

APPENDIX D BIODIVERSITY NET GAIN ASSESSMENT

D.1 METHODOLOGY

Biodiversity Metric

To calculate the ecological value of the pre- and post-development site, the Natural England Metric 3.1 methodology was utilised, following best practice guidance from Natural England⁶ and joint guidance from CIEEM, IEMA and CIRIA⁷.

This metric uses Biodiversity and Hedge Units as a proxy for the ecological value of area and hedgerow based habitats. The areas of each habitat parcel are measured, with each parcel assigned a 'Distinctiveness' and 'Condition' score. Distinctiveness is a default score for the habitat classification, representing its inherent ecological value, whereas condition refers to the state each parcel is in relative to predetermined set of criteria outlined in the supplementary Biodiversity Metric 3.1 guidance.

For post-development habitat areas, additional multipliers are applied taking into account the time taken to reach maturity and difficulty of creation of the habitats, and whether the habitat creation is in a strategically beneficial location.

An assessment of the predicted change in ecological value is undertaken comparing the Biodiversity and Hedge Units and assessing percentage change. Changes in broader habitat types (for example, 'Urban', 'Woodland' and 'Grassland' habitats) are also tracked, and trading habitats is discouraged unless specifically targeted within a local strategy. Trading down of habitats is not permitted.

Baseline calculation

To calculate pre-development Biodiversity Units, data collected during a Preliminary Ecological Appraisal (PEA) undertaken by Greengage (doc ref: 551337ogOct19FV01_PEA) was assessed. Areas of each habitat type were taken from the Phase 1 Habitat Map (Appendix B) and data relating to the condition of habitat parcels was collected in the field.

Stem diameters of each tree were used to assign each tree a rating of 'small', 'medium' or 'large', in line with the Natural England BNG User Guide. The rating corresponds to an area value to be used. Default distinctiveness and condition scores are given.

The length of all hedgerows on site were taken from the Phase 1 Habitat Map and data relating to the condition of these was collected in the field.

Proposed Development Calculations

The proposed redevelopment involves the creation of a new residential development, with associated amenity grassland gardens, a grassland meadow to the north of the site, a woodland, native scrub planting and new ornamental and native hedgerows.

Drawings of the proposed development used for this assessment were:

- 3649-LB-XX-00-DR-9001 - Landscape planting Plan.pdf; and
- 3649-LB-XX-00-DR-L-9002 - Urban Greening Factor.pdf.

Areas of each habitat type were measured from these plans and targeted condition scores used, taking into account the likely future use of each area.

D.2 RESULTS

Baseline Conditions

Area-based habitats

The baseline biodiversity value of the area-based habitats at the site is calculated to be 0.42 biodiversity units. A breakdown of this calculation is provided in Table A.1 below.

Table A.1 Baseline Biodiversity Units

Broad Habitat	Habitat Type	Area (Hectares)	Distinctiveness	Condition	Biodiversity Units
Grassland	Modified grassland	0.525	Low	Good	0.32
Urban	Introduced shrub	0.0238	Low	Condition Assessment - N/A	0.05
Urban	Developed land; sealed surface	0.1828	V.low	N/A - Other	0.00
Woodland and forest	Other woodland; broadleaved	0.012	Medium	Poor	0.05
Sparsely vegetated land	Ruderal/ephemeral	0.0096	Low	Poor	0.02
				TOTAL	0.42

Introduced shrub is given an automatic condition of 'Condition Assessment - N/A' and developed land; sealed surface is given an automatic condition of 'N/A - Other' within the Defra Metric 3.1.

There are several areas of modified grassland present on site. These areas contained a relatively limited mix of plant species including thistle (*Cirsium* sp.), broadleaved dock (*Rumex obtusifolius*), perennial ryegrass (*Lolium perenne*), false-oat grass (*Arrhenatherum elatius*), bindweed (*Convolvulus arvensis*), *Geranium* sp., Herb Robert (*Geranium robertianum*) and ragwort (*Jacobaea vulgaris*), considered to be 6-8 species per m². There was no scattered scrub, bracken or invasive species recorded either during the habitat survey. The sward appears to have been left to grow unkempt allowing a variety of tufted grasses and low growing herbs providing a variety to the sward height with no areas of bare ground or obvious areas of poaching present. Considering the above, the modified grassland on site passes 6 of 7 condition

criteria, the grassland failing on presence of between 1-10% bare ground. Therefore the grassland has been given a 'good' condition score.

Figure B.1 Area of 'good' condition modified grassland.



Modified Grassland - Condition Assessment Criteria		Pass
1	There must be 6-8 species per m2. If a grassland has 9 or more species per m2 it should be classified as a medium distinctiveness grassland habitat type. NB - this criterion is essential for achieving moderate or good condition.	Y
2	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.	Y
3	Some scattered scrub (including bramble) may be present, but scrub accounts for less than 20% of total grassland area. Note - patches of shrubs with continuous (more than 90%) cover should be classified as the relevant scrub habitat type.	Y
4	Physical damage is evident in less than 5% of total grassland area. Examples of physical damage include excessive poaching, damage from machinery use or storage, erosion caused by high levels of access, or any other damaging management activities.	Y
5	Cover of bare ground is between 1% and 10%, including localised areas (for example, a concentration of rabbit warrens).	N
6	Cover of bracken less than 20%.	Y
7	There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981).	Y

Condition Assessment Result	Condition Assessment Score
Passes 6 or 7 of 7 criteria including passing essential criterion 1	Good (3)

Condition Assessment Result	Condition Assessment Score
Passes 4 or 5 of 7 criteria including passing essential criterion 1	Moderate (2)
Passes 0, 1, 2 or 3 of 7 criteria, OR 4, 5 or 6 of criteria but failing criterion 1	Poor (1)

An area in the south-western corner of the site where tall ruderals had overgrown, due to lack of management. Common nettle (*Urtica dioica*) and broadleaved dock are present providing a single ecotone, without a diverse range of flowering species. Given the nature of the species present within this area, the ruderal vegetation passes 1 of 3 condition criteria, achieving a 'poor' condition.

Urban - Ruderal/Ephemeral Condition Assessment Criteria		Pass
CORE CRITERIA - applicable to all urban habitat types:		
1	Vegetation structure is varied, providing opportunities for insects, birds and bats to live and breed. A single ecotone (i.e. scrub, grassland, herbs) should not account for more than 80% of the total habitat area.	N
2	There is a diverse range of flowering plant species, providing nectar sources for insects. These species may be either native, or non-native but beneficial to wildlife. NB - To achieve GOOD condition, criterion 2 must be satisfied by native species only (rather than non-natives beneficial to wildlife). Note that Biodiverse green roofs are exempt from this requirement, and can include non-native sedums, as set out in footnote 1.	N
3	Invasive non-native species (Schedule 9 of WCA) cover less than 5% of total vegetated area. NB - To achieve GOOD condition, criterion 3 must be satisfied by a complete absence of invasive non-native species (rather than <5% cover)2.	Y

Condition Assessment Result	Condition Assessment Score
Essential criterion 2&3 achieved? (must be achieved to score a good condition for non biodiverse roofs)	N
If 3 criteria assessed:	
Passes 3 of 3 core criteria; AND Meets the requirements for good condition within criteria 2 and 3	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 criteria 2 and 3	Moderate (2)
Passes 0 or 1 of 3 core criteria	Poor (1)

An area of woodland in the north eastern corner of the site included sycamore (*Acer pseudoplatanus*), ash (*Fraxinus excelsior*), hornbeam, cherry, elm (*Ulmus* sp.), birch (*Betula* sp.) and tree of heaven (*Ailanthus altissima*) tree species, with laurel (*Laurus nobilis*) also present. All trees were of a similar age class with a combination of five native species and two non-native species, including laurel and no

evidence of regeneration. There were no areas of open space present within this parcel, with little deadwood and less than 1ha of nutrient enrichment.

Overall the area of woodland is very small and more similarly resembles urban trees within the UK HAB classification system, however, as the baseline is taken from 2019 this area has been assessed as woodland for the purposes of continuity and scores a total of 25 out of 39 on the condition criteria, this equates to a 'poor' condition score.

Woodland - Other woodland broadleaved - Condition Assessment Criteria					
	Indicator	Good (3 points)	Moderate (2 points)	Poor (1 point)	Score
1	Age distribution of trees ¹	Three age classes present	Two age classes present	One age class present	1
2	Wild, domestic and feral herbivore damage	No significant browsing damage evident in woodland ²	Evidence of significant browsing pressure is present in 40% or less of whole woodland	Evidence of significant browsing pressure is present in 40% or more of whole woodland	3
3	Invasive plant species ³	No invasive species present in woodland	Rhododendron or laurel not present, other invasive species < 10% cover	Rhododendron or laurel present, or other invasive species > 10% cover	1
4	Number of native tree species	Five or more native tree or shrub species found across woodland parcel	Three to four native tree or shrub species found across woodland parcel	None to two native tree or shrub species across woodland parcel	3
5	Cover of native tree and shrub species	> 80% of canopy trees and >80% of understory shrubs are native	50-80% of canopy trees and 50-80% of understory shrubs are native	< 50% of canopy trees and <50% of understory shrubs are native	2
6	Open space within woodland ⁴	10 – 20% of woodland has areas of temporary open space, unless woodland is <10ha in which case lower threshold of 10% does not apply	21- 40% of woodland has areas of temporary open space	More than 40% of woodland has areas of temporary open space	3
7	Woodland regeneration ⁵	All three classes present in woodland; trees 4-7cm dbh, saplings and seedlings or advanced coppice regrowth	One or two classes only present in woodland	No classes or coppice regrowth present in woodland	1
8	Tree health	Tree mortality less than 10%, no pests or diseases and no crown dieback	11% to 25% mortality and/or crown dieback or low risk pest or disease present	Greater than 25% tree mortality and or any high risk pest or disease present	3

Woodland - Other woodland broadleaved - Condition Assessment Criteria					
9	Vegetation and ground flora	Ancient woodland flora indicators present	Recognisable NVC plant community present	No recognisable NVC community	1
10	Woodland vertical structure ⁶	Three or more storeys across all survey plots or a complex woodland	Two storeys across all survey plots	One or less storey across all survey plots	2
11	Veteran trees ⁷	Two or more veteran trees per hectare	One veteran tree per hectare	No veteran trees present in woodland	1
12	Amount of deadwood	50% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps	Between 25% and 50% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps	Less than 25% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps	2
13	Woodland disturbance ⁸	No nutrient enrichment or damaged ground evident	Less than 1 hectare in total of nutrient enrichment across woodland area and/or less than 20% of woodland area has damaged ground	More than 1 hectare of nutrient enrichment and/or more than 20% of woodland area has damaged ground	2
Total score					25

Condition Assessment Result	Condition Assessment Score
Total score >32 (33 to 39)	Good (3)
Total score 26 to 32	Moderate (2)
Total score <26 (13 to 25)	Poor (1)

Proposed Site Layout

Based on the masterplan drawings and should the management plan be followed, the proposed development is predicted to provide 0.53 biodiversity units as shown in Table B.2 below.

Table B.2 Post-development habitat units

Broad Habitat	Habitat Type	Area (Hectares)	Distinctiveness	Condition	Biodiversity Units
Urban	Biodiverse green roof	0.0008	Medium	Moderate	0.00
Urban	Introduced shrub	0.0271	Low	N/A	0.05

Broad Habitat	Habitat Type	Area (Hectares)	Distinctiveness	Condition	Biodiversity Units
Urban	Rain garden	0.0118	Low	Moderate	0.04
Urban	Urban tree	0.0072	Medium	Poor	0.02
Urban	Urban tree	0.0876	Medium	Moderate	0.27
Grassland	Modified grassland	0.014	Low	Poor	0.05
Urban	Developed land; sealed surface	0.2	V. low	N/A - Other	0.00
Woodland and Forest	Other woodland, broadleaved	0.0309	Medium	Poor	0.10
				TOTAL	0.53

Introduced shrub and developed land are all given automatic condition scores.

Rain gardens have been proposed around the area of modified grassland in the centre of the site and along the access road in the west of the site. These areas are to be seeded and planted with a variety of native and non-native species, providing a variety of vegetative structure that would provide several habitat niches for a variety of invertebrates and foraging opportunities for birds and bats. There will also be an absence of invasive species, therefore for the purposes of this assessment the rain gardens have been given a 'moderate' condition score.

Urban - Rain Garden Condition Assessment Criteria		Pass
CORE CRITERIA - applicable to all urban habitat types:		
1	Vegetation structure is varied, providing opportunities for insects, birds and bats to live and breed. A single ecotone (i.e. scrub, grassland, herbs) should not account for more than 80% of the total habitat area.	Y
2	There is a diverse range of flowering plant species, providing nectar sources for insects. These species may be either native, or non-native but beneficial to wildlife. NB - To achieve GOOD condition, criterion 2 must be satisfied by native species only (rather than non-natives beneficial to wildlife). Note that Biodiverse green roofs are exempt from this requirement, and can include non-native sedums, as set out in footnote 1.	N
3	Invasive non-native species (Schedule 9 of WCA) cover less than 5% of total vegetated area. NB - To achieve GOOD condition, criterion 3 must be satisfied by a complete absence of invasive non-native species (rather than <5% cover)2.	Y

Condition Assessment Result	Condition Assessment Score
Essential criterion 2&3 achieved? (must be achieved to score a good condition for non biodiverse roofs)	Y
If 3 criteria assessed:	
Passes 3 of 3 core criteria; AND Meets the requirements for good condition within criteria 2 and 3	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 criteria 2 and 3	Moderate (2)
Passes 0 or 1 of 3 core criteria	Poor (1)

A total area of 8m² of biodiverse roofs are to be created on the roofs of the bin stores in the south of the site. Although a small area, the biodiverse roof will be seeded with a variety of native species from a mix such as the Bauder Flora 3 seed mix, which include 49 wildflower species of value to pollinators and no invasive species. The substrate will be formed of a range of crushed brick, expanded clay shale and recycled organic content, which would mimic the mosaic habitat of recently disturbed land, sandy piles and cobbles will provide opportunities for invert species to burrow into and a foraging resource for birds and bats. Overall, it is considered that the biodiverse roofs will achieve a 'moderate' condition score.

Urban - Biodiverse roof Condition Assessment Criteria		Pass
CORE CRITERIA - applicable to all urban habitat types:		
1	Vegetation structure is varied, providing opportunities for insects, birds and bats to live and breed. A single ecotone (i.e. scrub, grassland, herbs) should not account for more than 80% of the total habitat area.	N
2	There is a diverse range of flowering plant species, providing nectar sources for insects. These species may be either native, or non-native but beneficial to wildlife. NB - To achieve GOOD condition, criterion 2 must be satisfied by native species only (rather than non-natives beneficial to wildlife). Note that Biodiverse green roofs are exempt from this requirement, and can include non-native sedums, as set out in footnote 1.	Y
3	Invasive non-native species (Schedule 9 of WCA) cover less than 5% of total vegetated area. NB - To achieve GOOD condition, criterion 3 must be satisfied by a complete absence of invasive non-native species (rather than <5% cover)2.	Y
ADDITIONAL CRITERION - only applicable to biodiverse roofs		
4c1	Intensive green roofs – have a minimum of 50% native and non-native wildflowers - 70% of the roof area is soil and vegetation (including water features)	N/A
4c2	Biodiverse green roofs - have a varied depth of 80 - 150mm at least 50% is at 150mm and is planted and seeded with wildflowers and sedums or is pre-prepared with sedums and wildflowers. To achieve Good condition some additional habitat, such as sand piles, logs etc should be present.	N

Condition Assessment Result	Condition Assessment Score
Essential criterion 2&3 achieved? (must be achieved to score a good condition for non biodiverse roofs)	Y/N
If 3 criteria assessed:	
Passes 3 of 3 core criteria; AND Meets the requirements for good condition within criteria 2 and 3	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 criteria 2 and 3	Moderate (2)
Passes 0 or 1 of 3 core criteria	Poor (1)
If 4 criteria assessed:	
Passes 3 of 3 core criteria; AND Meets the requirements for good condition within criteria 2 and 3; AND Passes additional criterion 4a or 4b	Good (3)
Passes 2 of 3 of 4 criteria; OR Passes 4 of 4 criteria but does not meet the requirements for good condition within criteria 2 and 3	Moderate (2)
Passes 0 or 1 of 4 criteria	Poor (1)
Notes	
Footnote 1: For Biodiverse green roofs only - experience has shown that a range of sedums species (native, naturalised and non-native) support wildflowers during hot periods. Therefore, for Criteria 2 a Biodiverse green roof can have non-native sedums and still achieve Good condition.	
Footnote 2: For Criteria 3 - For green roof habitat types only - Buddleja davidii should be assessed alongside Schedule 9 species. This species impairs the health of the local ecosystem and reduces the biodiversity potential of the roof. It is also a sign that a roof has not been planted and seeded correctly in sub-sequent years.	

Grassland in the centre of the site is to be sown with a hardwearing, biodiverse amenity grassland mix, these are mixes with a higher proportion of species but are still hardwearing making them suitable for more heavily used areas. It is considered that this mix will have at least 6 species/m² but be regularly managed and maintained, there is likely to be some areas of bare ground and potential damage caused by machinery. There will be an absence of invasive species, scrub and bracken. Overall it is considered that these areas would achieve a 'moderate' condition.

Grassland Low - Modified grassland Condition Assessment Criteria		Pass
1	There must be 6-8 species per m2. If a grassland has 9 or more species per m2 it should be classified as a medium distinctiveness grassland habitat type. NB - this criterion is essential for achieving moderate or good condition.	Y
2	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.	N

Grassland Low - Modified grassland Condition Assessment Criteria		Pass
3	Some scattered scrub (including bramble) may be present, but scrub accounts for less than 20% of total grassland area. Note - patches of shrubs with continuous (more than 90%) cover should be classified as the relevant scrub habitat type.	Y
4	Physical damage is evident in less than 5% of total grassland area. Examples of physical damage include excessive poaching, damage from machinery use or storage, erosion caused by high levels of access, or any other damaging management activities.	N
5	Cover of bare ground is between 1% and 10%, including localised areas (for example, a concentration of rabbit warrens).	N
6	Cover of bracken less than 20%.	Y
7	There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981).	Y

Condition Assessment Result	Condition Assessment Score
Passes 6 or 7 of 7 criteria including passing essential criterion 1	Good (3)
Passes 4 or 5 of 7 criteria including passing essential criterion 1	Moderate (2)
Passes 0, 1, 2 or 3 of 7 criteria, OR 4, 5 or 6 of criteria but failing criterion 1	Poor (1)

A new native woodland is to be created along the southern boundary of the development area, there is to be at least seven tree species planted, the majority being native, along with understorey and associated woodland ground flora planting. All trees are considered to be planted at a similar age range and therefore unlikely within the time frame to have started regeneration. With the good management, the trees are likely to survive with a low tree mortality rate, with access to residents. Given the above, it is considered that the woodland will likely score 25/39 points on the condition assessment relating to a 'Poor' condition.

Woodland - Other woodland broadleaved Condition Assessment Criteria					
	Indicator	Good (3 points)	Moderate (2 points)	Poor (1 point)	Score
1	Age distribution of trees ¹	Three age classes present	Two age classes present	One age class present	1
2	Wild, domestic and feral herbivore damage	No significant browsing damage evident in woodland ²	Evidence of significant browsing pressure is present in 40% or less of whole woodland	Evidence of significant browsing pressure is present in 40% or more of whole woodland	3
3	Invasive plant species ³	No invasive species present in woodland	Rhododendron or laurel not present, other invasive species < 10% cover	Rhododendron or laurel present, or other invasive species > 10% cover	3

Woodland - Other woodland broadleaved Condition Assessment Criteria					
4	Number of native tree species	Five or more native tree or shrub species found across woodland parcel	Three to four native tree or shrub species found across woodland parcel	None to two native tree or shrub species across woodland parcel	3
5	Cover of native tree and shrub species	> 80% of canopy trees and >80% of understory shrubs are native	50-80% of canopy trees and 50-80% of understory shrubs are native	< 50% of canopy trees and <50% of understory shrubs are native	2
6	Open space within woodland ⁴	10 – 20% of woodland has areas of temporary open space, unless woodland is <10ha in which case lower threshold of 10% does not apply	21- 40% of woodland has areas of temporary open space	More than 40% of woodland has areas of temporary open space	3
7	Woodland regeneration ⁵	All three classes present in woodland; trees 4-7cm dbh, saplings and seedlings or advanced coppice regrowth	One or two classes only present in woodland	No classes or coppice regrowth present in woodland	1
8	Tree health	Tree mortality less than 10%, no pests or diseases and no crown dieback	11% to 25% mortality and/or crown dieback or low risk pest or disease present	Greater than 25% tree mortality and or any high risk pest or disease present	3
9	Vegetation and ground flora	Ancient woodland flora indicators present	Recognisable NVC plant community present	No recognisable NVC community	1
10	Woodland vertical structure ⁶	Three or more storeys across all survey plots or a complex woodland	Two storeys across all survey plots	One or less storey across all survey plots	1
11	Veteran trees ⁷	Two or more veteran trees per hectare	One veteran tree per hectare	No veteran trees present in woodland	1
12	Amount of deadwood	50% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps	Between 25% and 50% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps	Less than 25% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps	1
13	Woodland disturbance ⁸	No nutrient enrichment or damaged ground evident	Less than 1 hectare in total of nutrient enrichment across woodland area and/or less than 20% of	More than 1 hectare of nutrient enrichment and/or more than 20% of woodland area has damaged ground	2

Woodland - Other woodland broadleaved Condition Assessment Criteria					
			woodland area has damaged ground		
Total score					25

Condition Assessment Result	Condition Assessment Score
Total score >32 (33 to 39)	Good (3)
Total score 26 to 32	Moderate (2)
Total score <26 (13 to 25)	Poor (1)

The new tree planting along the northern boundary and through the built development will be a mix of native and non-native species with either continuous canopies or as individual trees. Within the 30 year timeframe all the trees won't be considered mature or veteran, it is also likely that the majority will be pruned or managed in some way and therefore not provide micro-habitats. However, the majority of these are likely be oversailing vegetation and therefore pass 3 of 6 condition criteria, achieving a 'moderate' score.

Urban Trees Condition Assessment Criteria		Pass
1	The tree is a native species (or more than 70% within the block are native species).	Y
2	The tree canopy is predominantly continuous, with gaps in canopy cover making up <10% of total area and no individual gap being >5 m wide (individual trees automatically pass this criterion).	Y
3	The tree is mature ² or veteran ³ (or more than 50% within the block are mature ² or veteran ³).	N
4	There is little or no evidence of an adverse impact on tree health by anthropogenic activities such as vandalism or herbicide use. There is no current regular pruning regime so the trees retain >75% of expected canopy for their age range and height.	N
5	Micro-habitats for birds, mammals and insects are present e.g. presence of deadwood, cavities, ivy or loose bark	N
6	More than 20% of the tree canopy area is oversailing vegetation beneath.	Y

Condition Assessment Result	Condition Assessment Score
Passes 5 or 6 of 6 criteria	Good (3)
Passes 3 or 4 of 6 criteria	Moderate (2)
Passes 0, 1 or 2 of 6 criteria	Poor (1)

D.3 DISCUSSION

Under these proposals, and in the absence of additional enhancement measures and habitat creation the development stands to result in a net gain of 0.11 habitat units which represents an increase of 25.67% in ecological value.

The proposals are therefore in compliance with local and national planning policy and are in compliance with the BNG Mandate which states a target of 10% net gain in biodiversity.