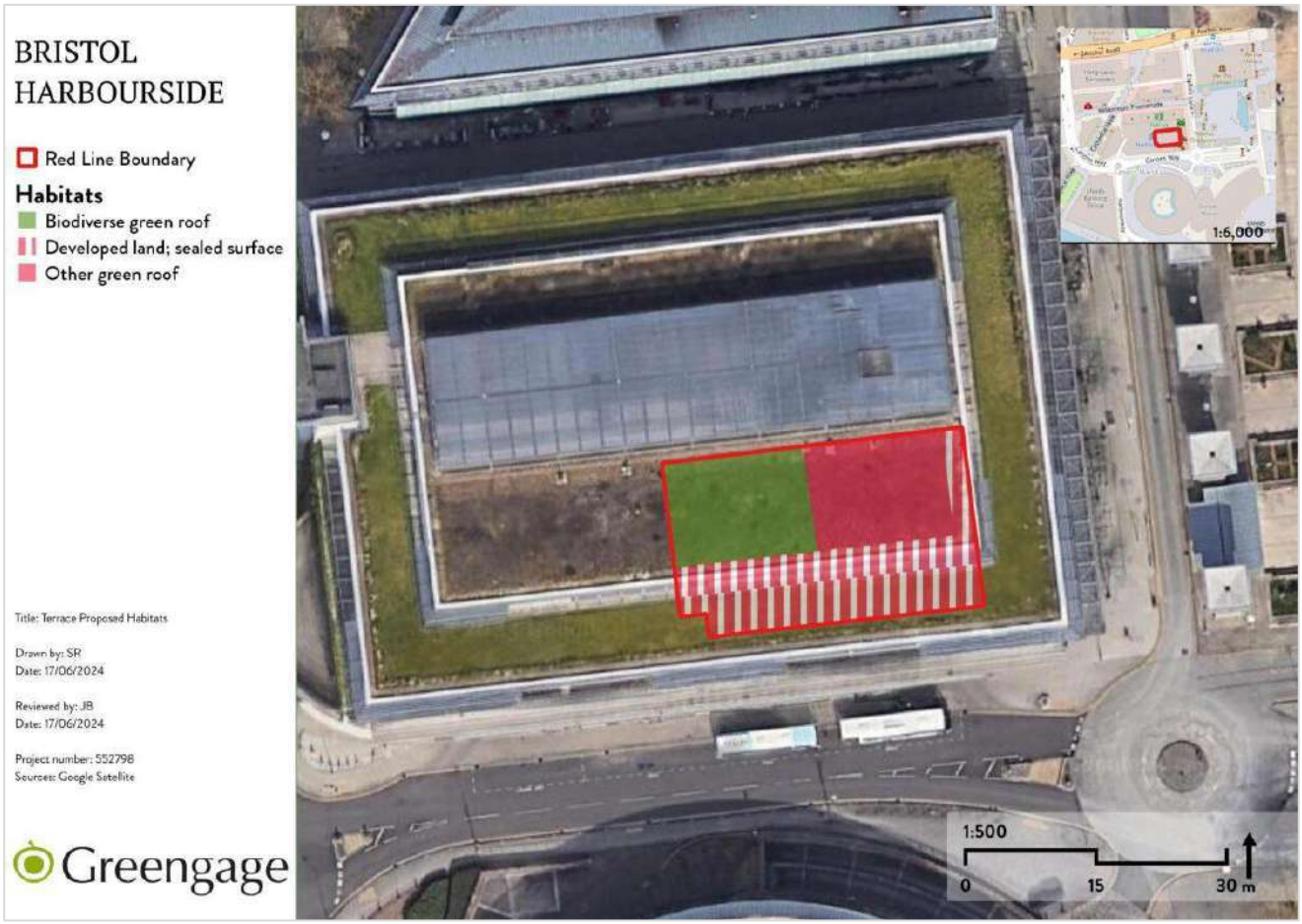
1.2 PROPOSED COMPENSATION / ENHANCEMENT

Overview

Given the nature of the existing site, and composition of existing green roofs, to compensate for the loss of an area of existing wildflower green roof on level 3.5 ('Other green roof') it is proposed to enhance an area of existing sedum green roof ('Other green roof') on level 4 to create a 'Biodiverse green roof'.

Creation of this habitat compliments the aims of the 'Open mosaic habitats on previously developed land' Habitat Action Plan (HAP) of the Bristol Biodiversity Action Plan (BAP) which encourages the inclusion of green roofs (e.g biodiverse roofs) with open mosaic habitat features. The proposed specification set out below incorporates features (substrate depth and type, sandy piles, log piles, rope coils) that align with this habitat. The roof will also provide foraging habitat for house sparrow, a Bristol BAP species.

Figure 1.2 Proposed site plan



Condition Criteria

The relevant condition criteria targeted for the biodiverse green roof are set out below (Moderate condition anticipated):

- Vegetation structure is varied, providing opportunities for vertebrates and invertebrates to live, eat and breed. A single structural habitat component or vegetation type does not account for more than 80% of the total habitat area. (Targeted)
- The habitat parcel contains different plant species that are beneficial for wildlife, for example flowering species providing nectar sources for a range of invertebrates at different times of year. (Targeted)
- Invasive non-native plant species (listed on Schedule 9 of WCA) and others which are to the detriment of native wildlife (using professional judgement) cover less than 5% of the total vegetated area. Note - to achieve Good condition, this criterion must be satisfied by a complete absence of invasive non-native species (rather than <5% cover). (Targeted, potentially may not achieve)
- The roof has a varied depth of 80 - 150 mm; at least 50% is at 150 mm and is planted and seeded with wildflowers and sedums or is pre-prepared with sedums and wildflowers. Note - to achieve Good condition some additional habitat, such as sand piles, stones, logs etc are present. (Targeted)

Post-development habitat units are set out below:

Table 1.2 Post-Development Habitat Units

Broad Habitat	Habitat Type	Area (Hectares)	Distinctiveness	Condition	Habitat Units
Retained					
Urban	Developed Land; Sealed Surface	0.0152	V-Low	N/a - Other	0.00
Urban	Developed Land; Sealed Surface	0.0162	V-Low	N/a - Other	0.00
Urban	Developed Land; Sealed Surface	0.0005	V-Low	N/a - Other	0.00
Urban	Other Green Roof	0.0194	Low	Condition Assessment N/A	0.04
Enhanced					
Urban	Other Green Roof	0.0199	Low	Condition Assessment N/A	0.12
*Rounding present				TOTAL	0.17

Design Guidance

Design guidance for the biodiverse roof is outlined below.

Substrate

The depth of the existing substrate will be increase so it ranges between 100mm-150mm (ideally 200mm). Additional substrate will be added which will be a 'typical' biodiverse substrate designed for extensive living roofs, composed of recycled crushed brick, expanded clay shale and recycled organic content.

Seeding

Once the substrate depth has been increased a seed mix will be sown.

A suitable seed mixes can be procured from a variety of retailers that are tailored for exposed, low-nutrient conditions on roof tops. Bauder's Flora 3 Seed Mix[1] contains 49 species including 35 wildflowers on the RHS Perfect for Pollinators list. The diverse mix of species increases the flowering period, increasing the availability of nectar for pollinators throughout the year. This seed mix, or similar products from other suppliers, should be used on the biodiverse substrate areas.

Examples of suitable species are provided below

Table 1.3 Example wildflower species

Common name	Scientific name
Yarrow	Achillea millefolium
Agrimony	Agrimonia eupatoria
Kidney Vetch	Anthyllis vulneraria
Thrift	Armeria maritimis
Common daisy	Bellis perenis
Common Knapweed	Centaurea nigra
Viper's Bugloss	Echium vulgare
Blue fleabane	Erigeron acer
Dropwort	Filipendula vulgaris
Lady's Bedstraw	Galium verum
Common Rock-rose	Helianthemum nummularium
Perforate St John's Wort	Hypericum perforatum
Common cat's-ear	Hypochaeris radicata
Wild Candytuft	Iberis amara
Field Scabious	Knautia arvensis

[1] Bauder (2015); Flora 3 Seed Mix Leaflet. Bauder, Ipswich

Rough Hawkbit	Leontodon hispidus
Oxeye Daisy	Leucanthemum vulgare
Birdsfoot Trefoil	Lotus corniculatus
Mellilots	Melilotus spp
Wild Marjoram	Origanum vulgare
Hoary Plantain	Plantago media
Salad Burnet	Sanguisorba minor
Cowslip	Primula veris
Selfheal	Prunella vulgaris
White stonecrop	Sedum album
Bladder Campion	Silene vulgaris
Red clover	Trifolium pretense
Dark Mullein	Verbascum nigrum
Wild pansy	Viola tricolor

Additional Enhancement Features

Additional enhancement features will be incorporated into the biodiverse roof to provide habitats suitable for invertebrates and further increase the range of micro niches and biodiversity. Log piles, sandy piles, stone swirls and rope coils will be integrated into the biodiverse roof to enhance its value for invertebrates and provide aesthetic interest.

It is recommended that a minimum of two of each enhancement feature described below is provided on the roofs.

Log pile

Two log piles made up of wood from broadleaved trees such as oak and beech, and from fruiting trees such as apple and pear will be installed on the biodiverse roof, at least 100mm in diameter with the bark still on. Logs in contact with the substrate will remain damp underneath, which is vital for many invertebrates such as woodlice. Logs will be placed both vertically and horizontally in clusters; vertical standing wood will be incorporated by submerging the logs into the full depth of the substrate, ideally in the deeper sections, again using a range of diameters and lengths, see Plate 1.3 below.

Plate 1.3 Examples of Log piles on biodiverse roofs

Sandy piles

Many species of burrowing solitary bees and wasps require sandy areas to burrow and nest. Provision of sandy piles provides nesting opportunities for such invertebrates within close proximity of a foraging resource. Two sandy piles will be incorporated on the biodiverse roof. It will be compacted to form a sandcastle effect, and be 50cm high covering one square metre, with 30° angled sides. Rocks and stones may be placed on the surface to increase stability, see Plate 1.4 below.

Plate 1.4 Sandy piles on biodiverse roof

Rope coil

A rope made from natural fibres will be used such as Manila rope which is suitable for general outdoor use. Manila rope is made from the leaves of the plant Musa textilis and will last up to 10 years, reducing maintenance requirements. The rope will be coiled in a spiral shape to cover an area of 1m^2; the rope will be coiled loosely to ensure suitable gaps are created for invertebrates. Pegs will need to be used to harness the rope to the roof and ensure that it cannot blow away. Two rope coils will be installed on the biodiverse roof, see plate 1.5.

Plate 1.5 Rope coil on biodiverse roof

1.3 MANAGEMENT

Management of the biodiverse green roof will be undertaken by the building maintenance team and comprise the following:

Table 1.4 Management Actions

Action	Description	Timing
Irrigation	The roof may require occasional watering in periods of prolonged drought	Summer (frequency depends of weather conditions)
Litter/leaf litter	Remove leaf litter/litter	Yearly - late Autumn
Check for blockages	Remove the lids of all inspection chambers, ensure that all rainwater outlets and downpipes are free from blockages and that water can flow freely away	Yearly - late Autumn
Plant encroachment	Any vegetation which has invaded into drainage outlets, inspection chambers, walkways and the vegetation barriers (pebbles) should be removed.	Yearly - late Autumn

	Additional washed stoned pebbles, similar to existing, can be added if movement or settlement of the pebble vegetation barrier has occurred.	
Strimming	In the late autumn the vegetation should be strimmed back to a height of 50-70mm and unwanted waste matter raked up and removed.	Yearly - late Autumn
Invasive species	Remove invasive species (e.g Buddleia)	Yearly - late Autumn

1.4 MONITORING

Monitoring of the 'condition' of the roof is proposed to be undertaken by an ecologist and will include confirming the following:

- Vegetation structure is varied, providing opportunities for vertebrates and invertebrates to live, eat and breed. A single structural habitat component or vegetation type does not account for more than 80% of the total habitat area.
- The biodiverse roof contains different plant species that are beneficial for wildlife, for example flowering species providing nectar sources for a range of invertebrates at different times of year.
- Invasive non-native plant species (listed on Schedule 9 of WCA) and others which are to the detriment of native wildlife (using professional judgement) cover less than 5% of the total vegetated area. Note - to achieve Good condition, this criterion must be satisfied by a complete absence of invasive non-native species (rather than <5% cover).
- The roof has a varied depth of 80 - 150 mm; at least 50% is at 150 mm and is planted and seeded with wildflowers and sedums or is pre-prepared with sedums and wildflowers. Note - to achieve Good condition some additional habitat, such as sand piles, stones, logs etc.

At or just after Practical Completion of the site, an ecologist will inspect the ecological enhancements implemented as a result of the recommendations in this strategy.

A single monitoring visit would then be completed between May and August in years 1, 2, 5, 10, 20 and 30. In accordance with the above criteria this would include a check of the following:

- Plant species composition;
- Presence/absence of invasive species; and
- Check additional enhancements (e.g sand piles, logs, rope coils) are intact.

Any remedial actions/recommendations will be provided to the building maintenance team. A monitoring report would be provided to the Local Planning Authority after each visit.

Remedial actions may include:

- Removal of any dominant plant species and re-seeding.
- Removal of invasive non-native plant species (ongoing management action).

- Replacement of substrate and additional enhancement features.

1.5 RETENTION OF HABITATS

Retained areas of existing wildflower green roof and sedum green roof will be protected from disturbance through the installation of appropriate signage and barriers (where applicable).

1.6 ROLES AND RESPONSIBILITIES

The following table summarises the roles and responsibilities associated with this draft Management Plan.

Table 1.5 Roles and responsibilities summary

Organisation / Individual	Responsibility
Planning consultant	Submission of Management Plan to the Local Planning Authority.
Client / building maintenance	Completion of management/maintenance actions and any remedial works.
Ecologist	Preparation of Management Plan. Advising on any remedial works Completion of monitoring visits and submission of Monitoring Reports.

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