BERDEN HALL FARM SOLAR FARM, PELHAM STOCKING, ESSEX: BIODIVERSITY NET GAIN ASSESSMENT

ECO02096-R-01b

Berden Hall Farm Solar Farm
BNG assessment
2
03 November 2022

[redacted]

Quality Management

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1 INTRODUCTION

Purpose and scope of this report

1.1 RPS was commissioned by Berden Solar Limited to undertake a Biodiversity Net Gain (BNG) assessment of a proposed solar farm at Pelham Stocking, Essex ('the site').

1.2 A habitat survey using the UK Habitat Classification system (Butcher *et al.,* 2020) was undertaken to inform the baseline assessment of the site (RPS, 2022a).

1.3 Habitat enhancement and creation proposals are taken from the Planting Plan for the site, as included in the LEMP (RPS, 2022b), which also includes details of management and monitoring to be undertaken over the lifetime of the project to monitor progress with achieving the BNG measured in this report.

1.4 This report provides:

- Assessment of baseline ecological value and ecological value of the application site post-development.
- A summary of habitat enhancement and creation proposals.
- Results of the overall net gain assessment.

Biodiversity Net Gain definition and methods

1.5 Biodiversity Net Gain is defined in Baker *et al* (2019)[1] as:

"Development that leaves biodiversity in a better state than before"

1.6 The requirement for developments to seek to achieve BNG arises from the National Planning Policy Framework (NPPF, 2021), which states in Para. 174 that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by … minimising impacts on and providing net gains for biodiversity."

1.7 An accepted method of assessing BNG is through the use of biodiversity calculators to assess the biodiversity value of habitats pre- and post-development based on habitat type, distinctiveness and condition.

1.8 A biodiversity index is derived for the baseline and for the proposed development, and BNG is considered to be achieved where an increase in value is delivered (on or offsite), and where habitats of a higher value are not replaced exclusively with habitats of a lower value.

1.9 This assessment was undertaken using the Defra biodiversity metric version 3.1 which was made available in April 2022. The metric and associated documents were downloaded from [redacted]

Baker, J., Hoskin, R. & Butterworth, T. (2019). *Biodiversity Net Gain – good practice principles for development.* Ciria, London.

Baseline habitats

1.10 The UK Habitat Classification survey map used to assess the baseline is provided in Figure 1. Refer to RPS (2022a) for full survey information.

Proposed habitats

1.11 The full landscaping proposal drawing for the site is provided in Appendix A. A plan showing habitat areas and hedgerows used for the BNG assessment based on the landscaping proposals is provided in Figure 2 (redrawn from Appendix A).

Figure 1. UK Habitat Classification survey map

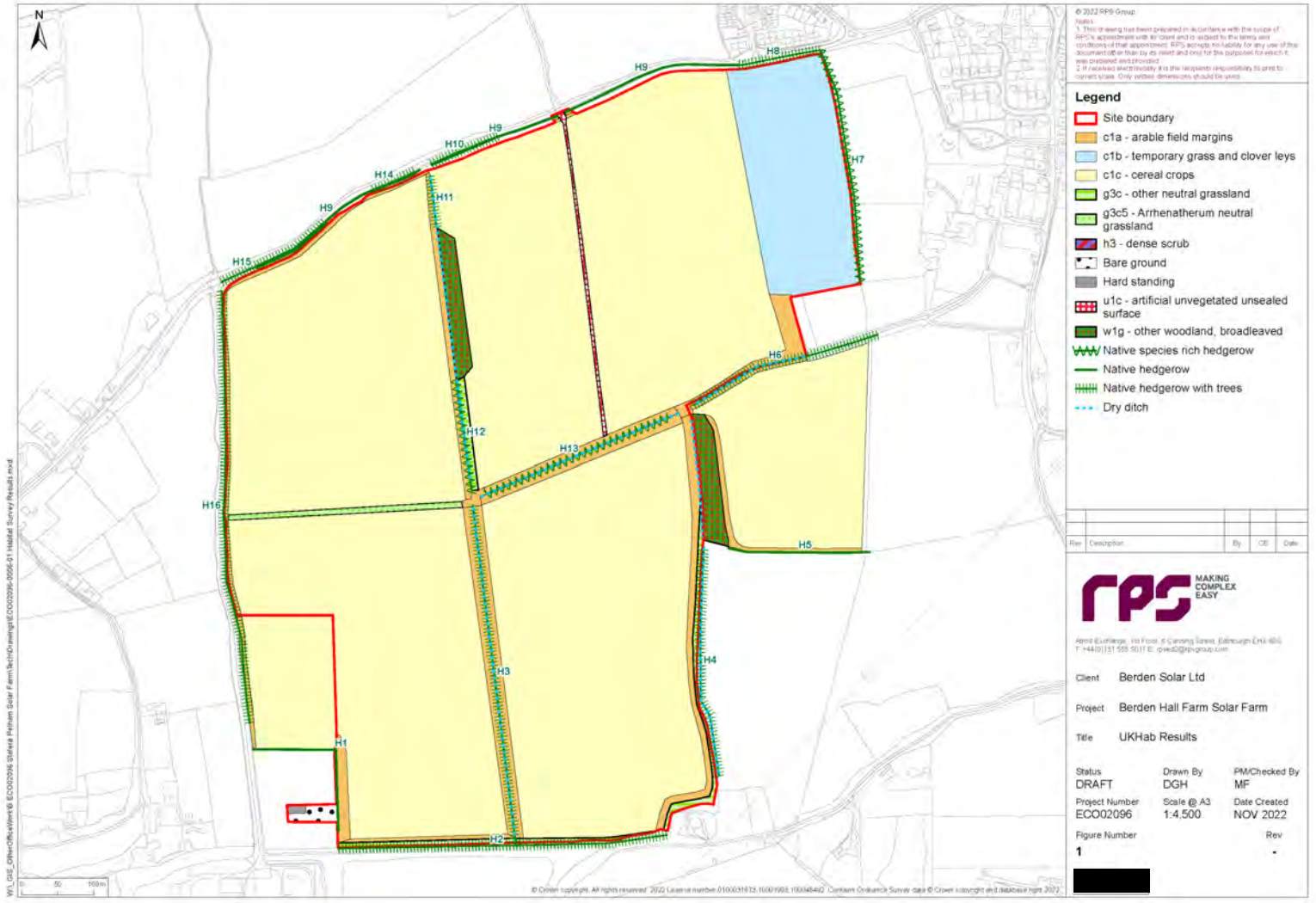
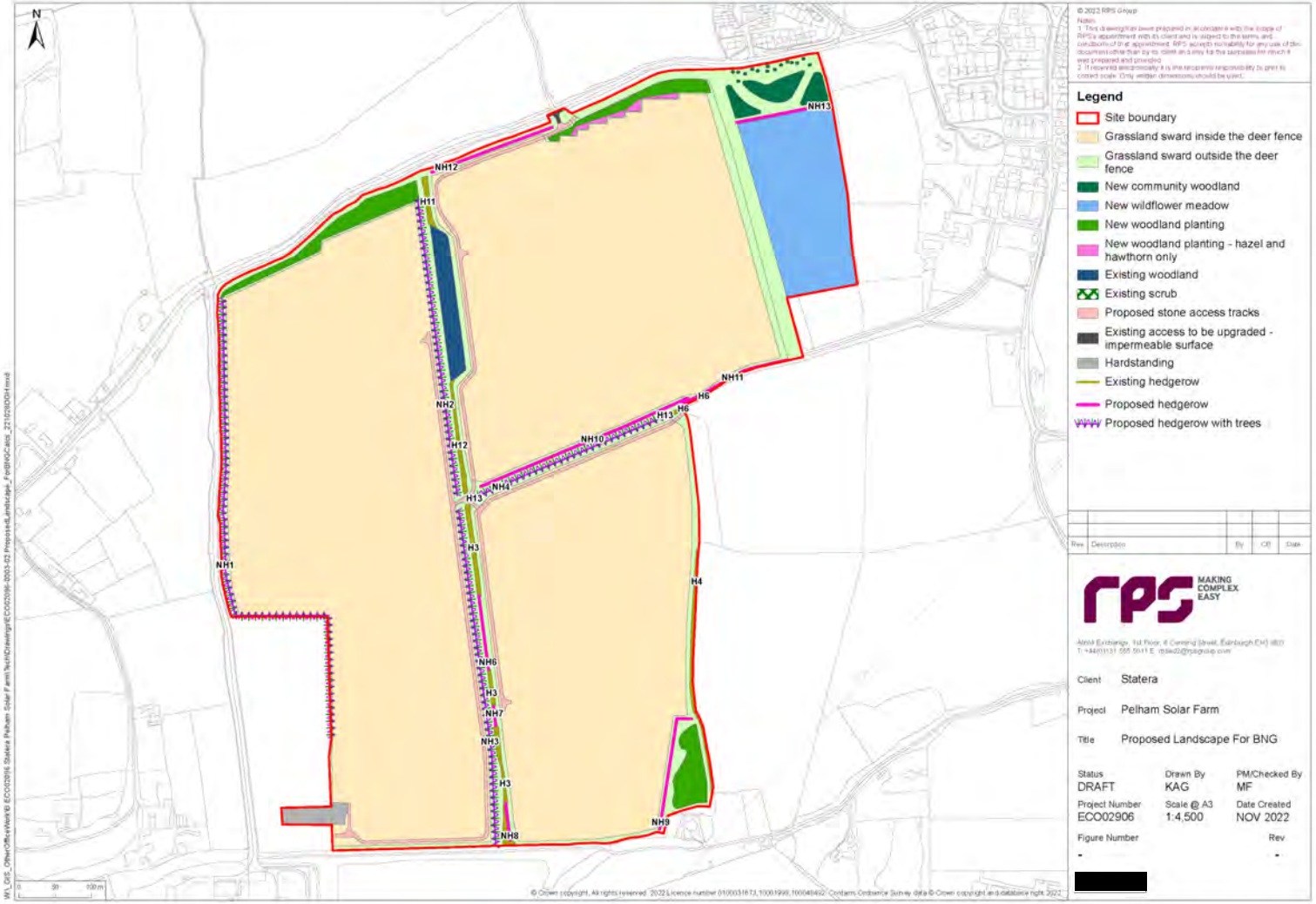


Figure 2. Habitat proposals within application red line



2 BIODIVERSITY NET GAIN ASSESSMENT

2.1 The baseline for assessment of BNG used the UK-Hab habitat map for the Site produced for the Ecological Appraisal (Figure 1).

2.2 Habitats on the proposed development site are taken from the proposals submitted with the outline planning application (Figure 2 and Appendix A).

2.3 Numbers in the tables in this section are copied from those generated by the Defra metric. Note that the spreadsheet rounds figures of credits to 2 decimal places which occasionally generates apparent minor discrepancies due to rounding errors when numbers are placed into tables.

Habitats

2.4 The extent, distinctiveness and condition of the baseline habitats on site are summarised in Table 2.1.

2.5 Areas of enhanced and new habitats proposed for the Site post-redevelopment and the biodiversity value as derived from the Defra calculation tool are provided in Table 2.2.

2.6 The assessment estimates the baseline value of the site at 146.91 units, of which 141.05 units are lost and 5.86 units are retained.

2.7 Habitat creation proposed for the site provides 271.47 units.

2.8 Post-development units on site are therefore **5.86 + 271.47** = **277.32 units**. This is a net change of +**130.41 habitat biodiversity units**, which is a gain of **88.77%**.

2.9 The Defra metric indicates that the trading rules for BNG are not satisfied due to the losses of arable field margin habitats. This is considered to be an artefact of the assessment process, and is discussed further in Section 4.

Table 2.1: Baseline assessment of biodiversity value

Habitat type	Area (ha)	Distinctiveness score		Condition score		Strategic significance score		Value (biodiversity units)[1]	Area of habitat retained	Area of habitat enhanced	Baseline value of retained habitats	Baseline value of enhanced habitats	Area of habitat lost (ha)	Value of habitats lost
Lowland mixed deciduous woodland (western woodland) (w1g)	0.488	High	6	Moderate	2	Low	1	5.86	0.488		5.86	0.00	0.00	0.00
Artificial unvegetated, unsealed surface (farm tracks) (u)	0.363	V.Low	0	N/A	0	Low	1	0.00			0.00	0.00	0.36	0.00
Cereal crops (c1c)	55.507	Low	2	N/A	1	Low	1	111.01			0.00	0.00	55.51	111.01
Arable field margins cultivated annually (c1a)	2.567	Medium	4	N/A	1	Low	1	10.27			0.00	0.00	2.57	10.27
Arable field margins pollen & nectar (c1a6)	0.008	Medium	4	N/A	1	Low	1	0.03			0.00	0.00	0.01	0.03
Arable field margins tussocky (c1a5)	1.454	Medium	4	N/A	1	Low	1	5.82			0.00	0.00	1.45	5.82
Temporary grass and clover leys (c1b)	4.42	Low	2	N/A	1	Low	1	8.84			0.00	0.00	4.42	8.84
Other neutral grassland (grassland field margins) (g3c)	0.693	Medium	4	Poor	1	Low	1	2.77			0.00	0.00	0.69	2.77
Other neutral grassland (*Arrenatherum* grassland field margins) (g3c5)	0.284	Medium	4	Moderate	2	Low	1	2.27			0.00	0.00	0.28	2.27
Developed land; sealed surface (Farm entrance) (u1b6)	0.031	V.Low	0	N/A	0	Low	1	0.00			0.00	0.00	0.03	0.00
Mixed scrub (h3)	0.005	Medium	4	Moderate	2	Low	1	0.04			0.00	0.00	0.01	0.04
Total	**65.82**							**146.91**	**0.488**	**0.00**	**5.86**	**0.00**	**65.33**	**141.05**

1: Calculated as: area x distinctiveness x condition x strategic significance

Table 2.2: Assessment of biodiversity value of post-construction habitat creation

Proposed habitat	Area (ha)	Distinctiveness score		Condition score		Time to target condition (years)	Temporal multiplier	Difficulty of creation	Difficulty multiplier	Habitat units delivered[1]
Modified grassland (grassland under panels inside deer fence, sown with solar farm grassland mix)	51.968	Low	2	Moderate	2	4	0.867	Low	1	**180.26**
Developed land; sealed surface (estimated area of total landtake for panel supports for solar arrays)	0.002	V.Low	0	N/A - Other	0	0	1.000	Medium	0.67	**0.00**
Other neutral grassland (meadow grassland sown outside of deer fencing)	7.029	Medium	4	Good	3	10	0.700	Low	1	**59.07**
Other woodland; broadleaved (Community woodland area)	0.431	Medium	4	Moderate	2	15	0.586	Low	1	**2.02**
Lowland mixed deciduous woodland (other new woodland planting)	1.19	High	6	Moderate	2	30+	0.320	High	0.33	**1.51**
Mixed scrub (hazel & hawthorn scrub planting near panels)	0.092	Medium	4	Moderate	2	5	0.837	Low	1	**0.62**
Artificial unvegetated, unsealed surface (stone access tracks)	0.955	V.Low	0	N/A - Other	0	0	1.000	Low	1	**0.00**
Developed land; sealed surface (hardstanding – upgraded farm access track)	0.013	V.Low	0	N/A - Other	0	0	1.000	N/A	N/A	**0.00**
Developed land; sealed surface (hard standing and solar farm infrastructure)	0.227	V.Low	0	N/A - Other	0	0	1.000	N/A	N/A	**0.00**
Other neutral grassland (area of wildflower meadow planting)	2.983	Medium	4	Good	3	10	0.700	Low	1	**25.07**
Other neutral grassland (grassland outside deer fence adjacent to retained hedges/ditches)	0.437	Medium	4	Moderate	2	5	0.837	Low	1	**2.93**
Total habitat creation	**70.78**									**271.47**

1: Calculated as: area x distinctiveness x condition x time x difficulty)

Hedgerows

2.10 Hedgerows present within the site are summarised in Table 2.3. New hedgerows proposed for the site are provided in Table 2.4.

2.11 The existing value of hedgerow habitat is **24.00** units, of which 23.92 units are retained.

2.12 The value of new hedgerows is **30.90** units.

2.13 Post-development hedgerow units on site are therefore **23.92 + 30.90** = **53.56 units**. This is a net change of +**30.82 hedgerow biodiversity units**, which is a gain of **135.53%**.

Table 2.3: Baseline assessment of hedgerows

Hedgerow no. (Fig 1)	Hedgerow type	Length (km)	Distinctiveness score		Condition score		Strategic significance score		Value (hedgerow units)	Length retained	Length enhanced	Baseline value of retained hedgerows	Baseline value of enhanced hedgerows	Length lost	Value of length lost
H1	Native Hedgerow	0.108	Low	2	Moderate	2	Low	1	0.43	0.088		0.35	0.00	0.02	0.08
H3	Native Species Rich Hedgerow	0.297	Medium	4	Good	3	Low	1	3.56	0.297		3.56	0.00	0.00	0.00
H4	Native Hedgerow with trees - Associated with bank or ditch	0.324	High	6	Good	3	Low	1	5.83	0.324		5.83	0.00	0.00	0.00
H5	Native Hedgerow	0.197	Low	2	Poor	1	Low	1	0.39	0.197		0.39	0.00	0.00	0.00
H6	Native Hedgerow with trees - Associated with bank or ditch	0.278	High	6	Moderate	2	Low	1	3.34	0.278		3.34	0.00	0.00	0.00
H7	Native Hedgerow with trees - Associated with bank or ditch	0.315	High	6	Moderate	2	Low	1	3.78	0.315		3.78	0.00	0.00	0.00
H11	Native Hedgerow with trees	0.072	Medium	4	Moderate	2	Low	1	0.58	0.072		0.58	0.00	0.00	0.00
H12	Native Species Rich Hedgerow - Associated with bank or ditch	0.154	High	6	Good	3	Low	1	2.77	0.154		2.77	0.00	0.00	0.00
H13	Native Species Rich Hedgerow - Associated with bank or ditch	0.276	High	6	Moderate	2	Low	1	3.31	0.276		3.31	0.00	0.00	0.00
	Total	**2.02**							**24.00**	**2.00**		**23.92**	**0.00**	**0.02**	**0.08**

Table 2.4: Assessment of biodiversity value of post-construction hedgerow creation

Hedgerow no. (Fig 2)	Proposed habitat	Length (km)	Distinctiveness score		Condition score		Time to target condition (years)	Temporal multiplier	Difficulty of creation	Difficulty multiplier	Hedgerow units delivered
1	Native Species Rich Hedgerow with trees	0.734	High	6	Good	3	20	0.490	Low	Low	6.48
2	Native Species Rich Hedgerow with trees	0.414	High	6	Good	3	20	0.490	Low	Low	3.65
3	Native Species Rich Hedgerow with trees	0.467	High	6	Good	3	20	0.490	Low	Low	4.12
4	Native Species Rich Hedgerow with trees	0.284	High	6	Good	3	20	0.490	Low	Low	2.51
5	Native Species Rich Hedgerow with trees	0.57	High	6	Good	3	20	0.490	Low	Low	5.03
9	Native Species Rich Hedgerow	0.176	Medium	4	Good	3	12	0.652	Low	Low	1.38
10	Native Species Rich Hedgerow	0.312	Medium	4	Good	3	12	0.652	Low	Low	2.44
11	Native Species Rich Hedgerow	0.157	Medium	4	Good	3	12	0.652	Low	Low	1.23
12	Native Species Rich Hedgerow	0.179	Medium	4	Good	3	12	0.652	Low	Low	1.40
13	Native Species Rich Hedgerow	0.134	Medium	4	Good	3	12	0.652	Low	Low	1.05
6, 8, 7	Native Species Rich Hedgerow with trees	0.182	High	6	Good	3	20	0.490	Low	Low	1.61
	Total	**3.61**									**30.90**

3 PROPOSED AND RETAINED HABITATS – TARGET CONDITION

3.1 This section sets out the criteria for achieving habitat condition as defined by the Defra 3.1 biodiversity metric guidance. Where appropriate, the criteria that will be targeted in order to achieve the target condition for the habitats are highlighted. Orange highlights indicate criteria that must be achieved in order to reach the target condition. Green highlights indicate the other targeted criteria.

Modified grassland

3.2 Grassland inside the deer fence will be sown with a 'solar farm permanent Solar Park Permanent Grassland – Low Maintenance seedmix. These seedmixes typically contain up to 9 grass species and no flowering plants, and as such this grassland would be defined as 'modified grassland' for BNG purposes.

3.3 To achieve moderate condition, this habitat needs to achieve between 4-5 of the 7 criteria listed in Table 3.1, of which criterion 1 is essential.

Table 3.1. Habitat condition criteria for modified grassland

Criterion no.	Criterion
1	There must be 6-8 species per m2.
2	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.
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.
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.
5	Cover of bare ground is between 1% and 10%, including localised areas (for example, a concentration of rabbit warrens).
6	Cover of bracken less than 20%.
7	There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981).

Other neutral grassland

3.4 Grassland outside the deer fence and in a separate area of meadow grassland (Figure 2 and Appendix A) will be sown with a Chalk & Limestone Soil Mixture. Although this is a grassland seedmix suitable for calcareous soils it is considered that it is unlikely to develop into full calcareous grassland given that it is being established on agricultural soils and therefore it has been defined as 'other neutral grassland' for the purposes of this assessment.

3.5 To achieve moderate condition, this habitat needs to achieve between 3-4 of the criteria in Table 3.2, of which criterion 1 is essential.

3.6 To achieve good condition, this habitat needs to achieve between 5-6 of the criteria listed in Table 3.2, of which criteria 1 and 6 are essential.

Table 3.2. Habitat condition criteria for other neutral grassland

Criterion no.	Criterion
1	The appearance and composition of the vegetation closely matches characteristics of the specific grassland habitat type. Wildflowers, sedges and indicator species for the specific grassland habitat type are very clearly and easily visible throughout the sward.
2	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20 per cent is more than 7 cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.
3	Cover of bare ground between 1% and 5%, including localised areas, for example, rabbit warrens.
4	Cover of bracken less than 20% and cover of scrub (including bramble) less than 5%.
5	There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981). Combined cover of species indicative of sub-optimal condition1 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.
6	There are greater than 9 species per metre squared. NB - This criterion is essential for achieving good condition (non-acid grassland types only).

Woodland

3.7 To maintain the existing woodlands in moderate condition, and to achieve moderate condition for new woodlands, this habitat needs to achieve a score of 26-32 from the criteria summarised in Table 3.3.

3.8 During the baseline assessment, the woodland parcel within the site boundary achieved a score of 30.

3.9 Highlighted cells in this table indicate the scores currently achieved by the woodland area on site. Blue cells indicate the score of the western woodland parcel, yellow cells indicate the score of the eastern woodland parcel, and purple cells indicate where both woodlands achieved the same score.

3.10 Where different criteria are targeted for new woodland, this is set out in the LEMP.

Table 3.3. Habitat condition criteria for woodland

Indicator		Good (3 points)	Moderate (2 points)	Poor (1 point)
1	Age distribution of trees	Three age classes present	Two age classes present	One age class present
2	Wild, domestic and feral herbivore damage	No significant browsing damage evident in woodland	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	Invasive plant species	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
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
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
6	Open space within woodland	10 – 20% of woodland has areas of temporary open space, unless woodland is	21- 40% of woodland has areas of temporary open space	More than 40% of woodland has areas of temporary open space

Indicator		Good (3 points)	Moderate (2 points)	Poor (1 point)
		<10ha in which case lower threshold of 10% does not apply		
7	Woodland regeneration	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
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
9	Vegetation and ground flora	Ancient woodland flora indicators present	Recognisable NVC plant community present	No recognisable NVC community
10	Woodland vertical structure	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
11	Veteran trees	Two or more veteran trees per hectare	One veteran tree per hectare	No veteran trees present in woodland
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
13	Woodland disturbance	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

Scrub

3.11 To achieve moderate condition, this habitat needs to meet 3-4 of the criteria summarised in Table 3.4.

Table 3.4. Habitat condition criteria for scrub

Criterion no.	Criterion
1	Habitat is representative of UKHab description (where in its natural range). There are at least three woody species, with no one species comprising more than 75% of the cover (except common juniper, sea buckthorn or box, which can be up to 100% cover).
2	There is a good age range – all of the following are present: seedlings, young shrubs and mature shrubs.
3	There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981) and species indicative of sub-optimal condition make up less than 5% of ground cover.
4	The scrub has a well-developed edge with scattered scrub and tall grassland and/or herbs present between the scrub and adjacent habitat(s).
5	There are clearings, glades or rides present within the scrub, providing sheltered edges.

Hedgerows

3.12 To achieve good condition, hedgerows must record no more than two failures in total, and no more than 1 in any functional group. To achieve moderate condition, hedgerows must fail no more than 5 in total of the criteria in Table 3.5 and must not fail both criteria in more than one functional group.

3.13 For new and retained hedgerows, the targeted criteria for achieving good condition are highlighted in green.

Table 3.5. Habitat condition criteria for hedgerows

Attributes and functional groupings (A, B, C, D & E)		Criteria (the minimum requirements for 'favourable condition')	Description
A1.	Height	>1.5 m average along length	The average height of woody growth estimated from base of stem to the top of 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).
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 (e.g. blackthorn suckers) are only included in the width estimate when they >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[4]).
B1.	Gap - hedge base	Gap between ground and base of canopy <0.5 m for >90% of length (unless 'line of trees')	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).
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).

Attributes and functional groupings (A, B, C, D & E)		Criteria (the minimum requirements for 'favourable condition')	Description
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 hedge (at least)	This is the level of disturbance (excluding wildlife disturbance) at the base of the hedge. Undisturbed ground should be present for at least 90% of the hedgerow length, greater than 1m in width and must be present along at least one side of the hedge. This criterion recognises the value of the hedge 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.
C2.	Undesirable 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 (Urtica spp.), cleavers (Galium aparine) and docks (Rumex spp.). Their presence, either singly or together, should not exceed the 20% cover threshold.
D1.	Invasive and neophyte species	>90% of the hedgerow and undisturbed ground is free of invasive non-native and neophyte species	Neophytes are plants that have naturalised in the UK since AD 1500. For information on neophytes see the JNCC website and for information on invasive non-native species see the GB Non-Native Secretariat website.
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 hedge cutting).
For hedgerows with trees only			
E1.	Tree age	At least one mature tree per 30m stretch of hedgerow. A mature tree is one that is at least 2/3 expected fully mature height for the species.	This criterion addresses if there are sufficient mature trees (within the scope of planning timescales) which are of higher value to biodiversity.
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 damage from livestock or wild animals, pests or diseases, or human activity.	This criterion identifies if the trees are subject to damage which compromises the survival and health of the individual specimens.

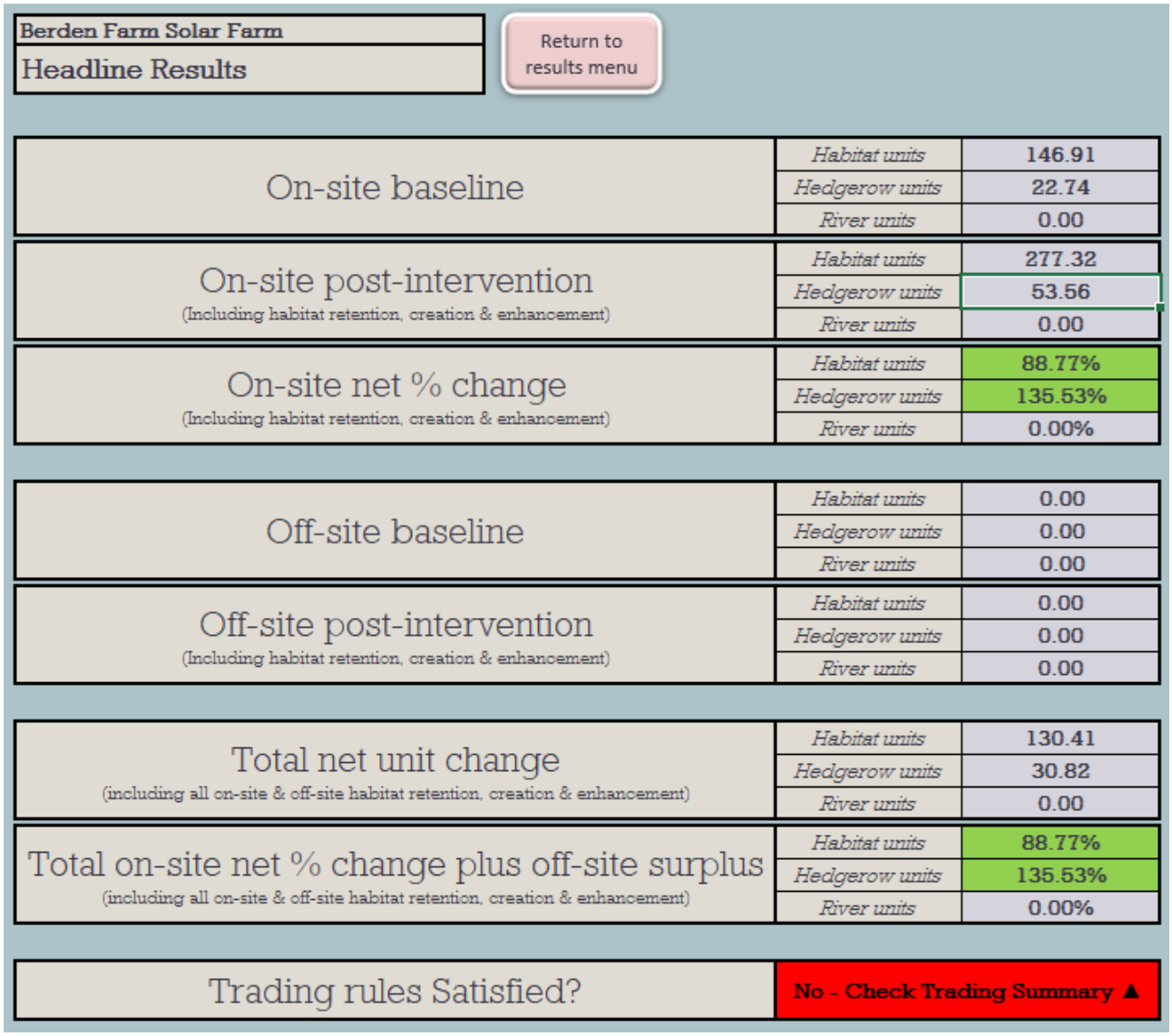
4 SUMMARY

4.1 The assessment above indicates that the development proposals provide the following:

- Area-based habitats: A net gain of 88.77%
- Hedgerows: A net gain of 135.53%

4.2 All three assessed habitat types therefore provide an enhancement significantly of above the target of 10% net gain as set out in the Environment Act 2021 assuming that moderate condition can be achieved for created habitats.

4.3 A summary screenshot from the calculator tool is provided below.



Berden Farm Solar Farm

Headline Results

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On-site baseline	*Habitat units*	146.91
	Hedgerow units	22.74
	River units	0.00
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	277.32
	Hedgerow units	53.56
	River units	0.00
On-site net % change (Including habitat retention, creation & enhancement)	*Habitat units*	88.77%
	Hedgerow units	135.53%
	River units	0.00%
Off-site baseline	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Total net unit change (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	130.41
	Hedgerow units	30.82
	River units	0.00
Total on-site net % change plus off-site surplus (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	88.77%
	Hedgerow units	135.53%
	River units	0.00%
Trading rules Satisfied?	No - Check Trading Summary ▲	

4.4 As can be seen from the screenshot above, the Defra metric algorithm returns a result of 'not satisfied' with respect to the habitat trading rules. The following sections discuss this in further detail.

4.5 The reason for the metric concluding that the trading rules are not satisfied is because of the loss of the three types of arable field margin habitats present on site:

- Arable field margins cultivated annually (c1a)
- Arable field margins pollen & nectar (c1a6)
- Arable field margins tussocky (c1a5)

4.6 These habitats are defined as "herbaceous strips or blocks around arable fields that are managed specifically to provide benefits for wildlife. The arable field must be in a crop rotation which includes an arable crop, even if in certain years the field is in temporary grass, set-aside or fallow" (Butcher *et al.,* 2020). The habitat type includes arable field margins dominated by grasses (c1a5).

4.7 These habitats are defined in the Defra metric as being of 'medium' value, requiring that the '*Same broad habitat or a higher distinctiveness habitat'* be provided to mitigate for any losses.

4.8 By definition these habitat types can only exist in conjunction with arable fields, and therefore there is no possible way of providing any replacement habitat of the same type within the development.

4.9 However, the habitat creation proposals do provide an equivalent of equal value, which is the meadow grassland seedmix to be sown outside the deer fence around all of the fields containing solar panels (Figure 2).

4.10 This meadow grassland will in practical terms provide a margin of herb-rich grassland around the fields, and therefore will fulfil the same ecological function as the existing field margin habitats (i.e. to provide habitat and nectar / pollen sources for invertebrates and hence also to provide food resources for other species such as reptiles, birds and bats).

4.11 As can be seen from the tables above, the baseline currently includes the following areas of arable field margin habitat:

- Arable field margins cultivated annually (c1a) – 2.567 ha
- Arable field margins pollen & nectar (c1a6) – 0.008 ha
- Arable field margins tussocky (c1a5) – 1.454 ha

4.12 This is therefore a total of 4.029 ha, with a baseline value of **16.12** units.

4.13 In addition to this are other grassland field margins (g3c and g3c5) which together cover 0.977 ha with baseline value of **5.04** units.

4.14 This is a total of 5.006 ha and 21.16 units.

4.15 The habitat creation proposals include 7.029 ha of wildflower grassland sown around the margins of the arrays outside of the deer fence, to be managed in good condition, with a value of **59.07 units** once target condition is achieved.

4.16 The development therefore provides an additional 2.023 of field margin habitat which has a value of 37.91 units higher than the baseline value.

4.17 It is therefore concluded that this represents a clear net gain with respect to field margin habitats, and the only reason the metric assesses this as not satisfying the trading rules is a peculiarity of the requirement to provide habitat of the same broad habitat type, despite a) this not being possible when arable land is converted to other uses, and b) the proposed grassland margins being created are essentially the same type and function as the arable field margin habitat it replaces.

4.18 Overall, the development provides a significant uplift in biodiversity value.

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APPENDIX A: DEVELOPMENT SITE PROPOSALS