Town and Country Planning Act 1990 (as amended)

Section 78 Appeal

PINS reference APP/C3105/W/17/3189611

(Cherwell District Council Reference: 15/00837/OUT)

by

Gallagher Estates, Charles Brown & Simon Digby

Site at

Gavray Drive, Bicester, OX26 6SU (nearest)

APPENDICES

TO THE
PROOF OF EVIDENCE

of

DOMINIC WOODFIELD

BIODIVERSITY AND RELATED POLICY MATTERS

May 2018

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APPENDIX 1

Appendix DW1 – History of DW Involvement in the Bicester 13 site at Gavray Drive (and relevance of that history to the current appeal).

1 The current appellants first applied for planning permission for a residential development of 500 units on the land now defined as Bicester 13 in 2004 [CDC ref 04/02797/OUT]. The proposals at that time represented a departure from the adopted Local Plan and involved loss to development of a large area of habitats that I knew from previous visits to the site to be exceptionally wildlife-rich, including around half of a designated Local Wildlife Site (LWS). I have always maintained that the Bicester 13 site as a whole could accommodate some development and indeed I have long recognised that a suitable and appropriate scale of development, concentrated on GDW in particular, could help pay for securing the future of the areas of importance for wildlife concentrated on GDE. However it was clear that the 500 unit residential scheme proposed in 2004 would give rise to ecological impacts of a scale that was wholly unacceptable in the context of prevailing policy and legislation. I also had grave concerns that the Environmental Statement (ES) submitted with the application in 2004 fell short of being adequately representative of the site's environmental constraints, and that there was a consequent risk of insufficient weight being attached in the decision making process to impacts such as loss of species-rich unimproved grassland, of a type now very rare, and of the site's interest for rare and scarce butterflies, as well as other scarce invertebrates and legally protected species.

2 Application 04/02797/OUT was not determined by Cherwell District Council, and the current appellants made an appeal against non-determination which was heard at a public inquiry held on 14-24 March 2006. At some commercial sacrifice I appeared as a third party at this inquiry, providing ecological evidence in support of reducing the extent of development and questioning the appellant's ecology and planning witnesses. In the run up to the appeal, and drawing on my own ecological expertise, I had spent time on the site fact-checking the appellants' submitted ecological information, and during that time I discovered a colony of marsh fritillary butterflies, a species previously thought to be extinct in the region, and which had been overlooked in the appellants' ES. When I reported this to the national charity Butterfly Conservation, interest in the site rapidly grew, and local volunteers from that charity promptly confirmed the marsh fritillary to be breeding on the site and also found another rare species, the brown hairstreak butterfly. The appellants made no changes to their masterplan in response to the emergence of this information, although they submitted information outlining how they proposed to compensate for impacts on these species. These relied heavily on providing a substantial commuted sum to Butterfly Conservation for conservation work off-site and in the local area. This led ultimately to the withdrawal of the objections from Natural England and Butterfly Conservation, who were uncertain as to the provenance and future sustainability of the marsh fritillary colony. Neither

party knew of the site's full importance for other butterfly species at that time. BBOWT, the local Wildlife Trust, maintained a position of objection throughout, citing the importance of the habitats generally.

3 Even though a third rare species, the black hairstreak butterfly, was found before the close of the inquiry (and a fourth, the white-letter hairstreak has been found since, putting Gavray Drive Meadows into an elite group of very few sites that can lay claim to harbouring all five UK hairstreak species), the withdrawal of Natural England's and Butterfly Conservation's objections in 2006 was I believe highly influential in the Inspector recommending that due to the weight of unmet local (i.e. Bicester and District) housing need at the time, permission should be granted, notwithstanding that he recognised that there were significant ecological concerns. The Secretary of State agreed with that recommendation and granted permission on the 12th July 2006.

4 Following the grant of outline planning permission in 2006, I maintained an interest in trying to ensure that the detail of the development reflected a) the requirements of the planning conditions, b) the intent of the Secretary of State in imposing those conditions and c) the commitments made by both the appellants and Cherwell District Council during the course of the public inquiry process. My continued involvement in decisions about the detail of the scheme was consistent with the stated wishes of the appeal Inspector and Secretary of State, as expressed in the Inspector's report into the appeal and reflected in the wording of a planning condition related to local consultation.

5 Early in the course of maintaining this interest and involvement in scrutinising conditions submissions and reserved matters applications between 2006 and 2010, it became clear that the appellant was intending to build a drainage system that required significant remodelling and raising of land levels. This in my view represented a significant departure from the requirements for 'best practice sustainable drainage' and on-site attenuation enshrined within the decision awarded by the Secretary of State. Furthermore it was evident that this objective was of itself likely to give rise to likely significant effects on the environment (through the importation of something in the region of 50-55,000 m^3 of fill material by lorry) that had not been assessed as part of the submitted EIA.

6 Subsequent opportunities to rectify this omission and subject this element of the development proposals to due EIA process were not taken, despite my making repeated representations on the matter to the Council. The clearest opportunity was provided by the submission of a reserved matters application [CDC ref: 09/00909/REM] for roads and drainage infrastructure. In parallel with my own objections to the granting of reserved matters approval without a new or updated

EIA, this reserved matters application attracted repeated objections and requests for further information from other statutory and non-statutory parties, including Natural England, the Environment Agency and Thames Water. It remained undetermined.

7 In 2010, the current appellant applied to CDC for an extension to the life of planning permission 04/02797/OUT. This application (CDC ref: 10/01667/OUT) included refinements to the drainage design attempting to address the objections to the reserved matters application 09/00909/REM. However, significant volumes of material were still required to be imported to the site, and in my view this still fell within the ambit of the EIA Regulations. There was also the matter of all the additional important wildlife confirmed from the site since 2006. No revised EIA was however submitted by the appellant, and no direction that a new or revised EIA should be submitted was made by CDC, despite their accepting that significant material changes had occurred (or been brought to light) since the original application and EIA.

8 CDC granted permission for the extension of time application on 14th February 2012. At that point I felt I had no option but to seek permission to challenge that decision through judicial review, and was able to do so with the benefit of a Protective Costs Order. I submitted claim CO/4955/2012 to the High Court on 11th May 2012 with six accompanying grounds of challenge related primarily to procedural deficiencies in the execution of the EIA process by CDC. That application for JR permission was heard by Justice Underhill in London on 18th December 2012. Shortly after the hearings, the appellant and CDC consented to judgment and the planning permission was quashed.

9 In the period since 2012, local interest in the site (especially GDE) and its wildlife has rocketed. In part as a result of the survey efforts of Butterfly Conservation and latterly due to the emergence of the local Save Gavray Meadows Group, the site is now celebrated locally and in some instances regionally as one of very few that lay claim to harbouring all five British hairstreak butterflies (the final one, the scarce white-letter hairstreak was found by Butterfly Conservation in 2011), as well as rare moths and other insects and a host of statutorily protected species and rare habitats. It is beyond argument that the LWS and indeed other parts of GDE continue to merit the ongoing efforts of many to protect it. At the same time the appellants have, disappointingly, elected to pursue a strategy of neglect of these areas and some of the important surviving grassland habitats are now becoming threatened from scrub development.

10 In 2014, the Examination process for Cherwell's replacement Local Plan commenced. The need for a suitably robust planning policy to achieve the right balance between development, protection and secured conservation management led me to independently suggest the site for a new site-

specific, development brief-type policy at the Local Plan Examination hearing held in June 2014. At that stage the Council had not put forward Gavray Drive for housing in the draft Local Plan due to the impasse and uncertainty created by the refusal of the appellants to lower their development ambitions in the wake of the 2012 High Court decision and the growing number of individuals and organisations objecting to the scale of those ambitions. The first sitting of the Examination in June 2014 heard evidence that CDC had not met its housing needs and the Inspector adjourned the Examination to give time for CDC to find additional sites capable of meeting that demand. I recognised that this created an obvious window for the land at Gavray Drive to be identified for a policy securing appropriately scaled development on the least sensitive part of the site (GDW) alongside protection and management of the important wildlife in the remainder (GDE). Naturally, the appellant was also promoting the site, albeit on rather different terms. At the same time they appeared to be continuing to pursue a policy of 'active neglect' of the LWS to denude its interest.

11 Policy Bicester 13 duly came into being and was tested through the reconvened Examination hearings in December 2014. The draft wording included a stipulation to not only protect the LWS within GDE, but also to protect some 3 hectares of land outside the designated Local Wildlife Site, but within the River Ray 'Conservation Target Area'. This land at GDE is known to include grassland habitats that meet the criteria for Local Wildlife Site status. Nevertheless, the stipulation was not to protect these areas from <u>all</u> development, but to protect them from <u>built</u> development, which would (for example) allow some use for drainage or open space infrastructure. The policy wording was challenged at the December 2014 Examination hearings by the appellants, and the Inspector heard evidence from the appellants, CDC and myself on the various issues surrounding the wording and the reasons for it. The appellants argued that the wording of Policy Bicester 13 was not consistent with the requirements of the overarching policy for Conservation Target Areas in the Plan (ESD11), which was more flexible in indicating that development within them could be permissible subject to the results of appropriate surveys. I supported CDCs position that in the case of Gavray Drive, the results of a voluminous database of survey information justified the prohibition on nature conservation grounds, noting that the prohibition was against <u>built</u> development only.

12 Subsequent to the December hearings and while the Local Plan was still in the process of Examination, the appellants submitted application 15/00837/OUT (the application subject to the current appeal) for 180 residential units on GDW. Despite it being self-evident that this would increase pressure on the adjoining land in the eastern part of the site (including the LWS), and despite the clear direction of the emerging Policy Bicester 13, this application included no provision for management of that land. The appellants' strategy appeared to be to pursue a two-

stage application process whereby the first stage of development ensures there is not enough space left to deliver the balance of the required 300 residential units specified by the policy without incursion into the areas intended to be protected.

13 The Inspector issued his report into the Local Plan on 9th June 2015. On the matter of the site specific policy relating to development at Gavray Drive (Policy Bicester 13), his report included what the High Court later heard to be 'ambiguous' reasoning on the matter of whether the wording "*that part of the site within the Conservation Target Area should be kept free from built development*" should be kept in as drafted or struck out via a modification. I accepted that the Inspector's reasoning could be read as ambiguous but I believed a clear and logical rationale for his decisions not to amend the policy (both at the time and subsequently) could be followed, based around the inclusion or exclusion of the word "built". Furthermore I have since learned that CDC sought further clarity on the matter directly from PINS who reiterated the position that no change needed to be made. The Plan was therefore adopted with the wording as drafted unchanged.

14 The appellant then challenged the adoption of the Plan in the High Court and they were successful in having the wording "t*hat part of the site within the Conservation Target Area should be kept free from built development"* removed. I independently challenged that High Court decision in the Court of Appeal. I did not seek to challenge that part of Justice Patterson's reasoning that the wording of Policy Bicester 13 needed to be revisited in the light of the perceived ambiguity in the Inspector's report, but I did challenge her decision to remove that wording (thereby substantially amending the Policy) without remitting the matter for public re-examination. My claim was unsuccessful and the Policy was ultimately re-adopted with those words removed.

15 The removal of the words "*that part of the site within the Conservation Target Area should be kept free from built development"* has relevance to this appeal mainly in the fact that it underlines that a future development phase of 120 units on GDE (i.e. the balance of the housing allocation were the current appeal to be allowed) would inevitably see built development on land abutting the LWS, including land recognised as of high intrinsic nature conservation importance. This extent of development will be at best very difficult to achieve alongside the 'net biodiversity gain' required by Policy Bicester 13. This is a material issue in the disposal of this appeal, as without a holistic approach to the allocation site it is not possible for decision makers to be satisfied that the various policy requirements can all be delivered. The Council's planning committee clearly recognised the same problem as evidenced by RFR1. My professional opinion is that such an extent of development (120 units) on GDE is not possible

without net loss to biodiversity, and allowing the appeal proposals would make that an inevitability.

APPENDIX 2

Warwickshire Coventry and Solihull - Biodiversity Impact Assessment Calculator

v. 18.3 08/08/2014
Amendment from v18.2 only affects green roofs, for o
Please fill in both tables

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Result

Local Planning Authority:	Cherwell DC
Site name:	Gavray Drive (West)
Planning application reference number:	
Assessor:	Rob Rowlands / David Lowe
Date:	22/03/2017

Please do not edit the formulae or structure
To condense the form for display hide vacant rows, do not delete them
If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services

								Habitat Biodiversity Value					
	Existing habitats on site Please enter all habitats within the site boundary			Habitat distinctiveness		Habitat condition		Habitats to be retained with no change within development		Habitats to be retained and enhanced within development		Habitats to be lost within development	
T. Note	code	Phase 1 habitat description	*Habitat area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*
		Direct Impacts and retained habitats			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H
						Poor	1						
	C31	Other: Tall ruderal	0.05	Medium-Low	3	Poor	1					0.05	**0.15**
	A22	Woodland: Scattered scrub	0.05	Medium	4	Poor	1			0.04	0.16	0.01	**0.04**
	J11	Other: Arable	6.54	Low	2	Poor	1			1.59	3.18	4.95	**9.90**
	A111	Woodland: Broad-leaved semi-natural woodland	0.18	High	6	Moderate	2			0.18	2.16		
		Total	6.82				Total	0.00	0.00	1.81	5.50	5.01	10.09
													∑D + ∑F + ∑H
											Site habitat biodiversity value		15.59

Before/after impact	Indirect Negative Impacts Including off site habitats	K					Value of loss from indirect impacts K x A x B = Li, Lii	Li - Lii
Before								
After								
	Total	0.00				M		0.00
								HIS = J + M
							Habitat Impact Score (HIS)	10.09

	Proposed habitats on site (Onsite mitigation)			Target habitats distinctiveness		Target habitat condition			Time till target condition		Difficulty of creation / restoration		Habitat biodiversity value
T. Note	code	Phase 1 habitat description	Area (ha)	Distinctiveness	Score	Condition	Score		Time (years)	Score	Difficulty	Score	
		Habitat Creation	N		O		P			Q		R	(N x O x P) / Q / R
	n/a	Built Environment: Buildings/hardstanding	3.23	none	0	Poor	1		5 years	1.2	Low	1	**0.00**
	n/a	Built Environment: Gardens (lawn and planting)	1.39	Low	2	Moderate	2		5 years	1.2	Low	1	**4.62**
	J12	Grassland: Amenity grassland	0.39	Low	2	Poor	1		5 years	1.2	Low	1	**0.65**
		Total	**5.01**										
		Habitat Enhancement						Existing value S (= F)					((N x O x P) - S) / Q / R
	A22	Woodland: Scattered scrub	0.04	Medium	4	Moderate	2	**0.16**	5 years	1.2	Low	1	**0.13**
	A111	Woodland: Broad-leaved semi-natural woodland	0.18	High	6	Good	3	**2.16**	10 years	1.4	Low	1	**0.77**
	B22	Grassland: Semi-improved neutral grassland	1.59	Medium	4	Moderate	2	**3.18**	10 years	1.4	Low	1	**6.81**
		Total	**1.81**								Trading down correction value		0.00
											Habitat Mitigation Score (HMS)		**12.99**
													HBIS = HMS - HIS
											Habitat Biodiversity Impact Score		**2.90**
											Percentage of biodiversity impact loss		

KEY	
	No action required
	Action required
	Drop-down menu
	Calculation
	Automatic lookup
	Overall Result

	Loss to biodiversity
	Gain to biodiversity

ther habitats v18.2 still usable.

Comment
Is the public open space area being retained and wildflower seed put into the soild after 'agricultural' preparations (i.e. like arable conversion to 'wildflower' ley? If not can any of it be left and if so just change the 1.59 figure
Can this habitat be enhanced?
J

Comment
Assumes 70% built to 30% amenity/garden
Assumes 70% built to 30% amenity/garden
Assumed 80% species-rich wildlfower grassland within 2ha of POS.
Assumed 20% amenity within 2ha of POS
The area you could enhance?
The area you could enhance?
DL - With cats and humans we suggest wildflower grassland would not reach a 'good' condition so I have altered this to 'moderate'. Also the time till target condition would be 10 years

Gain

Warwickshire Coventry and Solihull - Biodiversity Impact Assessment Calculator - Linear Features

Please fill in both tables

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Result

Linear Features
Hedges and other linear features can offer a higher biodiversity value per length than a standard area of habitat due to factors such as connectivity and must therefore be compensated for in parallel to the standard metric.

Please do not edit the formulae or structure
To condense the form for display hide vacant rows, do not delete them
If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services

		Existing linear features on site		Linear distinctiveness		Linear condition		Linear Biodiversity Value: Linear features to be retained with no change within development		Linear features to be retained and enhanced within development		Linear features to be lost within development	
T. Note	code	Phase 1 habitat description	*Feature length (km)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Length (km)*	*Existing value*	*Length (km)*	*Existing value*	*Length (km)*	*Existing value*
		Direct Impacts and retained features			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H
	J21	Hedges: Intact hedge	0.18	Medium	4	Poor	1					**0.18**	**0.72**
	G2	Ditches: Running water	0.25	High	6	Poor	1	0.25	**1.50**				
	A21	Hedges: Linear scrub	0.08	Medium	4	Poor	1			0.08	**0.32**		
		Total	0.51				Total	0.25	1.50	0.08	0.32	0.18	0.72
													∑D + ∑F + ∑H
											Site Linear Biodiversity Value		2.54

Before/after impact	Indirect Negative Impacts	K	Value of loss from indirect impacts: K x A x B = Li, Lii	Li - Lii
Before				
After				
Before				
After				
Before				
After				
Before				
After				
Before				
After				
	Total	0.00	M	0.00

	HIS = J + M
Linear Impact Score (LIS)	**0.72**

CAUTION - Destruction of features of medium or high distinctiveness, e.g. hedgerows and streams, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided?
Any unavoidable loss of valuable habitats must be replaced like-for-like. E.G. Loss of hedgerows must be replaced with similar or better hedgerows. All newly planted hedges should be native species-rich hedgerows.

	Proposed linear features on site (Onsite mitigation)			**Target linear distinctiveness**		**Target linear condition**			**Time till target condition**		**Difficulty of creation / restoration**		***Linear biodiversity value***
T. Note	code	Phase 1 habitat description	*Length (km)*	*Distinctiveness*	*Score*	*Condition*	*Score*		*Time (years)*	*Score*	*Difficulty*	*Score*	
		Linear Creation	N		O		P			Q		R	(N x O x P) / Q / R
	J211	Hedges: Native species rich intact hedge	0.31	High	6	Good	3		15 years	1.7	Low	1	**3.30**
		Total	**0.31**										
		Linear Enhancement						Existing value S (= F)					((N x O x P) - S) / Q / R
	J211	Hedges: Native species rich intact hedge	0.08	High	6	Good	3	**0.32**	15 years	1.7	Low	1	**0.66**
		Total	**0.08**								Trading down correction value		0.00
											Linear Mitigation Score (LMS)		**3.96**
													LBIS = LMS - LIS
											Linear Biodiversity Impact Score		3.24
											Percentage of linear impact loss		

KEY	
	No action required
	Action required
	Drop-down menu
	Calculation
	Automatic lookup
	Overall Result

	Loss to biodiversity
	Gain to biodiversity

Comment
not >2m tall or >1.5m wide
Poor water quality, no emergent or subaquatic vegetation. Steep bank profile, culverts, modification at northern end.
Low distinctiveness, defunct boundary feature in south of site
J

Comment
To be planted along new boundary between green space and development
Plug planting of linear scrub to form distinct boundary, continuation of new hedgrows around open space

Gain

Biodiversity Impact Assessment Summary

Site name:	Gavray Drive (West)
Planning reference number:	

Habitats	**Area (ha)**	**Habitat Biodiversity Value**
Total existing area onsite	6.82	15.59
Habitats negatively impacted by development Habitat Impact Score	5.01	10.09
On site habitat mitigation Habitat Mitigation Score	6.82	12.99
Habitat Biodiversity Impact Score If -ve further compensation required		**2.90**
Percentage of biodiversity impact		

Linear features	**Length (km)**	**Linear Biodiversity Value**
Total existing length onsite	0.51	2.54
Linear features negatively impacted by development Linear Impact Score	0.18	0.72
On site linear mitigation Linear Mitigation Score	0.39	3.96
Linear Biodiversity Impact Score If -ve further compensation required		**3.24**
Percentage of linear biodiversity impact		

For any questions with regard to biodiversity impact and this development please contact Warwickshire County Council Ecological Services:

email: planningecology@warwickshire.gov.uk
tel: 01926 418060

If there is an anticipated loss to biodiversity and no further ecological enhancements can be incorporated within the development it may be possible to compensate for this loss through a biodiversity offsetting scheme.

Please contact The Environment Bank for discussions on potential receptor sites in your area:

email: lmartland@environmentbank.com
tel: 01926 412772

Warwickshire County Council

the Environment Bank

Phase 1 Habitat Descriptions	Phase 1 Habitat Codes	Distinctiveness		Difficulty of creation		Difficulty of restoration	
Built Environment: Buildings/hardstanding	n/a	none	0	Low	1	Low	1
Built Environment: Gardens (lawn and planting)	n/a	Low	1	Low	1	Low	1
Woodland: Broad-leaved semi-natural woodland	A111	High	6	n/a	-	Low	1
Woodland: Broad-leaved plantation	A112	Medium	4	Medium	1.5	Low	1
Woodland: Coniferous semi-natural woodland	A121	Medium	4	n/a	-	Low	1
Woodland: Coniferous plantation	A122	Low	2	Medium	1.5	Low	1
Woodland: Mixed semi-natural woodland	A131	Medium	4	n/a	-	Low	1
Woodland: Mixed plantation	A132	Low	2	Medium	1.5	Low	1
Woodland: Wet woodland	n/a	High	6	Medium	1.5	Medium	1.5
Woodland: Dense continuous scrub	A21	Medium-Low	3	Low	1	Low	1
Woodland: Scattered scrub	A22	Medium	4	Low	1	Low	1
Woodland: Scattered trees	A3	Medium	4	Low	1	Low	1
Woodland: Broad-leaved parkland	A31	High	6	Medium	1.5	Low	1
Woodland: Coniferous parkland	A32	Medium	4	Medium	1.5	Low	1
Woodland: Recently felled woodland	A4	Low	2	n/a	-	n/a	-
Woodland: Orchard	A5	High	6	Low	1	Low	1
Grassland: Unimproved acidic grassland	B11	High	6	Medium	1.5	Low	1
Grassland: Semi-improved acidic grassland	B12	Medium-High	5	Medium	1.5	Low	1
Grassland: Unimproved neutral grassland	B21	High	6	Medium	1.5	Low	1
Grassland: Semi-improved neutral grassland	B22	Medium	4	Medium	1.5	Low	1
Grassland: Unimproved calcareous grassland	B31	High	6	Medium	1.5	Low	1
Grassland: Semi-improved calcareous grassland	B32	Medium-High	5	Medium	1.5	Low	1
Grassland: Poor semi-improved grassland	B6	Medium-Low	3	Medium	1.5	Low	1
Grassland: Improved grassland	B4	Low	2	n/a	-	Low	1
Grassland: Marsh / Marshy grassland	B5	High	6	High	3	Medium	1.5
Grassland: Dry heath / Acidic grassland mosaic	D5	High	6	Medium	1.5	Medium	1.5
Grassland: Set-aside / Arable field margins	J113	High	6	Low	1	Low	1
Grassland: Amenity grassland	J12	Low	2	Low	1	Low	1
Wetland: Standing water	G1	High	6	Medium	1.5	Medium	1.5
Wetland: Running water	G2	High	6	Medium	1.5	Medium	1.5
Wetland: Reedbed	n/a	High	6	low	1	low	1
Wetland: Sphagnum Bog	E11	High	6	Very High	10	High	3
Wetland: Acid/neutral flush	E21	High	6	High	3	Medium	1.5
Wetland: Basin Mire	E32	High	6	High	3	Medium	1.5
Wetland: Swamp	F1	High	6	High	3	Medium	1.5
Wetland: Inundation vegetation	F22	High	6	Low	1	Low	1
Other: Arable	J11	Low	2	n/a	-	n/a	-
Other: Continuous bracken	C11	Low	2	Low	1	Low	1
Other: Tall ruderal	C31	Medium-Low	3	Low	1	Low	1
Other: Non-ruderal	C32	Medium	4	Low	1	Low	1
Other: Ephemeral/short perennial	J13	Low	2	Low	1	Low	1
Other: Allotments	J112	Low	2	Low	1	Low	1
Other: Quarry	I21	Low	2	Low	1	Low	1
Other: Spoil	I22	Low	2	Low	1	Low	1
Other: Refuse tip	I24	Low	2	Low	1	Low	1
Other: Introduced shrub	J14	Low	2	Low	1	Low	1
Other: Bare ground	J4	Low	2	Low	1	Low	1

Other: Green roof	n/a	Low	2	Low	1	Low	1
Linear features							
Hedges: Intact hedge	J21	Medium	4	Low	1	Low	1
Hedges: Native species rich intact hedge	J211	High	6	Low	1	Low	1
Hedges: Hedge with trees	J23	Medium-High	5	Low	1	Low	1
Hedges: Native species rich hedge with trees	J231	High	6	Low	1	Low	1
Hedges: Defunct hedge	J22	Low	2	n/a	-	n/a	-
Hedges: Linear scrub	A21	Medium	4	Low	1	Low	1
Hedges: Linear trees	A3	Medium	4	Low	1	Low	1
Hedges: Introduced shrub	J14	Low	2	Low	1	Low	1
Ditches: Standing water	G1	High	6	Medium	2	Low	1
Ditches: Running water	G2	High	6	Medium	2	Low	1
Ditches: Dry ditch	J26	Low	2	Low	1	Low	1
Boundaries: Fence	J24	None	0	Low	1	Low	1
Boundaries: Wall	J25	Low	2	Low	1	Low	1
Boundaries: Dry stone wall	J25	Medium	4	Low	1	Low	1
Other: Inland cliff	I1	Medium	4	Low	1	Low	1
Other: Earth bank	J28	Low	2	Low	1	Low	1
Other: Green wall	n/a	Low	2	Low	1	Low	1

Distinctiveness	
High	6
Medium-High	5
Medium	4
Medium-Low	3
Low	2
none	0

Condition	
Good	3
Moderate	2
Poor	1

Time	
5 years	1.2
10 years	1.4
15 years	1.7
20 years	2
25 years	2.4
30 years	2.8
32+ years	3

Difficulty	
Very high	10
High	3
Medium	1.5
Low	1
n/a	0

Habitat trading down correction calculator

Existing Site

Existing habitat	Area of habitat impact	Distinctiveness	High distinctiveness habitat loss biodiversity value	Medium-High distinctiveness habitat loss biodiversity value	Medium distinctiveness habitat loss biodiversity value	Medium-Low distinctiveness habitat loss biodiversity value
Direct impacts						
-			0.00	0.00	0.00	0.00
Other: Tall ruderal	0.05	Medium-Low	0.00	0.00	0.00	0.15
Woodland: Scattered scrub	0.01	Medium	0.00	0.00	0.04	0.00
Other: Arable	4.95	Low	0.00	0.00	0.00	0.00
Woodland: Broad-leaved semi-natural woodland		High		0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
Indirect impacts						
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
TOTAL	5.01		0.00	0.00	0.04	0.15

Proposed Site

Proposed habitat creation	Area of habitat creation	Distinctiveness	High distinctiveness proposed biodiversity value	Medium-High distinctiveness proposed biodiversity value	Medium distinctiveness proposed biodiversity value	Medium-Low distinctiveness proposed biodiversity value
Built Environment: Buildings/hardstanding	3.23	none	0.00	0.00	0.00	0.00
Built Environment: Gardens (lawn and planting)	1.39	Low	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
Grassland: Amenity grassland	0.39	Low	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
Proposed habitat enhancement	Area	Distinctiveness	High	Medium-High	Medium	Medium-Low
Woodland: Scattered scrub	0.04	Medium	0.00	0.00	0.13	0.00
Woodland: Broad-leaved semi-natural woodland	0.18	High	0.77	0.00	0.00	0.00
Grassland: Semi-improved neutral grassland	1.59	Medium	0.00	0.00	6.81	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
TOTAL	6.82		0.77	0.00	6.95	0.00

Trading Down Correction	High	Medium-High	Medium	Medium-Low
Value of existing habitat loss per distinctiveness	0.00	0.00	0.04	0.15
Value of created habitats per distinctiveness	0.77	0.00	6.95	0.00
Would this result in trading down habitats?	Never	No	No	No
If no, value each distinctiveness still requiring compensation	0	0	0	0
Surplus gain to be carried over to compensate loss of lower habitats (rolls over)	0.77	0.77	7.68	7.53
Trading down correction value	n/a	0	0	0

This calculator assess whether there is any down trading in habitats value. E.g. loss of high distinctiveness habitat cannot be compensated for by surpluss medium mitigation. It ca value which enters into the primary calculator to take this into account. Such that the full level of high habitat loss compensation is required. However if additional medium gain is value of the high loss, this surplus is still be taken into account with on site gain.

CAUTION - Destruction of habitats of high distinctiveness, e.g. lowland meadow or ancient woodland, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided?
Any unavoidable loss of habitats of high distinctiveness must be replaced like-for like.

Linear trading down correction calculator

Existing Site

Existing linear features	length of loss (km)	Distinctiveness	High distinctiveness linear loss biodiversity value	Medium-High distinctiveness linear loss biodiversity value	Medium distinctiveness linear loss biodiversity value	Medium-Low distinctiveness linear loss biodiversity value	Low distinctiveness linear loss biodiversity value
Direct impacts							
Hedges: Intact hedge	0.18	Medium	0.00	0.00	0.72	0.00	0.00
Ditches: Running water		High		0.00	0.00	0.00	0.00
Hedges: Linear scrub		Medium	0.00	0.00		0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
Indirect impacts							
-	-		0.00	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00	0.00
TOTAL	0.18		0.00	0.00	0.72	0.00	0.00

Proposed Site

Proposed linear creation	Length of feature (km)	Distinctiveness	High distinctiveness proposed linear biodiversity value	Medium-High distinctiveness proposed linear biodiversity value	Medium distinctiveness proposed linear biodiversity value	Medium-Low distinctiveness proposed linear biodiversity value	Low distinctiveness proposed linear biodiversity value
Hedges: Native species rich intact hedge	0.31	High	3.30	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
Proposed linear enhancement	Length	Distinctiveness	High	Medium-High	Medium	Medium-Low	Low
Hedges: Native species rich intact hedge	0.08	High	0.66	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
TOTAL	0.39		3.96	0.00	0.00	0.00	0.00

Linear trading down correction

	High	Medium-High	Medium	Medium-Low	Low
Value of existing habitat loss per distinctiveness	0.00	0.00	0.72	0.00	0.00
Value of created habitats per distinctiveness	3.96	0.00	0.00	0.00	0.00
Would this result in trading down habitats?	Never	No	No	No	No
If no, value each distinctiveness still requiring compensation	0	0	0	0	0.00
Surplus gain to be carried over to compensate loss of lower habitats (rolls over)	3.96	3.96	3.24	3.24	n/a
Trading down correction value	n/a	0	0	0	0

This calculator assess whether there is any down trading in linear habitats. E.g. loss of high distinctiveness habitat and surplus creation of medium or low habitats. It calculates a correction value which enters into the primary calculator to take this into account. Such that the full level of high habitat loss compensation is required. However if additional medium gain is generated above the value of the high loss, this surplus is still be taken into account with on site gain.

CAUTION - Destruction of each habitat of medium distinctiveness and above should be mitigated for with creation/restoration of a similar habitat. Trading up of habitat type is encouraged.

APPENDIX 3

Warwickshire Coventry and Solihull - Biodiversity Impact Assessment Calculator

v. 18.3 08/08/2014
Amendment from v18.2 only affects green roofs, for o
Please fill in both tables

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Result

Local Planning Authority:	Cherwell DC
Site name:	Gavray Drive (East)
Planning application reference number:	
Assessor:	Rob Rowlands / David Lowe
Date:	22/03/2017

Please do not edit the formulae or structure
To condense the form for display hide vacant rows, do not delete them
If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services

		Existing habitats on site Please enter all habitats within the site boundary		**Habitat distinctiveness**		**Habitat condition**		**Habitat Biodiversity Value**					
								Habitats to be retained with no change within development		**Habitats to be retained and enhanced within development**		**Habitats to be lost within development**	
T. Note	code	Phase 1 habitat description	*Habitat area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*
		Direct Impacts and retained habitats			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H
	A21	Woodland: Dense continuous scrub	3.72	Medium-Low	3	Poor	1			0.15	0.46	3.56	**10.69**
	B6	Grassland: Poor semi-improved grassland	3.85	Medium-Low	3	Moderate	2			1.58	9.47	2.27	**13.64**
	B22	Grassland: Semi-improved neutral grassland	6.08	Medium	4	Poor	1			5.12	20.50	0.95	**3.82**
	G1	Wetland: Standing water	0.03	High	6	Moderate	2			0.01	0.14	0.01	**0.16**
	A111	Woodland: Broad-leaved semi-natural woodland	0.46	High	6	Moderate	2			0.46	5.50		
	F1	Wetland: Swamp	0.10	High	6	Poor	1			0.10	0.57		
	C31	Other: Tall ruderal	0.49	Medium-Low	3	Moderate	2					0.49	**2.95**
	B5	Grassland: Marsh / Marshy grassland	0.85	High	6	Poor	1			0.13	0.81	0.71	**4.28**
	B5	Grassland: Marsh / Marshy grassland	0.17	High	6	Moderate	2			0.00		0.17	**2.05**
		Total	15.74				Total	0.00	0.00	7.56	37.45	8.18	37.59
													∑D + ∑F + ∑H
											Site habitat biodiversity value		75.04

Before/after impact	**Indirect Negative Impacts** Including off site habitats	K					Value of loss from indirect impacts K x A x B = Li, Lii	Li - Lii
Before								
After								
	Total	0.00				M		0.00
								HIS = J + M
							Habitat Impact Score (HIS)	37.59

CAUTION - Destruction of habitats of high distinctiveness, e.g. lowland meadow or ancient woodland, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided?
Any unavoidable loss of habitats of high distinctiveness must be replaced like-for-like.

	Proposed habitats on site (Onsite mitigation)			Target habitats distinctiveness		Target habitat condition			Time till target condition		Difficulty of creation / restoration		*Habitat biodiversity value*
T. Note	code	Phase 1 habitat description	*Area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*		*Time (years)*	*Score*	*Difficulty*	*Score*	*biodiversity value*
		Habitat Creation	N		O		P			Q		R	(N x O x P) / Q / R
	n/a	Built Environment: Buildings/hardstanding	3.49	none	0	Poor	1		5 years	1.2	Low	1	**0.00**
	n/a	Built Environment: Gardens (lawn and planting)	1.50	Low	2	Poor	1		5 years	1.2	Low	1	**2.49**
	B21	Grassland: Unimproved neutral grassland	3.15	High	6	Moderate	2		10 years	1.4	Medium	1.5	**18.00**
	G1	Wetland: Standing water	0.04	High	6	Good	3		10 years	1.4	Medium	1.5	**0.34**
		Total	**8.18**										
		Habitat Enhancement						Existing value S (= F)					((N x O x P) - S) / Q / R
	A111	Woodland: Broad-leaved semi-natural woodland	0.46	High	6	Good	3	**5.50**	25 years	2.4	Low	1	**1.15**
	B5	Grassland: Marsh / Marshy grassland	0.13	High	6	Moderate	2	**0.81**	5 years	1.2	Medium	1.5	**0.45**
	B21	Grassland: Unimproved neutral grassland	6.70	High	6	Moderate	2	**29.96**	10 years	1.4	Low	1	**36.04**
	G1	Wetland: Standing water	0.01	High	6	Good	3	**0.14**	5 years	1.2	Medium	1.5	**0.04**
	F1	Wetland: Swamp	0.10	High	6	Moderate	2	**0.57**	5 years	1.2	Medium	1.5	**0.32**
	A22	Woodland: Scattered scrub	0.15	Medium	4	Good	3	**0.46**	10 years	1.4	Low	1	**0.99**
		Total	**7.56**								Trading down correction value		-2.49
											Habitat Mitigation Score (HMS)		**57.33**
													HBIS = HMS - HIS
											Habitat Biodiversity Impact Score		**19.74**
											Percentage of biodiversity impact loss		

KEY	
	No action required
	Action required
	Drop-down menu
	Calculation
	Automatic lookup
	Overall Result

	Loss to biodiversity
	Gain to biodiversity

ther habitats v18.2 still usable.

Comment
Mostly blackthorn, in dense thickets
MG6b - in appr. management but lower species diversity
Semi-improved grassland communities (MG9) with elements of lowland meadow (MG4). Heavy scrub encroachment (>5%), wildflower cover low due to crowding out by grasses, high frequency of undesirable species
Meet all conditions of FEP assessment for good condition, but invert. surveys show poor diversity
Very little dead wood, very dense canopy and brambles mean little ground flora
Swamp and tall herb fen - high occurrence of scrub and dead vegetation
Low distinctiveness and diversity
MG10 and marshy grassland, lots of scrub encroachment
MG10 within managed field, low diversity and small patches but no scrub
J

Comment
Value of 70% built to 30% garden/green space assumed (no data currently available)
Value of 70% built to 30% garden/green space assumed (no data currently available)
Grassland seeding on areas of removed scrub/ruderal. Will improve in quality over time with appropriate management. Hope to reach good condition after 10 years. Remainder of scrub/ruderal lost to development.
Will be created in close proximity to existing ponds, within current poor SI fields. Should begin to support GCN and other species fairly quickly.
Fairly young woodland. Maturation and light management to open up and dead wood will mean reaches good condition.
Removal of scrub and dead vegetation and commencement of management will restore former value.
Combination of all poor and rich SI. Removal of scattered scrub, ruderal encroachment, commencement of management to open up sward, some seeding. Appropriate management will increase value of grasslands, to reach good quality unimproved
Planting of aquatic plants, addition of new ponds, enhancement of surrounding habitats will all increase value.
Removal of scrub and dead vegetation and commencement of management will restore former value.
Dense scrub to be thinned out to scattered scrub

Gain

Warwickshire Coventry and Solihull - Biodiversity Impact Assessment Calculator - Linear Features

Please fill in both tables

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Result

Linear Features
Hedges and other linear features can offer a higher biodiversity value per length than a standard area of habitat due to factors such as connectivity and must therefore be compensated for in parallel to the standard metric.

Please do not edit the formulae or structure
To condense the form for display hide vacant rows, do not delete them
If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services

	Existing linear features on site			**Linear distinctiveness**		**Linear condition**		**Linear Biodiversity Value**					
								Linear features to be retained with no change within development		**Linear features to be retained and enhanced within development**		**Linear features to be lost within development**	
T. Note	code	Phase 1 habitat description	*Feature length (km)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Length (km)*	*Existing value*	*Length (km)*	*Existing value*	*Length (km)*	*Existing value*
		Direct Impacts and retained features			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H
	J21	Hedges: Intact hedge	0.93	Medium	4	Moderate	2	0.00		0.77	**6.16**	**0.16**	**1.28**
	J231	Hedges: Native species rich hedge with trees	0.59	High	6	Good	3	0.59	**10.62**	0.00			
	J26	Ditches: Dry ditch	0.86	Low	2	Poor	1	0.86	**1.72**	0.00			
	G2	Ditches: Running water	0.65	High	6	Poor	1	0.56	**3.36**	0.00		**0.09**	**0.54**
		Total	3.03				Total	2.01	15.70	0.77	6.16	0.25	1.82
													∑D + ∑F + ∑H
											Site Linear Biodiversity Value		23.68

Before/after impact		**Indirect Negative Impacts**	K					Value of loss from indirect impacts K x A x B = Li, Lii	Li - Lii
	Before								
	After								
	Before								
	After								
	Before								
	After								
	Before								
	After								
	Before								
	After								
		Total	0.00					M	0.00

	HIS = J + M
Linear Impact Score (LIS)	**1.82**

CAUTION - Destruction of features of medium or high distinctiveness, e.g. hedgerows and streams, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided?
Any unavoidable loss of valuable habitats must be replaced like-for-like. E.G. Loss of hedgerows must be replaced with similar or better hedgerows. All newly planted hedges should be native species-rich hedgerows.

		Proposed linear features on site (Onsite mitigation)		**Target linear distinctiveness**		**Target linear condition**			**Time till target condition**		**Difficulty of creation / restoration**		***Linear biodiversity value***
T. Note	code	Phase 1 habitat description	*Length (km)*	*Distinctiveness*	*Score*	*Condition*	*Score*		*Time (years)*	*Score*	*Difficulty*	*Score*	
		Linear Creation	N		O		P			Q		R	(N x O x P) / Q / R
	J211	Hedges: Native species rich intact hedge	0.37	High	6	Good	3		10 years	1.4	Low	1	**4.76**
		Total	**0.37**										
		Linear Enhancement						Existing value S (= F)					((N x O x P) - S) / Q / R
	J21	Hedges: Intact hedge	0.77	Medium	4	Good	3	**6.16**	10 years	1.4	Low	1	**2.20**
		Total	**0.77**								Trading down correction value		0.00
											Linear Mitigation Score (LMS)		**6.96**
													LBIS = LMS - LIS
											Linear Biodiversity Impact Score		**5.14**
											Percentage of linear impact loss		

KEY	
	No action required
	Action required
	Drop-down menu
	Calculation
	Automatic lookup
	Overall Result

	Loss to biodiversity
	Gain to biodiversity

Comment
Low species diversity, some gaps
Meet all FEP conditions, higher diversity.
Scrub choked
Scrub choked
J

Comment
Gap planting with additional species to increase diversity

Gain

Biodiversity Impact Assessment Summary

Site name:	Gavray Drive (East)
Planning reference number:	

Habitats	Area (ha)	Habitat Biodiversity Value
Total existing area onsite	15.74	75.04
Habitats negatively impacted by development Habitat Impact Score	8.18	37.59
On site habitat mitigation Habitat Mitigation Score	15.74	57.33
Habitat Biodiversity Impact Score If -ve further compensation required		**19.74**
Percentage of biodiversity impact		

Linear features	Length (km)	Linear Biodiversity Value
Total existing length onsite	3.03	23.68
Linear features negatively impacted by development Linear Impact Score	0.25	1.82
On site linear mitigation Linear Mitigation Score	1.14	6.96
Linear Biodiversity Impact Score If -ve further compensation required		**5.14**
Percentage of linear biodiversity impact		

CAUTION - Destruction of habitats of high distinctiveness, e.g. lowland meadow, ancient woodland or species-rich hedgerows, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided? Any unavoidable loss of habitats of high distinctiveness must be replaced like-for-

For any questions with regard to biodiversity impact and this development please contact Warwickshire County Council Ecological Services:

email: planningecology@warwickshire.gov.uk
tel: 01926 418060

If there is an anticipated loss to biodiversity and no further ecological enhancements can be incorporated within the development it may be possible to compensate for this loss through a biodiversity offsetting scheme.

Please contact The Environment Bank for discussions on potential receptor sites in your area:

email: lmartland@environmentbank.com
tel: 01926 412772

Warwickshire County Council

the Environment Bank

Phase 1 Habitat Descriptions	Phase 1 Habitat Codes	Distinctiveness		Difficulty of creation		Difficulty of restoration	
Built Environment: Buildings/hardstanding	n/a	none	0	Low	1	Low	1
Built Environment: Gardens (lawn and planting)	n/a	Low	1	Low	1	Low	1
Woodland: Broad-leaved semi-natural woodland	A111	High	6	n/a	-	Low	1
Woodland: Broad-leaved plantation	A112	Medium	4	Medium	1.5	Low	1
Woodland: Coniferous semi-natural woodland	A121	Medium	4	n/a	-	Low	1
Woodland: Coniferous plantation	A122	Low	2	Medium	1.5	Low	1
Woodland: Mixed semi-natural woodland	A131	Medium	4	n/a	-	Low	1
Woodland: Mixed plantation	A132	Low	2	Medium	1.5	Low	1
Woodland: Wet woodland	n/a	High	6	Medium	1.5	Medium	1.5
Woodland: Dense continuous scrub	A21	Medium-Low	3	Low	1	Low	1
Woodland: Scattered scrub	A22	Medium	4	Low	1	Low	1
Woodland: Scattered trees	A3	Medium	4	Low	1	Low	1
Woodland: Broad-leaved parkland	A31	High	6	Medium	1.5	Low	1
Woodland: Coniferous parkland	A32	Medium	4	Medium	1.5	Low	1
Woodland: Recently felled woodland	A4	Low	2	n/a	-	n/a	-
Woodland: Orchard	A5	High	6	Low	1	Low	1
Grassland: Unimproved acidic grassland	B11	High	6	Medium	1.5	Low	1
Grassland: Semi-improved acidic grassland	B12	Medium-High	5	Medium	1.5	Low	1
Grassland: Unimproved neutral grassland	B21	High	6	Medium	1.5	Low	1
Grassland: Semi-improved neutral grassland	B22	Medium	4	Medium	1.5	Low	1
Grassland: Unimproved calcareous grassland	B31	High	6	Medium	1.5	Low	1
Grassland: Semi-improved calcareous grassland	B32	Medium-High	5	Medium	1.5	Low	1
Grassland: Poor semi-improved grassland	B6	Medium-Low	3	Medium	1.5	Low	1
Grassland: Improved grassland	B4	Low	2	n/a	-	Low	1
Grassland: Marsh / Marshy grassland	B5	High	6	High	3	Medium	1.5
Grassland: Dry heath / Acidic grassland mosaic	D5	High	6	Medium	1.5	Medium	1.5
Grassland: Set-aside / Arable field margins	J113	High	6	Low	1	Low	1
Grassland: Amenity grassland	J12	Low	2	Low	1	Low	1
Wetland: Standing water	G1	High	6	Medium	1.5	Medium	1.5
Wetland: Running water	G2	High	6	Medium	1.5	Medium	1.5
Wetland: Reedbed	n/a	High	6	low	1	low	1
Wetland: Sphagnum Bog	E11	High	6	Very High	10	High	3
Wetland: Acid/neutral flush	E21	High	6	High	3	Medium	1.5
Wetland: Basin Mire	E32	High	6	High	3	Medium	1.5
Wetland: Swamp	F1	High	6	High	3	Medium	1.5
Wetland: Inundation vegetation	F22	High	6	Low	1	Low	1
Other: Arable	J11	Low	2	n/a	-	n/a	-
Other: Continuous bracken	C11	Low	2	Low	1	Low	1
Other: Tall ruderal	C31	Medium-Low	3	Low	1	Low	1
Other: Non-ruderal	C32	Medium	4	Low	1	Low	1
Other: Ephemeral/short perennial	J13	Low	2	Low	1	Low	1
Other: Allotments	J112	Low	2	Low	1	Low	1
Other: Quarry	I21	Low	2	Low	1	Low	1
Other: Spoil	I22	Low	2	Low	1	Low	1
Other: Refuse tip	I24	Low	2	Low	1	Low	1
Other: Introduced shrub	J14	Low	2	Low	1	Low	1
Other: Bare ground	J4	Low	2	Low	1	Low	1

Other: Green roof	n/a	Low	2	Low	1	Low	1
Linear features							
Hedges: Intact hedge	J21	Medium	4	Low	1	Low	1
Hedges: Native species rich intact hedge	J211	High	6	Low	1	Low	1
Hedges: Hedge with trees	J23	Medium-High	5	Low	1	Low	1
Hedges: Native species rich hedge with trees	J231	High	6	Low	1	Low	1
Hedges: Defunct hedge	J22	Low	2	n/a	-	n/a	-
Hedges: Linear scrub	A21	Medium	4	Low	1	Low	1
Hedges: Linear trees	A3	Medium	4	Low	1	Low	1
Hedges: Introduced shrub	J14	Low	2	Low	1	Low	1
Ditches: Standing water	G1	High	6	Medium	2	Low	1
Ditches: Running water	G2	High	6	Medium	2	Low	1
Ditches: Dry ditch	J26	Low	2	Low	1	Low	1
Boundaries: Fence	J24	None	0	Low	1	Low	1
Boundaries: Wall	J25	Low	2	Low	1	Low	1
Boundaries: Dry stone wall	J25	Medium	4	Low	1	Low	1
Other: Inland cliff	I1	Medium	4	Low	1	Low	1
Other: Earth bank	J28	Low	2	Low	1	Low	1
Other: Green wall	n/a	Low	2	Low	1	Low	1

Distinctiveness	
High	6
Medium-High	5
Medium	4
Medium-Low	3
Low	2
none	0

Condition	
Good	3
Moderate	2
Poor	1

Time	
5 years	1.2
10 years	1.4
15 years	1.7
20 years	2
25 years	2.4
30 years	2.8
32+ years	3

Difficulty	
Very high	10
High	3
Medium	1.5
Low	1
n/a	0

Habitat trading down correction calculator

Existing Site

Existing habitat	Area of habitat impact	Distinctiveness	High distinctiveness habitat loss biodiversity value	Medium-High distinctiveness habitat loss biodiversity value	Medium distinctiveness habitat loss biodiversity value	Medium-Low distinctiveness habitat loss biodiversity value
Direct impacts						
Woodland: Dense continuous scrub	3.56	Medium-Low	0.00	0.00	0.00	10.68927
Grassland: Poor semi-improved grassland	2.27	Medium-Low	0.00	0.00	0.00	13.6428
Grassland: Semi-improved neutral grassland	0.95	Medium	0.00	0.00	3.81764	0.00
Wetland: Standing water	0.01	High	0.1566	0.00	0.00	0.00
Woodland: Broad-leaved semi-natural woodland		High		0.00	0.00	0.00
Wetland: Swamp		High		0.00	0.00	0.00
Other: Tall ruderal	0.49	Medium-Low	0.00	0.00	0.00	2.95446
Grassland: Marsh / Marshy grassland	0.71	High	4.27752	0.00	0.00	0.00
Grassland: Marsh / Marshy grassland	0.17	High	2.049	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00
Indirect impacts						
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
TOTAL	8.18		6.48	0.00	3.82	27.29

Proposed Site

Proposed habitat creation	Area of habitat creation	Distinctiveness	High distinctiveness proposed biodiversity value	Medium-High distinctiveness proposed biodiversity value	Medium distinctiveness proposed biodiversity value	Medium-Low distinctiveness proposed biodiversity value
Built Environment: Buildings/hardstanding	3.49	none	0.00	0.00	0.00	0.00
Built Environment: Gardens (lawn and planting)	1.50	Low	0.00	0.00	0.00	0.00
Grassland: Unimproved neutral grassland	3.15	High	18.00	0.00	0.00	0.00
Wetland: Standing water	0.04	High	0.34	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
Proposed habitat enhancement	Area	Distinctiveness	High	Medium-High	Medium	Medium-Low
Woodland: Broad-leaved semi-natural woodland	0.46	High	1.15	0.00	0.00	0.00
Grassland: Marsh / Marshy grassland	0.13	High	0.45	0.00	0.00	0.00
Grassland: Unimproved neutral grassland	6.70	High	36.04	0.00	0.00	0.00
Wetland: Standing water	0.01	High	0.04	0.00	0.00	0.00
Wetland: Swamp	0.10	High	0.32	0.00	0.00	0.00
Woodland: Scattered scrub	0.15	Medium	0.00	0.00	0.99	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00
TOTAL	15.74		56.34	0.00	0.99	0.00

Trading Down Correction	High	Medium-High	Medium	Medium-Low
Value of existing habitat loss per distinctiveness	6.48	0.00	3.82	27.29
Value of created habitats per distinctiveness	56.34	0.00	0.99	0.00
Would this result in trading down habitats?	Never	No	No	No
If no, value each distinctiveness still requiring compensation	0	0	0	0
Surplus gain to be carried over to compensate loss of lower habitats (rolls over)	49.86	49.86	47.03	19.74
Trading down correction value	n/a	0	0	0

This calculator assess whether there is any down trading in habitats value. E.g. loss of high distinctiveness habitat cannot be compensated for by surpluss medium mitigation. It ca value which enters into the primary calculator to take this into account. Such that the full level of high habitat loss compensation is required. However if additional medium gain is g value of the high loss, this surplus is still be taken into account with on site gain.

CAUTION - Destruction of habitats of high distinctiveness, e.g. lowland meadow or ancient woodland, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided?
Any unavoidable loss of habitats of high distinctiveness must be replaced like-for like.

Linear trading down correction calculator

Existing Site

Existing linear features	length of loss (km)	Distinctiveness	High distinctiveness linear loss biodiversity value	Medium-High distinctiveness linear loss biodiversity value	Medium distinctiveness linear loss biodiversity value	Medium-Low distinctiveness linear loss biodiversity value	Low distinctiveness linear loss biodiversity value
Direct impacts							
Hedges: Intact hedge	0.16	Medium	0.00	0.00	1.28	0.00	0.00
Hedges: Native species rich hedge with trees		High		0.00	0.00	0.00	0.00
Ditches: Dry ditch		Low	0.00	0.00	0.00	0.00	
Ditches: Running water	0.09	High	0.54	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
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-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
-			0.00	0.00	0.00	0.00	0.00
Indirect impacts							
-	-		0.00	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00	0.00
-	-		0.00	0.00	0.00	0.00	0.00
TOTAL	0.25		0.54	0.00	1.28	0.00	0.00

Proposed Site

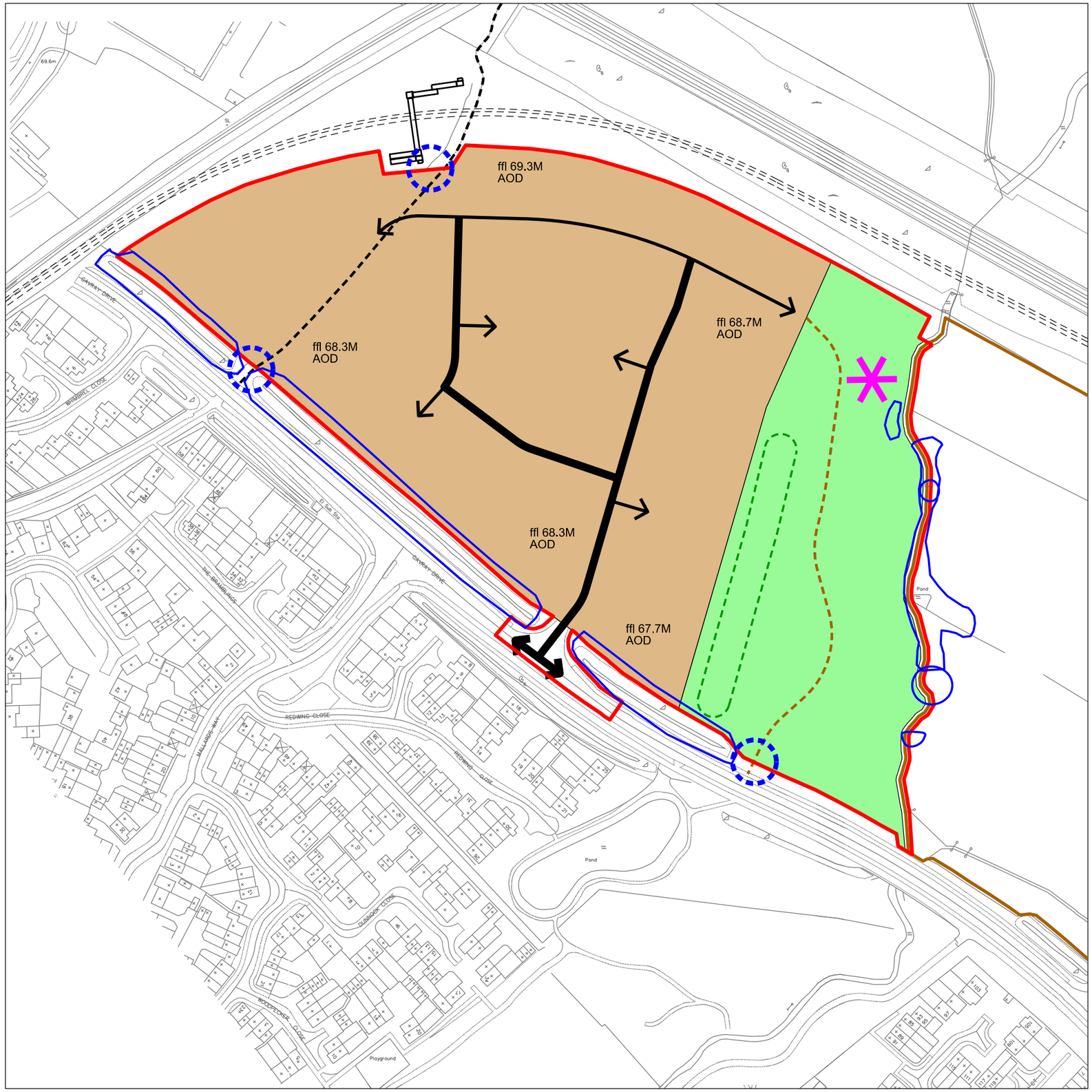
Proposed linear creation	Length of feature (km)	Distinctiveness	High distinctiveness proposed linear biodiversity value	Medium-High distinctiveness proposed linear biodiversity value	Medium distinctiveness proposed linear biodiversity value	Medium-Low distinctiveness proposed linear biodiversity value	Low distinctiveness proposed linear biodiversity value
Hedges: Native species rich intact hedge	0.37	High	4.76	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
Proposed linear enhancement	Length	Distinctiveness	High	Medium-High	Medium	Medium-Low	Low
Hedges: Intact hedge	0.77	Medium	0.00	0.00	2.20	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
-	0.00		0.00	0.00	0.00	0.00	0.00
TOTAL	1.14		4.76	0.00	2.20	0.00	0.00

Linear trading down correction	High	Medium-High	Medium	Medium-Low	Low
Value of existing habitat loss per distinctiveness	0.54	0.00	1.28	0.00	0.00
Value of created habitats per distinctiveness	4.76	0.00	2.20	0.00	0.00
Would this result in trading down habitats?	Never	No	No	No	No
If no, value each distinctiveness still requiring compensation	0	0	0	0	0.00
Surplus gain to be carried over to compensate loss of lower habitats (rolls over)	4.22	4.22	5.14	5.14	n/a
Trading down correction value	n/a	0	0	0	0

This calculator assess whether there is any down trading in linear habitats. E.g. loss of high distinctiveness habitat and surplus creation of medium or low habitats. It calculates a correction value which enters into the primary calculator to take this into account. Such that the full level of high habitat loss compensation is required. However if additional medium gain is generated above the value of the high loss, this surplus is still be taken into account with on site gain.

CAUTION - Destruction of each habitat of medium distinctiveness and above should be mitigated for with creation/restoration of a similar habitat. Trading up of habitat type is encouraged.

APPENDIX 4



- Application boundary - area - 6.92Ha including access
- Use - Residential - area - 4.62Ha
- Use - Public open space - area - 2.0Ha
- Area of surface water run-off within public open space
- Play Area
- Main residential street - made up of 5.5m wide carriageway and two footways of 2m width
- Access to minor lanes and mews streets
- Retained footpath
- Proposed footpath
- Footpath connections at application boundary
- Hedgerow canopy (Category B)
- Local Wildlife Site

Scale and massing of buildings by types: in meters and are additional to approximate finished ground level (AOD) indicated on plan.

Building Type		Length (m)	Width (m)	Ridge Heights (m)	Storeys
		Distance across frontage	Depth from front to back	Highest point above AOD	
Typical terraces	Minimum	13.5	5.5	8.5	1
	Maximum	48	10	11	2.5
Semi-detached	Minimum	10	5.5	8.5	1
	Maximum	20	10	11	2.5
Detached	Minimum	8	8	6	1
	Maximum	12	11	11	2.5
Dwelling over Garage	Minimum	10	6	5.5	2
	Maximum	13	8	12	2.5
Garage	Minimum	3	6	1.5	1
	Maximum	12	6	6	1
Bin Stores / Ancillary	Minimum	2	3	3	1
	Maximum	5	5	3.5	1

Client
Gallagher Estates

23-25 GREAT SUTTON STREET
LONDON EC1V 0DN
T. +44(0)20 7017 1785
W. info@pauldrewdesign.co.uk

Project
Gavray Drive West

PAUL DREW DESIGN

Drawing Title
Parameters Plan

Job Ref. Ge.GD.W
Drawn Pd
Scale 1:2,000 @ A3
Date 22.10.2014
Drawing no. 001
Rev. D 13.02.2015

APPENDIX 5

Gavray Drive East - Illustrative Masterplan

Sketch of General Parameters

1:2,000@A1 / 1:4,000@A3

10.09.2014

David Lock Assoicates and Paul Drew Design for Gallagher Estates

APPENDIX 6

Matthew Parry <Matthew.Parry@cherwell-dc.gov.uk> 20/04/2017

to Nick, me, haidrunbreith, David

Nick/Dominic

I think it is useful if I just add to David Lowe's email for clarity.

Officers are currently not of the view that it is necessary for an ecological management plan or funding of any kind to be secured in relation to the adjacent LWS as part of this planning application. We do not consider that this current development would materially add to recreational pressure on the LWS in the context of existing use to justify such a requirement. In any event, the LWS is private land and those that stray from the public footpath are trespassing and could be controlled by the developer/landowner so that such adverse impact does not occur. We are however fully of the view that a comprehensive ecological management plan and programme of enhancement/funding relating to the LWS will be necessary to mitigate the impact of development on the eastern part of the allocated site and in our discussions with the applicant/developer they are fully aware of that position. Indeed the applicant is expecting to have to make significant financial contributions as well as other commitments at this next stage in order to be able to meet planning policy requirements and achieve a planning consent and they seem to be fully accepting of this.

I hope this clarifies matters.

Kind regards

Matthew Parry

Principal Planning Officer

Development Management

Cherwell District Council

Telephone: 01295 221837

Email: matthew.parry@cherwell-dc.gov.uk

Website: www.cherwell.gov.uk

Dominic

This is exactly want my advise is and is being cemented into the applicant's understanding of future requirements. The 'front-loading' of this work is also being considered.

I have seen the Management Plan, but as with all good plans I like to establish the non-negotiable objectives balanced (prescribed in the BIAs) with the 'constraints'. I would like the applicant to understand the 'financial' implications of long-term habitat management as it is often the £s that matters most to them. It may also assist with any viability assessment for the site as a whole; thus an early understanding of costs helps everyone.

As always, please feel free to call me when we both have holidayed.

Thanks

David Lowe B.Sc Hons MCIEEM BES

Team Leader, Ecology, Historic Environment & Landscape

Community Services

PO Box 43

Warwick

CV34 4SX

Tel: 01926 418076

On 20 April 2017 at 13:56, Dominic Work <dominicwoodfield@bioscanuk.com> wrote:

Hi David

Thanks for this response. If I'm reading your comments right, I think this aligns your advice to CDC much more closely with that of Charlotte Watkins' in relation to the need for provision for secured and funded management of the LWS at Gavray East to be an integral part of any permission for 15/00837/OUT.

If that is correct it is welcome clarification.

With regard to your suggestion, there has been a lot of discussion over the years as to what form this management should/could take. There was also a Wildlife Management Plan produced by the applicant pursuant to an older permission and approved via that process. Although in need of updating this would seem a good starting point.

I also am on leave but I welcome the chance to discuss this further with you once we're both back.

Best regards

Dominic

Sent from my iPhone

On 20 Apr 2017, at 12:58, David Lowe <davidlowe@warwickshire.gov.uk> wrote:

Dear Dominic and Nick

Thank you (Dominic) for your amended calculated.

I have considered this indirect impact on the neighbouring site and it is becoming apparent that public access on the neighbouring LWS needs to be restricted in order to maximise it biodiversity potential (for all interested biodiversity stakeholders). As I understand it there is a single east-west right of way that runs through the East site that it will probably be diverted, where this diversion goes is still to be discussed. What the BIA does is to highlight this issue and my advice would be that CDC will need to secure this is the subsequent management arrangements (plan and company). This restrictive arrangement is not unusual and is something that wildlife organisations and Country Parks have on many of their more sensitive reserves/parks, thus it is achievable.

For future reference it may be worth noting now that a subsequent management plan for the LWS should include:

- Restrictive access/Byelaws
- Interpretation Board / signs
- possible wardens?

and the resources to make these happen. The triggers for these arrangement will need to be discussed further.

I am on holiday for a week, but please feel free to make suggestions as to what you would like to see in any management for the future of the LWS and I will pick these up on my return.

Thanks
David Lowe B.Sc Hons MCIEEM BES

Team Leader, Ecology, Historic Environment & Landscape

Community Services

PO Box 43

Warwick

CV34 4SX

Tel: 01926 418076

On 20 April 2017 at 08:51, Dominic Woodfield <dominicwoodfield@bioscanuk.com> wrote:
Dear Matthew

Thanks for your explanation of officers' position on the matter of contextual information and the need or otherwise for accessibility and clarity of understanding for the lay public in relation to the Biodiversity Offsetting Calculators submitted by the applicant.

To be clear, I disagree with your apparent suggestion that this information does not constitute evidence supporting the ES conclusions (especially since it appears to have changed the opinion of your Council's ecologist), and the adequacy of the Council's actions in respect of due publicity and accessibility. However I will now reserve my position on that point and turn to the flaws in the information itself.

Herewith an initial and simple illustration of why the claims being made by EDP based on this calculator are open to challenge.

Attached is a copy of the calculator for Gavray West into which I have input all the same measurements and habitat categories that EDP have done. I have not challenged some of these at this stage, even though there are grounds to do so, as it is not necessary for the purposes of this simple exercise of illustration.

The only addition I have made to the calculator is to factor in a negative indirect impact on the grasslands of the adjoining Local Wildlife Site from deterioration of condition as a result of increased recreational pressure. I have not even sought to correct EDPs erroneous classification of these grasslands as semi-improved (they are unimproved).

You will note that a deterioration of condition of this habitat from 'moderate' to 'poor' as a consequence of indirect effects arising from the adjoining 180 unit development changes the output from the claimed "no net loss" to biodiversity to a net loss of -21.41. The result if the grassland was more correctly classified as unimproved would be even further into the negative. This would not be compliant with Policy Bicester 13.

There can be no doubt as to the likelihood of such a negative effect. As I and others, including Charlotte Watkins, have noted previously, the residents of Gavray West will clearly avail themselves of the adjoining undeveloped land at Gavray East for informal recreation and other activities. In the absence of management, the net effect on the habitats of value

there will be a deterioration of their condition. This concern has been behind the repeated requests by consultees for any development on Gavray West to be accompanied by funded management of the LWS on Gavray East, as the applicant has said it intends to do in due course anyway. The same concern about the lack of this provision being linked to Gavray West was behind your own ecologist, Charlotte Watkins', position of objection as stated last year before she went on maternity leave.

What the attached reveals is that the calculator, for all its faults, can be made to take account for such impacts if those using it take an honest and/or fully informed approach. It also underlines why those being asked to comment upon it in the course of consultation need to be furnished with enough information to understand how it has been used and whether there are any errors in that process.

I will be responding in more detail on the calculators, including for Gavray East, when I have more time after my return from leave. But the very simple exercise I have done in the attached serves as an immediate illustration of how unsafe it is to put any weight on EDPs submission without an opportunity for it to be subject to due scrutiny and informed review. It also presents an evidential challenge to statements such as yours below that "The additional information is to assist in demonstrating the net biodiversity impacts of the proposed development..." and the implication within it that such information might a) be relied upon as a material consideration and b) accepted without due question as to its veracity.

Best regards

Dominic

On 19 April 2017 at 17:18, Matthew Parry <Matthew.Parry@cherwell-dc.gov.uk> wrote:

Dominic

As officers we have concluded that the additional information submitted by the applicant (BIAs together with supporting letter) does not amount to ‘further information’ for the purposes of the EIA Regulations 2011 (as amended). We have concluded that it is simply additional information in support of the planning application and not directly in support of the Environmental Statement which officers consider adequately assesses the likely environmental effects. The additional information is to assist in demonstrating the net biodiversity impacts of the proposed development as well as potential impacts/opportunities associated with development on the eastern part of the allocated site. This has been volunteered by the applicant and not specifically requested by the Council. We have publicised/consulted upon the new information in the same way that we would if we had received ‘any other information’ in support of an Environmental Statement even though we do not specifically consider that it amounts to such information – this is to be prudent and ensure that those with an interest in commenting have the ability to do so.

With respect to the BIA submitted in relation to development proposed on the application site, the information necessary to adequately interpret it can be found within the BIA itself (and associated guidance notes) as well as in the GIS habitat information contained in the Environmental Statement. The BIA in relation to Gavray Drive East (i.e. the eastern section of allocated Bicester 13) is not

intended to be so directly accurate as it is simply an attempt to demonstrate to the LPA that there is sufficient opportunity to deliver approximately 120 dwellings on the remainder of the allocated site whilst delivering net biodiversity gain to accord with Policy Bicester 13. The BIA in relation to the application site provides support for the applicant's claims that the scheme would deliver net gain and not put additional pressure on achieving net gain through development on the remainder of the allocated eastern part of the site. The Council's ecologist has reviewed the BIA submitted in relation to the proposed development and considers this to be a realistic and conservative attempt at characterising and grading existing habitat on the site as well as target time/condition/difficulty of achieving proposed new habitat. The Council's ecologist has similarly concluded that the currently proposals would not have a materially adverse effect on biodiversity generally or the value/integrity of the adjacent LWS or CTA. The Council's ecologist has also reviewed the BIA for the eastern part of the site and concluded that there is strong scope for biodiversity enhancement as part of a housing scheme on the remainder of Bicester 13 and that there is no evidence to suggest otherwise. No further additional information will be supplied by the applicant on this matter

If you have specific concerns about the ability to achieve net biodiversity gain as part of the current proposals, perhaps you could detail them and we could consider these carefully.

Kind regards

Matthew Parry

Principal Planning Officer

Development Management

Cherwell District Council

Telephone: 01295 221837

Email: matthew.parry@cherwell-dc.gov.uk

Website: www.cherwell.gov.uk

From: Dominic Woodfield [mailto:dominicwoodfield@bioscanuk.com]
Sent: 11 April 2017 16:27
To: Matthew Parry
Cc: Adrian Colwell; David Peckford; Planning; Charlotte Frizzell; Caroline Bulman; Haidrun Breith; Matthew Jackson; Nigel Bourn; Neil Clennell; Nick Bowles; Euesden, Olivia (NE); davidlowe@warwickshire.gov.uk
Subject: Re: 15/00837/OUT - Gavray Drive West - Further Environmental Information from applicant

Hi Matthew

I would appreciate a further response from you on this, advising of whether the further information from the applicant that I have suggested is required to be publicised will duly be so.

I have noted today a representation from Pat Clissold on the on-line planning file that rather illustrates my point about the need for contextual information, and similarly debunks the notion you advance below that "*those that would have an interest in the metric will presumably be familiar with its application*". Quite clearly that is not the case, and the impenetrability of the metric to those unfamiliar with it, and the confusion that its submission has created is self-evident in Ms Clissold's remarks.

Having begun the process of going through the calculator myself I can see that there are significant concerns with how the task has been approached, including clear departures from Warwickshire's own (and relevant national) guidance. These are matters that at the very least need elucidation and due justification, again in accordance with the applicable guidance for how these metrics should be used. That information is not forthcoming and Ms Clissold's representation amply demonstrates the clear disadvantage to the public and other interested parties that is resulting.

I am compiling a list of the errors and unjustified assumptions in the calculator inputs and resulting outputs, but I can already advise that the one for GD East does not stand up as evidence in support of a 'no net loss' outcome being achievable, even putting aside the inherent limitations with the use of such calculators *per se*. This is a significant material consideration in the determination of the application before you for GD West, as approval of that scheme would create a situation whereby the 'no net loss' requirements of Policy Bicester 13 could not be delivered at the same time as 120 units on that part of the site.

Before completing my review and making more fulsome submissions in support of that point however, I wish to ask again how the Council intends to ensure that the contextual information essential for the understanding of how the calculator has been used in this case is made available for due consultation and public scrutiny in a transparent and accessible manner.

I look forward to hearing from you.

Best regards

Dominic

On 7 April 2017 at 17:20, Dominic Woodfield <dominicwoodfield@bioscanuk.com> wrote:

Hi Matthew

Thanks for this. If the applicant's consultants EDP are already preparing such a package, like as not it will include what is needed so I would strongly suggest it is publicised and duly consulted upon once it is received.

To some extent I have already set out the contextual information that is needed in previous e-mails, but for further clarity what is needed is the reasoned justification for some of the input parameters that have been used, and the judgments that appear to have been made.

As one quick example, the metric itself contains the advisory red text *"Destruction of habitats of high distinctiveness, e.g. lowland meadow or ancient woodland, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided? Any unavoidable loss of habitats of high distinctiveness must be replaced like-for-like."*

The grassland habitats on Gavray Drive East have long been recognised as including representations of unimproved Lowland Meadow habitat (for example by TVERC, BBOWT and others). No such value has been attributed to them in the calculator, and such habitats have been classified as species-poor semi-improved grassland of low distinctiveness. If the applicant's case is that these high distinctiveness habitats have deteriorated to the point where such a significant re-classification is justified, that case needs to be clearly set out with supporting evidence so it can be examined and its veracity tested (though I'm not sure how an unimproved grassland can ever be turned into a semi-improved grassland simply through active neglect!). In any event, this assessment also contradicts the conclusions of the specialist studies the applicant themselves subcontracted and then submitted with their application. Although David Lowe's name is included at the top of the calculator, it is not clear whether he has visited the site, or whether he is relying upon information provided to him by EDP.

I said previously that the offsetting metric can be all things to all men, a box of tricks and something that can give you the answer you want to hear. It would be a very simple matter for me to put together a competing version presenting a far more sober calculation and a far more negative picture of the biodiversity impacts. I could even take the applicant's approach and do this through simply selecting different options from the drop down menus without any justification for doing so. If that is what you need me to do in order to give appropriate weight to this evidence and engage with the planning balance, then I will, but I suspect it will

not greatly assist your deliberations, nor the determination process. I hope this illustrates why due explanation and justification is required: if EDP feel that the grassland has suddenly deteriorated to the point of significant down-grading in terms of classification, then let's see their evidence and justification for that case. It is certainly not present in the study they sub-contracted to BEC and submitted with the application, and therein lies the concern over how this metric is being used.

Best regards

Dominic

On 7 April 2017 at 16:34, Matthew Parry <Matthew.Parry@cherwell-dc.gov.uk> wrote:

Dominic

I understand the applicant is preparing a clearer package of documentation to submit as part of the application. However, from discussions with our ecologists, there does not seem to be any contextual information other than the metric's guidance notes which are now available via the website. I am told that the information needed to interpret the metric is generally included with the metric spreadsheet.

Obviously this information is not going to be particularly accessible to ordinary members of the public but that is the case with many technical assessments and those that would have an interest in the metric will presumably be familiar with its application. Is there a particular piece of contextual information that you feel is needed?

Kind regards

Matthew Parry

Principal Planning Officer

Development Management

Cherwell District Council

From: Dominic Woodfield [dominicwoodfield@bioscanuk.com]
Sent: 07 April 2017 16:16
To: Matthew Parry
Subject: Re: 15/00837/OUT - Gavray Drive West - Further Environmental Information from applicant

Hi Matthew

Can you advise how the Council intends to deal with the transparency/publicity issues we've recently been discussing please? Will the contextual information requested by forthcoming?

Best regards

Dominic

On 4 April 2017 at 15:09, Dominic Woodfield <dominicwoodfield@bioscanuk.com> wrote:

Hi Matthew

Yes I understand the reasons why the applicant has submitted the metrics. Indeed, appreciation of those reasons helps to underline why this information is intrinsically linked to the ES as it is being presented as evidence in support of a 'no significant impact' premise in respect to developing the western part of the site for 180 houses. To assess the veracity of that evidence, it is important to understand the degree to which matters such as indirect effects on adjacent sensitive habitats and species from recreational pressure (as exacerbated by the presence of those houses) and the absence of any provision for management of the LWS in the eastern area (which will reduce its ability to accommodate such pressure) have been factored in to this 'no significant impact' premise. As I said in my last e-mail, it is not possible to do that without further contextual information. Are you able to give a response to my question asking whether the applicant has been asked to supply this contextual information and that this will form part of the package that is publicised and consulted upon?

With respect to Gavray Drive East, I also appreciate that the metrics are being submitted as evidence in support of the applicant's proposition that development of this eastern part of the site to the tune of 120 houses will not result in a net loss to biodiversity. Although there is no scheme before you for that part of the site, this evidence is nevertheless germane to your Council's consideration of the issue of whether permitting the 180 unit scheme on Gavray West will compromise the ability of all the various requirements of Policy Bicester 13 to be met. CDC must surely be keen to satisfy itself that approval of the 180 unit scheme will not set up a situation where delivery of the remainder of the residential allocation of 300 will result in net loss to biodiversity, as that would not be compliant with its own stated policy. The veracity of the metric for Gavray East is thus also a highly significant material consideration in the determination of 15/00837/OUT.

I am not trying to stall or slow the determination process here. Nor do I want to enter into any further litigation unless forced into that position. It appears that you do appreciate the logic and rationale of duly publicising and consulting upon this material, and I am grateful for your

indications that this is the Council's intention. However it will be rendered a meaningless exercise unless those who take a statutory or non-statutory interest, including but not restricted to the parties copied in to this e-mail, are furnished with adequate information as to how the numbers have been arrived at, in order that they can comment from a properly informed standpoint. Surely the risk of further delay, if that is a concern, is actually higher with waiting for a statutory authority to ask for that contextual information some weeks down the line, than to just provide it at the outset, and given that it must be both in the applicant's possession and 'to-hand', there can be no good reason not to do so.

Best regards

Dominic

On 4 April 2017 at 14:39, Matthew Parry <Matthew.Parry@cherwell-dc.gov.uk> wrote:

Dominic

The intention is to publicise/consult on the new information. There is technically a difference between ‘further information and ‘any other information’ under the EIA regs – the former is specifically requested by the LPA and required in order to form a satisfactory Environmental Statement. The latter is submitted voluntarily by the applicant without a request. Both technically need to be publicise and consulted upon in the usual way.

It is arguable however whether this new information is part of the ES or just additional information in support of the planning application – i.e. not all documents and plans are part of the ES. Given the history with the site we have decided to play it safe and publicise it as ‘any other information’ in support of an ES with an eye on reporting the application to the May Planning Committee. I understand the metrics have been submitted to demonstrate that there is the potential for biodiversity gain on the application site whilst theoretically achieving approximately 120 dwellings on the eastern part of the allocated site whilst also delivering biodiversity gain in the CTA and LWS as well as conserving protected/priority species.

Regards

Matthew Parry

Principal Planning Officer

Development Management

Cherwell District Council

Telephone: 01295 221837

Email: matthew.parry@cherwell-dc.gov.uk

Website: www.cherwell.gov.uk

From: Dominic Woodfield [mailto:dominicwoodfield@bioscanuk.com]
Sent: 03 April 2017 12:45
To: Matthew Parry; Planning
Subject: Re: 15/00837/OUT - Gavray Drive West - Further Environmental Information from applicant

Hi Matthew

I note that processes of publicising and consulting upon this further information are now being entered into. I reserve my position on whether what is being done is compliant with the Regs at this stage - more on this at the end of this e-mail. But more immediately, it is not clear whether you have asked the applicant for the contextual information I inquired after and which it is essential is provided along with the calculator outputs for the purposes of a) allowing interested members of the public (who may not have my degree of familiarity with the calculators) to properly understand and comment upon the offsetting calculations and b) avoiding disadvantage to interested parties (including myself) by requiring them to have to back calculate, pick through and deduce from the figures how they have been arrived at and what (if any) multipliers have been applied at what stage. In respect to (b), it is not enough to merely point an interested party towards generic guidance on how these calculators are used.

While I at least may be able to get this important contextual information from David Lowe, and I welcome the prospect of discussing this with him more generally in due course, that would not serve the more immediate public participation and transparency requirements that apply here. I am not the only consultee or commentator likely to have an interest in fully understanding what has gone on in order to arrive at these calculations, and the role they seem to be playing in seemingly mollifying the position of Cherwell's ecologist from the

previous one of overt objection, as previously set out by Charlotte Watkins. Because the figures appear to be being presented as being instrumental in changing that internal consultee view, they are highly material to the determination and EIA processes, and therefore I disagree with your view that they are merely 'any other information'. They need to be properly and duly presented and consulted upon in accordance with the Regs.

Best regards

Dominic

On 3 April 2017 at 10:54, Matthew Parry <Matthew.Parry@cherwell-dc.gov.uk> wrote:

Dominic

The application is not proposed to be on the agenda for the 13th April Planning Committee and is now expected to be determined at the 18th May Planning Committee. The Council is in the process of re-publicising the application to reflect the latest submissions. In our view they do not constitute "further information" for the purposes of the EIA regulations as such information must have been formally requested by the LPA, which it was not. We are however treating it as "any other information" as it was voluntarily submitted by the applicant. The applicant has utilised Warwickshire County Council's version of the DEFRA biodiversity metric to help demonstrate overall net gain on the application site as well as potential for net gain on the remainder of the allocated site (i.e. Gavray Drive East). I understand that this metric has been reviewed and edited in consultation with the Council's ecologists who have now indicated that they are satisfied with it though recognising that it is a bit of a crude tool and has limitations. Your thoughts on it would be welcomed. I should say that the Council's publicity procedure may mean you don't get directly notified – it involves neighbour letters, site notices and newspaper notice. However, the website will be updated accordingly. The following link may prove helpful in interpreting the biodiversity metric: http://www.warwickshire.gov.uk/biodiversityoffsetting. I also understand that David Lowe – the Council's ecologist, is happy to have a conversation with you if you have any specific queries.

Kind regards

Matthew Parry

Principal Planning Officer

Development Management

Cherwell District Council

Telephone: 01295 221837

Email: matthew.parry@cherwell-dc.gov.uk

Website: www.cherwell.gov.uk

Details of applications are available to view through the Council's Online Planning Service at http://www.publicaccess.cherwell.gov.uk/online-applications

Instructions on how to use the Public Access service to **view, comment on and keep track of applications** can be found at http://www.cherwell.gov.uk/viewplanningapp

Find us on Facebook www.facebook.com/cherwelldistrictcouncil

Follow us on Twitter @Cherwellcouncil

From: Dominic Woodfield [mailto:dominicwoodfield@bioscanuk.com]
Sent: 29 March 2017 10:14
To: Matthew Parry; Nigel Bell
Cc: Charlotte Frizzell; Matthew Jackson; Charlotte Watkins; Neil Clennell; Haidrun Breith; Euesden, Olivia (NE); Nick Bowles; Caroline Bulman; Nigel Bourn
Subject: 15/00837/OUT - Gavray Drive West - Further Environmental Information from applicant

Dear Matthew

I have just noted the recent additions to the on-line planning file comprising a representation from David Lowe (Warwickshire ecologist who I believe is standing in for CDCs own ecologist Charlotte Watkins whilst she is on maternity leave) and two print-outs of the Warwickshire biodiversity offsetting metric, presenting output calculations (presumably originating from the developer) for Gavray Drive East and Gavray Drive West respectively.

The submission of this information raises a number of technical matters on which I intend to respond in due course, as I suspect other consultees (cc'd in) might also be minded to do. In the first instance however, I need to raise the issue of due publicity and consultation, as the appearance of these documents on the on-line file without any advertisement makes it at best unclear what the Council's intentions are on this front.

I make the following points on the procedural matter that is raised:

1) 15/00837/OUT is EIA development, and therefore the EIA Regs apply.

2) There can be no doubt that the outputs from the biodiversity offsetting calculator are 'Further Environmental Information' (FEI) under the Regs.

3) They thus fall to be duly publicised and consulted upon. It is plain that this has not happened to date.

The Council has previously got into difficulties over adherence to due EIA procedure on this site. To ensure this does not happen again, could you reassure me that this FEI will now be duly advertised and formally consulted upon in the normal manner?

To avoid wasted time, I also make the following points:

I have a great deal of familiarity with the biodiversity offsetting system and the use of such calculators. Whilst they can play a useful role as a tool to assist in the assessment of net biodiversity loss or gain, they are rarely, if ever, the beginning and end of the answer. They are very poor, for example, at factoring-in indirect effects (particularly salient in this case, given anticipated recreational and disturbance pressures on any retained habitats) and they cannot properly account for effects on species (including in this instance protected species, and species with other legal obligations). They are also, as with all simplified 'tools' of this nature, something of a "box of tricks", with the outputs easily influenced by seemingly innocuous tweaks to input parameters. In other words, they can be tailored in the hands of the unscrupulous to "give the answer you want to hear".

In this context, it is not enough to present information merely as a "computer says no" (or in this instance "yes") output. In accordance with the EIA Regs and the attendant requirements for accessibility and transparency, whatever is sent out to consultation needs to give full chapter and verse on the input parameters, the assumptions that have been made, the application (or otherwise) of upscaling factors (e.g. to account for delivery risk) and other relevant considerations for putting the calculator outputs into the appropriate context. What has recently been uploaded to the on-line file does not do this.

Once due publicity and consultation procedures are entered into, and once in receipt of the contextual information mentioned above, I intend to comment on the technical matters this FEI raises, and thence on the observations of Mr Lowe.

Best regards

Dominic Woodfield CEcol CEnv MCIEEM
Director

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dominicwoodfield@bioscanuk.com

APPENDIX 7

On 7 February 2018 at 14:44, David Lowe <davidlowe@warwickshire.gov.uk> wrote:
Dominic

To clarify...

I had the EIA documents and the excel spreadsheet. I did not double check the area calculations.

I was only made aware that the applicant did not own the entire site subsequent to our conversation regarding the potential use of a condition to secure off-site enhancement.

Thanks
David Lowe B.Sc Hons MCIEEM BES
Team Leader, Ecology, Historic Environment & Landscape
Community Services
PO Box 43
Warwick
CV34 4SX

Tel: 01926 418076

On 6 February 2018 at 12:19, Dominic Woodfield <dominicwoodfield@bioscanuk.com> wrote:
Dear David

In preparation for the forthcoming appeal inquiry related to the above site, I have been seeking to understand how the appellants/EDP arrived at the BIA outputs using the Warwickshire calculator.

I have found it difficult or near-impossible to relate the figures on the spreadsheets to the situation on the ground. Can I ask, did you ever see or review EDPs area measurements for existing and future habitats on plan (i.e. their "workings out") and if so were you provided with a copy? Or were you just presented with the spreadsheet as submitted to CDC and advised that the measurements were derived from the habitat maps in the application reports?

Were you also made aware that a significant portion of the LWS (enhancement of which is factored in to the calculations) was (and remains) not under the applicant's control?

I would be very grateful for prompt answers to these queries if possible.

Kind regards

--

Dominic Woodfield CEcol CEnv MCIEEM
Director

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APPENDIX 8

Ms Leanne Palmer
The Planning Inspectorate
Kite Wing Rm 3/O,
Temple Quay House
2 The Square
Temple Quay
Bristol
BS1 6PN

1 March 2018

Appeal Reference: APP/C3105/W/17/3189611
Our ref.: JJG050/BBO

By email

Dear Leanne

Appeal By: Gallagher Estates, Charles Brown and Simon Digby
Site Address: Gavray Drive, Bicester
Local Planning Authority: Cherwell District Council

As requested by Dominic Woodfield, please find enclosed the following plans:

- Biodiversity Impact Assessment (drawing number: edp0124_d123);
- Biodiversity Impact Assessment (drawing number: edp0124_d124); and,
- Land Ownership, Land East of Langford Brook (drawing number: 8530-134).

The Biodiversity Impact Assessment plans set out the area and linear measurement calculations which were used as a basis for the BIA calculations.

In respect of landownership, the Appellants control the majority of the land east of the Langford Brook (Gavray Drive, East). The Appellants have been working with London and Metropolitan for many years, most recently through the Local Plan process to secure allocation of the site. The parties will continue to work together to bring forward a planning application that will be submitted in due course.

We also note Natural England's correspondence with the Inspectorate dated 2nd February 2018. Natural England states that it "*did not comment on the original application for this site (15/00837/OUT)*". This is incorrect.

Natural England submitted two formal consultation responses to application; dated 3rd June 2015 and 26th April 2017 respectively. The 26th April 2017 response confirmed that Natural England has "*no objection"* to the proposals; a position documented within the Council's Committee Report for the application.

We trust Natural England will attend the inquiry to explain its change of position (if it is a change of position, a matter not clear from its letter) and be prepared to answer questions from the Appellant's barrister.

David Lock Associates Limited
50 NORTH THIRTEENTH STREET, CENTRAL MILTON KEYNES, MK9 3BP
t: 01908 666 276 f: 01906 605 747 e: mail@davidlock.com
www.davidlock.com

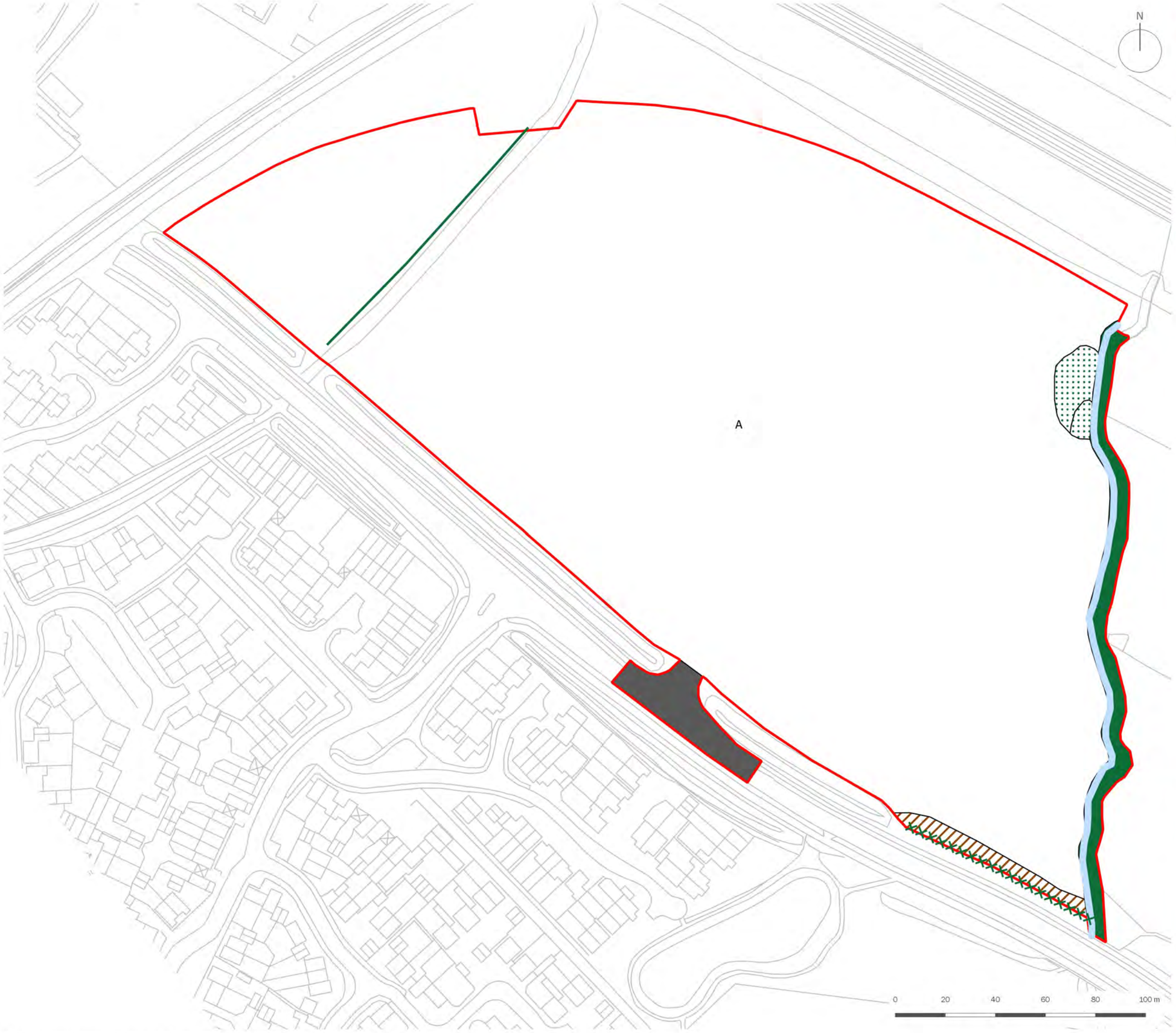
Please do not hesitate to contact me should you have any further queries. I have copied this letter and its enclosures to Cherwell District Council and the Rule 6 parties.

Yours sincerely

PETER CHAMBERS
Associate

cc. Tom Plant, Cherwell District Council
Dominic Woodfield, Bioscan
John and Pam Roberts, Save Gavray Meadows Campaign
Steve Wheatley, Butterfly Conservation
Haidrun Breith, Berkshire, Buckinghamshire Oxfordshire Wildlife Trust
John Broad, CPRE
Rebecca Micklem, Natural England

encl. Biodiversity Impact Assessment (drawing number: edp0124_d123)
Biodiversity Impact Assessment (drawing number: edp0124_d124)
Land Ownership, Land East of Langford Brook (drawing number: 8560-134)



Site Boundary

Linear Habitats

- Linear scrub (0.08km)
- Species-poor hedgerow (0.18km)
- Stream (0.25km)

BIA Habitat

- A — Arable (6.54ha)
- Broad-leaved woodland (0.18ha)
- Hard standing
- Scattered scrub (0.05ha)
- Tall ruderal vegetation (0.05ha)

client

Gallagher Estates Ltd

project title

Gavray Drive West

drawing title

Biodiversity Impact Assessment

date	19 FEBRUARY 2018	**drawn by**	GY
drawing number	edp0124_d123	**checked**	WC
scale	Refer to scale bar	**QA**	LB

the environmental dimension partnership

info@edp-uk.co.uk www.edp-uk.co.uk

Cirencester 01285 740427 Cardiff 02921 671900 Shrewsbury 01939 211190

Site Boundary

Linear Habitats

Wet ditch (0.65km)

Dry ditch (0.86km)

Species-rich hedgerow with trees (0.59km)

Intact hedgerow (0.93km)

Species-poor hedgerow

Species-rich hedgerow

BIA Habitats

Ponds (0.03ha)

Tall ruderal (0.49ha)

Broad-leaved woodland (0.46ha)

Dense scrub (3.72ha)

Semi-improved neutral grassland (6.08ha)

MG9

MG9 (MG4)

MG9 (U4)

Neutral SI

Poor semi-improved grassland (3.85ha)

MG6b (Poor SI)

Species-poor SI

Marsh/marshy grassland (1.02ha)

MG10

SI Marshy grassland

Wetland: Swamp (0.10ha)

S28

client

Gallagher Estates Ltd

project title

Gavray Drive East

drawing title

Biodiversity Impact Assessment

date	19 FEBRUARY 2018	**drawn by**	GY
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REV	DATE	DESCRIPTION

PROJECT :-

Land at
Gavray Drive, Bicester

TITLE :-

Land Ownerships
Land East of Langford Brook

SCALE :-	1:2500 @A3	DATE:-	15-02-2018	DRAWN:-	KB
STATUS :-	DRAFT	DRAWING No:-	8530-134	REVISION:-	

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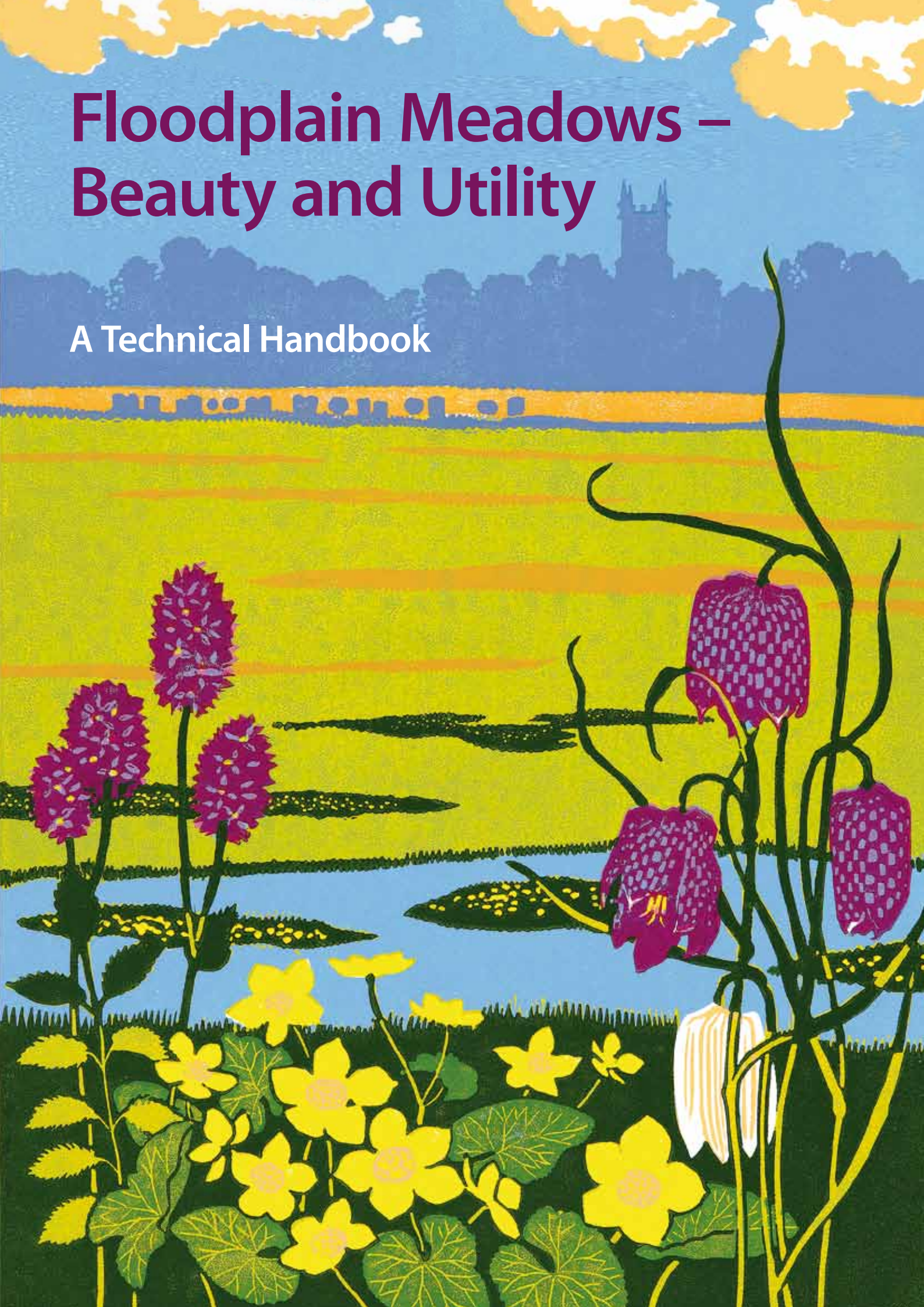
APPENDIX 9

Floodplain Meadows – Beauty and Utility

A Technical Handbook



Chapter 10
Restoration and creation of floodplain meadows

Clare Lawson and Emma Rothero

This chapter summarises the importance of restoration and creation. It outlines the steps involved in deciding what action needs to be taken based on a site assessment. It considers the different practical methods for restoration and creation, also considering the needs of the landowner. Examples are provided through real-life case studies.

Why carry out restoration and creation of floodplain meadows?

Floodplain meadows are highly valued for their wildlife, landscape and history. They support many uncommon species including the iconic snakeshead fritillary and increasingly scarce breeding waders. However, since 1940, they have mostly been converted to intensive grassland and arable cultivation, so only a scatter of small vulnerable sites remain. Their value to society in terms of floodwater and nutrient storage are increasingly being recognised, and they offer a sustainable and cost-effective means for producing an agricultural crop on floodplains.

As well as protecting surviving floodplain meadows, we need to restore as many as possible and create new ones. In addition to increasing the total area of species-rich grassland, these actions will create protective buffers around existing areas and link fragmented sites, increasing the benefits they provide to society, and enhancing the resilience of their rare plant communities to external pressures such as climate change (e.g. increased frequency and intensity of floods and droughts). As well as restoring floodplain meadows for their own sake, it is worth restoring and creating floodplain meadows for the following reasons:

- They are a productive system adapted to a floodplain environment needing minimal inputs, remaining productive even during droughts.
- They can form part of viable commercial enterprises, producing good quality, sustainably produced hay and nutritionally valuable forage for livestock grazing in late summer and early autumn.
- They support a range of wildlife that has now almost vanished from Britain including pollinating insects and rare species.
- They represent an important element of our rural history and are part of our cultural heritage that we should protect.
- They are an integral part of cherished rural landscapes as painted by Turner and Constable and celebrated by poets and writers.
- They provide storage of carbon, sediments, nutrients and floodwaters.
- A change from species-poor pasture or arable to species-rich meadow will result in a net reduction of nutrients in the catchment through hay cropping and a reduction of artificial inputs (fertilisers, pesticides).
- They provide an important resource for education and research, personal enjoyment, rest, relaxation, mental and physical health and well-being.

Floodplain meadows can provide places for learning, bring communities together and inspire collective action. Left: Sherborne Meadow, Warwickshire. © Emma Rothero **Right: North Meadow, Wiltshire.** © Mike Dodd

Definitions for restoration

Creation – the establishment of a meadow on an area which has lost all characteristics of a meadow, for example on arable land or on improved grassland that has been re-seeded with agricultural plant varieties.

Restoration – the restoration of a floodplain meadow on an area of grassland which has undergone substantial changes in management (e.g. more intensive farming or changes in water level), but that still retains some of the characteristics of the original habitat, such as a permanent grassland that has not been re-seeded and has retained functioning floodplain-meadow hydrology.

Target community – the botanical goal of the restoration/creation project.

Assessing the potential for floodplain-meadow restoration or creation

Subtle changes in hydrology, topography and soil fertility can result in large shifts in floodplain-meadow plant communities (Gowing, Tallowin *et al.* 2002). The soil-water regime and topography determine where different plant communities will grow. Soil fertility is also key; for example, the amount of available phosphorus in the soils of a Burnet floodplain meadow (MG4), is typically between 5 and 15 mg l^{-1} (Gowing, Tallowin *et al.* 2002). So, before exploring the options further, it is essential to collect information about soil type, structure and fertility, hydrology and topography through a **site assessment**, as this may reveal issues that will need to be addressed before restoration or creation can take place.

As a minimum, a site assessment should examine the factors listed in Table 10.1. Approaches are outlined below and further information given in the chapters indicated in Table 10.1. Past and current management should also be taken into consideration.

There may be plants on site that also indicate soil-water and soil-fertility conditions. Table 10.2 lists species indicative of particular plant communities, and therefore particular soil-water and soil-fertility levels.

If the assessment indicates that the various factors are within the ranges that will support species-rich floodplain meadow, follow the chart in Figure 10.1. If the assessment reveals that some elements are not within range, follow the chart in Figure 10.2.

Table 10.1 Factors requiring assessment before undertaking restoration or creation. Further information on investigation and monitoring is given in Chapter 11.

	Ideal range for restoration/creation	Further information within handbook
Soil fertility	5–25 mg/l^{-1} P	Chapter 6
Soil pH	pH > 5.5	Chapter 6
Soil-water levels	Roughly matching those described in Figure 7.6 for MG4 or MG8 type community[A]	Chapter 7 Chapter 11
Soil texture and structure	Good soil structure (not compacted), soil profile indicates fluctuating water levels in appropriate zone	Chapter 5

A Soil-water levels given in Figure 7.6 are general ranges for a typical MG4 community. The exact water-level requirements will depend on specific site conditions such as soil type and structure. A simple Excel spreadsheet is available (see page 93 in Chapter 11) which will predict plant community based on soil-water and soil-type data.

Figure 10.1 How to determine the best approach at a site where soil fertility, water levels and soil structure are within the range expected for a species-rich floodplain meadow, but the botanical community is species-poor. Case studies are listed at the end of this chapter.

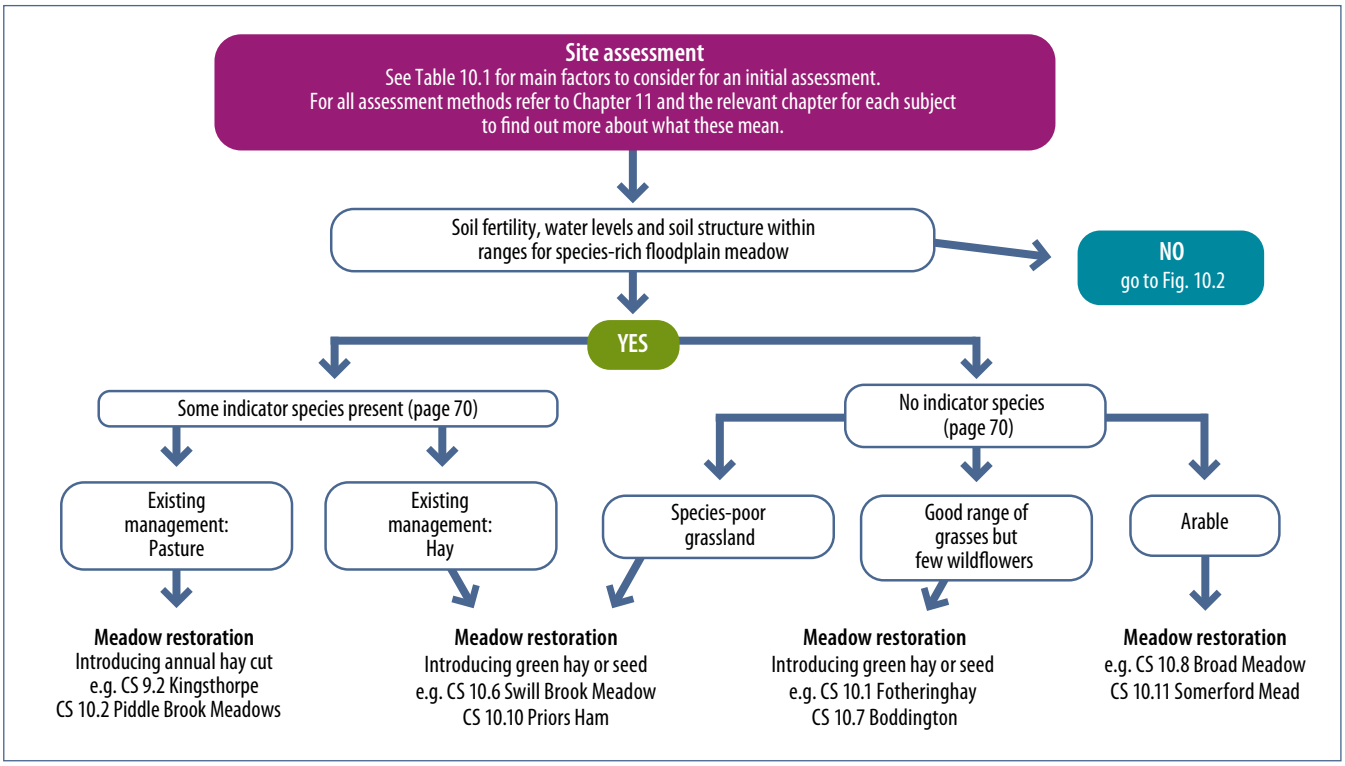
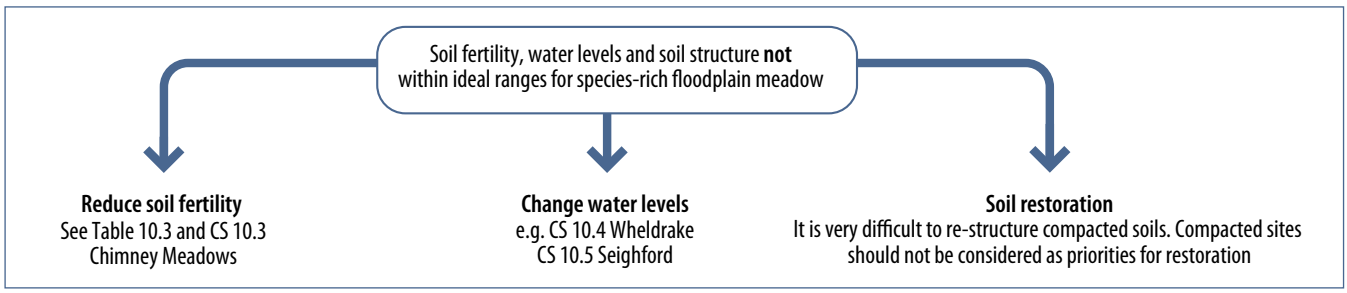


Figure 10.2 How to determine the best approach at a site where soil fertility, water levels or soil structure are not within the range expected for a species-rich floodplain meadow. See the relevant section below for specific information on when restoration or creation of floodplain-meadow communities may not be the best option for a site.



Plants

If the site supports plant species of interest (i.e. vegetation other than arable crops or leys of perennial rye-grass and white clover), they will be useful indicators of the existing soil and water conditions. For example, plants such as oxeye daisy and quaking-grass are adapted to drier conditions whilst others, such as pepper-saxifrage and meadow foxtail, can tolerate short periods of flooding. If the site has tall vegetation dominated by vigorous plants such as common couch, hogweed or curled dock, this indicates a highly fertile soil which will not develop floodplain-meadow communities until the soil fertility is reduced. A first step is therefore to carry out a baseline survey (see Chapter 11) to collect information on the plant species present and their relative abundance.

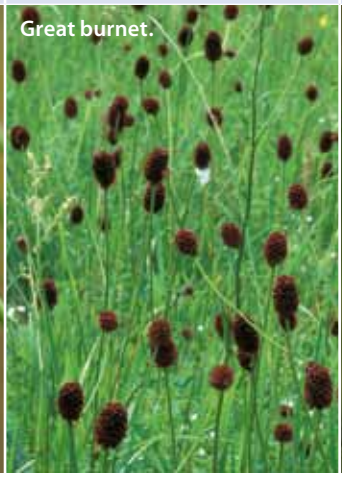
Table 10.2 lists plants that indicate that soil and water conditions may be appropriate for the restoration of characteristic floodplain-meadow plant communities. The presence of even one or two of these species suggests that the site has potential. For example, Burnet floodplain meadow (MG4) is tolerant of short periods of flooding and is found on **well-drained alluvial soils**. If the site has several of the characteristic species, the soil and water are likely to be appropriate for the restoration of Burnet floodplain meadow (MG4).

If the site supports plants more tolerant of **dry conditions**, the restoration of Knapweed meadow (MG5) would be a more suitable objective. Sites with a constantly moist soil may be suitable to restore Kingcup-carnation sedge meadow (MG8). However, if the site supports plants more tolerant of **prolonged water logging** (Table 10.2, column 4), drainage issues will need to be addressed before attempting conversion to floodplain-meadow communities. Some plant species, such as common knapweed, are found in more than one meadow community. In most cases it will be necessary to supplement the botanical survey with direct measurements of soil and water conditions.

Table 10.2 Plants that indicate that soil and water conditions are appropriate to restore floodplain-meadow plant communities (see Chapter 8 for community descriptions) or that indicate prolonged waterlogging. Adapted from Gowing, Lawson *et al*. 2002.

Knapweed meadow (MG5) (dry conditions)	**Burnet floodplain meadow (MG4)** (well-drained alluvial soils)	**Kingcup-carnation sedge meadow (MG8)** (constantly moist soil)	**Species indicative of prolonged waterlogging**
Hemp agrimony	Great burnet	Marsh-marigold	Creeping bent
Downy oatgrass	Meadow foxtail	Brown sedge	Marsh foxtail
Bulbous buttercup	Common knapweed	Common sedge	Slender tufted-sedge
Field scabious	Red fescue	Creeping-jenny	Common spike-rush
Salad burnet	Meadowsweet	Common marsh-bedstraw	Reed sweet-grass
Green-winged orchid	Lady's bedstraw	Ragged-robin	Floating sweet-grass
Rough hawkbit	Meadow vetchling	Tufted forget-me-not	Tubular water-dropwort
Burnet saxifrage	Autumn hawkbit	Marsh ragwort	Amphibious bistort
Smooth hawk's beard	Cuckooflower	Marsh stitchwort	Curled dock
Common knapweed	Pepper-saxifrage	Common meadow-rue	


Field scabious.


Great burnet.


Ragged-robin.


Amphibious bistort.

Photos © Mike Dodd

Plants also give big clues about management history. A site that has a good range of grass species but no or very few herbs, is likely to have been treated with herbicide in the past and may therefore still retain appropriate soil-water and soil-fertility conditions and be very suitable for restoration. Case Study 10.1 demonstrates this situation and is now subject to seed spreading to increase the diversity of herbs in the sward.

Soil fertility and pH

It is vital to carry out an assessment of soil fertility before attempting to restore or create a species-rich floodplain meadow, as this will determine whether or not it is feasible. Floodplain meadows require soils that have moderate levels of soil nutrients, particularly phosphorus (P) (Critchley *et al.* 2002). Soils should be analysed for extractable phosphorus, potassium and magnesium. Levels of these major plant nutrients will give a good indication of whether the site is suitable for floodplain-meadow restoration or creation. In particular, if soil phosphorus is too high, it needs to be reduced before seeding is attempted, typically through more intensive vegetation management for a number of years. Table 10.3 outlines some methods for reducing high levels of P.

Soil pH should also be measured, as sites that are too acidic (pH < 5.5) are also unsuitable.

Soil texture and structure

Soil texture and structure influence water retention and drainage and so information about the soil is needed before restoration/creation is attempted at a site. If the soil is compacted, waterlogging will reduce the availability of oxygen for plants (see Chapter 5), making the site unsuitable for species-rich floodplain-meadow vegetation. The presence of extensive creeping buttercup or hard rush at a site suggests compaction. A site with severely compacted soil is probably not one to target for meadow restoration. A soil pit showing soil structured as horizontal plates with few or no vertical fissures would indicate this.

Table 10.3 The suitability of soils with different extractable phosphorus levels for floodplain-meadow creation or restoration.

Index[A]	Olsen's P Range (mg/l^{-1})	Comments
0	0–9	5–15 mg/l^{-1} P is the range within which many species-rich floodplain-meadow sites are found
1	10–15	This range should be perfect for the typical floodplain-meadow plant community
2	16–25	Species-richness declines above 20 mg/kg^{-1}, but it is still worth attempting restoration/creation within this range
3	26–45	Consider reducing P levels by growing a catch crop such as barley on arable, or reduce P on improved grassland through hay crops (up to two per year). It might take several years before P levels start to fall, particularly on clay-rich soils
4	46–70	Values above 50 mg/l^{-1} are probably too high for restoration unless drastic measures such as topsoil stripping or soil inversion, deep ploughing or chemical amendment can be undertaken

A The P index for a soil reflects the amount of P present ranging from index 0 (very low fertility) to index 9 (very high fertility). More information about these can be found in Natural England Technical Information Note TIN036 'Soils and agri-environment schemes: interpretation of soil analyses'. http://webarchive.nationalarchives.gov.uk/20151201000001/http:/publications.naturalengland.org.uk/publication/23030

Marsh-marigold grows where the soil is constantly moist.
© Mike Dodd

Water

Water management is key to the restoration and creation of floodplain-meadow plant communities, which require particular hydrological conditions (see Chapter 7). The proximity to the water table and its seasonal variation is very important as it determines the length of time that the soil is 'dry' or 'wet', which in turn influences the plant community. For example, the Burnet floodplain meadow (MG4) community is typically found at sites with 10–20 weeks of wet soil and 10–20 weeks of dry soil (see FSC 2010 and Chapter 7 for more details). Installing dipwells (Chapter 11) will give more information and enable monitoring of water levels throughout the year.

Objectives and targets

Once the soil and water conditions have been determined, it is possible to develop general objectives for the restoration or creation project. Plant communities take time to develop and will vary according to soil type, water levels, soil fertility, geographic location and past management, amongst other factors. NVC communities can be used for guidance, but should not be used too prescriptively. It is better to focus on using appropriate restoration techniques, management and monitoring to achieve the most species-rich vegetation possible.

Practical methods for restoration and creation

There are a number of different methods for increasing the species diversity of a site. The approach chosen will depend on the results of the site assessment. To change the characteristics of the site prior to sward enhancement, a change in management, reducing fertility, managing water levels or treatment of compacted soils may be required.

Introducing a change in agricultural management

At some sites, the generally favourable soil characteristics and water regime, together with the presence of a number of key plant species, may mean that a simple change in management is sufficient for restoration. For example, a change from management as pasture to hay cutting is being trialled on a number of sites in the UK (see Case Study 10.2: Piddle Brook Meadows in this chapter and Case Study 9.2: Kingsthorpe Meadows in Chapter 9). More intensive agricultural management may also be introduced on a temporary basis (see below).

Reducing excessive fertility in the soil

The most suitable sites for restoration are those where the soil fertility is moderate. However, the use of artificial fertilisers, particularly nitrogen and phosphorus (which is relatively persistent in soils), have increased the fertility of many farmland soils. On more fertile sites, nutrient levels will need to be reduced before species-rich swards will develop. There are several techniques that can be used (Walker *et al.* 2004). For arable soils, fertility can be reduced by taking arable crops for at least one or two years without using any fertiliser. For improved grasslands, the same is possible through cropping for silage or hay. Case Study 10.3: Chimney Meadows demonstrates reduction of soil fertility through an annual hay cut over ten years. More intensive methods could be considered, such as removal of topsoil and turf stripping, but these are more costly and run the risk of damaging soil structure.

Changing the soil-water regime

While it is essential to introduce seed to sites where floodplain-meadow communities have been lost, for meadows where characteristic plants still survive, restoration may only require changes to the water management.

Water-control structures, usually found in ditches, can be manipulated to manage water levels, but many floodplain meadows do not have such infrastructure. In many cases the maintenance or reinstatement of small foot drains, gutters or grips in the soil is required to ensure water can drain away effectively during the spring and summer, creating aerobic conditions for plant growth.

It is important to keep culverts and other drainage routes clear from potential blockages, so that water does not pool behind them, resulting in a change in the plant community (see Case Study 10.4: Wheldrake Ings and Case Study 10.5: Seighford, Staffordshire).

Drains and ditches can also be used in cases where a site has become too dry. The water table can be raised by bringing water onto a site from an area of high water such as a river or lake and feeding it through a series of carefully spaced channels. A thorough understanding of water movement, soil types and water quality is needed. Such activities may also require an abstraction licence, adding time and expense to the operation. If complicated water-control mechanisms are required to create suitable conditions, floodplain-meadow restoration or creation may not be the best option at a site.

Managing compacted soil

It is possible to improve compacted soil as soil will over time improve its structure, but it can take some years. Compacted soil is poorly draining, has a lack of aeration and will stay waterlogged for prolonged periods. To produce a diverse meadow community on such a site, the key thing to address is the soil structure. Management options are (see Table 10.4):

- improved drainage e.g. digging shallow grips to let any ponded water flow off the site in early spring;
- improving the structure directly by using a sub-soiler (but water must be able to drain from the site, so drainage infrastructure should be improved first);
- adding organic matter to the soil to speed up its restructuring – spreading old farmyard manure (several years old so that most of the nitrogen has gone) could be considered; and
- maintaining an annual hay cut which will gradually deplete the nutrient pool, taking some of the vigour out of species such as creeping buttercup and giving other species a chance. Cutting in late June rather than July would give best results.

Be very careful with stocking on such a fragile soil, i.e. take stock off as soon as their hooves start sinking in and leaving marks. Grazing in spring may not be a sensible option unless the weather is very dry. Grazing in wet conditions will slow down the speed of soil recovery.

Re-introducing plant species

Sward disturbance

Once the site characteristics are appropriate, sward disturbance and enhancement may be required. Where the goal is to diversify an existing grassland, disturbing the existing sward is essential to enable introduced seeds to germinate (Foster 2001). Power-harrowing the grassland before introducing seed is very effective at promoting germination (Hofmann and Isselstein 2004) and increasing plant diversity (Edwards *et al.* 2007). However, care is needed as soil disturbance can also promote the establishment of unwanted species such as soft rush (this species also indicates that the drainage regime needs addressing, as soft rush benefits from waterlogged soil).

Table 10.4 Activities that can be undertaken to improve compacted soil structure.

Action	Management options	Reason
Resolve drainage issues	Clean out ditches, install grips or foot drains	Ensures water can leave site effectively
Maintain annual hay cut	Cut in June if possible	Reduces vigour of infesting species such as creeping buttercup, depletes nutrient pool
Protect and improve soil structure	Manage stock carefully and wait	Prevents further damage to fragile soil
	Add organic matter Consider using a sub-soiler	Improves soil structure more rapidly if funds and time allow

A network of shallow cross drains created to facilitate removal of water from the top layers of the soil to preventing soil waterlogging and anoxia. © RNRP

There are a number of ways to re-introduce appropriate plant species to sites where they are no longer present. These include relying on the seed bank or natural dispersal of propagules, spreading dry or green hay, sowing brush-harvested seed from a nearby meadow, or sowing a commercial seed mix. While such approaches can be successful, it should be remembered that there is always a chance that drought or flooding might limit establishment in any given year, and cannot be controlled.

Using existing seed bank or seed rain as a source for meadow creation and restoration

When creating or restoring a floodplain meadow in situations where there are few or no characteristic plants present, consideration should be given as to whether the desired plants could arrive naturally, either from the existing seed bank or through seed rain (seed drop from existing plants in the vicinity). The evidence suggests that most floodplain-meadow plants have transient or short-lived (less than five years) seed banks (McDonald 1993; McDonald *et al.* 1996). Seed from floodplain-meadow plants tends to be dispersed very locally, within 1.5 m of the parent plant, with little being dispersed more than 3 m (Bischoff 2002). Where there are clusters of existing floodplain-meadows upstream from a creation site, seeds may disperse to the new site in floodwater. However, given the scarcity and fragmentation of the habitat, it is likely to be necessary to introduce seed to a meadow creation site.

Introducing seed from elsewhere

An effective means of seed transferral is through spreading dry hay, an approach traditionally used by farmers to repair bare patches. It can be achieved simply by feeding species-rich hay to animals in a field during autumn, and is a very low-cost option. Alternatively, green hay can be collected from a nearby species-rich floodplain meadow and spread immediately (see Case Study 10.6: Swill Brook Meadow, Clattinger Farm), or the seed can be collected using a brush-harvesting machine and dried for later use (see box 'Green hay and brush-harvested seed' and Case Study 10.7: Boddington, Northamptonshire). Where it is not possible to

Green hay and brush-harvested seed

The use of both harvested seed and green hay from local donor sites with appropriate plant communities have been found to be very effective methods for re-introducing species (Edwards *et al.* 2007).

The green-hay method involves the transfer of cut vegetation from a species-rich donor site. It is important that this is cut and then spread on the recipient restoration site on the same day. Standard farm machinery such as silage-making equipment and muck-spreaders can be used.

Collecting the seed from donor sites using a brush harvester requires specialised equipment and requires the seed to be cleaned and stored, which the green-hay method does not. Brush harvesting also fails to collect seed growing on low-growing species (Edwards *et al.* 2007). However, brush harvesting provides an effective method of introducing local seed to sites where green hay cannot be used, as the seed can be stored and kept until required, whereas green hay must be spread immediately. If there is no local site to source green hay from, or no suitable equipment to collect and spread green hay, then brush-harvested seed is a good alternative.

Sourcing and spreading green hay and seed

Sources of information about possible donor sites for green hay include:

- The meadow map on http://www.floodplainmeadows.org.uk/about-meadows/meadow-map
- Natural England's Nature on the Map www.natureonthemap.naturalengland.org.uk/MagicMap.aspx
- The list of Coronation Meadows http://coronationmeadows.org.uk/

Green hay collected from 1 ha of meadow should be sufficient to spread on 3 ha of receiving land, although a ratio of 1 ha spread on 1 ha may give better results (Edwards *et al.* 2007). It must be cut and spread in the same day; if left for longer, the cut vegetation heats up and the viability of the seed is reduced.

If a commercial seed mix is used, the make-up of the mix should be discussed with the supplier, taking into consideration the relative wetness of the site – species tolerant of longer periods of flooding should be included for wetter sites and plants tolerant of longer dry periods on drier sites. Yellow-rattle is a useful species to include, as it is a hemiparasite, gaining some of its nutrients from grasses and suppressing their growth. This can prevent other species from being out-competed by vigorous grasses.

Introducing a large number of characteristic plant species is more likely to result in an appropriate plant community (Manchester *et al.* 1999) and can be an insurance against failure (Yachi and Loreau 1999). For example, if the current water regime is not fully understood or there is some variation across the site, including a range of species tolerant of different water regimes in the mix means that those most suited to the conditions across the site will become established. Plant traits such as life form, seed biology and phenology determine which species will successfully establish (Pywell *et al.* 2003).

The amount of seed sown should be 15–20 kg of seed per ha with 10% of the seed being wildflowers and the rest grasses.

The donor site should be cut at its usual time, when the seed is ready. Of course the timing of the cut will determine which species are successful in the receptor site (Edwards *et al.* 2007).

Seed provenance – does it matter where the seed comes from?

The extent to which floodplain-meadow plants have developed local variants of species is not yet clear – floodplain-meadow plant communities were formerly widely distributed throughout England and the movement of hay from one area to another was common. A study of the genetics of the meadow buttercup found genotypes to be surprisingly uniform throughout the country, suggesting common species such as this show little local specialisation (Oaten 2005). However, consideration should be given to using seeds that are local genotypes and adapted to local environmental conditions (van der Mijnsbruggea *et al.* 2010). Restoration using some commercially available wildflower seed mixtures could introduce other variants which may hybridise or out-compete local variants, although the better commercial seed suppliers collect seed from known sources. As a precautionary measure, seeds should therefore be collected as locally as possible, or at least their provenance should be known.

use dry hay, green hay or brush-harvested seed, commercial seed mixtures can be sown. These are relatively expensive, but have been used successfully for restoring species-rich floodplain meadows (see Case Study 10.8: Broad Meadow, Northamptonshire and box 'Sourcing and spreading green hay and seed').

Managing unwanted species

The seed bank in arable fields is likely to be dominated by annual and ruderal plants and disturbing the soil in preparation for sowing seed will encourage these plants to germinate. Weed control carried out by allowing weed species to germinate and then spraying them with herbicide before sowing meadow seeds on arable sites can improve establishment, although this should only be a temporary problem that will rapidly diminish once cutting and grazing is established and the sward 'closes'. Herbicides must be used with caution and in appropriate weather conditions, especially near watercourses. An alternative is to repeatedly till the soil, leaving sufficient time in between tilling to allow germination of weed seeds. This will exhaust the seed bank and create a stale seed bed.

In some cases, aggressive weeds (e.g. docks, thistles and nettles) or invasive aliens (e.g. Himalayan balsam) may become established. See Chapter 9 for guidance on how to control these species.

Understanding the needs of the landowner/tenant

A floodplain meadow can be a valued part of the farming system. To ensure that this is the case, it is vital that restoration, creation or management takes into account the requirements of the farmer/landowner. Landowners and tenant farmers need to be clear what will be required of them and how long it will take to restore a site – significant changes may occur each year for the first ten years, and possibly take many more years to develop fully. The land manager must be willing to adopt an appropriate management regime, which may include finding a grazier, or altering their own grazing and cutting regime. Introducing grazing for the first time on a farm with no livestock may be the biggest hurdle. This can often be facilitated through agri-environment schemes, which may offer grants to pay for new infrastructure such as fencing, ditching and access to water for grazing animals.

Newly restored or created floodplain meadows are often very productive, resulting in large crops of hay and valuable aftermath grazing while requiring little or no inputs. Farms that have experienced repeated flooding or low productivity may be particularly interested in floodplain-meadow restoration or creation. Case Study 10.9: Oundle Lodge, Northamptonshire, describes floodplain-meadow creation from the landowner's perspective.

How long does restoration take?

Floodplain-meadow restoration can be a long-term process. The speed of success will partly be determined by the prevailing weather conditions. The site may not look very promising even after two or three years if the weather has not been ideal (i.e. floods and droughts), but it is usually worth persisting; for example Case Study 10.10: Priors Ham, Wiltshire, demonstrates the impacts of severe flooding on a restoration site. Some species are only detected several years after being introduced as seed. Somerford Mead, a restoration site in Oxfordshire, see Case Study 10.11, was only considered to be fully referable to the Burnet floodplain meadow (MG4) community after 23 years of consistent management (McDonald 2011).

Funding

Restoring or creating floodplain meadows is not necessarily expensive, although it may be so if the site has to be seeded or there are weed problems during establishment. It is important to have sufficient funding in place, or a clear plan for fundraising, before starting a project. Funding will need to cover project planning, the cost of the work itself, the ongoing costs of managing the meadow, and monitoring change during establishment.

The restoration and creation of floodplain meadows can be funded by grants provided through the Rural Development Programme, such as agri-environment schemes. Information is available from national agencies such as Natural England, whose staff will be able to provide advice on eligibility to enter the scheme. Alternative sources of funding include landfill tax grants, industrial sponsorship, support from grant-making charitable trusts and the Heritage Lottery Fund.

The level of payments from Countryside Stewardship could be £267–£446 per hectare per year for five years for floodplain-meadow re-creation, and £145–£295 per hectare per year for five years for restoration. Payments are also available for capital works such as fencing, gates and drinkers and are paid at approximately 50% of the full cost. The cost of native seed for re-creation is paid at 100% of cost.

Other sources of help

The **Floodplain Meadows Partnership** can offer general advice and site visits. Visit www.floodplainmeadows.org.uk

Statutory bodies such as **Natural England**, **Natural Resources Wales** and **Scottish Natural Heritage** may be able to offer guidance and advice on restoring and creating floodplain meadows, especially if they are providing funds to support the work. Visit https://www.gov.uk/government/organisations/natural-england; http://www.snh.gov.uk/; Natural Resources Wales https://naturalresources.wales/splash?orig=/

The local **Wildlife Trust** may be able to offer guidance from experienced conservationists, and advice on sources of funding. Visit http://www.wildlifetrusts.org/

The **RSPB** may be able to offer on-site guidance and advice for habitat management, both for wintering and breeding waders. They may also be able to offer breeding bird surveys in some areas and can offer advice on breeding wader survey methodologies and potential funding sources for habitat management.

The **Environment Agency** local staff should be contacted at the earliest possible stage when planning such a project, as they can help with information on flooding and water quality, and the need for flood-risk assessments, waste disposal, abstraction and other licences and permits.

View across Fotheringhay Meadow to the River Nene and the historic landmarks of Fotheringhay church and castle mound. © RNRP

Natural England (NE) has produced a series of informative Technical Information Notes (TINs) some of which address issues relevant to the creation and restoration of floodplain meadows. Relevant TINs are listed here, and are available on request from NE.

- **TIN035** *Soil sampling for habitat recreation and restoration* – http://publications.naturalengland.org.uk/publication/31015
- **TIN036** *Soil and agri-environment schemes: interpretation of soil analysis* – http://webarchive.nationalarchives.gov.uk/20151201000001/http://publications.naturalengland.org.uk/publication/23030
- **TIN037** *Soil texture* – http://publications.naturalengland.org.uk/publication/32016
- **TIN038** *Seed sources for grassland restoration and re-creation in Environmental Stewardship* – http://webarchive.nationalarchives.gov.uk/20150909000001/http://publications.naturalengland.org.uk/publication/31014
- **TIN060** *The use of yellow-rattle to facilitate grassland diversification* – http://webarchive.nationalarchives.gov.uk/20151201000001/http://publications.naturalengland.org.uk/publication/23026
- **TIN061** *Sward enhancement: selection of suitable sites* – http://webarchive.nationalarchives.gov.uk/20151201000001/http://publications.naturalengland.org.uk/publication/35008
- **TIN062** *Sward enhancement: choice of methods* – http://webarchive.nationalarchives.gov.uk/20151201000001/http://publications.naturalengland.org.uk/publication/34012
- **TIN063** *Sward enhancement: diversifying grassland by spreading species-rich green* – http://webarchive.nationalarchives.gov.uk/20151201000001/http://publications.naturalengland.org.uk/publication/23025
- **TIN064** *Sward enhancement: diversifying grassland by oversowing and slot seeding* – http://webarchive.nationalarchives.gov.uk/20151201000001/http://publications.naturalengland.org.uk/publication/34011
- **TIN065** *Sward enhancement: diversifying grassland using pot-grown wildflowers or seedling plugs* – http://webarchive.nationalarchives.gov.uk/20151201000001/http://publications.naturalengland.org.uk/publication/32013
- **TIN067** *Arable reversion to species-rich grassland: establishing a sown sward* – http://webarchive.nationalarchives.gov.uk/20151201000001/http://publications.naturalengland.org.uk/publication/35007
- **TIN068** *Arable reversion to species-rich grassland: early management of the new sward* – http://webarchive.nationalarchives.gov.uk/20151201000001/http://publications.naturalengland.org.uk/publication/33012

Many thanks to additional contributors Dave Cadman, Robin Field, Jenny Hayward, James Hitchcock, Catherine Hosie, Matt Johnson, Ellie Jones, Louise King, Lisa Lane, Brian Lavelle, Michael Liley, Anna Maxwell, Alison McDonald, Heather Proctor, Neil Pullen, Caroline Thorogood and Isobel Whitwam.

CASE STUDY 10.1
Fotheringhay Meadow, Northamptonshire – restoration of a site with good soil structure and water regime

About the site

Fotheringhay Meadow is a privately owned, undesignated 12 ha meadow on the River Nene floodplain. It is managed by the farmer with support from the Nene Valley Nature Improvement Area (NIA).

Historically, the meadow was used for spring sheep grazing until May or June, followed by a hay cut in late July or early August. A walk-over survey showed it to be rich in grasses but poor in broadleaved herbs, although there were small areas with some key herbs including great burnet. This suggested that the site had not been fertilised, but that selective herbicides may have been applied in the past. The NIA wished to explore the restoration potential of the meadow.

Soil survey

A soil profile survey was undertaken at nine sample points using a 1.2 m long auger. For each profile, the depth of the darker surface horizon and the depth to sand and/or gravel were measured, and any mottling of grey/brown (which indicates a fluctuating water table) was noted. The basic profile of the soil across the field was found to be a layer of dark brown loamy clay to about 0.2 m, followed by a band of clay up to 1 m thick. In some places the band of clay was thinner, and had sand and some gravel sitting below it (see Figure 10.3). Cores with sand and gravel within 1 m of the surface showed very little mottling in the clay layer, suggesting that the area the cores were taken from were free draining and had a water regime that could support a more species-rich floodplain meadow. At points where no sand or gravel was found, the clay was dense and had significant mottling (grey/brown), suggesting long periods of waterlogging or poor drainage. The soil cores with sand and gravel were found in areas of higher species diversity.

The low nutrient levels, presence of gravels, low weed cover and low cover of competitive grasses such as cock's-foot and false oat-grass (which can swamp species such as great burnet) all suggested that the chances of a successful restoration of a species-rich sward were high.

Spreading seed using a quad-bike mounted fertiliser/seed hopper. © RNRP

Preparing strips of the ground with a tractor and harrow (spring tine or similar). © RNRP

Techniques
In September 2014, six 150 m x 6 m strips were lightly cultivated, seeded and then rolled in one half of the site. The strips were separated by 12 m and were located so as to give a range of different soil and water conditions. The strips were seeded with a commercial seed mix (Emorsgate EM8). As the site already had a good diversity of grasses, the seed mix contained herb seeds only. Known patches of great burnet were avoided. The work was carried out by the farmer using standard farm machinery. The second half of the meadow was scheduled to be treated in spring 2015, followed by the reinstatement of hay-meadow management, with grazing until no later than mid May and a July hay cut, earlier than previously.

Monitoring
In summer 2014, fixed-point botanical monitoring along a transect was carried out to provide baseline data, and will be repeated as the project progresses.

Cost
The cost of the seed (approx. £6,000) was covered by the NIA. The meadow is in HLS option HK15 "maintenance of grassland for target features", but Natural England will review the option over the next couple of years.

Partners
Nene Valley NIA (lead partners – Wildlife Trust BCN, River Nene Regional Park), the farmer, Natural England.

Benefits
- Enhanced public views of the flower-rich meadow from the historic castle.
- Increased biodiversity.
- Improved habitat for pollinators in a largely arable landscape.

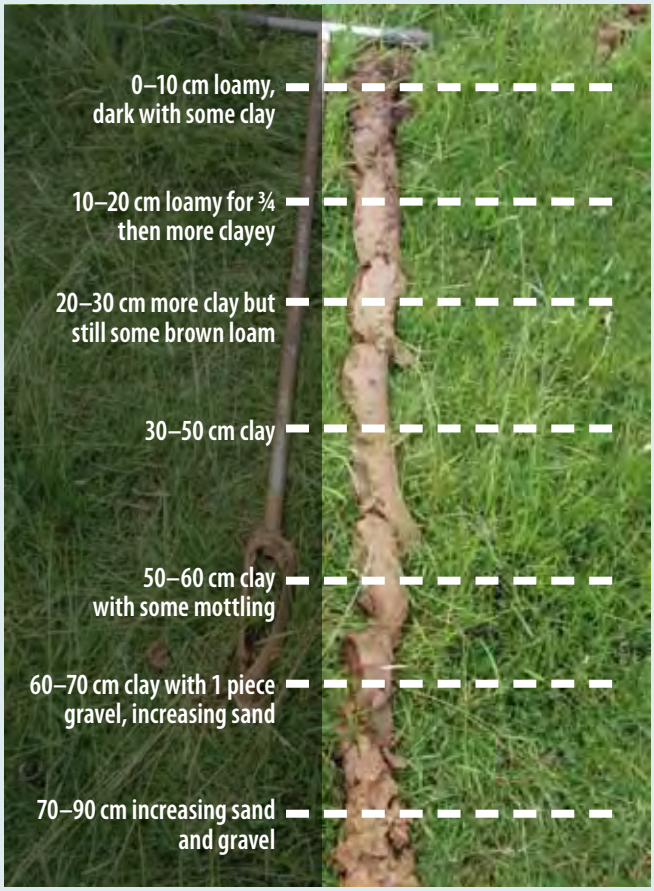


Figure 10.3 A soil core taken from Fotheringhay Meadow showing the soil profile. © Heather Proctor

CASE STUDY 10.2
Piddle Brook Meadows, Worcestershire – change from pasture to meadow management on a site with some floodplain-meadow indicator species present

About the site
Piddle Brook Meadows was purchased from the Naunton Court Estate in August 2009 by Worcestershire Wildlife Trust (WWT). The 7 ha site lies within the Forest of Feckenham Living Landscape area and is adjacent to Worcestershire Wildlife Trust's Naunton Court Fields reserve.

The meadows have had a mixed-management regime in the past, including silage cuts in May, and spring horse grazing on the drier ground. There is a small area of ridge and furrow on the western boundary of the site, which has been designated as a Local Wildlife Site. It is not known whether artificial fertiliser has been applied in the past, but although there is a good diversity of grass species, herbs are lacking from large areas. The Piddle Brook has been deepened and several pollution incidents have occurred in the past. The site floods in winter and more recently summer flooding has occurred, but water drains from the site effectively. WWT wished to increase the floristic diversity within the sward.

Technique used
Since the project began in 2010, hay cuts have been taken in late June followed by aftermath grazing with cattle and sheep in late summer and autumn under an HLS agreement. If results proved poor after five years under this regime, the plan was to spread green hay from a similar nearby reserve.

Monitoring
- Fixed transects and NVC survey (2011 and 2014).
- Soil pH and nutrient status.

Results
The NVC survey showed a grassland strip that is a 'hybrid' of Cuckooflower grassland (MG15p) and the species-poor Creeping bent sub-community of Burnet floodplain meadow (MG4d), although one of the main community constants, great burnet, is missing and has not been previously recorded here.

These findings justify the restoration programme currently being put into operation as the management has maintained the cover of meadowsweet, a dropwort and other MG4 associates, but has not increased their abundance or extended their distribution across the site. The next phase should be to consider whether to bolster the diversity from year six (2016) onwards by spreading hay or seed from a nearby compatible donor site, at least on a small trial area.

Cost
After the initial cost of purchasing the site, erecting fencing and installing a water supply, site management costs are for 3–5 person days per year. Two volunteer work parties per year carry out pollarding and hedge/scrub management. These have on average, ten people per work party at £50 per day plus one day of staff time. Income is generated through renting the grazing, the HLS agreement and sale of the hay.

Partners
Worcestershire Wildlife Trust with Natural England through HLS agreement.

Benefits
- Increased offtake of nutrients from catchment through removal of hay crop.
- Increased public access to flower-rich meadow.
- Increased biodiversity.
- Enhancement of Piddle Brook corridor and Feckenham Forest Living Landscape (connectivity).

CASE STUDY 10.3
Chimney Meadows, Oxfordshire – reduction of high P levels through an annual hay cut and aftermath grazing

Chimney Meadows are a National Nature Reserve and SSSI owned and managed by BBOWT (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust). In 2004, BBOWT bought 70 ha of arable land adjacent to the NNR and planned to restore it to species-rich floodplain meadow through green-hay spreading, using green hay from the adjacent species-rich NNR. As part of the project plan, soil analyses were undertaken including P data from all the fields. Two of the fields recorded P indexes of 4 (46–70 mg/l^{-1}) which is outside of the range considered suitable for floodplain-meadow restoration. The others recorded P indexes of 3 or below. The index 4 fields had been previously sown with winter wheat or spring barley.

To prepare these fields for green-hay spreading, sheep were used to graze grass and weeds that had grown amongst the stubble, any remaining vegetation was sprayed with the herbicide glyphosate, dead vegetation was topped and the soil was then disc-harrowed to turn dead vegetation into the soil and to create a seed bed.

Green hay collected from the NNR was spread across all the fields at a ratio of 1 ha of green hay cut spread across 3 ha of receptor field. The spread material was then rolled and left to germinate. Follow-up management involved topping the vegetation to a height of 10–15 cm to keep the sward open and encourage germination of other plants, and then annually hay cutting and aftermath grazing once a sward was established.

On the P index 4 fields, a thick grass sward grew very vigorously with few herbs. After hay cutting, grazing and weed topping for ten years, the sward now contains species indicative of lower fertility swards, including cowslip, common knapweed, fairy flax and pepper-saxifrage.

CASE STUDY 10.4
Wheldrake Ings, Yorkshire – water-level management for birds and meadows

About the site
This 157 ha site was purchased by Yorkshire Wildlife Trust (YWT) in 1973, when it was still used for hay making. Anecdotal evidence from farming families suggests that the good quality hay meadows spread much further into the central (lowest) part of the site than they do today. Botanical records from the 1970s suggest that Burnet floodplain meadow (MG4) indicator species (great burnet, meadowsweet and pepper-saxifrage) were previously more extensive.

After the site was purchased, sluices were installed in the two main ditches draining into the River Derwent, allowing the fine-scale management of water levels. At the time, water was held on the site in winter and spring to try to attract more bird life. Before this, water flowed freely on and off the Ings. Over the last several decades, the focus of the management at the reserve has swung from birds to botany and back again. The site is designated an SPA for wintering, passage and breeding birds, and an SAC for floodplain-meadow grassland. It is also an SSSI and an NNR[42].

Much of the site drainage is controlled through a network of grips and ditches, with two sluices controlling flow into the Derwent. Water will only flow out of the ditches when water levels in the Derwent are low enough, as the sluices are gravity controlled.

Funding
The reserve is managed mostly under Farm Business Tenancies and annual tenancies to the local farmers who cut and graze it. It is currently in an HLS agreement with much of the land managed through contracted farmers, and YWT graze part of the site. YWT then tries to supplement this with external funding bids.

42 See page 21, Chapter 4 for a definition of designations.

Project objectives

1. To increase the area of Burnet floodplain meadow (MG4), which is believed to have decreased in the last 50 years, by lowering winter and spring water levels.
2. To balance the needs of the plant communities with those of the wintering and passage birds and to ensure the bird populations are maintained.

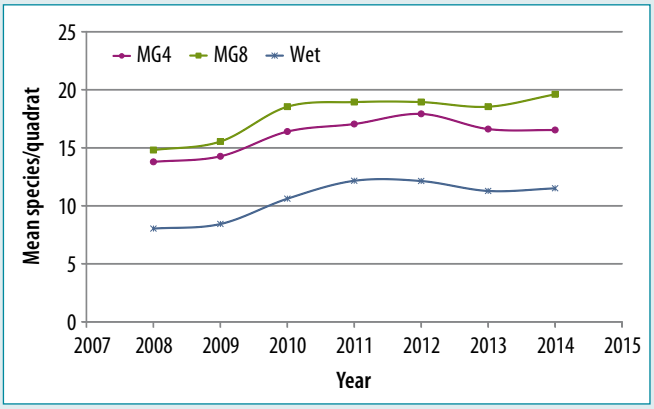
Technique used

A trial management regime was put in place, initially for five years. This was based on advice from wetland experts David Gowing and Neil Humphries, who suggested that Burnet floodplain meadow (MG4) cannot stand prolonged inundation, but that a water level of about 40 cm below the surface of the ground during the growing season could be tolerated, with the vegetation being less susceptible to waterlogging during the winter.

Ground-level contours for the Ings were investigated to explore the likely area of winter inundation under different scenarios. A sufficient drop in water level was needed to expose an area big enough to be worthwhile for floodplain-meadow restoration, whilst also leaving enough open water to support the tens of thousands of wintering birds that use the reserve. The area chosen is adjacent to the existing floodplain-meadow plant communities, so local seed sources and plants should colonise the restoration area. Further advice was sought from Natural England on how to make these changes without significantly affecting the birds on site. The trialled solution is as follows:

Winter: when river levels allow, the sluices are opened and water drops down to 40 cm below the 'sill level', revealing a 'band' of land where Burnet floodplain meadow (MG4) can re-establish itself. In practice, however, this rarely happens as the river water levels are too high so water cannot leave the site.

Figure 10.4 Change in species richness for permanent monitoring quadrats between 2008 and 2014 at Wheldrake Ings, Yorkshire. 'Wet' refers to those quadrats falling within NVC communities of the OV and S categories.



Spring: the draw-down of water continues so that the water table reaches its 'summer level' by mid May. By the end of May there is no standing water, only occasional pools for passage birds. The higher areas of the site should be dry enough, early enough, for the re-establishment of Burnet floodplain meadow (MG4).

Summer/autumn: a cutting and grazing regime is followed to suit Burnet floodplain meadow (MG4) restoration, and good relationships have been developed with tenant farmers to ensure that this management takes place. There is more reliable grazing now possible through the capital HLS fencing installation.

Monitoring

- Seventy-two fixed-point quadrats are surveyed annually by the Floodplain Meadow Partnership (FMP). One line of 20 quadrats was first recorded in the 1970s with repeat surveys conducted in 2002 and 2006.
- Dipwells with automated readers were installed and are downloaded annually by FMP, which also collects soil-fertility and hay-quality data.
- Wetland Bird Survey (WeBS) counts and Breeding Wading Bird Surveys are carried out by Natural England.
- NVC surveys 2003, 2008, 2014.

Results

Overall species richness increased most between 2009 and 2010; however, despite the lowered water levels, it is clear that the species-richness of the swamp and OV vegetation communities also continued to increase between 2010 and 2011. This may be due to drier soils allowing increased cutting of these wetter areas, leading to a reduction in shading by a few more bulky species, such as reed canary-grass. Regular cutting of the wetter areas is likely to maintain these increases in species-richness. Overall species-richness peaked in 2012 following the relatively dry winter and summer of 2010–2011. The wet summer of 2012 resulted in a small decrease in species-richness in 2013, especially in the drier Burnet floodplain meadow (MG4) vegetation. However, species-richness in 2014 was significantly higher than at the start of the trial in 2008. The slow draw-down in spring leaves valuable pools for passage birds and is of particular benefit to whimbrel travelling through the Lower Derwent Valley.

Cost

Approximately £12,000 per year plus staff and volunteer time.

Partners

YWT, Natural England.

Benefits

Increased area of species-rich floodplain meadow. The combination of water-level management, better relationships with tenants, greater areas being cut and regular ditch maintenance has all helped to achieve this. However, the habitat has shown itself to be very sensitive to weather-pattern fluctuations year on year.

CASE STUDY 10.5
Seighford Moor, Staffordshire – changing ditch-water levels to retain species-rich plant communities

Seighford Moor is a 40 ha Local Wildlife Site in Staffordshire. It is owned by a nearby estate and leased to a tenant farmer. About a quarter of the site is occupied by floodplain meadows, which are managed with a hay cut followed by aftermath grazing. The site has been farmed by the same family for at least 50 years, and has a long history of consistent use. The site is managed through an HLS scheme.

The potential of the site as a Local Wildlife Site and floodwater storage area was recognised in 2007 by the 'Farming Floodplains for the Future' Staffordshire pilot project. Under this project, and supported by agri-environment scheme funds, water-control equipment was installed in 2009 in order to 'wet the site up', focusing on the less species-rich areas of the site for the benefit of wading birds.

A visit from the Floodplain Meadows Partnership in 2010 identified that the species-rich areas were changing towards swamp communities as the raised water levels and recent high rainfall started to take effect. Staffordshire Wildlife Trust (SWT) commissioned a botanical monitoring programme to assess the long-term effects of hydrological manipulation on the flora of the meadows, and in summer 2011 an NVC survey of the meadows showed that some of the hay meadows were Kingcup-carnation sedge meadow (MG8), and some small areas were similar to the Yorkshire fog sub-community of Burnet floodplain meadow (MG4). The overall assessment was that the site was being kept wet for 6–8 weeks too long per year and that the water-control structures should be opened or removed to reduce waterlogging of the surface soil.

Technique used
The water-level control structure closest to the species-rich meadow area of the site was removed in late 2010. Monitoring was instigated to assess the stability of the vegetation at the site and to relate species and community distributions to the soil-water regime.

Figure 10.5 NVC map for Seighford Moor species-rich hay meadow area with dipwell locations.

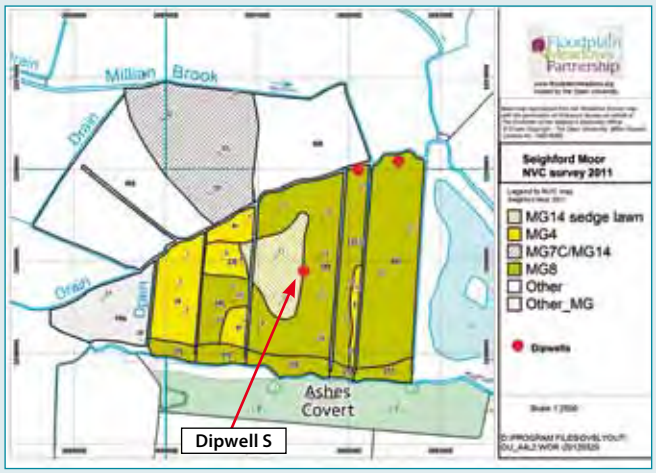
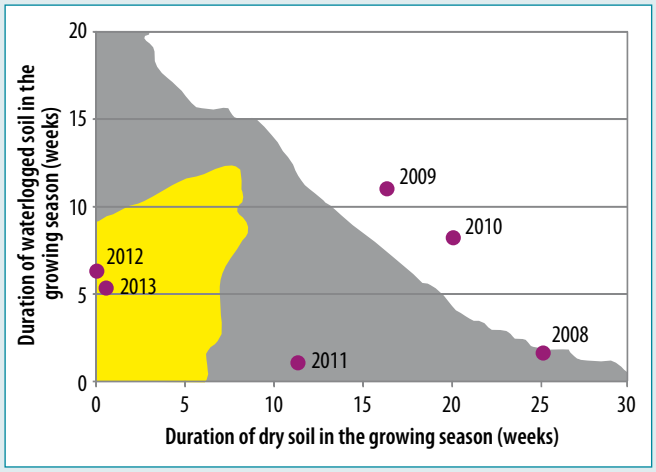


Figure 10.6 The expected hydrological range for Kingcup-carnation sedge meadow (MG8) is shaded yellow compared to the hydrological range for all species-rich grasslands shaded grey. Annual hydrological regimes from recordings of Seighford Moor's Dipwell (S) in the period 2008–2013 (see Figure 10.5) have been plotted to show the duration of wet and dry soils during the growing season.



Monitoring
In 2010, some botanical monitoring was undertaken and in June 2012 a series of 54 botanical transects were established. SWT installed a series of dipwells to monitor the effects of the ditch level controls.

Results
A review of the dipwell data from 2011 to 2013 shows that the water levels were within the expected range for Kingcup-carnation sedge meadow (MG8).

Figure 10.6 illustrates the degree to which management can affect hydrology. This site was relatively dry prior to 2008, as typified by the 2008 spot showing that 25 weeks of the growing season had water tables deep enough to cause little impact on the surface soil. The ditch levels at the site were artificially raised in 2009, producing a regime that gave around ten weeks of waterlogging during the growing season, as indicated by the 2009 and 2010 spots. This hydrological regime proved to be beyond anything previously recorded for species-rich grassland, which is represented by the grey zone in the figure. In response to this information, ditch levels were allowed to fall again, producing the moist, but not heavily waterlogged regime of 2011, which was a dry year weather-wise. The years 2012 and 2013 were very wet in terms of rainfall and their hydrological regimes as plotted on the figure show them to fall clearly into the preferred hydrological niche of Kingcup-carnation sedge meadow (MG8) (represented by the yellow zone).

Quadrat data from 2011, 2012 and 2013 were used to assess changes in the goodness-of-fit to NVC communities.

The dipwell (S) from which the data plotted in Figure 10.6 are derived sits in a low-lying area of Sedge lawn (MG14) surrounded on the drier margins of the field by typical Kingcup-carnation sedge meadow (MG8) (see Chapter 8). The sward in the field to the west represents an excellent example of the Burnet sub-community (MG8a) of Kingcup-carnation sedge meadow (MG8D), which is usually associated with rather drier soils than the Typical form or the Sedge lawn (MG14). The botanical monitoring data from this area indicated that the vegetation was stable in NVC terms, with no expansion of large sedge species.

The fields to the east of dipwell (S) supported species-poor Kingcup-carnation sedge meadow (MG8) in 2011 and subsequently showed an increase in species diversity and improved goodness-of-fit to Kingcup-carnation sedge meadow (MG8), with a reduction of rush cover and increases in common sedge, tufted hair-grass, ribwort plantain and clover species, suggesting a move to a drier community.

Cost
No cost for change in management as this was simply removal of the sluice board, carried out by the Farming Floodplains for the Future project. Monitoring equipment (automated recorders, dipwells, installation and analysis) was approximately £4,500.

Partners
Staffordshire Wildlife Trust, Natural England, Floodplain Meadows Partnership, landowners, tenants of the Seighford Estate and the Sow and Penk IDB (Internal Drainage Board).

Benefits
Retention of species-rich plant communities. Entry of site into HLS scheme and designation of site as a Local Wildlife Site.

CASE STUDY 10.6
Swill Brook Meadow, Lower Moor Farm complex, Wiltshire – introducing green hay to a species-poor grassland

About the site

Swill Brook Meadow (2.86 ha) is a component of the Lower Moor Farm complex of nature reserves purchased by Wiltshire Wildlife Trust between 1996 and 2005. Swill Brook Meadow links directly to Clattinger Farm (also part of the complex) which is an SAC (see Chapter 4) for its high-quality floodplain-meadow vegetation. Although very species-poor in comparison to the SAC, Swill Brook Meadow was less agriculturally improved than the remainder of the Lower Moor Farm fields.

Together with the rest of Lower Moor Farm, Swill Brook Meadow had a history of year-round grazing by cattle and sheep. It is very wet in winter and has a tendency to flood, so is likely to have escaped the heaviest winter-grazing pressure.

In 2010 the Lower Moor Farm complex was entered into an Environmental Stewardship (ES) agreement and Swill Brook Meadow was identified as a suitable location for sward enhancement in order to extend the area of good quality floodplain-meadow habitat.

Technique used

The management option chosen was sward supplementation with green hay due to the on-site availability of suitable species-rich grassland from which green hay could be harvested. In late July 2010, the meadow was cut tight to the ground. A spring tine harrow was used to break up the sward and create bare ground by pulling out the remnant thatch and any dead vegetation lying on the soil surface (thus ensuring that seeds in the green hay were able to reach the ground to germinate).

At Swill Brook Meadow the area of bare ground created was less than the recommended 40–50% because of the presence of species of interest including low numbers of snakeshead fritillary. The green hay was cut and big-baled in nearby Oaksey Moor Farm Meadow and transported 500 m to Swill Brook Meadow where it was spread within a few hours using a straw spreader. The ratio of donor to receptor area was a little less than 1:3. After spreading, the meadow was left to settle for a few weeks, then grazed lightly by sheep. Sheep were used because the underlying Oxford Clay soils are vulnerable to poaching in wet conditions.

The bale is loaded into the rear of the spreader, chopped and then spread over the grassland through a funnel. The angle of the funnel and flow rate are adjustable, allowing the depth of the green-hay layer and the area of distribution to be altered. This method is quick and efficient. © Catherine Hosie

Following green-hay application, the meadow has been managed with a hay cut after 15 July, depending on weather conditions. Traditionally the hay cut was an extended process carried out over several weeks by hand or with small agricultural machinery. In the species-rich fields at Lower Moor Farm this extended hay-cutting process continued until the late 1990s when the farmer retired. Using modern farm machinery, hay cutting can now be completed within a matter of hours and as high nutrients are not a problem at Clattinger Farm, a later cutting date tries to replicate the traditional management at the site. This management is supported by the HLS option within the existing ES agreement. Aftermath grazing is carried out by cattle, which graze a number of the fields together, until the ground becomes too wet. If not cut for hay, the meadow may be extensively cattle grazed during the summer.

Monitoring

Ten 1 x 1 m quadrats were set up adjacent to Swill Brook Meadow on Side Ham to provide data from a sward that had not been enhanced for comparison and was already species rich. Three groups of five quadrats were established on Swill Brook Meadow to look at the impact of the green-hay intervention.

Figure 10.7 Mean species number per m² for each field between 2010 and 2014.

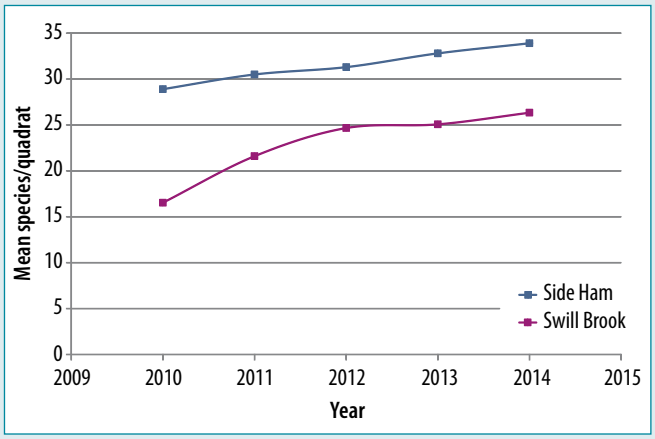
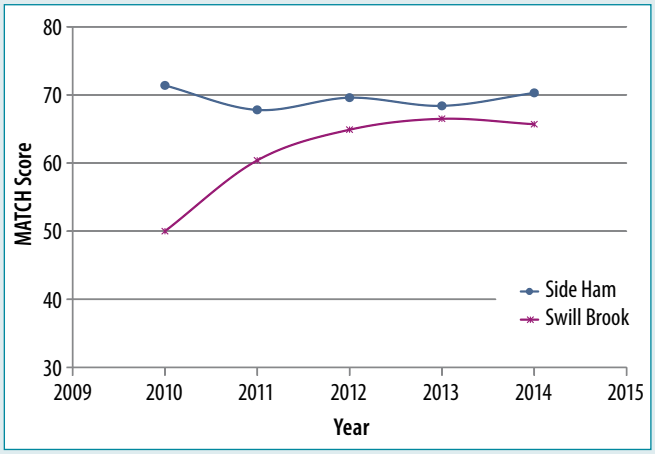


Figure 10.8 Change in the goodness-of-fit to the Burnet floodplain meadow community (MG4) of Rodwell (1992) of Swill Brook and Side Ham between 2010 and 2014. Scores are Czekanowski coefficients of similarity calculated using the MATCH program (Malloch 1998). Values are based on constancy tables derived from sets of ten quadrats in Side Ham and 15 quadrats in Swill Brook.



Results
The monitoring programme indicates that the work at Swill Brook Meadow is successfully recreating a species-rich sward referable to the Burnet floodplain community (MG4). In 2011, just 12 months after the green-hay application, species-richness had increased significantly, as had the goodness-of-fit to the target floodplain-meadow community. The transformation from species-poor Cuckooflower grassland (MG15p) to the more herb-rich Burnet floodplain meadow (MG4) continued in 2012 with further recruitment and expansion of species. Moss cover has also increased whilst the cover of species of more improved mesotrophic grasslands, such as perennial rye-grass and white clover has continued to decline. Changes in 2013 and 2014 were more modest, but the field is now similar in its species-richness to other Burnet floodplain meadow (MG4) fields in the reserve (see Figures 10.7 and 10.8).

Costs
Minimal as machinery used belonged to the Trust and green hay was collected and spread from Trust-owned adjacent fields.

Partners
Natural England through HLS agreement.

Benefits
Creation of 2.86 ha of species-rich meadow, additional hay crop, buffer for existing species-rich meadow.

CASE STUDY 10.7
Boddington Meadow and Kingsthorpe North Meadows, Northamptonshire – wildflower seed collection by brush harvesting for use in restoring floodplain meadows

About the sites
Boddington Meadow is a 2.3 ha Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire reserve and Local Wildlife Site with areas of Burnet floodplain meadow (MG4). The site is particularly herb-rich and also has a good range of grasses. Never ploughed, a wet meadow on the edge of a reservoir provides an impressive display of colour, with great burnet, betony and devil's-bit scabious. The site became a Trust reserve in 1986 and has been managed through a late hay cut and light aftermath grazing ever since. It became the county's Coronation Meadows in 2013.

Kingsthorpe North Meadows (as opposed to Kingsthorpe Meadow, Chapter 9) is a 4.5 ha site with a mix of drier ridge-and-furrow and wetter floodplain meadow, and has been owned by the local community since 2009. It is situated on the banks of a tributary of the River Nene. A small wetland section in the northern end became a Local Wildlife Site in 2005. The site is managed through an annual hay cut. Soil samples showed low nutrient levels and the upper slopes have already been restored to a semi species-rich grassland through management. The lower sections are species-poor, with a range of grasses, and regularly flood during the winter. The project aims to restore the lower area to a species-rich floodplain meadow. P levels of 12 mg/l^{-1} indicate that this should be feasible.

Technique used
Donor site
Boddington Meadow was chosen as a donor site as it has similar soil and hydrological conditions to Kingsthorpe North. A low-impact brush harvester was used to collect the seed. This had a rotary brush with stiff bristles, designed to sweep the seed heads it comes into contact with into the hopper, and was pulled by a compact tractor.

Seed harvesting was undertaken on two occasions (mid July and late August). Additional great burnet and devil's-bit scabious seed was collected by hand. Seed was collected from around one-sixth of the site on each visit across roughly spaced sets of strips, meaning seed was collected from around a third of the site in total.

The seed was bagged and most was taken straight to an agricultural contractor to be dried using a seed drier, while the remainder was spread out and dried on a barn floor.

Receptor site
Kingsthorpe North Meadows were cut short in early August. Several 6 m wide strips were created by shallow rotavation with the aim of creating open ground on one-third of the site. The collected seed was hand-sown into these strips, and the strips were then rolled. The plan was to top the strips the following year to help control weed growth. A shallow drain running through the field was re-dug to help drain the topsoil.

Seed harvesting at Boddington Meadow using a brush harvester. © River Nene Regional Park RNRP

Monitoring
Boddington: quadrats were undertaken along fixed transects to assess impact of seed collection in the year following collection, then every three years.

Kingsthorpe: quadrats were undertaken along fixed transects to monitor the restoration on an annual basis.
Monitoring results for the two sites are not yet available.

Cost
- Seed collection: £200.
- Rotavation and rolling: £380.
- Ditch works: £760.
- Most of the labour was through staff time and volunteers.

Partners
Wildlife Trust BCN, with Nene Valley NIA, Kingsthorpe North Meadows Trust, Coronation Meadows and Biffaward.

Benefits
- Increased offtake of nutrients from catchment through removal of hay crop.
- Creation of 4.5 ha of flower-rich pollinator habitat.
- Buffering of wetland Local Wildlife Site.
- Increased public access to flower-rich meadow.

CASE STUDY 10.8
Broad Meadow, Northamptonshire – converting an arable field to a floodplain meadow

About the site
Broad Meadow was species-rich floodplain meadow until the 1970s, when the farmer gave up dairying and converted to arable. The fields were used for arable production until 2007 when the last crop of oilseed rape was harvested. During this time artificial fertiliser was used as required. The field floods from the river each autumn and spring.

Technique used
Soil analysis undertaken in August 2007 showed that phosphorus levels were on the upper edge of the expected range for a species-rich floodplain meadow (phosphorus 16 mg/kg^{-1}, potassium 96 mg/kg^{-1}, magnesium 129 mg/kg^{-1}, pH 6.3). Emorsgate Meadow Seed Mixture for Wetlands (EM8) was chosen on the basis of the soil fertility and hydrological conditions, and included 17 wildflowers and seven grasses.

The seed was sown at 3 g/m^2 in April 2008 after the field had been ploughed and rotavated. A small section that had not been used for arable cropping was treated with the herbicide glyphosate. After sowing, the meadow was cut four times during the first six months. No grazing took place in the first year.

In 2009 a hay cut was taken. The cut was timed to remove the maximum amount of nutrients, and took place on 30 June. It was baled on 2 July, making 242 large bales from approximately 7 ha.

Ongoing management
The meadow is cut for hay annually during June or July and is then grazed by sheep and/or cows until late autumn. The farmer cuts and bales the hay and then sells it. A grazier provides livestock for aftermath grazing.

Monitoring
- A botanical survey using ten 1 x 1 m quadrats, 15 m apart is carried out in June each year by surveyors from the Wildlife Trust for Bedfordshire, Cambridgeshire and Northamptonshire and the River Nene Regional Park. The abundance of all plant species is recorded.
- A butterfly transect is undertaken by the farmer's wife once a week from April to September (as per UKBMS[43] criteria).

Results
Species-richness
At Broad Meadow there has been little change in mean species-richness between years since the start of the trial (see Figure 10.9). However, this does not mean that there have not been substantial changes in the composition of the vegetation, as the balance of species has changed.

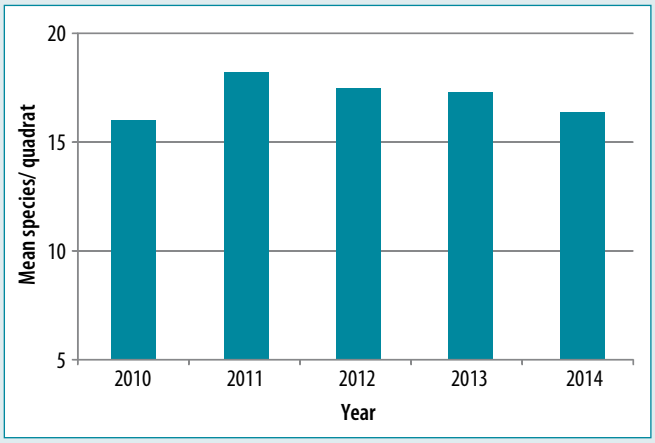
Goodness-of-fit to NVC communities
The degree of similarity with NVC communities was calculated using the MATCH programme for:
- the species list of the seed mix (2008 values);
- a species list for 2009 (no constancy values were available for that year);
- constancy tables based on ten quadrats recorded each year between 2010 and 2014.

The progression of the sward towards Burnet floodplain meadow (MG4) community can be seen in Figure 10.10. The MATCH score is approaching 60, which is generally considered as representing an acceptable level of agreement.

The prepared seed bed at Broad Meadow. © RNRP

Broad Meadow in 2012. © RNRP

Figure 10.9 Species-richness (the mean value based on ten quadrats) over time at Broad Meadow, Northamptonshire.



43 UK Butterfly Monitoring Scheme: www.ukbms.org/Methods.aspx

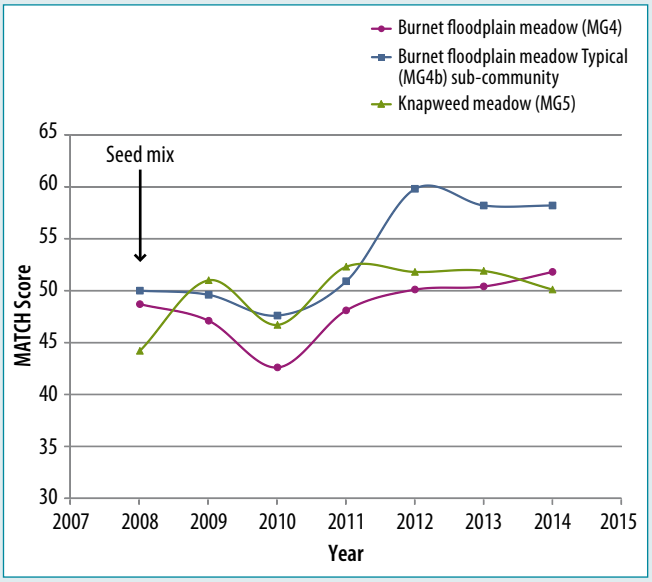


Figure 10.10 MATCH Scores for the seed mix applied in 2008, a list of species recorded in 2009 and constancy values for species recorded in ten quadrats annually between 2010 and 2014 at Broad Meadow, Northamptonshire.

The restoration has been so successful that the site has now been designated as a Local Wildlife Site and several site visits have been conducted with other interested farmers, which have led to another 100 ha of species-rich meadow restoration being undertaken.

Costs
Covered by Natural England's Higher Level Scheme and the landowner.
- Seed: £16,000.
- Fencing and new hedges: over £15,000.
- Ongoing management and creation of new permissive path: approximately £4,500 per year for ten years.

Partners
Natural England, River Nene Regional Park CIC and Mr and Mrs Banner (landowners).

Benefits
- Reduced nutrient inputs to River Nene from cessation of artificial fertilisers.
- Increased offtake of nutrients from Nene catchment through removal of hay crop.
- Economic benefit through sale of hay and grazing.
- A new permissive path increases public access.
- Creation of 7 ha of flower-rich pollinator habitat.
- Creation of a demonstration and discussion site.

CASE STUDY 10.9
Oundle Lodge, Northamptonshire – floodplain-meadow creation from the landowners' perspective

Oundle Lodge restoration project is found at Big Meadow, a 10 ha field along the River Nene in Northamptonshire. Previously an arable field, it floods most years resulting in nutrient, pesticide and soil loss and poor crop yields.

The farm is a mixed farm with other riverside meadows and so was able to expand the livestock (beef) enterprise element. The farmer's father was very interested in the environment and in the 1970s and 1980s created new habitats on the farm, and so the project focused on creating further wildlife habitat in addition to managing the site in line with environmental factors.

The farmer already had the equipment and livestock to manage the fields for hay, including aftermath grazing. However, the farm did not have the appropriate physical infrastructure for grazing the restoration fields. The plan drawn up for the Higher Level Scheme over the ten years of the agreement therefore included fencing, gates and cattle drinking points. It also included the use of native-breed cattle.

A Wet Grassland Mixture from Emorsgate seeds (EM8) was used to re-seed the field as no donor sites for either seed or hay were available. This mix had proved to be very successful elsewhere along the River Nene (e.g. Broad Meadow in Upper Heyford in 2008). It was sown at 3 g/m^2 in the autumn of 2010 and cut four times in 2011. In 2012, spot spraying was carried out to control docks and the hay was cut at the start of July to remove nutrients, and aftermath grazed. This management has continued.

This creation scheme was funded by Natural England's Higher Level Scheme at the following rates:
- ELS payments: £30/ha.
- HLS payment for the creation of species-rich grassland: £280/ha.
- HLS payment for hay making option: £75/ha.
- HLS Payment for native breeds at risk grazing supplement: 70/ha.

Capital works
- Fencing: £2.50/m.
- Gates: £149 each.
- Cattle drinking bays: £119 each.
- Native seed mix: £1,400/ha.

As a result of the project, a number of considerations for advisors were drawn up in discussion with tenant farmers and landowners, and are listed in Table 10.5.

Table 10.5 Factors for advisors to consider in planning creation and restoration projects.

Farmer/business needs and opportunities	Planning considerations	Machinery and stock considerations
Managing the business in the most profitable way	Ensure the case for re-creation or restoration is financially sound	Mixed farms may already have the right stock and machinery
Matching the available resources and skills with current enterprises	Check that suitable infrastructure is either in place or is attainable	Arable-only farms may struggle to manage a floodplain meadow in the long term
Expanding or starting an enterprise	Check that the landowner has the means to manage the site in the long term	Intense grassland management is needed in the first year of creation projects
Benefiting the environment	Explore creation/ restoration options	Increased weed control may be needed for the first five years on certain sites
Possibility of taking a hay crop on sites that fail to support more intensive crops due to annual flooding		The use and number of livestock needs to be closely monitored over the first five years

CASE STUDY 10.10
Priors Ham, Wiltshire – changing from pasture to hay-meadow management where water regime and nutrients were appropriate but indicator species scarce

About the site
Priors Ham is a small (4 ha) meadow adjacent to North Meadow National Nature Reserve. In 2008, survey work carried out by the Floodplain Meadows Partnership indicated that the site had potential to be restored from species-poor pasture to species-rich meadow. The soil-fertility status and soil-water levels were within the range suitable for Burnet floodplain meadow (MG4) and the meadow was entered into an HLS agreement for restoration and enhanced public access.

Technique used
In 2010, the meadow was sprayed twice with a glyphosate weedkiller prior to spreading with brush-harvested seed. For comparison, a small area was also spread with green hay in early August, following a single application of weedkiller earlier in the year. In 2011 the seeded area was sown again with brush-harvested seed collected from North Meadow by Emorsgate Seeds and grazed lightly. No other management was undertaken that year. Particularly wet conditions in 2012 prevented both hay cutting and any further interventions (treatment for docks and oversowing with brush-harvested seed in the green-hay area). In 2013 the field was 'topped' to cut the weeds, then cattle grazed. An early hay cut was taken in 2014 to try to re-balance the nutrient influx from the extensive floods of 2012/2013 and grazed once again.

Monitoring
Two blocks of five quadrats were surveyed in 2010 prior to the restoration work, one block in the green-hay area and the other in the seed-treatment area. These were re-recorded annually in 2012–2014. Two dipwells were installed with automated data loggers to monitor water-table levels. Soil samples were collected at two locations, pre- and post-restoration work. An adjacent field, Lake Meadow was also monitored and acted as a control throughout the trial.

Results
At Priors Ham, species-richness had more than doubled by 2012, although many species were present at low cover and great burnet had not colonised. In 2013, there was a marked decline in richness following a long period of flooding in 2012–2013. By 2014, Priors Ham was showing recovery from the flooding, and although species-richness remained below that of the 2012 peak, both areas were significantly richer than at the start of the trial and richer than the unseeded Lake Meadow, which showed very little change over the monitoring period (see Figure 10.11).

Priors Ham in 2015. It may take a while to see a really species-rich meadow here, but the management is now right and species diversity is increasing. © Mike Dodd

Data from the two soil samples showed high pH (7.4 and 7.6) similar to that found in much of the adjacent North Meadow. However, the values for available phosphorus (41.7 and 56.0 mg/l^{-1}) were much higher than the range suitable for Burnet floodplain meadow (MG4) community and were higher than at the start of the trial, presumably because of the extensive flooding in 2013–2014 (see Figure 10.12). The depth and duration of spring flooding was quite limited in both 2011 and 2012, with water levels falling to 50 cm below ground during summer 2011 and between late April and early May 2012. However, the summer rainfall in June 2012 resulted in almost continuous surface water across the meadow from July 2012 until early May 2013.

Figure 10.11 Changes in species-richness at Priors Ham and Lake Meadow 2010–14. Lake Meadow (S) and (N) are two blocks of quadrats in the control field.

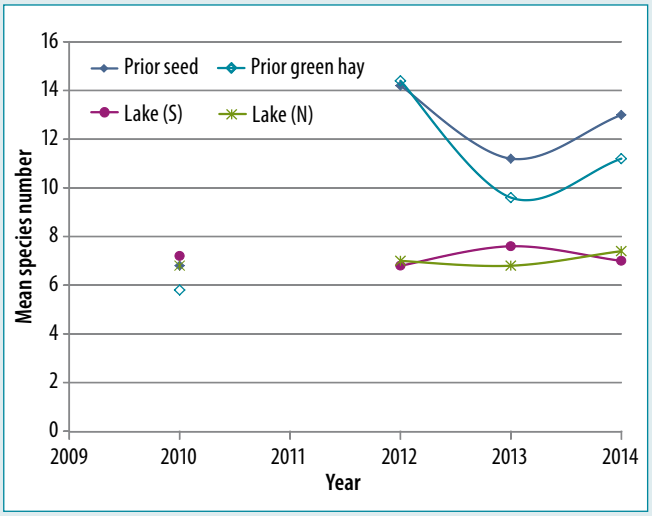
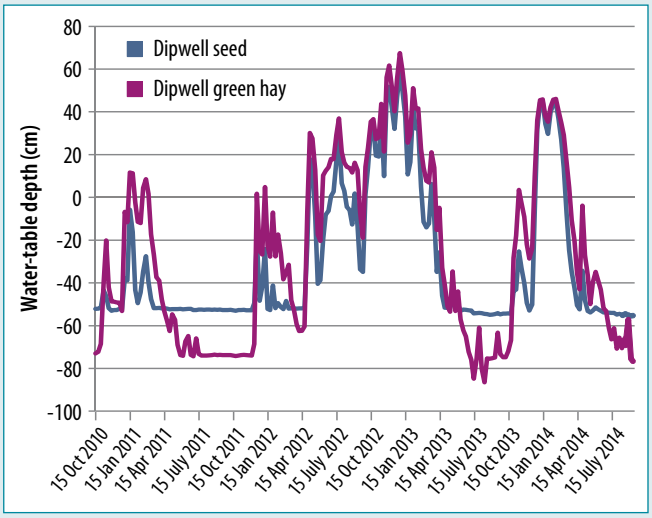


Figure 10.12 Hydrographs for the two dipwells in Priors Ham. Negative values indicate the depth of water table below the surface; positive values indicate the depth of surface floodwater.



Cost
The initial costs of approximately £1,300 were made up of:
- ground preparation (including weed control and cultivating);
- costs of getting area in North Meadow brush harvested;
- drying and storing of seed; and
- sowing of seed (labour, machinery and sand-mixer costs).

Natural England provided the National Nature Reserve green hay free of charge. The second oversowing cost approximately £500.

Partners
The Co-op group (landowners), the tenant farmer and Natural England.

Benefits
- Increased offtake of nutrients from catchment through removal of hay crop.
- Increased public access to flower-rich meadow.
- Increased biodiversity.

CASE STUDY 10.11
Somerford Mead[44], Oxfordshire – a long-term restoration site with post-restoration management trials. How long does it take?

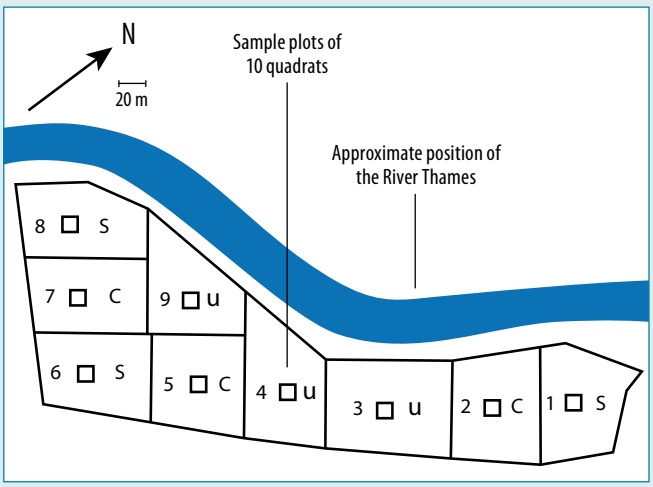
Introduction
Somerford Mead (6.1 ha), had been Burnet floodplain meadow (MG4) in the 1950s at the University of Oxford's Field Station at Wytham, Oxfordshire. In the 1960s it became sheep pasture and in the 1970s the site was agriculturally improved. It was ploughed for the first time in 1981 and three crops of barley, grown with agro-chemicals were harvested. In 1985 a fourth barley crop was taken specifically to reduce soil fertility. No further chemicals were added prior to a restoration project. A seed-bank study in 1985/1986 looking at plants growing amongst the sown barley determined that no seeds of floodplain-meadow species remained in the soil.

Data collected in 1985 demonstrated that Somerford Mead was situated on circum-neutral (pH 7.5) alluvial soils over limestone gravel of varying thickness.

In 1986, seed from nearby Oxey Mead was harvested by Emorsgate Seeds and spread on Somerford Mead, which was then managed as a hay meadow with a late June/early July hay cut, and aftermath grazing with 12 heifers and 50 sheep. Similar management was undertaken in 1987 and 1988.

In 1989, a replicated block experiment was set up to compare differences between aftermath-grazing treatments of sheep, cattle and no grazing (Figure 10.13). The hay cut and differential grazing continued throughout the experimental period. Monitoring was carried out in the centre of each plot throughout the experiment.

Figure 10.13 Position of different grazing plots with ten sheep (s) in each of three plots, two cows (c) in each of three plots and no grazing (u) in three plots.



44 See McDonald 2012.

Somerford Mead in June 1987. Yellow-rattle has germinated, but the sward is grass dominated and species poor.
© Alison McDonald

Results
Botanical diversity
Germination of sown grasses such as meadow brome, Yorkshire fog, rough meadow-grass and perennial rye-grass was good in the first year (1987) but arable flowers in the seed-bank accompanied the sown grasses in almost equal numbers in the very open sward (Figure 10.14). In 1988, 18 of the unsown annuals recorded during the seed-bank study did not germinate or become established and sown species, such as red and white clover, and crested dog's-tail, increased in abundance. Red fescue, cock's-foot, and meadow fescue appeared for the first time (McDonald 1993).

Great burnet germinated well in the first year after sowing (1987) but many of the seedlings died and the plants that became established were at considerable distances from each other. This plant takes many years to spread vegetatively and typically covers large areas of ancient flood meadows, whilst it is still patchy at Somerford Mead. It may not have thrived in the early years of this experiment because the soil was too dry and warm. It began to increase in numbers in the recording plots in 2001 and by the summer of 2007 a few seedlings and small plants were seen in and out of the recording plots, but the plant is still a long way from being as widespread as it is in Oxey Mead, the seed source site, and other similar grasslands. Similarly, meadow foxtail, was first recorded in 1997. By 2007, when there was more rainfall, its population had increased overall, but plants are still scarce in the recording plots. Even though snakeshead fritillary were recorded on the site for the first time in 2015, after 29 years Somerford Mead does still not reflect the description of Burnet floodplain meadow (MG4) in the NVC or match species-rich sites nearby.

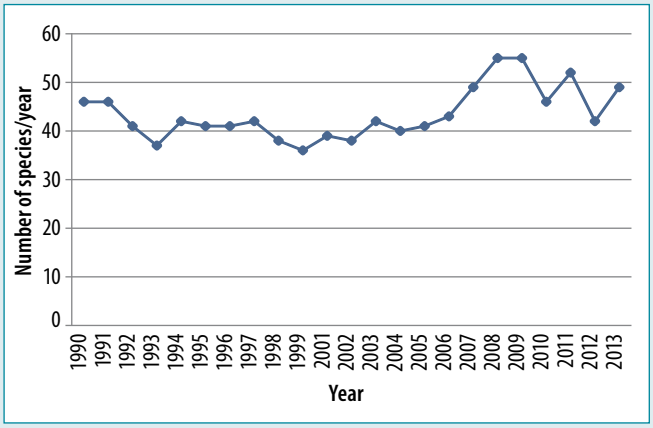


Figure 10.14 The total number of species recorded in the cow-grazed plots over the course of the experiment. The initially high records are due to the mix of arable and meadow species. The drop occurs as the arable species decline, and then the species numbers increase as meadow species develop. Fluctuations in the latter years are related to annual changes in weather conditions.

Phosphate

In 1987, the standing hay was lush and tall and the soil was described as 'requiring no additional nutrients'. By 1990, the soil was already regarded as being of 'low nutrient status'. At this time it was noted that the average pH had increased from 7.7 to 8.7.

Aftermath treatment

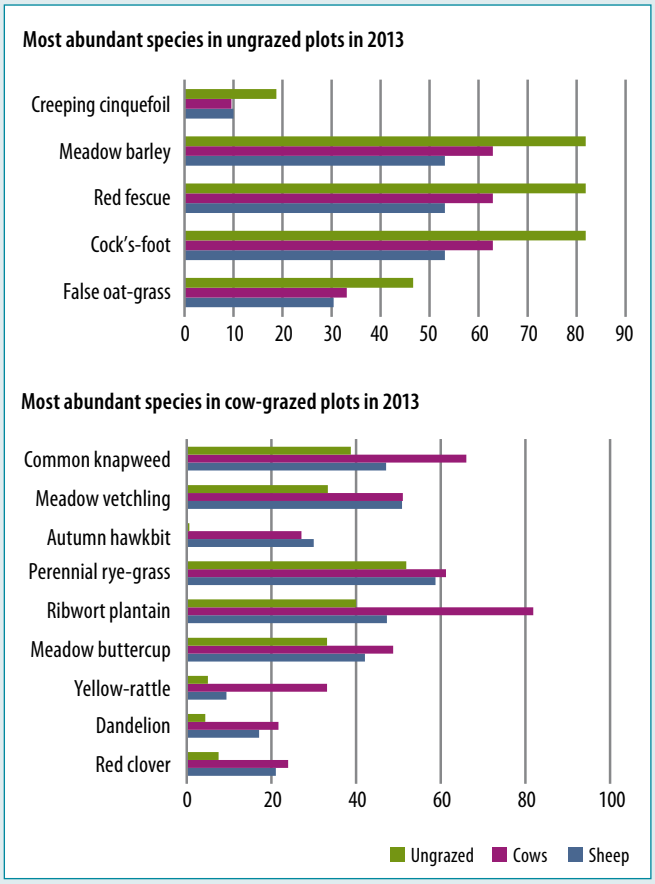
The traditional management of cutting for hay followed by cattle grazing has produced a sward which is a little more species-rich than the sheep-grazed treatments in some years but both of these treatments are richer than the ungrazed plots (Figure 10.15). In 2013, 44 species in total were recorded in both the ungrazed and sheep-grazed plots, and 49 species in the cow-grazed plots.

Invertebrates

As the sward architecture in Somerford Mead became more complex over time it was of increased importance to both the diversity and abundance of invertebrates (which need structures such as stems, leaves, flowers and seed heads for various periods in their life cycle). Since 1993 the cow-grazed plots have become the most suitable for invertebrates including plant-eating beetles (Woodcock and McDonald 2011).

Great burnet at Somerford Mead. © Alison McDonald

Figure 10.15 The cow-grazed plots have a flora more typical of a species-rich meadow, compared to the ungrazed plots, which are typically grass dominated.



APPENDIX 10

arwickshire Coventry and Solihull - Biodiversity Impact Assessment Calculat

v. 18.3 08/08/2014
Amendment from v18.2 only affects green roofs, for other habitats v18.2 still usable.
Please fill in both tables

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Result

Local Planning Authority:	
Site name:	
Planning application reference number:	
Assessor:	
Date:	

Please do not edit the formulae or structure
To condense the form for display hide vacant rows, do not delete them
If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services

	Existing habitats on site Please enter all habitats within the site boundary		**Habitat distinctiveness**		**Habitat condition**		**Habitat Biodiversity Value**						
							Habitats to be retained with no change within		**Habitats to be retained and enhanced within**		**Habitats to be lost within development**		
T. Note	code	Phase 1 habitat description	*Habitat area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Comment*
		Direct Impacts and retained habitats			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H	
	C31	Other: Tall ruderal	0.05	Medium-Low	3	Poor	1					0.05	**0.15**	
	A22	Woodland: Scattered scrub	0.05	Medium	4	Poor	1			0.04	0.16	0.01	**0.04**	
	J11	Other: Arable	6.54	Low	2	Poor	1					6.54	**13.08**	
	A111	Woodland: Broad-leaved semi-natural woodland	0.18	High	6	Moderate	2			0.18	2.16			
		Total	6.82				Total	0.00	0.00	0.22	2.32	6.60	13.27	J
													∑D + ∑F + ∑H	
											Site habitat biodiversity value		15.59	

Before/after impact	**Indirect Negative Impacts** Including off site habitats	K					Value of loss from indirect impacts K x A x B = Li, Lii	Li - Lii
Befor								
After								
Befor								
After								
Befor								
After								
Befor								
After								
Befor								
After								
	Total	0.00					M	0.00
								HIS = J + M
							Habitat Impact Score (HI	13.27

T. Note	Proposed habitats on site (Onsite mitigation) code	Phase 1 habitat description	Area (ha)	Target habitats distinctiveness ss	Score	Target habitat condition Condition	Score		Time till target condition (years)	Score	Difficulty of creation / restoration Difficulty	Score	Habitat biodiversity value	Comm
		Habitat Creation	N		O		P			Q		R	(N x O x P) / Q / R	
	n/a	Built Environment: Buildings/hardstanding	3.23	none	0	Poor	1		5 years	1.2	Low	1	**0.00**	
	n/a	Built Environment: Gardens (lawn and planting)	1.38	Low	2	Moderate	2		5 years	1.2	Low	1	**4.63**	
	G1	Grassland: Amenity grassland	1.98	Low	2	Poor	1		5 years	1.2	Low	1	**3.30**	
		Total	**6.60**											
		Habitat Enhancement						Existing value S (= F					((N x O x P) - S) / Q / R	
	A22	Woodland: Scattered scrub	0.04	Medium	4	Moderate	2	**0.16**	5 years	1.2	Low	1	**0.13**	
	A111	Woodland: Broad-leaved semi-natural woodland	0.18	High	6	Good	3	**2.16**	10 years	1.4	Low	1	**0.77**	
	B22	Grassland: Semi-improved neutral grassland		Medium	4	Moderate	2		10 years	1.4	Low	1	**0.00**	
		Total	**0.22**											
												Trading down correction value		0.00
												Habitat Mitigation Score (HMS)		**8.84**
														HBIS = HMS -
												Habitat Biodiversity Impact Score		**4.43** Loss
												Percentage of biodiversity impact loss		33.40

KEY	
	No action required
	Action required
	Drop-down menu
	Calculation
	Automatic lookup
	Overall Result

	Loss to biodiversity
	Gain to biodiversity

APPENDIX 11

arwickshire Coventry and Solihull - Biodiversity Impact Assessment Calculat

v. 18.3 08/08/2014
Amendment from v18.2 only affects green roofs, for other habitats v18.2 still usable.
Please fill in both tables

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Result

Local Planning Authority:	
Site name:	
Planning application reference number:	
Assessor:	
Date:	

Please do not edit the formulae or structure
To condense the form for display hide vacant rows, do not delete them
If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services

		Existing habitats on site Please enter all habitats within the site boundary		**Habitat distinctiveness**		**Habitat condition**		**Habitat Biodiversity Value**						
								Habitats to be retained with no change within		**Habitats to be retained and enhanced within**		**Habitats to be lost within development**		
T. Note	code	Phase 1 habitat description	*Habitat area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Comment*
		Direct Impacts and retained habitats			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H	
	C31	Other: Tall ruderal	0.05	Medium-Low	3	Poor	1					0.05	**0.15**	
	A22	Woodland: Scattered scrub	0.05	Medium	4	Poor	1			0.04	0.16	0.01	**0.04**	
	J11	Other: Arable	6.54	Low	2	Poor	1			1.59	3.18	4.95	**9.90**	
	A111	Woodland: Broad-leaved semi-natural woodland	0.18	High	6	Moderate	2			0.18	2.16			
		Total	6.82				Total	0.00	0.00	1.81	5.50	5.01	10.09	J
													ΣD + ΣF + ΣH	
											Site habitat biodiversity value		15.59	

Before/after impact	**Indirect Negative Impacts** Including off site habitats	K					Value of loss from indirect impacts K x A x B = Li, Lii	Li - Lii
Befor	Grassland: Poor semi-improved grassland	3.85	Medium-Low	3	Moderate	2	**23.10**	**11.55**
After					Poor	1	**11.55**	
Befor	Woodland: Broad-leaved semi-natural woodland	0.46	High	6	Moderate	2	**5.52**	**2.76**
After					Poor	1	**2.76**	
Befor	Grassland: Marsh / Marshy grassland	0.17	High	6	Moderate	2	**2.04**	**1.02**
After					Poor	1	**1.02**	
Befor	Wetland: Standing water	0.03	High	6	Moderate	2	**0.36**	**0.18**
After					Poor	1	**0.18**	
Befor	Other: Tall ruderal	0.49	Medium-Low	3	Moderate	2	**2.94**	**1.47**
After					Poor	1	**1.47**	
	Total	5.00				M	16.98	
								HIS = J + M
							abitat Impact Score (HI	**27.07**

CAUTION - Destruction of habitats of high distinctiveness, e.g. lowland meadow or ancient woodland, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided?
Any unavoidable loss of habitats of high distinctiveness must be replaced like-for-like

CAUTION - Destruction of habitats of high distinctiveness, e.g. lowland meadow or ancient woodland, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided?
Any unavoidable loss of habitats of high distinctiveness must be replaced like-for-like.

	Proposed habitats on site (Onsite mitigation)			Target habitats distinctiveness		Target habitat condition			Time till target condition		Difficulty of creation / restoration		Habitat biodiversity value	
T. Note	code	Phase 1 habitat description	Area (ha)	ss	Score	Condition	Score		(years)	Score	Difficulty	Score		Comm
		Habitat Creation	N		O		P			Q		R	(N x O x P) / Q / R	
	n/a	Built Environment: Buildings/hardstanding	3.23	none	0	Poor	1		5 years	1.2	Low	1	**0.00**	
	n/a	Built Environment: Gardens (lawn and planting)	1.39	Low	2	Moderate	2		5 years	1.2	Low	1	**4.63**	
	G1	Grassland: Amenity grassland	0.39	Low	2	Poor	1		5 years	1.2	Low	1	**0.65**	
		Total	**5.01**											
		Habitat Enhancement						Existing value S (= F					((N x O x P) - S) / Q / R	
	A22	Woodland: Scattered scrub	0.04	Medium	4	Moderate	2	**0.16**	5 years	1.2	Low	1	**0.13**	
	A111	Woodland: Broad-leaved semi-natural woodland	0.18	High	6	Good	3	**2.16**	10 years	1.4	Low	1	**0.77**	
	B22	Grassland: Semi-improved neutral grassland	1.59	Medium	4	Moderate	2	**3.18**	10 years	1.4	Low	1	**6.81**	
		Total	**1.81**											
												Trading down correction value	-3.19	
												Habitat Mitigation Score (HMS)	**9.81**	
													HBIS = HMS -	
												Habitat Biodiversity Impact Score	**-17.26**	Loss
												Percentage of biodiversity impact loss	63.75	

KEY	
	No action required
	Action required
	Drop-down menu
	Calculation
	Automatic lookup
	Overall Result

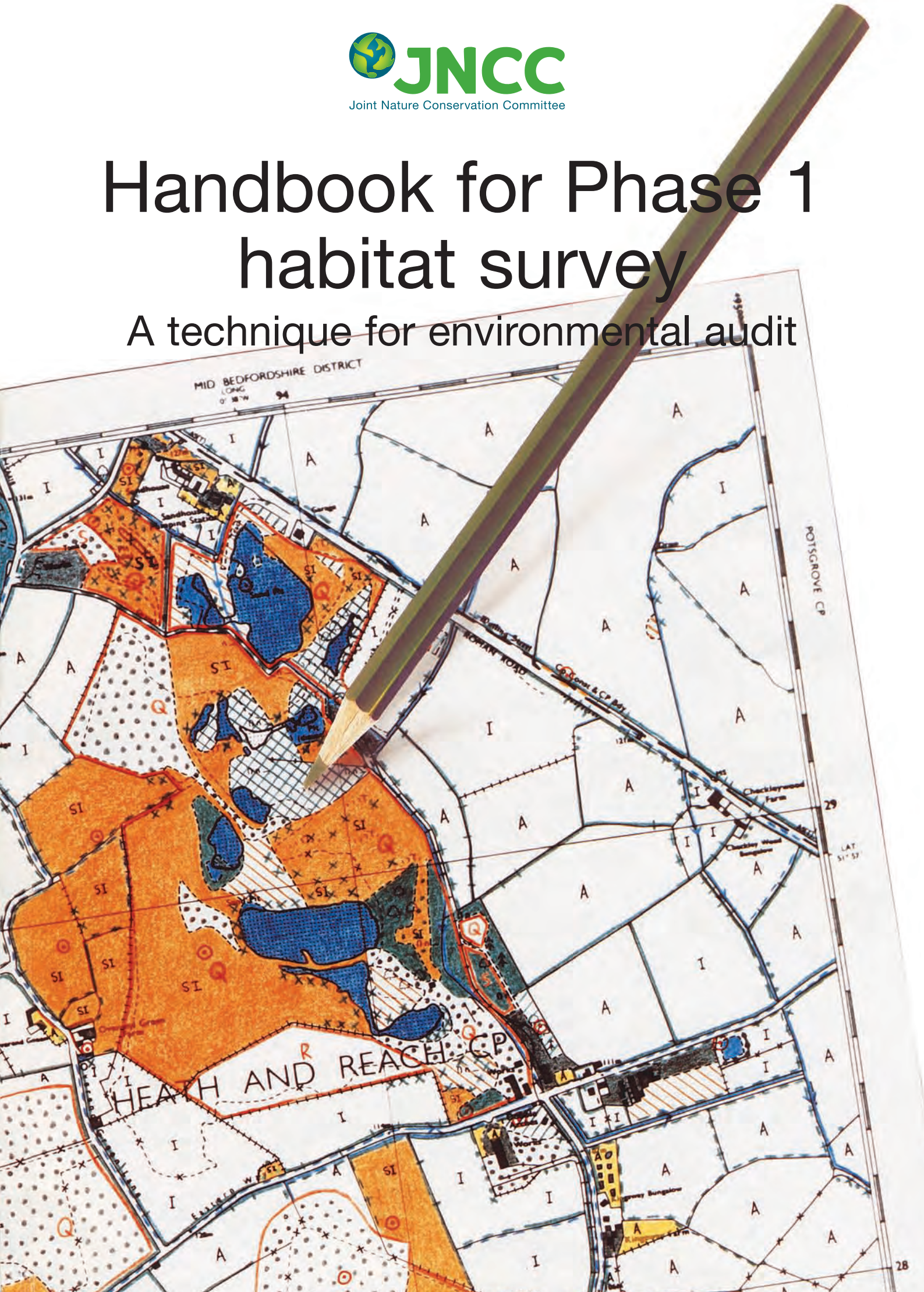
	Loss to biodiversity
	Gain to biodiversity

APPENDIX 12

JNCC
Joint Nature Conservation Committee

Handbook for Phase 1 habitat survey

A technique for environmental audit



montane scrub with Salix lapponum, S lanata, S. myrsinites, S. arbuscula or S. phylicifolia;

- stands of mature Crataegus monogyna, Prunus spinosa or Salix cinerea, even if more than 5 m tall;
- all willow carr less than 5 m tall; all Salix cinerea carr;
- stands of Myrica gale more than 1.5 m tall.

The following should not be included in this category:-

- very low Salix herbacea (see heathland, D), Salix repens (see dune slack, H6.4), or Myrica gale (see mire, E);
- Ulex gallii or Ulex minor (see heathland D);
- hedges (see J2);
- stands of young trees or stump regrowth less than 5 m high, where these represent more than 50% of the immature canopy cover;
- stands of introduced shrub species (see J1.4);
- scrub on dunes (see H6.7).

A3 Parkland and scattered trees

Tree cover must be less than 30% to warrant inclusion in this category. For scattered trees over pasture (as in parkland), or over heath, bog, limestone pavement, etc, the green dot symbol should be superimposed on the appropriate habitat colour. The density of dots should be varied in proportion to the density of trees. Dominant species should be coded. Exotic trees should be target noted. Lines of trees forming windbreaks or avenues should be marked as a series of dots with the dominant species code.

A4 Recently-felled woodland

The only areas of felled trees which should be included in this category are those whose future land use is uncertain, for instance when it is not clear whether they are to be replanted or used for crops. The dominant species which have been felled should be coded and the codes placed in parentheses.

B Grassland and marsh

This category includes both areas of herbaceous vegetation dominated by grasses and certain wet communities dominated by Juncus species, Carex species, Filipendula ulmaria or by other marsh herbs. For grasslands where there is a greater than 25% cover of dwarf shrub heaths see heathland (D), for emergent stands of tall reed grasses see swamp (F1), for coastal grasslands see saltmarsh (H2), dune (H6) and maritime cliff and slope (H8).

Most grasslands have been subjected to some degree of agricultural improvement by repeated grazing, mowing, fertilising, drainage or herbicide treatment. It is important to try to distinguish unimproved and semi-improved from improved grasslands. However, these grassland types form a continuum, so that it is not possible to define each with precision, especially as species critical for their definition are often only observable for a short season in the year. Agricultural improvement usually results in a decrease in the floristic diversity of the sward and dominance by a few quick-growing grasses such as Lolium perenne, Holcus lanatus and Festuca rubra. The resulting sward composition is likely to vary with intensity of treatment and with the composition of the original sward, so careful field training is necessary to define and maintain the boundaries between these categories. However, residual difficulties are bound to occur.

Grassy roadside verges, railway cuttings and embankments may be very important features, especially in intensively farmed areas. If they are wide enough they should be mapped as the appropriate grassland habitat. Narrow herb-rich verges should be shown by a broken orange line and target noted, if time permits. See also amenity grassland (J1.2).

Unimproved grassland

Unimproved grasslands are likely to be rare, especially in the lowlands. They may be rank and neglected, mown or grazed. They may have been treated with low levels of farmyard manure, but should not have had sufficient applications of fertiliser or herbicide, or have been so intensively grazed or drained, as to alter the sward composition significantly. Species diversity is often high, with species characteristic of the area and the soils and with a very low percentage of agricultural species.

In cases of doubt, map as semi-improved and target note the need for further information.

Semi-improved grassland

Semi-improved grassland is a transition category made up of grasslands which have been modified by artificial fertilisers, slurry, intensive grazing, herbicides or drainage, and consequently have a range of species which is less diverse and natural than unimproved grasslands. Such grasslands are still of some conservation value. Semi-improved grassland may originate from partial improvement of acid, neutral or calcareous grassland and should be mapped as such. However, it should be noted that improvement reduces the acid or calcareous character of the grassland, so that this is not always easy to distinguish in the field.

Species diversity will generally be lower than in unimproved grassland in the same area. If the signs of improvement listed under B4 are lacking, the grassland is likely to be semi-improved and should be mapped accordingly. Target notes should be made in all of the better quality sites. Surveyors should be aware of the species compositions indicative of semi-improved conditions in the locality of the survey. See also poor semi-improved grassland (B6).

B1 Acid grassland

Grassland in this category is often unenclosed, as on hill-grazing land, and occurs on a range of acid soils (pH less than 5.5). It is generally species-poor, and often grades into wet or dry dwarf shrub heath, although it must always have less than 25% dwarf shrub cover (see heathland, especially D5 and D6). Pioneer annual-rich calcifuge communities on dry sandy soils are included in this category, as are wet acidic grasslands typified by species such as Juncus squarrosus (but see marsh/marshy grassland, B5).

The following are indicative of acidic conditions when frequent or abundant: Deschampsia flexuosa, Nardus stricta, Juncus squarrosus, Galium saxatile, and Rumex acetosella.

B2 Neutral grassland

Typically enclosed and usually more intensively managed than acid or calcareous grassland (except on roadside verges), this category encompasses a wide range of communities occurring on neutral soils (pH 5.5-7.0).

The following are indicative of neutral conditions when frequent or abundant: Alopecurus pratensis, Arrhenatherum elatius, Cynosurus cristatus, Dactylis glomerata, Deschampsia cespitosa, Festuca arundinacea and Festuca pratensis. Lolium perenne may be present, but when abundant it is indicative of improved grassland (see B4).

Hay meadows will usually fall within this category. Surveyors should be aware that after cutting, a hay meadow can have the appearance of improved pasture as the new growth comes through.

Included in neutral grassland is a range of grasslands which are inundated periodically, permanently moist, or even water-logged (but see marsh/marshy grassland, B5). Examples are:-

- inundated grassland with abundant Glyceria species, Alopecurus geniculatus, Poa trivialis and Polygonum hydropiper;
- water meadows and alluvial meadows;
- species-poor Deschampsia cespitosa grasslands and grazed Juncus effusus/Juncus inflexus - Holcus lanatus/Deschampsia cespitosa grasslands;
- wet meadows or pastures where grasses are dominant in the sward (cf. marsh/marshy grassland, B5) but with species such as Caltha palustris, Filipendula ulmaria, Valeriana species, Juncus species or Crepis paludosa present.

B3 Calcareous grassland

These grasslands are often unenclosed, not managed intensively, and occur on calcareous soils (pH above 7.0). Dryas octopetala communities are included. Where the grass is tall, the dominant species is usually either Brachypodium pinnatum or Bromus erectus, whilst species indicative of short, close-grazed and species-rich calcareous turf are Koeleria macrantha, Avenula pratensis, Sesleria albicans, Helianthemum nummularium, Sanguisorba minor and Thymus praecox.

B4 Improved grassland

Improved grasslands are those meadows and pastures which have been so affected by heavy grazing, drainage, or the application of herbicides, inorganic fertilisers, slurry or high doses or manure that they have lost many of the species which one could expect to find in an unimproved sward. They have only a very limited range of grasses and a few common forbs, mainly those demanding of nutrients and resistant to grazing. Lolium perenne, Cynosurs cristatus, Trifolium repens, Rumex acetosa, Taraxacum officinale, Bells perennis, Ranunculus acris and Ranunculus bulbosus are typical of improved grassland, while stands of dock Rumex species, common nettle Urtica dioica and thistles Cirsiurn species indicate local enrichment of the soil by grazing animals.

The following signs usually indicate substantial improvement:-

- bright green, lush and even sward, dominated by grasses (though poaching causes unevenness);
- low diversity of forb species;
- more than 50% Lolium perenne, Trifolium repens and other agricultural species.

Fields which have been reseeded in the past and have since become somewhat more diverse are included in this category, but recently reseeded monoculture grassland such as rye grass leys, with or without clover, should be classified under cultivated land (J1). Most amenity grassland should also be classified under J1.

B5 Marsh/marshy grassland

This is a diffuse category covering certain Molinia grasslands, grasslands with a high proportion of Juncus species, Carex species or Filipendula ulmaria, and wet meadows and pastures supporting communities of species such as Caltha palustris or Valeriana species, where broadleaved herbs rather than grasses,

predominate. The category differs from swamp (F1) in that the latter has a water table distinctly above the substratum for much of the year and is dominated by reed grasses or large sedges. Unlike marginal vegetation (F2), marsh/marshy grassland occurs on more or less level areas, rather than on the banks of watercourses. It differs from flush (E2) in that bryophytes are not a conspicuous component of the vegetation, also flushes always have a flow or seepage of water through them.

The following communities are included in marsh/marshy grassland:-

- vegetation with a greater than 25% cover of Molinia caerulea, on less than 0.5m of peat (cf. mire, E);
- vegetation with less than 25% dwarf shrub cover on peat less than 0.5 m deep (cf. heathland, D);
- vegetation with a greater than 25% cover of Juncus acutiflorus, J. effusus, J. inflexus, Carex species or Filipendula ulmaria, except for grazed Juncus effusus - Holcus lanatus/Deschampsia cespitosa grasslands, which should be classified under neutral grassland, B2;
- wet meadows and pastures where grasses are subordinate to forbs (cf. wet neutral grassland, B2). Such communities are often rich in plants such as Caltha palustris, Filipendula ulmaria, Valeriana species, Crepis paludosa, Dacylorhiza species, Eupatorium cannabinum, Juncus species and Carex species.

If Sphagnum is abundant, refer to the mire classification (E).

B6 Poor semi-improved grassland

Where there is a large amount of semi-improved grassland it may be useful to split this category into 'good semi-improved' and 'poor semi-improved', to facilitate re-survey of the better semi-improved grasslands at a later date. This sub-division is optional.

Good semi-improved grassland will have a reasonable diversity of herbaceous species, at least in parts of the sward, and is clearly recognisable as acid, calcareous or neutral in origin. Such grassland should be left in the semi-improved categories of acid, neutral and calcareous grassland (B1.2, 2.2 and 3.2). Poor semi-improved grassland will have a much more restricted list of species and, being more improved, it is more likely to resemble a species-poor neutral grassland, irrespective of its origin. This category (B6) should be marked SI and left uncoloured.

C Tall herb and fern

C1 Bracken

Areas dominated by Pteridium aquilinum, or with scattered patches of this species.

C2 Upland species-rich ledges

This ledge vegetation contains species such as Angelica sylvestris, Filipendula ulmaria, Solidago virgaurea, Athyrium filix-femina, Trollius europaeus and Crepis paludosa. Areas supporting this habitat are nearly always too small to map and consequently must be target noted.

C3 Other tall herb and fern

Tall ruderal (C3.1)

This category comprises stands of tall perennial or biennial dicotyledons, usually more than 25cm high, of species such as Chamenon (Chamaenerion) angustifolium, Urtica dioica and Reynoutria japonica. Dominant species should be coded. See also ephemeral/short perennial (J1).

Non-ruderal (C3.2)

Non-wooded stands of species such as Oreopteris limbosperma, Athyrium felix-femina, Dryopteris species or Luzula sylvatica should be included in this category. Dominant species should always be coded.

D Heathland

Heathland includes vegetation dominated by ericoids or dwarf gorse species, as well as 'heaths' dominated by lichens and bryophytes, dwarf forbs, Carex bigelowii or Juncus trifidus. Generally occurring on well-drained acid soils, heathland is further distinguished from mire (E) by being arbitrarily defined as occurring on peat less than 0.5m thick (but see flood-plain mire E3.3). Dominant species should always be coded. See also dune heath (H6.6) and coastal heathland (H8.5).

D1 Dry dwarf shrub heath

Vegetation with greater than 25% cover of ericoids or small gorse species in relatively dry situations forms this category. Calluna vulgaris, Vaccinium myrtillus, Erica cinerea, Ulex minor and Ulex gallii are typical of lowland dry dwarf shrub heath, whilst Empetrum nigrum, Empetrum hennaphroditum, Arctostaphylos uva-ursi and Vaccinium vitis-idaea are found in upland heaths. Acid heaths usually occur on deep podsols developed on base-deficient sands, gravels and clays. Basic heaths are much more restricted in extent, and may be recognised by the presence of herbs characteristic of chalk grassland and open habitats. See also wet dwarf shrub heath (D2), dry heath/acid grassland mosaic (D5) and dry modified bog (E1.4). Damp Calluna heath with

APPENDIX 13

arwickshire Coventry and Solihull - Biodiversity Impact Assessment Calculat

v. 18.3 08/08/2014
Amendment from v18.2 only affects green roofs, for other habitats v18.2 still usable.
Please fill in both tables

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Result

Local Planning Authority:	
Site name:	GDE (as submitted)
Planning application reference number:	
Assessor:	
Date:	

Please do not edit the formulae or structure
To condense the form for display hide vacant rows, do not delete them
If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services

	Existing habitats on site Please enter all habitats within the site boundary		**Habitat distinctiveness**		**Habitat condition**		**Habitat Biodiversity Value**						
							Habitats to be retained with no change within		**Habitats to be retained and enhanced within**		**Habitats to be lost within development**		
T. Note	code	Phase 1 habitat description	*Habitat area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	***Comment***
		Direct Impacts and retained habitats			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H	
	A21	Woodland: Dense continuous scrub	3.72	Medium-Low	3	poor	1			0.15	0.45	3.57	**10.71**	
	B22	Grassland: Semi-improved neutral grassland	3.86	Medium	4	Good	3			1.58	18.96	2.27	**27.24**	
	B21	Grassland: Unimproved neutral grassland	6.08	High	6	Moderate	2			5.12	61.44	0.96	**11.52**	
	G1	Wetland: Standing water	0.03	High	6	moderate	2			0.01	0.12	0.02	**0.24**	
	A111	Woodland: Broad-leaved semi-natural woodland	0.46	High	6	moderate	2			0.46	5.52			
	F1	Wetland: Swamp	0.10	High	6	poor	1			0.10	0.60			
	C31	Other: Tall ruderal	0.49	Medium-Low	3	moderate	2					0.49	**2.94**	
	B5	Grassland: Marsh / Marshy grassland	0.85	High	6	poor	1			0.13	0.78	0.72	**4.32**	
	B5	Grassland: Marsh / Marshy grassland	0.17	High	6	moderate	2			0.00		0.17	**2.04**	
		Total	15.75				Total	0.00	0.00	7.55	87.87	8.20	59.01	J
													∑D + ∑F + ∑H	
											Site habitat biodiversity value		146.88	

Before/after impact	**Indirect Negative Impacts** Including off site habitats	K					Value of loss from indirect impacts K x A x B = Li, Lii	Li - Lii
Befor								
After								
Befor								
After								
Befor								
After								
Befor								
After								
Befor								
After								
	Total	0.00					M	0.00
								HIS = J + M
							Habitat Impact Score (HI	59.01

APPENDIX 14

abitat Impact Score (HI 59.01

CAUTION - Destruction of habitats of high distinctiveness, e.g. lowland meadow or ancient woodland, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided? Any unavoidable loss of habitats of high distinctiveness must be replaced like-for-like.

	Proposed habitats on site (Onsite mitigation)			Target habitats distinctiveness		Target habitat condition			Time till target condition		Difficulty of creation / restoration		Habitat biodiversity value	
T. Note	code	Phase 1 habitat description	Area (ha)	ss	Score	Condition	Score		(years)	Score	Difficulty	Score		Comm
		Habitat Creation	N		O		P			Q		R	(N x O x P) / Q / R	
	n/a	Built Environment: Buildings/hardstanding	3.49	none	0	Poor	1		5 years	1.2	Low	1	**0.00**	
	n/a	Built Environment: Gardens (lawn and planting)	1.50	Low	2	Poor	1		5 years	1.2	Low	1	**2.50**	
	B21	Grassland: Semi-improved neutral grassland	3.15	Medium	4	Moderate	2		10 years	1.4	Medium	1.5	**12.00**	
	G1	Wetland: Standing water	0.04	High	6	Good	3		10 years	1.4	Medium	1.5	**0.34**	
		Total	**8.18**	ERROR - [illegible]										
		Habitat Enhancement						Existing value S (= F					((N x O x P) - S) / Q / R	
	A111	Woodland: Broad-leaved semi-natural woodland	0.46	High	6	Good	3	**5.50**	25 years	2.4	Low	1	**1.16**	
	B5	Grassland: Marsh / Marshy grassland	0.13	High	6	Moderate	2	**0.81**	5 years	1.2	Medium	1.5	**0.42**	
	B21	Grassland: Unimproved neutral grassland	6.70	High	6	Moderate	2	**26.26**	10 years	1.4	Low	1	**38.67**	
	G1	Wetland: Standing water	0.01	High	6	Good	3	**0.14**	5 years	1.2	Medium	1.5	**0.02**	
	F1	Wetland: Swamp	0.10	High	6	Moderate	2	**0.57**	5 years	1.2	Medium	1.5	**0.35**	
	A22	Woodland: Scattered scrub	0.15	Medium	4	Good	3	**0.46**	10 years	1.4	Low	1	**0.96**	
		Total	**7.55**											

ERROR - [illegible]

Trading down correction value	-2.50	
Habitat Mitigation Score (HMS)	**53.92**	
	HBIS = HMS -	
Habitat Biodiversity Impact Score	-5.09	Loss
Percentage of biodiversity impact loss	8.63	

KEY	
	No action required

APPENDIX 15

arwickshire Coventry and Solihull - Biodiversity Impact Assessment Calculat

v. 18.3 08/08/2014

Amendment from v18.2 only affects green roofs, for other habitats v18.2

Please fill in both tables

KEY	
	No action required
	Enter value
	Drop-down menu
	Calculation
	Automatic lookup
	Result

Local Planning Authority:	
Site name:	GDE (as submitted)
Planning application reference number:	
Assessor:	
Date:	

Please do not edit the formulae or structure
To condense the form for display hide vacant rows, do not delete them
If additional rows are required, or to provide feedback on the calculator please contact WCC Ecological Services

		Existing habitats on site Please enter all habitats within the site boundary		**Habitat distinctiveness**		**Habitat condition**		**Habitat Biodiversity Value** **Habitats to be retained with no change within**		**Habitats to be retained and enhanced within**		**Habitats to be lost within development**		
T. Note	code	Phase 1 habitat description	*Habitat area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Comment*
		Direct Impacts and retained habitats			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H	
	A21	Woodland: Dense continuous scrub	3.72	Medium-Low	3	poor	1			0.15	0.45	3.57	**10.71**	
	B22	Grassland: Semi-improved neutral grassland	3.85	Medium	4	Good	3			1.58	18.96	2.27	**27.24**	
	B21	Grassland: Unimproved neutral grassland	6.08	High	6	Moderate	2			5.12	61.44	0.96	**11.52**	
	G1	Wetland: Standing water	0.03	High	6	moderate	2			0.01	0.12	0.02	**0.24**	
	A111	Woodland: Broad-leaved semi-natural woodland	0.46	High	6	moderate	2			0.46	5.52			
	F1	Wetland: Swamp	0.10	High	6	poor	1			0.10	0.60			
	C31	Other: Tall ruderal	0.49	Medium-Low	3	moderate	2					0.49	**2.94**	
	B5	Grassland: Marsh / Marshy grassland	0.85	High	6	poor	1			0.13	0.78	0.72	**4.32**	
	B5	Grassland: Marsh / Marshy grassland	0.17	High	6	moderate	2			0.00		0.17	**2.04**	
		Total	15.75				Total	0.00	0.00	7.55	87.87	8.20	59.01	J
													∑D + ∑F + ∑H	
											Site habitat biodiversity value		146.88	

Before/after impact	**Indirect Negative Impacts** Including off site habitats	K					Value of loss from indirect impacts K x A x B = Li, Lii	Li - Lii
Befor	Woodland: Dense continuous scrub	1.89	Medium-Low	3	Poor	1	**5.67**	**0.00**
After					Poor	1	**5.67**	
Befor	Grassland: Semi-improved neutral grassland	1.49	Medium	4	Good	3	**17.88**	**5.96**
After					Moderate	2	**11.92**	
Befor	Wetland: Standing water	0.01	High	6	Moderate	2	**0.12**	**0.06**
After					Poor	1	**0.06**	
Befor	Other: Tall ruderal	0.44	Medium-Low	3	Moderate	2	**2.64**	**1.32**
After					Poor	1	**1.32**	
Befor								
After								
	Total	3.83				M		7.34
								HIS = J + M
							abitat Impact Score (Hi	66.35

CAUTION - Destruction of habitats of high distinctiveness, e.g. lowland meadow or ancient woodland, may be against local policy. Has the mitigation hierarchy been followed, can impact to these habitats be avoided? Any unavoidable loss of habitats of high distinctiveness must be replaced like-for-like.

Any unavoidable loss of habitats of high distinctiveness must be replaced like-for-like.

T. Note	Proposed habitats on site (Onsite mitigation)			Target habitats distinctiveness		Target habitat condition			Time till target condition		Difficulty of creation / restoration		Habitat biodiversity value	Comm
	code	Phase 1 habitat description	*Area (ha)*	*ss*	*Score*	*Condition*	*Score*		*(years)*	*Score*	*Difficulty*	*Score*		
		Habitat Creation	N		O		P			Q		R	(N x O x P) / Q / R	
	n/a	Built Environment: Buildings/hardstanding	3.48	none	0	Poor	1		5 years	1.2	Low	1	**0.00**	
	n/a	Built Environment: Gardens (lawn and planting)	1.50	Low	2	Poor	1		5 years	1.2	Low	1	**2.50**	
	B21	Grassland: Semi-improved neutral grassland	3.15	Medium	4	Moderate	2		10 years	1.4	Medium	1.5	**12.00**	
	G1	Wetland: Standing water	0.04	High	6	Good	3		10 years	1.4	Medium	1.5	**0.34**	
		Total	**8.18**	[illegible]										
		Habitat Enhancement						Existing value S (= F					((N x O x P) - S) / Q / R	
	A111	Woodland: Broad-leaved semi-natural woodland	0.27	High	6	Good	3	**5.50**	25 years	2.4	Low	1	**-0.27**	
	B5	Grassland: Marsh / Marshy grassland	0.13	High	6	Moderate	2	**0.81**	5 years	1.2	Medium	1.5	**0.42**	
	B21	Grassland: Unimproved neutral grassland	5.66	High	6	Moderate	2	**26.26**	10 years	1.4	Low	1	**29.76**	
	G1	Wetland: Standing water	0.01	High	6	Good	3	**0.14**	5 years	1.2	Medium	1.5	**0.02**	
	F1	Wetland: Swamp	0.10	High	6	Moderate	2	**0.57**	5 years	1.2	Medium	1.5	**0.35**	
	A22	Woodland: Scattered scrub	1.07	Medium	4	Good	3	**0.46**	10 years	1.4	Low	1	**8.84**	
		Total	**7.24**	[illegible] ...nced, above								Trading down correction value	-2.50	
				[illegible]								**Habitat Mitigation Score (HMS)**	**51.47**	
													HBIS = HMS -	
												Habitat Biodiversity Impact Score	[illegible]	Loss
												Percentage of biodiversity impact loss	22.43	

KEY	
	No action required
	Action required
	Drop-down menu
	Calculation
	Automatic lookup
	Overall Result
	Loss to biodiversity
	Gain to biodiversity

APPENDIX 16

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BY E-MAIL ONLY

20th October 2014
Our Ref: DW/Gavray/CDC - 201014

Dear Rebecca

TOWN AND COUNTRY PLANNING ACT 1990 &
TCPA (ASSESSMENT OF ENVIRONMENTAL IMPACTS) REGULATIONS 2011
SCOPING APPLICATIONS 14/00008/SCOP (Gavray Drive East) AND 14/00009/SCOP (Gavray Drive West)
CONSULTATION RESPONSE

Thank you for your letter of 1st October inviting comments on the above submitted scoping applications. I have reviewed the applicant's scoping reports and related documentation, which I note to be little changed from the single report submitted in support of scoping application 14/00001/SCOP in Spring 2014. The main change appears to be that Gallagher Estates have now decided, apparently in response to advice from CDC, to submit separate applications for the areas of the site west and east of the Langford Brook. The applicant also cites emerging policy support for the applications, despite the fact that the quantum of housing they propose exceeds the limit envisaged by the Council in the draft policy and the fact that the draft policy is itself the subject of formal examination, which may see it modified in line with the multiple objections it has elicited.

On the basis that relatively little else has changed other than the fission of one application into two, I need not repeat all of the comments I made in March 2014 in response to 14/00001/SCOP. It should be noted however that the following issues remain:

- While the botanical survey information now presented remains a vast improvement on previous assessments, it remains disappointing that it still omits consideration of the remaining pockets of grassland within Field 2, as mapped on plan EDP1 submitted with the supporting EDP report, and which clearly have the same 'unimproved' origins as much of the grassland within the LWS, albeit badly affected by scrub invasion in recent years. This is an important point in assessing the merits of the latest masterplan.
- On butterflies, as previously, I will defer to the national and local experts from Butterfly Conservation, but I would make the observation that a further section 41 species, grizzled skipper, is inexplicably omitted from the baseline despite having been recorded by a local party last year and I believe despite photographic confirmation having been sent to EDP by that individual.

I note that the previous failure to conduct overnight moth-trapping surveys, despite these being specifically advised in many previous consultations dating back many years, is now stated as to be remedied in 2014. This is an important step forward as moths remain a significantly under-studied species on this site, and the recent discovery of the day-flying forester moth, also a priority species under section 41 of the NERC Act, clearly signposts that there could be substantial as yet undocumented interest associated with this group. This is an important point in assessing

the merits of the proposed scope of the EIA and the latest masterplan. However if additional and remedial survey work on moths has now been completed, as it presumably must have been by this point in the year, it is unclear why this has not been included along with all the other surveys within the application documentation. Assuming the work has been carried out to an adequate standard, this will assist with correcting the flawed and inconsistent approach to evaluation of invertebrates as a collective group that was raised as a concern in the previous scoping report. Indeed I note that the applicant has responded to such criticism by raising the status of the overall invertebrate assemblage to a 'valued ecological receptor' in recognition of the previous oversight.

However the approach of 'scoping out' elements "not currently considered to be VER's" remains. I previously indicated that this is a non-standard approach that is inherently challengeable in EIA terms as it risks failing to alert decision makers to 'likely significant effects'. Despite the elevation of the 'District' level of importance receptor of invertebrates to a 'VER' in response to this criticism, the intention still appears to be to scope out other receptors valued at District level (e.g. the overall breeding bird assemblage). As previously stated, this could mean that District level impacts falling within the ambit of 'likely significant effects' in EIA terms, and which will be integral to the process of assessing local plan policy compliance in any event, will fail to be identified in the ES, and cannot then be taken into account by decision makers. This could undermine the validity and legal robustness of the EIA. As stated previously, I would strongly recommend that the approach advocated by the Chartered Institute of Ecology and Environmental Management (CIEEM) and as set out in their Guidelines for Ecological Impact Assessment is more fully and properly followed, as indeed it is stated will be the case elsewhere in the scoping report. This absolutely does not mean that every last receptor needs to be included in the assessment, but it does mean that receptors clearly identified as of conservation importance (e.g. species of Principal Importance further to sections 40 and 41 of the NERC Act, including several bird species and harvest mouse) should not be artificially set aside in the manner being proposed.

As previously stated, while the surveys for amphibians, breeding and wintering birds and bats presented in the 2013 report are subject to various omissions and/or limitations, on the whole these are minor and I am content that overall the work provides a reasonably representative baseline for these groups.

I therefore consider that, subject to the above comments, and seeing the methodology and results of the 2014 moth surveys in particular, the ecological baseline is broadly sufficient for EIA purposes. The approach to assessment, using this information, does however still need to be amended to be in line with minimum industry standards and I advise that the Council seeks confirmation on this point in order to avoid a flawed and legally challengeable EIA.

Turning aside from ecology, you will recall that in my responses to both 13/00001/SCOP and 14/00001/SCOP, I also offered comments on other EIA disciplines. The result of any further work on these disciplines is not included in the applicant's scoping report, although comments are provided on the approach that they intend to take to each. I repeat the comments on each of these as follows:

Air Quality – no comments to make
Arboriculture – I welcome the intention to map root protection zones for trees. I note that the stated intention is for RPZs for both trees and hedgerows to be respected in designing the development interface with retained hedgerow and tree features (see para 3.4 of the scoping report). In this context I would observe that the arboricultural survey needs also to map RPZs for hedgerows as well as trees.
Archaeology and Heritage – I previously commented that the Environmental Statement submitted in support of a previous industrial proposal classed the relict Mediaeval hedge and green lane pattern in the eastern part of the site (including one hedgerow assessed to be of Saxon age), together with the extent of intact ridge and furrow, to be a 'regionally significant' historic landscape. In this context I welcome the statements at 5.20 and 5.25 which appear to recognise the presence of historic landscape receptors and commit to their inclusion in the assessment process.
Hydrology and Drainage – I am concerned that the statement at paragraph 5.38 suggests that all surface water drainage will be directed to the public sewer network, after appropriate attenuation. Although mention is now made of SUDS, there still does not appear to be any intention to make provision for upholding existing groundwater

infiltration rates, which raises the possibility that the hydrological regime underpinning the grassland habitats of conservation importance on the site could be subject to derogation. The applicant previously commissioned a study from the Wetlands Advisory Service that established a good baseline understanding of the existing hydrological regime. It is crucially important to the future of the retained habitats that this existing regime is protected. My previous (2013) comments on this aspect of the EIA therefore still stand, so I repeat them here:

> *"FRA should be carried out in accordance with the latest flood risk models adjusted for climate change and should include details of any compensation excavations proposed, including assessment of alternatives (e.g. to developing in the flood zone).*
>
> *Details will need to be provided as to how on-site attenuation of surface water will be designed and managed in accordance with best practice SUDS principles to replicate existing Greenfield rates of run-off from the site to avoid increasing downstream flood risk (including within Langford Village, but also in respect of downstream SSSIs identified as a concern by Natural England).*
>
> *Details will need to be provided as to how surface water quality will be upheld, including through use of interception an filtration systems and through biological treatment in 'open' SUDS systems.*
>
> *The existing hydrological regimes supporting lowland flood meadow, retained hedgerows and ponds should be understood through appropriate survey information and details set out as to how these would be replicated, including compensatory provision for loss of inputs from hard development and/or from re-direction of established flows."*

Landscape and Visual Amenity – no comments to make
Noise – no comments to make
Services and Utilities – no comments to make
Socio-economics – no comments to make
Transportation and Access – I welcome the commitment to assess construction traffic movements to rectify the omission of this important potential impact source from the previous ES.

There are two other areas that I believe the EIA needs to cover, as set out in my response to 13/00001/SCOP, but for which there is no specific mention in the latest scoping report. I therefore repeat the comments here:

Sustainability

As well as 'locational' sustainability (including proximity to facilities and likely transport modes of residents), this section of the ES needs to cover matters such as the source of building materials – in particular the type and source of primary aggregate required for any land raising.

Details of the cut and fill balance, including in particular the likely requirements for export of surplus material from the site, also need to be provided (amongst other things to inform construction traffic assessments).

Cumulative Impacts and consideration of alternatives

The EIA process needs to include proper consideration of alternatives, including reduced scale or altered configuration of development within the site, over and above alternative sites and in the context of need. It is also crucial, in the context of the current rapid expansion of Bicester and pressure on the existing transport, drainage and sewerage infrastructure, that cumulative effects are considered – not only of recently completed developments but of those 'in planning' or envisaged as part of CDCs' Bicester masterplan.

Achieving 'not net loss' and compliance with national policy

I hope the above comments are helpful in terms of setting the scope for the forthcoming EIAs of the applicant's revised development proposals. I note that in terms of the progression of those proposals beyond the indicative masterplan stage, the 'split' masterplans provided do not take us further forward from the position in March this year. Indeed, the applicant's intended site yield appears to have gone up, despite the apparent acceptance that this is a site with particular and weighty constraints. Because the information base on ecology is now much better known, it is surprising that the applicants consider that 160 dwellings could be delivered on the land east of Langford Brook. The source of this conflict between the ambitions of the applicant and the need to achieve a form of development that is sustainable in the context of the NPPF, may well be continuing unaddressed flaws in the evaluation of the baseline survey information. Despite concerns having been raised about this issue previously in respect of 14/00001/SCOP, I note that the same problems remain.

To ensure national and local policy compliance the objective of the masterplan has to be to achieve 'no net loss' of biodiversity and 'net gain' where possible. On this sensitive site, this will only be achieved by a combination of retention of critical habitat resources, managing the tension between development proximity and optimal management, and putting the mechanisms in place as part of the development package to deliver and sustain the optimum management of the site into the long term.

There are no defined systems for 'measuring' net loss or net gain, but using the emerging Defra metrics that inform the pilot 'biodiversity offsetting' system, and assuming optimum management is delivered and sustained for retained habitats, the current indicative masterplan still indicates a small shortfall in equity of loss versus gain.
Sensitivity testing suggests that this shortfall would be remedied by an element of further 'pull back' from the boundaries of the Local Wildlife Site in the eastern part of the site, in particular in terms of Fields 3 and 2, which have intrinsic interests complementing the LWS and which assist its connectivity eastwards to the wider River Ray Conservation Target Area. I note that these fields fall within the area subject to the CTA policy in any event.
If optimum (grazing and hay-cutting) management of the retained LWS is to be achieved, there is also a need to ensure that such management is a viable proposition. In this context, there is a need for on-site areas of semi-improved grassland, such as that within Fields 8, 9 and 3, to be available as a place to rotate grazing animals.
It is in no-one's interests to preclude public access and use of the retained habitats – at the end of the day this site is, and should remain, a fantastic asset for the people of Bicester. But in order for it to remain so, formal open space uses, or uses that are likely to generate pressure from future residents to manage the site in a certain way (e.g. informal kick-about areas) will not be compatible uses for the retained habitats. Conversely, the larger retained area relative to neighbouring development will, assuming the delivery of optimum management, improve the resilience of the retained LWS to informal uses, rendering jogging, dog-walking and passive recreation (e.g. around field edges on mown paths) able to be accommodated without significant detriment. Indeed the presence of this asset on the doorstep is likely to have a highly positive effect on values and by extension the sense of local ownership and stewardship and the motivation to sustain it.

I hope these comments are useful.

Best regards

Dominic Woodfield CEcol CEnv MCIEEM
Director