Biodiversity Net Gain (BNG) baseline survey for Trust for Oxfordshire's Environment (TOE) biodiversity offset application

Kilman Down, Oxfordshire

September 2023

Client details	Trust for Oxford Environment (TOE)		
Date of Survey work	30th June 2023	Date of Report	6 September 2023
Report version	2986_06.09.2023 Authors		Robert Gray BA Hons MCIEEM and Iain Corbyn MA (Oxon) MSc MCIEEM CEnv

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1 Introduction

1.1 The report provides a baseline habitat survey for three locations at Kilman Down.

1.2 Area A is included in an existing BNG agreement and includes areas of mixed woodland creation, lowland calcareous grassland creation and neutral grassland enhancement. Ecoconsult has been asked to carry out a condition assessment of the grassland creation and enhancement areas against 'Lowland calcareous grassland' habitat type and provide feedback on establishment and management.

1.3 Area B is currently an arable field. There is potential for grassland creation. Ecoconsult has been asked to carry out a baseline survey and complete a Metric calculation. Soil samples were taken and assessed.

1.4 Area C is currently an arable field. There is potential for grassland creation. Ecoconsult has been asked to carry out a baseline survey and complete a Metric calculation. Soil samples were taken and assessed.

2 Methodology

2.1 The field survey was carried out for Areas A, B and C on 30th June 2023. The survey was carried out by Robert Gray MCIEEM and Iain Corbyn MCIEEM CEnv of Ecoconsult Ltd.
Both have extensive experience of carrying out botanical and phase 1 habitat surveys. They have attended training events on the UKHAB and the use of the Metric 4.0. Please refer to Table 1 below for timings and conditions.

2.2 The survey has followed guidance in Survey and monitoring standards for offset sites funded by Trust for Oxfordshire's Environment (TOE) provided by the Thames Valley Environmental Records Centre (TVERC).

2.3 Habitats were mapped following methodology in UK Habitat Classification Version 2.0 (UKHab Ltd 2023).

2.4 The Biodiversity Metric 4.0 was used to calculate the onsite area habitat baseline following guidance in The Biodiversity Metric 4.0 User Guide (Natural England 2023).

2.5 Soil samples were taken on 30th June 2023 following the methodology in (Natural England 2008) Natural England Technical Information Note TIN035: Soil Sampling for Habitat Recreation and Restoration.

2.6 Soil samples were analysed by Tim O'Hare Associates for the following parameters:

- particle size analysis (sand, silt, clay);
- pH value;
- organic matter content;
- total nitrogen (Dumas method);
- extractable phosphorus (Olsen method);
- extractable potassium; □ extractable magnesium; □ hand soil texture.

Table 1: Timings and conditions of field surveys

Date	Timings	Survey work	Weather
30/06/23	Start: 09:30 Finish: 18:00	Areas A, B and C	16 - 20°C Light showers Light air to gentle breeze (Beaufort 1 to 3) 100% cloud

3 Results

3.13 Area B

3.14 Area B is an arable field with an area of c.12.8 ha categorised as c1c7 Other cereal crops. The field is dominated by wheat Triticum aestivum with a small number of common native botanical species typical of arable fields located around the field boundaries including locally abundant barren brome Anisantha sterilis and fat hen Chenopodium album agg., alongside less frequent white campion Silene latifolia, small toadflax Chaenorhinum minus, black grass Alopecurus myosuroides, dove's-foot crane'sbill Geranium molle and fool's parsley Aethusa cynapium. A margin running along the west of the field has been planted with sweetcorn Zea sp potentially as a game cover crop. Please refer to Table 9 below for a list botanical species recorded and their frequencies and to Figure 1 for UKHab map.

3.15 An 8m wide grass margin runs along the eastern boundary of the field categorised as c1a5 Arable field margins – tussocky. The sward supports abundant to locally abundant false oat-grass Arrhenatherum

elatius, cock's-foot Dactylis glomerata and red fescue Festuca rubra. Please refer to Table 9 below for a list botanical species recorded and their frequencies and to Figure 1 for UKHab map.

Table 9: Area B - botanical species list

Latin name	Common name	DAFOR
c1c7 Other cereal crops		
Aethusa cynapium	Fool's parsley	R
Alopecurus myosuroides	Black grass	O
Anisantha sterilis	Barren brome	LA
Chaenorhinum minus	Small toadflax	R
Chenopodium album agg.	Fat hen agg.	LA
Cirsium arvense	Creeping thistle	R
Fumaria officinalis	Common fumitory	R
Geranium molle	Dove's-foot crane's-bill	R
Silene latifolia	White campion	O
Sonchus asper	Prickly sow-thistle	R
Triticum aestivum	Bread wheat	D
Urtica dioica	Common nettle	O
Zea sp.	Sweetcorn	LA
c1a5 Arable field margins – tussocky		
Arrhenatherum elatius	False oat grass	A
Cirsium arvense	Creeping thistle	R
Conium maculatum	Hemlock	R
Dactylis glomerata	Cock's-foot	A
Festuca arundinacea	Tall fescue	O
Festuca rubra agg.	Red fescue agg.	LA
Galium aparine	Cleavers	O
Lolium perenne	Perennial rye-grass	LF
Papaver rhoeas	Common poppy	R
Phleum pratense	Timothy	F
Poa trivialis	Rough-stalked meadow-grass	F
Reseda lutea	Wild mignonette	R
Rumex crispus	Curled dock	R
Silene dioica	Red campion	R

Silene latifolia	White campion	F
Urtica dioica	Common nettle	F
DAFOR: D=Dominant; A=Abundant; F=Frequent, O=Occasional; R=Rare; L=Locally		

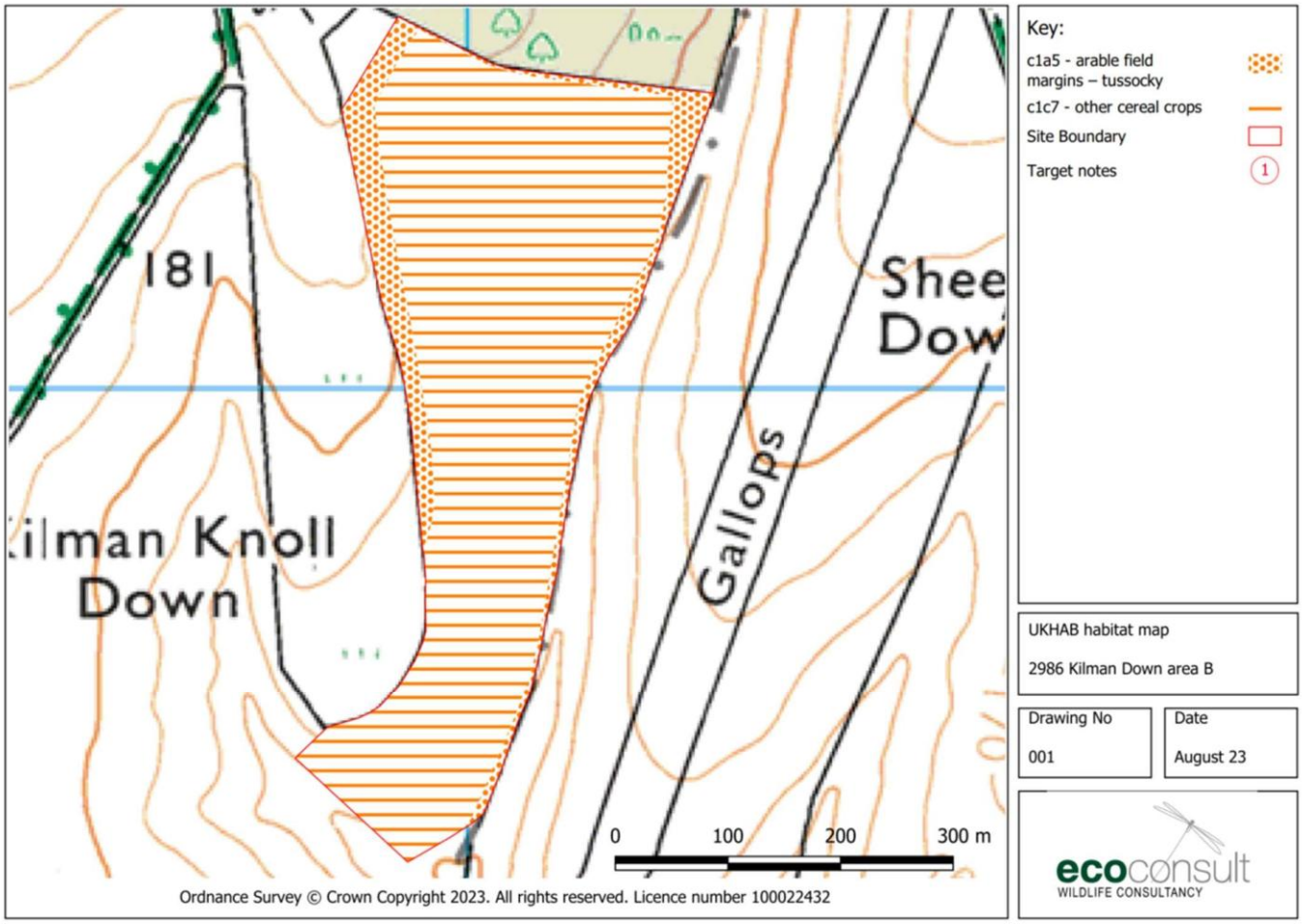
3.16 The soil analysis results are provided in Appendix B. The soil characteristics and their suitability for the creation of Lowland calcareous grassland are provided in Table below

Table 10: Area B - Soil characteristics and suitability for Lowland calcareous grassland creation.

Sample reference B	Analysis	Suitability for calcareous grassland creation
Particle size analysis		
Clay	20 %	
Silt	53 %	
Sand	27 %	
Hand texture	Silt loam	Suitable, lower nutrient retention than clay soils.
pH value;	8.1	Very suitable
organic matter content;	14.8%	
total nitrogen (Dumas method);	0.78 %, High	High N but likely to leached from soil over time.
extractable phosphorus (Olsen method);	28 mg/l, Index 3	Quite high but likely to leached from soil over time.. Very shallow and stony soil, and sloping ground will help to counteract this by increasing stress on plants leading to higher botanical diversity.
extractable potassium;	152 mg/l, Index 2-	Slightly high for wildflower grassland creation but acceptable. Likely to be leached from soil over time.
extractable magnesium;	62 mg/l, Index 2	Important for livestock health

3.17 Although N, P and K levels are relatively high at present due to past the application of fertiliser in the past, these nutrients are likely to be leached out over time from the silty loam soil on slightly sloping ground. The soils are very shallow and stony (chalk) which will help the establishment of lowland calcareous grassland. Nutrient stripping could be considered to reduce these nutrients prior to seeding to facilitate the creation of lowland calcareous grassland. Overall, the site is considered suitable for the creation of lowland calcareous grassland.

Figure 1: Area B - UKHab map



3.18 The on-site baseline value of the site equates to 26.68 habitat units.

3.19 On-site lowland calcareous grassland creation in good condition would equate to 42.88 habitat units which is an on-site net change of 16.20 Habitat units. 3.20 Area C

4 References

Natural England (March 2023) The Biodiversity Metric 4.0: User Guide

Natural England (February 2008) Soil sampling for habitat recreation and restoration, Natural England Technical Information Note TIN035

Natural England (February 2008) Soil and agri-environment schemes: interpretation of soil analysis, Natural England Technical Information Note TIN036

TVERC (2022) Survey and monitoring standards for offset sites funded by Trust for Oxfordshire's Environment (TOE)

UKHab Ltd (2023) UK Habitat Classification Version 2.0 (at https://www.ukhab.org)

Appendix A: Relevant UKHAB Habitat descriptions

UKHab

Code and Name

g2a Lowland calcareous grassland

Category Type

Primary Level 4

Spatial Feature Type

Area

Status

Priority Habitat

Definition

A grassland that meets at least two of these three criteria:

1. >15 species per m^2 (including grasses and excluding bryophytes);
2. >30% cover of broadleaved herbs and sedges (excluding White Clover *Trifolium repens*, Creeping Buttercup *Ranunculus repens* and injurious weeds);
3. <10% cover of rye grasses and White Clover *Trifolium repens*.

AND ≥2 of these indicators are classed as 'frequent' on the DAFOR scale.

AND ≥3 of these indicators are classed as 'occasional' on the DAFOR scale.

g2a Indicator species list

Common name	Scientific name
Agrimony	*Agrimonia eupatoria*
Betony	*Betonica officinalis*
Bird's-foot-trefoil	*Lotus corniculatus*
Burnet saxifrage	*Pimpinella saxifraga*
Carline thistle	*Carlina vulgaris*
Clustered bellflower	*Campanula glomerata*
Common rock-rose	*Helianthemum nummularium*
Common knapweed	*Centaurea nigra*
Cowslip	*Primula veris*

g2a Indicator species list (cont)

Common name	Scientific name
Dropwort	*Filipendula vulgaris*
Devil's-bit scabious	*Succisa pratensis*
Eyebright	*Euphrasia officinalis*
Fairy flax	*Linum catharticum*
Field scabious	*Knautia arvensis*
Spring gentian	*Gentiana verna*
Autumn gentian	*Gentianella amarella*
Chiltern gentian	*Gentianella germanica*
Greater knapweed	*Centaurea scabiosa*
Hairy violet	*Viola hirta*
Harebell	*Campanula rotundifolia*
Hoary plantain	*Plantago media*
Hoary rock-rose	*Helianthemum oelandicum*
Horseshoe vetch	*Hippocrepis comosa*
Kidney vetch	*Anthyllis vulneraria*
Lady's bedstraw	*Galium verum*
Wild marjoram	*Origanum vulgare*
Common milkwort	*Polygala vulgaris*
Chalk milkwort	*Polygala calcarea*
Dwarf milkwort	*Polygala amarella*
Mouse-ear hawkweed	*Pilosella officinarum*
Orchids	*Various*
Ox-eye daisy	*Leucanthemum vulgare*
Purple milk-vetch	*Astragalus danicus*
Common restharrow	*Ononis repens*
Rough hawkbit	*Leontodon hispidus*
Lesser hawkbit	*Leontodon saxatilis*
Salad burnet	*Poterium sanguisorba subsp. minor*
Saw-wort	*Serratula tinctoria*
Small scabious	*Scabiosa columbaria*
Squinancywort	*Asperula cynanchica*
Dwarf thistle	*Cirsium acaule*
Thyme-leaved sandwort	*Arenaria serpyllifolia*
Wild basil	*Clinopodium vulgare*
Wild thyme	*Thymus drucei*
Yellow-wort	*Blackstonia perfoliata*

UKHab

g2a Lowland calcareous grassland (continued)

Landscape and ecological context

Found on calcareous soils over chalk and limestone in the lowlands and upland fringe, generally <300 m in altitude. They are largely restricted to the warmer and drier climates of the southern and eastern areas of the UK.

Inclusions

Calcareous grassland that meets the qualifying thresholds around Morecambe Bay in Cumbria or on roadside verges.

Exclusions

Calcareous grassland in functional enclosures that do not meet the qualifying thresholds (see g2c).

Calcareous grassland in the unenclosed uplands (see g2b).

Calcareous grassland on the Pennines (see g2b).

Heath false-brome *Brachypodium pinnatum* dominated grassland is unlikely to meet the criteria above unless there has been a long history of heavy grazing.

Species

As well as the indicator species listed in the core definition, typical grasses include Common Bent *Agrostis capillaris*, Crested Hair-grass *Koeleria macrantha*, Blue Moor-grass *Sesleria caerulea*, Hairy Oat-grass *Avenula pubescens*, Quaking-grass *Briza media*, Sheep's Fescue *Festuca ovina*, Cock's Foot *Dactylis glomerata*, Upright Brome *Bromopsis erecta*, Tor-grass *Brachypodium pinnatum* and Yellow Oat-grass *Trisetum flavescens*. These do not contribute to the indicator score.

NVC Associations

Close correspondence with the following NVC communities is a prerequisite for this habitat type: CG1-CG8 (CG9 in Scotland) although CG4 communities are unlikely to meet the core definition criteria (see g2c).

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UKHab

Code and Name

c1c7 Other cereal crops

Category Type

Primary Level 5

Spatial Feature Type

Area

Definition

Cereal crops that do not meet the definition of c1c5 or c1c6.

Inclusions

Wheat, Barley, Oats, Rye, Maize, Linseed, Oilseed Rape.

Exclusions

Sugar-beet, onions, field beans, root crops (see c1d8).

Field vegetables such as broccoli and cauliflower (see c1f~).

UKHab

Code and Name

c1a5 Arable field margins – tussocky

Category Type

Primary Level 5

Spatial Feature Type

Area Line

Status

Subset of Priority Habitat

Definition

Grass margins around arable fields, sown with tussocky grasses, such as Cocksfoot *Dactylis glomerata* and Timothy *Phleum pratense*, that are of particular value for ground-nesting birds and over-wintering insects.

Species

Grasses are likely to also include Sweet Vernal Grass *Anthoxanthum odoratum*, Smooth Meadow Grass *Poa pratensis*, Red Fescue *Festuca rubra*, Crested Dog's-tail *Cynosurus cristatus* and Yellow Oat-grass *Trisetum flavescens*.

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Appendix 2: Soil analysis

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Ecoconsult Limited**
Project:	**Kilman Down**
Job:	**Topsoil Analysis**
Date:	**24/07/2023**
Job Ref No:	**TOHA/23/1023/SS**

Sample Reference			**Site B SU 46044 84127**	**Site C SU 45836 85642**
		Accreditation		
Clay (<0.002mm)	%	UKAS	20	20
Silt (0.002-0.063mm)	%	UKAS	53	58
Sand (0.063-2.0mm)	%	UKAS	27	22
Hand Texture Class	--	--	ZL	ZL
pH Value (1:2.5 water extract)	units	UKAS	8.1	8.0
Organic Matter (LOI)	%	UKAS	14.8	12.1
Total Nitrogen (Dumas)	%	UKAS	0.78	0.64
Extractable Phosphorus (Olson)	mg/l	UKAS	28	10
Extractable Potassium	mg/l	UKAS	152	57
Extractable Magnesium	mg/l	UKAS	62	49

ZL = SILT LOAM

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