



Biodiversity Net Gain Assessment

Land East of Westergate

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Report	Biodiversity Net Gain Assessment
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Client	Cala Homes South Home Counties
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1.0 INTRODUCTION

1.1 Background

Ecosupport Ltd were commissioned by Cala Homes to undertake a Biodiversity Net Gain Assessment for a site called 'Land East of Westergate' in Chichester.

The purpose of this assessment is to quantify the biodiversity value of the Site prior to its development, and the predicted value post development. This is measured in biodiversity units, calculated according to the habitats present based on their size, distinctiveness and condition. This enables the quantitative calculation of the predicted change in biodiversity value as a result of the proposed development, with the objective of achieving a net gain in biodiversity.

This report has been prepared by Project Ecologists Lewis Lakudzala BSc (Hons), MRes & Amy Johnston BSc (Hons).

1.2 Site Location and Description

The site comprises of grassland, arable, woodland, scrub and hedgerows/treelines located to the east of Westergate, Chichester, PO20 3QR (**Fig 1**) (centered on OS grid reference SU 941 048). The north of the site is bound by a secondary school and residential units, the majority of the east is bound by residential units except for the south-east of site which is largely bound by an adjacent field. Meanwhile the west of site is bound by agricultural land and finally, the south is bound by a railway line. The immediate surrounding wider environ is largely comprised of agricultural fields with the village of Westergate just to the east and twin village Eastergate to the north-east.

Figure 1. Google satellite aerial image of the site with approximate redline boundary.



1.3 Development Proposals

A hybrid application for the development of 400 dwellings and associated access, landscaping and drainage.

2.0 METHODOLOGY

The methodology for the assessment follows the Natural England Statutory Biodiversity Metric habitat condition assessment protocols and uses the Statutory Biodiversity Metric calculation tool to calculate biodiversity losses and gains (DEFRA, 2023b).

2.1 Habitat Assessment

Habitats on site pre-development were identified in accordance with the categories specified for a UK Habitats survey using Habitat Definitions Version 2.0 (UKHab Ltd., 2023). This was chosen as an appropriate habitat categorisation system as it fits within the Statutory Biodiversity Metric calculation.

A condition assessment, in line with the Statutory Biodiversity Metric Technical Annex 1, was carried out on site by Amy Johnston BSc (Hons), Project Ecologist with Ecosupport, on the 18th January 2023 by Adam Jessop MSc ACIEEM, (10 years post MSC graduation experience) and Lyndsey Barrat BSc (Hons) PGCerts ACIEEM. The area of identified habitats is calculated in hectares (ha), ignoring linear features or ditches (the area is measured to the centre line of such features). The length of linear features is measured separately in kilometres (km). The dominant habitat type was selected, according to those defined by UKHab Ltd (2023). Where there was disparity between the UK classification for habitat type and those present within the Statutory Biodiversity Metric calculator tool, this was noted within the condition assessment tables.

2.2 Habitat Distinctiveness

Each habitat was assigned a score for distinctiveness, according to the Statutory Biodiversity Metric calculator tool (DEFRA, 2023b). This ranged from Poor - High for most habitats, or Not Applicable (e.g. Developed Land – Sealed Surface). Using the tool, habitats were assigned a score based on their distinctiveness.

2.3 Habitat Condition

The condition of each habitat was assessed following criteria set out in the Statutory Biodiversity Metric Technical Annex 1 (DEFRA, 2023b), which includes detailed assessment criteria for different habitats. Full results of the condition assessments can be found within **Section 3.0**. The condition of each habitat was assessed individually on site, but was found to be the same for each type across the site. Therefore, the results of the habitat condition for each habitat are grouped together for each habitat.

2.4 Limitations

Despite the condition assessment being conducted outside of the optimal season for vascular flowering plants, given the nature of the habitat types present and the species recorded, this is not considered to have affected the accuracy of the site's valuation.

NB: The details of this report will remain valid for a period of 18 months (i.e. until November 2025). Beyond this period, if works have not yet been undertaken, it is recommended that a review of the validity of the conclusions are undertaken. Note that the recommendations within this report should be reviewed (and reassessed if necessary) should there be any changes to the development layout which this report was based upon.

3.0 EXISTING HABITATS AND DEVELOPMENT PROPOSALS

Information on the existing habitats was initially provided by Ecosupport Ltd '*Ecological Impact Assessment (EclA) – Land East of Westergate*' (Ecosupport Ltd, 2023). For the extent of the habitats on site please refer to **Fig 2** below.

Sections 3.1 and **3.2** provide tables outlining the Condition Assessment undertaken with reference to the Biodiversity Metric 4.0 Technical Supplement (Natural England, 2022). For these assessments, the current habitats on site were categorised according to UK Hab (2020) classifications.

3.1 Habitats

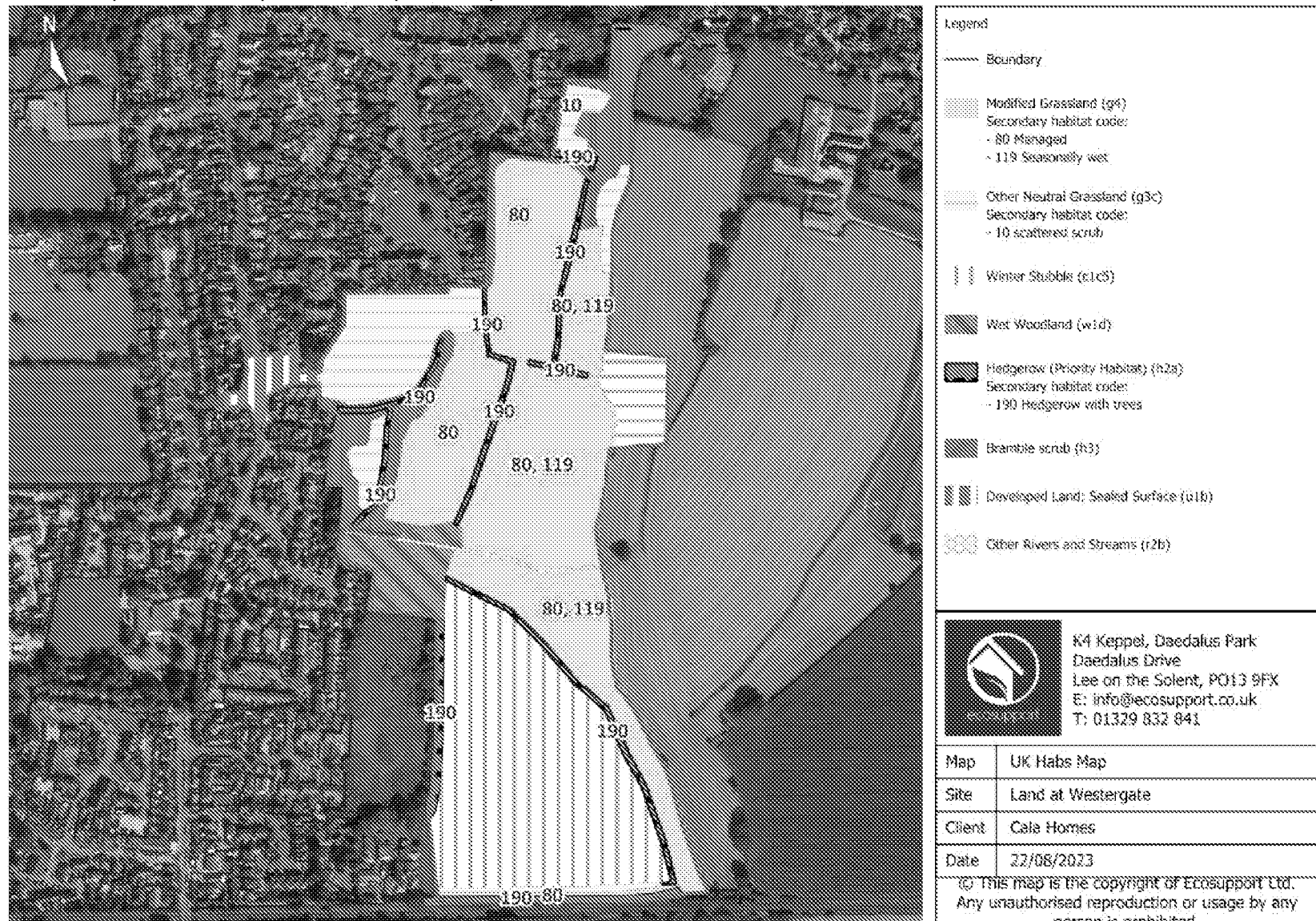
The following habitats were found on site:

- Modified grassland (g4) – 8.626ha
- Other neutral grassland (g3c) – 2.05ha
- Bramble scrub (h3d) – 1.588ha
- Wet woodland (w1d) – 0.8ha
- Winter Stubble (c1c5) – 6.097ha
- Developed land; sealed surface (u1b) – 2.05ha

3.2 Linear Habitats

The following linear habitats were found on site:

- Native hedgerow (h2a) — 1.05km
- Other Rivers and streams (r2b) – 0.267km

Figure 2. UK Habs Map of the habitats present on site pre-development.

Ecosupport Ltd K4 Keppel, Daedalus Park, Daedalus Drive, Lee-on-the-Solent, Hampshire, PO13 9FX

3.3 Condition Assessments

The following tables outline the Condition Assessments undertaken on the 18th January 2023. Species composition of the habitats found on site can be found in the Ecological Impact Assessment (EclA) (Ecosupport Ltd, 2023). No significant changes in species composition are believed to have occurred since this survey.

3.3.1 Modified Grassland

GRASSLAND (low distinctiveness)

Condition Assessment Criteria		Criterion passed (Yes or No)	Notes (such as justification)
A	There are 6-8 vascular plant species per m² present, including at least 2 forbs (this may include those listed in Footnote 1). Note - this criterion is essential for achieving Moderate or Good condition. Where the vascular plant species present are characteristic of medium, high or very high distinctiveness grassland, or there are 9 or more of these characteristic species per m² (excluding those listed in Footnote 1), please review the full UKHab description to assess whether the grassland should instead be classified as a higher distinctiveness grassland. Where a grassland is classed as medium, high, or very high distinctiveness, please use the relevant condition sheet.	Y	
B	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates which provide opportunities for vertebrates and invertebrates to live and breed.	N	
C	Some scattered scrub (including bramble <i>Rubus fruticosus</i> agg.) may be present, but scrub accounts for less than 20% of total grassland area. Note - patches of scrub with continuous (more than 90%) cover should be classified as the relevant scrub habitat type.	N	
D	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	

E	Cover of bare ground is between 1% and 10%, including localised areas (for example, a concentration of rabbit warrens) ² .	Y	
F	Cover of bracken <i>Pteridium aquilinum</i> is less than 20%.	Y	No bracken present
G	There is an absence of invasive non-native plant species ³ (as listed on Schedule 9 of WCA ⁴).	Y	No Invasives present
Essential criterion achieved (Yes or No)			Y
Number of criteria passed			5
Condition Assessment Result (out of 7 criteria)	Condition Assessment Score	Score Achieved ✓/✓	
Passes 6 or 7 criteria including passing essential criterion A	Good (3)		
Passes 4 or 5 criteria including passing essential criterion A	Moderate (2)	✓	
Passes 3 or fewer criteria; OR Passes 4 - 6 criteria (excluding criterion A)	Poor (1)		

3.3.2 Other Neutral Grassland

GRASSLAND (medium, high and very high distinctiveness)

Small patches of ONG to the Northwest of the site

Condition Assessment Criteria		Criteria passed (Yes or No)	Notes (such as justification)
A	The grassland is a good representation of the habitat type it has been identified as, based on its UKHab description - the appearance and composition of the vegetation closely matches the characteristics of the specific grassland habitat type. Indicator species listed by UKHab for the specific grassland habitat type are consistently present. Note - this criterion is essential for achieving Moderate or Good condition for non-acid grassland types only.	Y	
B	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.	Y	
C	Cover of bare ground is between 1% and 5%, including localised areas, for example, rabbit warrens ¹ .	Y	
D	Cover of bracken <i>Pteridium aquilinum</i> is less than 20% and cover of scrub (including bramble <i>Rubus fruticosus</i> agg.) is less than 5%.	N	
E	Combined cover of species indicative of sub-optimal condition² and physical damage (such as excessive poaching, damage from machinery use or storage, damaging levels of access, or any other damaging management activities) accounts for less than 5% of total area. If any invasive non-native plant species³ (as listed on Schedule 9 of WCA⁴) are present, this criterion is automatically failed.	N	
Additional Criterion - must be assessed for all non-acid grassland types			

F	There are 10 or more vascular plant species per m ² present, including forbs that are characteristic of the habitat type (species referenced in Footnote 2 and 4 cannot contribute towards this count). Note - this criterion is essential for achieving Good condition for non-acid grassland types only.	N	
Essential criterion for Good condition achieved (for non-acid grassland) (Yes or No)		N	
Number of criteria passed		3	
Condition Assessment Result	Condition Assessment Score	Score Achieved x/✓	
Non-acid grassland Types (Result out of 6 criteria)			
Passes 5 or 6 criteria, including essential criterion A and additional criterion F.	Good (3)		
Passes 3 - 5 criteria, including essential criterion A.	Moderate (2)	✓	
Passes 2 or fewer criteria; OR Passes 3 or 4 criteria excluding criterion A and F.	Poor (1)		

Larger parcel of ONG to the NW and also smallest patch to the east

Condition Assessment Criteria		Criteria on passed (Yes or No)	Notes (such as justification)
A	The grassland is a good representation of the habitat type it has been identified as, based on its UKHab description - the appearance and composition of the vegetation closely matches the characteristics of the specific grassland habitat type. Indicator species listed by UKHab for the specific grassland habitat type are consistently present. Note - this criterion is essential for achieving Moderate or Good condition for non-acid grassland types only.	Y	
B	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates	Y	

	which provide opportunities for insects, birds and small mammals to live and breed.		
C	Cover of bare ground is between 1% and 5%, including localised areas, for example, rabbit warrens ¹ .	Y	
D	Cover of bracken <i>Pteridium aquilinum</i> is less than 20% and cover of scrub (including bramble <i>Rubus fruticosus</i> agg.) is less than 5%.	Y	
E	Combined cover of species indicative of sub-optimal condition ² and physical damage (such as excessive poaching, damage from machinery use or storage, damaging levels of access, or any other damaging management activities) accounts for less than 5% of total area. If any invasive non-native plant species ³ (as listed on Schedule 9 of WCA ⁴) are present, this criterion is automatically failed.	N	
Additional Criterion - must be assessed for all non-acid grassland types			
F	There are 10 or more vascular plant species per m ² present, including forbs that are characteristic of the habitat type (species referenced in Footnote 2 and 4 cannot contribute towards this count). Note - this criterion is essential for achieving Good condition for non-acid grassland types only.	Y	
Essential criterion for Good condition achieved (for non-acid grassland) (Yes or No)		Y	
Number of criteria passed		5	
Condition Assessment Result	Condition Assessment Score	Score Achieved x/✓	
Non-acid grassland Types (Result out of 6 criteria)			
Passes 5 or 6 criteria, including essential criterion A and additional criterion F.	Good (3)		
Passes 3 - 5 criteria, including essential criterion A.	Moderate (2)	✓	

Passes 2 or fewer criteria; OR Passes 3 or 4 criteria excluding criterion A and F.	Poor (1)		
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3.3.3 Wet Woodland

WOODLAND

Condition Assessment Criteria						
Indicator		Good (3 points)	Moderate (2 points)	Poor (1 point)	Score per indicator	Notes (such as justification)
A	Age distribution of trees	Three age-classes ¹ present.	Two age-classes ¹ present.	One age-class ¹ present.	3	
B	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 ² .	Evidence of significant browsing pressure is present in 40% or more of whole woodland ² .	3	
C	Invasive plant species	No invasive species ³ present in woodland.	Rhododendron <i>Rhododendron ponticum</i> or cherry laurel <i>Prunus laurocerasus</i> not present, other invasive species ³ <10% cover.	Rhododendron or cherry laurel present, or other invasive species ³ >10% cover.	3	
D	Number of native tree species	Five or more native tree or shrub species ⁴ found across woodland parcel.	Three to four native tree or shrub species ⁴ found across woodland parcel.	Two or less native tree or shrub species ⁴ across woodland parcel.	1	
E	Cover of native tree and shrub species	>80% of canopy trees and >80% of understory shrubs are native ⁵ .	50 - 80% of canopy trees and 50 - 80% of understory shrubs are native ⁵ .	<50% of canopy trees and <50% of understory shrubs are native ⁵ .	3	

F	Open space within woodland	10 - 20% of woodland has areas of temporary open space ⁶ . Unless woodland is <10ha, in which case 0 - 20% temporary open space is permitted ⁷ .	21 - 40% of woodland has areas of temporary open space ⁶ .	<10% or >40% of woodland has areas of temporary open space ⁶ . But if woodland <10ha has <10% temporary open space, please see Good category ⁷ .	3	
G	Woodland regeneration	All three classes present in woodland ⁸ ; trees 4 - 7 cm Diameter at Breast Height (DBH), saplings and seedlings or advanced coppice regrowth.	One or two classes only present in woodland ⁸ .	No classes or coppice regrowth present in woodland ⁸ .	2	
H	Tree health	Tree mortality less than 10%, no pests or diseases and no crown dieback ⁹ .	11% to 25% mortality and/or crown dieback or low-risk pest or disease present ⁹ .	Greater than 25% tree mortality and or any high-risk pest or disease present ⁹ .	3	
I	Vegetation and ground flora	Recognisable NVC plant community ¹⁰ at ground layer present, strongly characterised by ancient woodland flora specialists.	Recognisable woodland NVC plant community ¹⁰ at ground layer present.	No recognisable woodland NVC plant community ¹⁰ at ground layer present.	2	
J	Woodland vertical structure	Three or more storeys across all survey plots or a complex woodland ¹¹ .	Two storeys across all survey plots ¹¹ .	One or less storey across all survey plots ¹¹ .	2	

K	Veteran trees	Two or more veteran trees ¹² per hectare.	One veteran tree ¹² per hectare.	No veteran trees ¹² present in woodland.	1	
L	Amount of deadwood	50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, branch stubs and stumps, or an abundance of small cavities ¹³ .	Between 25% and 50% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities ¹³ .	Less than 25% of all survey plots within the woodland parcel have deadwood, such as standing deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities ¹³ .	1	
M	Woodland disturbance	No nutrient enrichment or damaged ground evident ¹⁴ .	Less than 1 hectare in total of nutrient enrichment across woodland area and or less than 20% of woodland area has damaged ground ¹⁴ .	More than 1 hectare of nutrient enrichment and or more than 20% of woodland area has damaged ground ¹⁴ .	3	
Total Score (out of a possible 39)					30	
Condition Assessment Result				Condition Assessment Score	Result Achieved	
Total score >32 (33 to 39)				Good (3)	Moderate	
Total score 26 to 32				Moderate (2)		
Total score <26 (13 to 25)				Poor (1)		

3.3.4 Native hedgerow with trees

HEDGEROW

Hedgerow favourable condition attributes				
Attributes and functional groupings (A, B, C, D and E)	Criteria - the minimum requirements for 'favourable condition'	Description	Criterion passed (Yes or No)	Notes (such as justification)
Core groups - applicable to all hedgerow types				
A1.	Height	>1.5 m average along length The average height of woody growth estimated from base of stem to the top of the shoots, excluding any bank beneath the hedgerow, any gaps or isolated trees. Newly laid or coppiced hedgerows are indicative of good management and pass this criterion for up to a maximum of four years (if undertaken according to good practice). A newly planted hedgerow does not pass this criterion (unless it is >1.5 m height).	Y	
A2.	Width	>1.5 m average along length The average width of woody growth estimated at the widest point of the canopy, excluding gaps and isolated trees. Outgrowths (such as blackthorn <i>Prunus spinosa</i> suckers) are only included in the width estimate when they are >0.5 m in height. Laid, coppiced, cut and newly planted hedgerows are indicative of good management and pass this criterion for up to a maximum of four years (if undertaken according to good practice).	N	

B1.	Gap - hedge base	Gap between ground and base of canopy <0.5 m for >90% of length	This is the vertical 'gappiness' of the woody component of the hedgerow, and its distance from the ground to the lowest leafy growth. Certain exceptions to this criterion are acceptable (see page 65 of the Hedgerow Survey Handbook).	Y	
B2.	Gap - hedge canopy continuity	Gaps make up <10% of total length; and No canopy gaps >5 m	This is the horizontal 'gappiness' of the woody component of the hedgerow. Gaps are complete breaks in the woody canopy (no matter how small). Access points and gates contribute to the overall 'gappiness' but are not subject to the >5 m criterion (as this is the typical size of a gate).	Y	
C1.	Undisturbed ground and perennial vegetation	>1 m width of undisturbed ground with perennial herbaceous vegetation for >90% of length: - Measured from outer edge of hedgerow; and - Is present on one side of the hedgerow (at least).	This is the level of disturbance (excluding wildlife disturbance) at the base of the hedgerow. Undisturbed ground is present for at least 90% of the hedgerow length, greater than 1 m in width and must be present along at least one side of the hedgerow. This criterion recognises the value of the hedgerow base as a boundary habitat with the capacity to support a wide range of species. Cultivation, heavily trodden footpaths, poached ground etc. can limit available habitat niches.	N	
C2.	Nutrient-enriched perennial vegetation	Plant species indicative of nutrient enrichment of soils dominate <20% cover of the area of undisturbed ground.	The indicator species used are nettles <i>Urtica</i> spp., cleavers <i>Galium aparine</i> and docks <i>Rumex</i> spp. Their presence, either singly or together, does not exceed the 20% cover threshold.	Y	

D1.	Invasive and neophyte species	>90% of the hedgerow and undisturbed ground is free of invasive non-native plant species (including those listed on Schedule 9 of WCA ³) and recently introduced species.	Recently introduced species refer to plants that have naturalised in the UK since AD 1500 (neophytes). Archaeophytes count as natives. For information on archaeophytes and neophytes see the JNCC website ⁴ , as well as the BSBI website ⁵ where the 'Online Atlas of the British and Irish Flora' ⁶ contains an up-to-date list of the status of species. For information on invasive non-native species see the GB Non-Native Secretariat website ⁷ .	Y	
D2.	Current damage	>90% of the hedgerow or undisturbed ground is free of damage caused by human activities.	This criterion addresses damaging activities that may have led to or lead to deterioration in other attributes. This could include evidence of pollution, piles of manure or rubble, or inappropriate management practices (e.g., excessive hedgerow cutting).	N	
Additional group - applicable to hedgerows with trees only					
E1.	Tree class	There is more than one age-class (or morphology) of tree present (for example: young, mature, veteran and or ancient ^a), and there is on average at least one mature, ancient or veteran tree present per 20 - 50m of hedgerow.	This criterion addresses if there are a range of age-classes or morphologies which allow for replacement of trees and provide opportunities for different species.	Y	
E2.	Tree health	At least 95% of hedgerow trees are in a healthy condition (excluding veteran features valuable for wildlife). There is little or no evidence of an adverse impact on tree health by	This criterion identifies if the trees are subject to damage which compromises the survival and health of the individual specimens.	Y	

		damage from livestock or wild animals, pests or diseases, or human activity.			
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The hedgerow condition assessment generates a weighting (score) ranging from 1 - 3, which is used within the metric. The scores for each are set out in the tables below.

Condition categories for hedgerows with trees					
Category	Category Requirements	Metric score			
Good	No more than 2 failures in total; AND No more than 1 failure in any functional group.	3			
Moderate	No more than 5 failures in total; AND <u>Does not fail both attributes</u> in more than one functional group (e.g., fails attributes A1, A2, B1, C2 and E1 = Moderate condition).	2			
Poor	Fails a total of more than 5 attributes; OR <u>Fails both attributes</u> in more than one functional group (e.g. fails attributes A1, A2, B1 and B2 = Poor condition).	1			
Score achieved:		2			

4.0 PROPOSED CREATED HABITATS & NET GAIN ASSESSMENT

4.1 On Site

Following a consultation with Cala Homes, in order to minimise the loss of biodiversity on site, the following habitats are being provided / created (please refer to the landscape areas plan in **Fig 6** below for information on the locations of these habitats on site):

4.1.1 Modified Grassland

Grassland planting will be created on site in open green space areas on site to create 1.294ha of modified grassland along the eastern boundary and through the centre of the site.

Recommended species planting of grass species may include Perennial Rye-grass (*Lolium perenne*), Common Bent (*Agrostis capillaris*), False Oat-grass (*Arrhenatherum elatius*), Yorkshire-fog (*Holcus lanatus*), Rough Meadow-grass (*Poa trivialis*) and Cock's-foot (*Dactylis glomerata*). Herb planting may include Yarrow (*Achillea millefolium*), Ribwort Plantain (*Plantago lanceolata*) and Creeping Thistle (*Cirsium arvense*).

4.1.2 Other Neutral Grassland

An area of 3.425ha of other neutral grassland will be created on site to good condition. This will be achieved through removal of any encroaching scrub and bracken and reducing any physical damage by ensuring no excessive damage occurs through poaching, machinery or access. The area will be seeded with recommended species to increase diversity as listed below.

Recommended grass species for this habitat type may include Perennial Rye-grass (*Lolium perenne*), Common Bent (*Agrostis capillaris*), False Oat-grass (*Arrhenatherum elatius*), Yorkshire-fog (*Holcus lanatus*), Rough Meadow-grass (*Poa trivialis*) and Cock's-foot (*Dactylis glomerata*). Herb planting may include Yarrow (*Achillea millefolium*), Ribwort Plantain (*Plantago lanceolata*), Red Clover (*Trifolium pratense*), Common Knapweed (*Centaurea nigra*), Bird's-foot Trefoil (*Lotus corniculatus*), Common Mouse-ear (*Cerastium fontanum*), Meadow Buttercup (*Ranunculus acris*), Self-heal (*Prunella vulgaris*).

A section of grassland towards the centre of the site will be used as a reptile receptor and therefore needs to be managed appropriately. The following is recommended.

Year 1 Works

- Cut grassland down to a height of 15cm using a strimmer (no heavy machinery to be used)
- Spot-treat dense nettles if present with a glyphosate-based weed killer (best applied in late summer when the Nettles will be in full growth)
- Sow the EM1 wildflower seed mixture where Nettle has been removed and in bare patches.
- Create of hibernaculas for reptiles (see ECIA for details)

Ongoing Management (Year 2 onwards)

All ongoing management is designed to maintain the enhancements created in Year 1 and should be completed on an annual basis

Should

- If vandalised, replace/repair damaged hibernaculum between April-October (*Reason: to avoid when reptiles are likely using the hibernaculum*)
- Only use hand tools for any hedge trimming/grass cutting, no heavy machinery is to be used (i.e. mowers/vehicles) (*Reason: to avoid the risk of injuring/killing reptiles using the grassland*)
- Complete an annual cut of the grassland in August (*Reason: to prevent too much rank/coarse/scrubby vegetation from taking over the grassland and to avoid the period of time wildflowers are flowering*). Further cuts can be completed between August-October if necessary.
- Spot treat patches of nettles or invasive species (*Reason: to prevent undesirable species from competing with desirable species*)
- Re-seed any unshaded bare patches of ground with EM1 wildflower seed mixture (available from Emorsgate) (*Reason: to enhance resources for reptiles and insects*)
- After grass cutting/removal of pond vegetation all arisings should be raked from the pond and left for 24 hours close to pond before removing from the receptor (*Reason: to prevent the build-up of nutrients and to allow aquatic wildlife to move back into the pond after removing*)
- Remove all arisings from grass cutting from the site (*Reason: to prevent the build-up of nutrients*)
- Allow some scrub (i.e. Bramble, tree saplings) to grow but not exceed 15% of the grassland (*Reason: to provide shelter for reptiles*)- no specific location

Shouldn't

- Use fertiliser anywhere within the receptor
- Spray large quantities of weed killer (only spot treat dense Nettle when necessary)
- Cut grassland below a height of 15cm
- Remove established scrub/trees during the bird nesting season (March- August)
- Drive heavy machinery through the receptor
- Interfere with the hibernaculum between October-March
- Cut no more than 50% of the grassland area in the same year
- Complete the grass cut between April-July
- Complete pond maintenance between November-June

4.1.3 Wet Woodland

An area of 0.633ha of wet woodland will be enhanced on site. This will be through the planting of suitable native species alongside appropriate management and monitoring.

4.1.3.1 Proposed Planting

In order to increase native species diversity within the woodland, it is recommended that the following tree and understory species are planted; Canopy Alder (*Alnus glutinosa*), Crack Willow (*Salix fragilis*), Oak (*Quercus robur*), Black Poplar (*Populus nigra ssp.betulifolia*), Ash (*Fraxinus excelsior*), White Willow (*Salix alba*), Grey willow (*Salix cinerea*), Elder (*Sambucus nigra*), Osier (*Salix viminalis*), Hawthorn (*Crataegus monogyna*), Goat Willow (*Salix caprea*), Holly (*Ilex aquifolium*), Hazel (*Corylus avellana*), Blackthorn (*Prunus spinosa*), Guelder Rose (*Viburnum opulus*). Any tree planting will occur in the autumn, avoiding any periods of flooding. Trees will be planted manually with varied spacing including some clumps.

4.1.3.2 Management

Wet woodland is generally suited to a low intensity management regime however, the following is recommended. The woodland will also be monitored annually the first 3 years, with bi-annual monitoring between 4-10 years.

Maintain water levels

A key factor of wet woodlands are the water levels and therefore, it is critical these are maintained. If the woodland is prone to flooding, it is important that the natural flood regime is uninterrupted. Wet habitats are easily compacted and trampled so human access must be kept to a minimum. It may be necessary to dam existing drains if the woodland is beginning to dry out.

Encourage age diversity through management and natural regeneration

Birch, Alder and Willow species all seed prolifically and therefore, it is unlikely any artificial planting will be required for regeneration long term. Some thinning of the woodland may be required to encourage diversity of age classes, this can be done through selective removal or coppicing.

Coppicing

Any Hazel will be managed on a rotational coppicing scheme. This involves cutting young trees down to ground level to promote new growth and prevent over-shading. This will be rotationally implemented, with only a small portion approximately 30% of Hazel coppiced every 3 years during winter months (November to March), but only once the Hazel has grown to a size that will be beneficial and appropriate.

Coppice management is best carried out on a rotation of approximately every 6-10 years for each tree, with timing staggered for plants to ensure there is continued connectivity at any given time.

Retain some of the dead wood. Include some larger horizontal trunks and limbs as well as log piles and discarded brash. Leave wood piles in shady areas.

Thinning

Woodland will be thinned (i.e. trees removed) to benefit retained trees and promote regeneration. The optimal canopy target is 75% cover, which allows greater development of the understory to create a more diverse woodland. Selective thinning will be carried out every five years to maintain a canopy target of 75% cover.

The target trees to be removed are those showing signs of disease or poor growth; The specific target trees and areas of woodland will be determined by the supervising ecologist or arborist. Please note, all mature trees will need to be surveyed for PRFs that may be suitable for roosting bats. If any trees have PRFs, it is recommended they are retained if possible and alternative trees are selected for thinning.

It is considered likely a botanical survey will identify areas of highest botanical value and this will influence the location of thinning. The recommended botanical survey should be undertaken during the optimum survey season during the first year of woodland management to identify areas of botanical interest. It is recommended this is repeated every five years.

Where practical to do so, as determined by the arborist, some potential selected trees may be cut at 3-5m height and the stumps will be left in situ to rot as habitat for saprophytic invertebrates.

Retain natural clearings/edge habitat where possible

Any natural clearing and edges should be maintained to create diversity in the structure of the woodland. Clearance of these areas may be necessary to stop colonisation. Any clearance should be undertaken outside of the nesting bird season (March – September) unless checked by an ecologist prior to the works.

Leave standing and fallen deadwood as key habitat

Any deadwood, both standing or fallen should be left within the woodland to create habitat for a range of wildlife. This also includes any deadwood that is submerged or semi submerged into standing water as these are important for invertebrate species.

Removal of non-native/undesirable species

Any invasive species will be removed from the site, as these could have deleterious effects on native species. The removal of such species would open-up ground for restoration of natural woodland. Invasive species will generally be removed by a combination of cutting back and removal of cut material from the site, followed by treatment of stumps, roots or regrowth using an approved systemic herbicide (such as glyphosate). However, any herbicides must be used cautiously to avoid polluting any waterbodies. This process may need to be repeated over the course of several years.

Contractors will need to be shown the locations of the species and mark these where needed to help avoid native species being removed accidentally. Areas of bare ground created by this work should be left for regeneration.

4.1.4 Mixed Scrub

An area of 0.98ha of mixed scrub will be created on site. Recommended species planting includes Holly (*Ilex aquifolium*), Hazel (*Corylus avellana*), Gorse (*Ulex* spp.) and Hawthorn (*Crataegus monogyna*).

This will help provide a matrix of habitats and additional foraging opportunities for a variety of species, including local birds and bats. The best time to plant is late autumn and it is recommended to avoid freezing temperatures or heat. The scrub plants will be planted with large spacing to avoid creating dense clusters. The scrub will become denser and more connected as it grows up.

4.1.4.1 Management

Following establishment, scrub management will be undertaken annually (as needed) to maintain a suitable matrix between grassland, scrub and other habitats. This can be achieved by manual cutting as well as mechanical clearance in winter months that can be carried out to ensure the area does not become overgrown.

4.1.5 SUDs

A number of SUDs will be created within the other neutral grassland areas. The basin and margins will be seeded with an appropriate wetland seed mix to support variations in water levels. The following wetland species are recommended to encourage establishment of a wetland area:

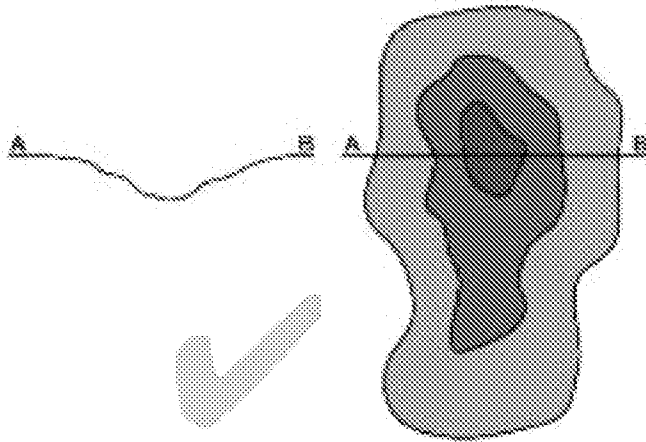
- Greater Pond-sedge (*Carex riparia*)
- Sharp-flowered Rush (*Juncus acutiflorus*)
- Meadow Foxtail (*Alopecurus pratensis*)
- Marsh Foxtail (*Alopecurus geniculatus*)
- Creeping Bent (*Agrostis stolonifera*)
- Rough Meadow-grass (*Poa trivialis*)
- Marsh-marigold (*Caltha palustris*)
- Yellow Iris (*Iris pseudacorus*)
- Ragged-robin (*Silene flos-cuculi*)
- Cuckooflower (*Cardamine pratensis*)
- Water Mint (*Mentha aquatica*)
- Greater Bird's-foot-trefoil (*Lotus pedunculatus*)
- Meadowsweet (*Filipendula ulmaria*)

This habitat will also provide a range of plant species which will encourage invertebrate diversity and enhance foraging and sheltering opportunities for amphibians on site. A maintenance regime will be undertaken to establish a varied structure in vegetation and discourage invasive non-native species cover.

Ideally the margins of the SUDs should be shallow. The best ecologically valuable ponds have 'gentle shelving edges. Therefore, whilst excavating the SUDs it will be ensured that the SUDs has sloping edges to ensure there is a shallow water environment at less than 1:5 (12°) and preferably less than 1:20 (3°) (Freshwater Habitats 2013) (**Fig 3**). It is recommended the SUDs are an approximate

maximum depth of 0.9m, but the depth should vary across the SUDs. Creating shelves is one option of obtaining different depths.

Figure 3. Design of SUDs showing varying depths at a gently sloping level (Freshwater Habitats 2013)



4.1.5.1 Management

The SUDs will be planted up with a suitable grassland seed mix and selective plug planting to encourage establishment of a wetland areas. Planting beyond this is not recommended as per Freshwater Habitats (2013), as the new-pond stage within a pond/SUDs is relatively short, and they will colonise naturally. Further, the new-pond stage can be important for some species such as certain species of dragonflies. Therefore, no planting will occur, but management will be required within 2-5 years after establishment.

In the early years, blanket weed can cover waterbodies which includes ponds/SUDs. This will be controlled if necessary and be pulled out carefully. Once the waterbody has settled blanket weed will usually be kept in check by animals. Any plant that starts to dominate will be thinned out. Only one third of a waterbody should be cleared per year.

Once cleared, plants or debris will be left along the edge for a few days to allow any trapped wildlife to return to the water.

Frog (*Rana temporaria*) spawning is usually the first to take place within freshwater habitats, starting as early as January. From February adult Newts emerge from hibernation and make their way to aquatic habitat where they then breed. Common Toads (*Bufo Bufo*) also congregate in waterbodies in early spring, often shortly after Frogs. All three amphibians then lay eggs in early Spring. Common Toads then move away from waterbodies into terrestrial habitat. In summer metamorphosis takes place.

As a result, the best time for waterbody management is late September and October. Tadpoles would have left the SUDs and adult amphibians have not yet gone into hibernation at this time. Ponds should not be disturbed in mid-winter as this might expose hibernating amphibians to severe cold, for example Newts will be hibernating in damp areas nearby to the pond and Frogs are known to hibernate at the bottom of waterbodies.

Whilst a varied vegetation structure is recommended, to prevent overgrowth of possible establishment from scrub around the edges of the SUDs, further management will also be required. It is recommended this is achieved by manual cutting to keep scrub from overgrowing.

4.1.6 Ditch/Stream

It is proposed that a 0.014km ditch of moderate condition will be created to the east of the wet woodland. As well as this, 0.267km of the stream present along the eastern boundary of the site will be enhanced. This will be achieved through planting and management as per the following:

The water quality of the ditch will be monitored to ensure the ditch is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution. No fertilisers or polluting substances will be used on the habitats in proximity to the ditch.

The ponded section of the ditch will be plug planted with a range of a range of emergent, submerged and floating-leaved plants. Recommended species includes; Spiked water-milfoil (*Myriophyllum spicatum*), Common water-crowfoot (*Ranunculus aquatilis*), Frogbit (*Hydrocharis morsus-ranae*), Water-forget-me-not (*Myosotis scorpioides*), Watermint (*Mentha aquatica*), and Marsh marigold (*Caltha palustris*).

The ditch will be monitored for signs of eutrophication such as filamentous algae or duckweed *Lemna* sp. If present these should be removed and attempts to identify the cause of the eutrophication will occur.

An aquatic seed mix will be used around the margins of the ponded area as per the section above to create a fringe of aquatic vegetation.

To ensure no physical damage to the ditch occurs, it will not be used for storage of materials or machinery, or inappropriately managed resulting in damage.

Any invasive or undesirable species will be removed from the ditch opening up areas for natural regeneration. Invasive species will generally be removed by a combination of cutting back and removal of cut material from the site, followed by treatment of stumps, roots or regrowth using an approved systemic herbicide (such as glyphosate). This process may need to be repeated over the course of several years. The method used to remove the invasives must be suitable for use in a ditch so that any water is not polluted.

4.1.7 Trees

257 'individual trees,' will be planted within the site, these have been classified as 'urban' or 'rural' depending on whether they are located within the development parcels or created greenspace.

Recommended species planting of tree/shrub species may include:

- Hazel (*Corylus avellana*)
- Hawthorn (*Crataegus monogyna*)
- Blackthorn (*Prunus spinosa*)

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- Field Maple (*Acer campestre*)
- Oak (*Quercus robur*)
- Rowan (*Sorbus aucuparia*)
- Silver Birch (*Betula pendula*)
- Wild Cherry (*Prunus avium*)

4.1.7.1 Management

Mycorrhizal Treatment

To ensure a successful establishment of the newly planted trees, it is recommended that mycorrhizal treatment to the tree roots is conducted **during the planting**, this would reduce the risk of tree mortality and increase the long-term tolerance of these trees to periods of drought or adverse soil conditions thus ensuring a higher chance of successful long-term establishment.

Weed Management

All newly planted trees must have a 1-metre exclusion zone whereby weeds are routinely and pro-actively removed for the **first 2 – 3 years**. Outlined within the section below, bark mulch is recommended around each tree and will act as an effective management method to also suppress weed colonisation.

Tree Protection (Tree Guards & Rabbit Mesh Guards)

All trees must have a form of tree guards installed to act as a form of protection from extreme weather or excessive foraging from wildlife. It is recommended that the mesh is approximately 12.5mm x 12.5mm aperture of 0.61m in height; however, due to the suitability on site and the surrounding habitats, this site may be at risk of Roe Deer. Therefore, it is recommended that the form of tree guards suitable to mitigate excessive foraging from this species is installed at a height above 1.2m and comprised of a guard such as weld mesh tree shelter or a suitable alternative.

During aforementioned weed removal, all aspects of the tree guards should also be routinely checked to ensure they are maintained in good condition and are firmly positioned within the soil. If the guards begin to split, they must be removed and disposed of responsibly and consequently replaced where required.

The trees and newly planted shrubs on site will also be protected through the implementation of mesh rabbit guards, along with bark mulch at the base to suppress any grass and weed colonisation. Monthly inspections on the newly planted trees will be undertaken, with weed removal / tree guard replacement as required. The bark mulch will also be maintained at a minimum level of 50mm for the **first 2 years** of establishment.

Selective Thinning

Once the newly planted trees / shrubs are established, selective thinning of retained or established trees will be conducted to promote regeneration and a vigorous, dense regrowth. Such work must be undertaken during the period October – February to avoid the breeding bird season. It is considered likely a botanical survey will identify areas of highest botanical value and this will influence the location of thinning, conducted by a suitably qualified botanist.

Where practical to do so, as determined by the arborist, some potential selected trees may be cut at

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3-5m height and the standing stumps will be left in situ to rot as habitat for saprophytic invertebrates and a resource for woodland birds such as Woodpeckers and Nuthatch.

Rotational Coppicing

Occasional rotational coppicing may be required of the newly planted or retained trees on site to prevent overcrowding and promote natural new growth. All Hazel present on site will be managed on a rotational coppicing scheme. This involves cutting young trees down to a low level to promote new growth and prevent over-shading. This will be rotationally implemented, with only a small portion approximately 30% of Hazel coppiced **every 3 years** during winter months (November to March), but only once the Hazel has grown to a size that will be beneficial and appropriate.

Coppice management is best carried out on a rotation of approximately **every 6-10 years** for each tree, with timing staggered for plants to ensure there is continued connectivity at any given time. Retain some of the dead wood. Include some larger horizontal trunks and limbs as well as log piles and discarded brash. Leave wood piles in shady areas.

Invasive Species

Any invasive species, such as Japanese Knotweed (*Fallopia japonica*) Himalayan Balsam (*Impatiens glandulifera*), Rhododendron (*Rhododendron ponticum*), Giant Hogweed (*Heracleum mantegazzianum*), will be removed from the site, as these could have deleterious effects on native species. The removal of such species would open-up ground for restoration for natural re-generation. Invasive species will generally be removed by a combination of cutting back and removal of cut material from the site, followed by treatment of stumps, roots or regrowth using an approved systemic herbicide (such as glyphosate). This process may need to be repeated over the course of several years.

Contractors will need to be shown the locations of the species and mark these where needed to help avoid native species being removed accidentally. Areas of bare ground created by this work will be left for natural regeneration (described below).

Replacement of Trees, Shrubs and Natural Regeneration

Recommendations may also include that any plants (newly planted or retained) that are removed, die or become seriously damaged or defective during the 30-year monitoring period shall be replaced like for like in the next planting season. If any of the plants fail, they will be replaced like-for-like.

Similarly, scope for tree and shrub species to establish by natural regeneration should be permitted where possible e.g. by creating space for new regeneration around existing specimens of the desired trees and shrub species. Ash regeneration could be an important part of the mix, it should not be cut out or destroyed unless suffering from Ash Dieback, and would benefit from being protected.

Monitoring

All the newly planted and retained trees within the site in communal areas (i.e., excluding all trees within privately owned gardens) are to be managed post-development for a period of at least 30 years. As part of the management regime, it is recommended that there are tree inspections done with the frequency determined by a suitably experienced arborist.

These inspections will be carried out by a suitably experienced arborist **during late winter – early spring of each year when required**. These monitoring visits will assess the general health of the trees and determine if any remedial action is required, including noting any presence of disease. As part of these monitoring visits, the arborist will produce a monitoring report which will be sent to the LPA outlining the results and appropriate recommendations (i.e. remedial works, removal /replacement).

NB Please note, all mature trees recommended for removal, remedial works or selective thinning will need to be surveyed for (potential roost features PRFs) that may be suitable for roosting bats. If any trees have PRFs, it is recommended they are retained if possible and alternative trees are selected where possible. This will be conducted by a suitably qualified ecologist.

4.1.8 Hedgerows

A number of new native hedgerows (approximately 1.248km total in length) will be planted throughout the site.

Recommended species should include predominantly Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and Holly (*Ilex aquifolium*) in addition to a mix of shrub and tree species including:

- Blackthorn (*Prunus spinosa*)
- Pedunculate Oak (*Quercus robur*)
- Silver Birch (*Betula pendula*)
- Rowan (*Sorbus aucuparia*)
- Wild Cherry (*Prunus avium*)
- Dog rose (*Rosa canina*),
- Butcher's-broom (*Ruscus aculeatus*)
- Honeysuckle (*Lonicera periclymenum*).

4.1.8.1 Management

To enable a successful outcome, future management of the retained and planted hedgerows will require on going management works. This will include monitoring, prescriptive tasks and implementation of necessary works. Elements of this future management are detailed below. The *Hedgerow Management and Wildlife* (Barr et al., undated) document outlines three important factors in how hedgerows are managed that affect resident mammal population (and have therefore formed the basis of the recommendations in this section):

1. The type and amount of food available within the hedgerow. Favourable conditions being a large invertebrate population or prolific annual seed and berry crop.
2. The vegetation structure and composition of the hedgerow. For instance, a dense, herb- rich basal layer or a continuous line of hedgerow trees is preferred by several species.
3. The continuity and connectivity of the hedge within the landscape. For instance, a hedgerow that connects patches of small farm woodlands will have greater value as a corridor for the dispersal of mammals.

Monitoring

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Annual monitoring will take place of the newly planted trees / hedge areas for the first 3 years, with bi-annual monitoring between 4-10 years. The existing hedgerows / tree lines will be monitored during the first, third and fifth year. This will be carried out by a suitably experienced ecologist during late winter – early spring of each year. These monitoring visits will assess the general health of the hedgerows and determine if any remedial action is required (some of which are outlined below such as replacement planting or altering the frequency of cuts).

Replacement

Any plants that are removed, die or become seriously damaged or defective during the 10-year monitoring period of planting shall be replaced like for like in the next planting season.

If hedgerows become very thin, coppicing of selected plants / laying of short lengths of hedgerow may be required and will be beneficial to promote vigorous, dense regrowth. Such works must be undertaken during the period October – February to avoid the breeding bird season.

Hedge Trimming Regime

The more favourable approach to managing hedgerows for the benefits of small mammals is to encourage minimal interference and ensure when there is any cutting, it does so after autumn fruiting (so late winter is preferable). The key points of the management prescriptions will therefore be as follows (adopting recommendations as outlined within Bright and MacPherson 2002):

- Cutting will be done on a 3-year cycle (part of the hedges on site cut during the first year, another part of the hedges cut during second year and no cutting during the third year), to provide sustained foraging opportunities across the site every active season. Hedgerows will be allowed to develop into a tall, dense, bushy structures and maintained at a height of 3 – (preferably 4) meters.
- A proportion of hedges (at least 30%) should be left to grow for at least 7 – 10 years.
- Not all hedgerows should be cut in any one year, so some heavy fruiting hedges are always present.
- Flails should not be used if possible meaning management works will likely involve cutting using hand tools
- Coppicing or laying should be used to manage an of the hedgerows on site which become gappy or spars

If the size of the hedgerow needs to be reduced, avoid cutting the top and cut one side.

Figure 4. Post development layout map.



4.2 Metric Calculations

Following the incorporation of the above measures into the statutory metric, **on site there is a net loss of -18.81% (or 15.61 habitat units)** (see Fig 5 below). In addition to this, with the above recommended hedgerow planting undertaken, **on site there is a net gain 84.71% (or 3.91 hedgerow units)**.

Figure 5. Screenshot of the 'headline results' output from the BNG assessment undertaken for the site using the Statutory Defra metric.

FINAL RESULTS		
Total net unit change (Including all on-site & off-site habitat creation, creation & enhancement)	Habitat units	-15.61
	Hedgerow units	3.91
	Terrestrial units	0.65
Total net % change (Including all on-site & off-site habitat creation, creation & enhancement)	Habitat units	-18.81%
	Hedgerow units	84.71%
	Terrestrial units	26.53%
Trading rules satisfied?	Yes, based on existing arrangements	

5.0 REFERENCES

DEFRA (2023b) *Statutory Biodiversity Metric Tools and Guides*. Available at: <https://www.gov.uk/government/publications/statutory-biodiversity-metric-tools-and-guides>

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