Appeal Ref: APP/Y0435/W/20/3251121
Application Ref: 19/01818/OUT

South Caldecotte

HB3/3
Plans and Appendices to

Proof of Evidence in respect of Ecology & Nature Conservation

By

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BA (Hons), MA (Oxon), MSc, CEcol, CEnv, MCIEEM

July 2020

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Quality Management	
Client:	Hampton Brook
Project:	South Caldecotte
Report Title:	HB3/3 Plans and Appendices to Proof of Evidence in respect of Ecology & Nature Conservation
Project Number:	1005263
File Reference:	5263 Proof P&A vf
Date:	28/07/2020

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Plan 5263/EN1:

Ecological Mitigation and Enhancements

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South Caldecotte — PROJECT

Ecological Mitigation and Enhancements — TITLE

5263/EN1 — DRAWING NO.

\- — REV.

July 2020 — DATE

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Plan 5263/AP1:

Aerial Photographs of Fields F3 and F4

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South Caldecotte — PROJECT

Aerial Photographs of Fields F3 and F4 between 2007 and 2018 — TITLE

5263/AP1 — DRAWING NO.

\- — REV.

July 2020 — DATE

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Plan 5263/LM1:

Lowland Meadow within Milton Keynes

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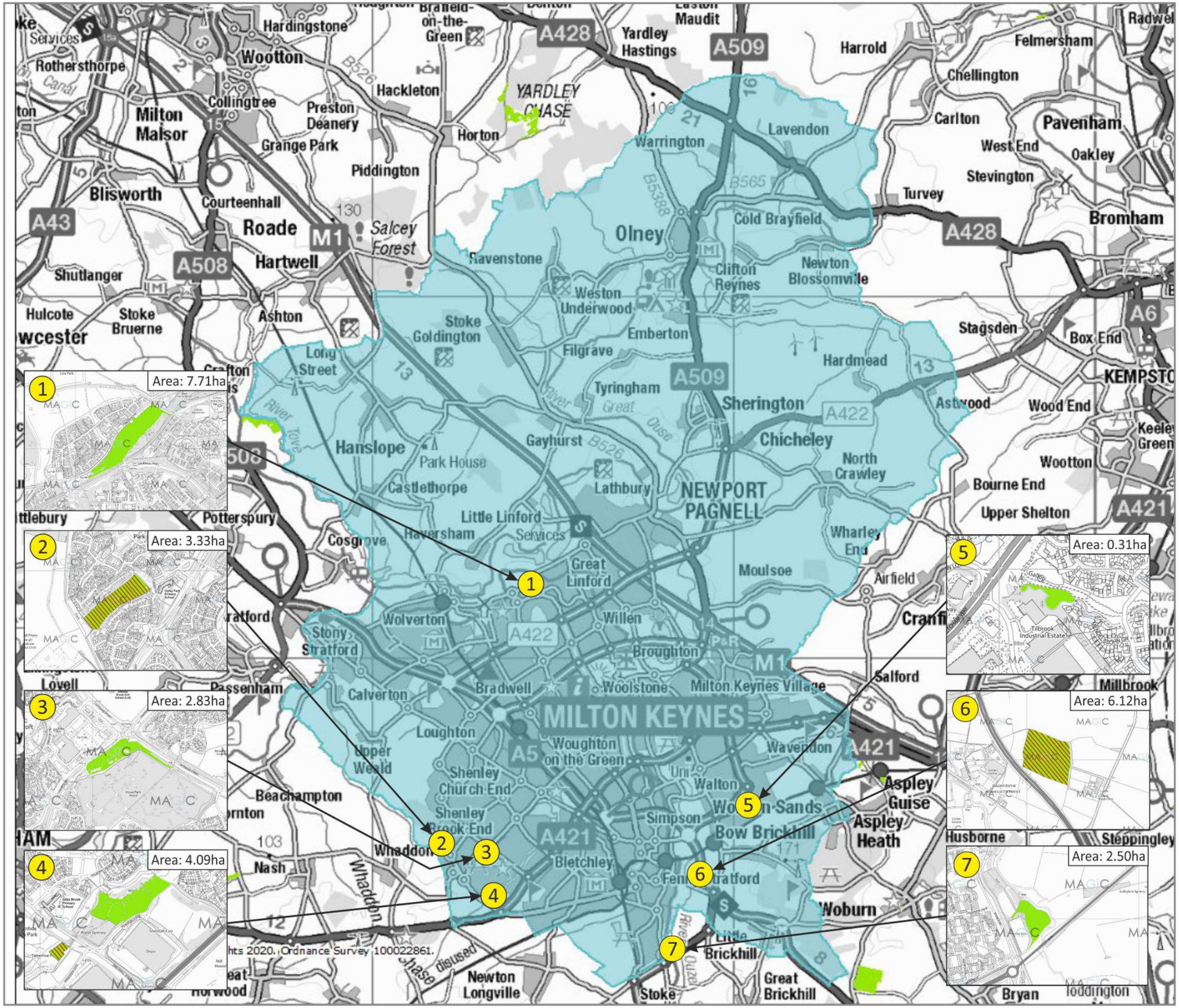

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Appendix 5263/AB1:

Illustrative Landscape Strategy

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NATIVE TREES & STRUCTURAL PLANTING - *Trees planting in groups, larger blocks and random drifts to provide varied structural edge habitats and robust landscape buffers. The native tree and structural planting will be primarily located around the site boundaries to create wide green buffers, and also internally breaking up the various plots to link the overall green infrastructure and provide a green setting that assists to integrate the built form. Native tree species will include standards, whips and transplants and will include:*

Field Maple	*Acer campestre*
Common Alder	*Alnus glutinosa*
Downy Birch	*Betula pubescens*
Hornbeam	*Carpinus betulus*
Hawthorn	*Crataegus monogyna*
Crab Apple	*Malus sylvestris*
Wild Cherry	*Prunus avium*
Bird Cherry	*Prunus padus*
Blackthorn	*Prunus spinosa*
Pendunculate Oak	*Quercus robur*
Goat Willow	*Salix caprea*
Rowan	*Sorbus aucuparia*

FEATURE INTERNAL & ROADSIDE TREE PLANTING - *Feature tree and ornamental planting along the primary and secondary roads throughout the development will aim to tie in with species used within South Caldecotte to the north, whilst also creating a high quality enviornment to the development. A variation in species for each plot, zone or type of area will help to provide variation and separate character areas within the development. The use of a degree of semi-mature tree planting will provide 3-dimensional depth and instant impact to the green infrastructure. Feature ornamental species will include:*

Acer campestre 'Streetwise'
Betula pendula jacquemontii
Carpinus betulus 'Frans Fontaine'
Liquidambar styraciflua
Prunus avium 'Plena'
Prunus x subhirtella 'Autumnalis'
Sorbus aria 'Lutescens'
Tilia cordata 'Greenspire'

NATIVE HEDGEROWS & WOODLAND EDGE - *Planting using a mix of native hedgerow and shrub species to increase the diversity of hedgerows and woodland edges and provide foraging opportunities for local wildlife. Hedgerow flowering/fruiting species will include:*

Dogwood	*Cornus sanguinea*
Hazel	*Corylus avellana*
Hawthorn	*Crataegus monogyna*
Holly	*Ilex aquifolium*
Wild Privet	*Ligustrum vulgare*
Blackthorn	*Prunus spinosa*
Dog Rose	*Rosa canina*
Common Elder	*Sambucus nigra*
Guelder Rose	*Viburnum opulus*

WILDFLOWER MEADOWS - *Wildflower Meadow grass mix is sown within sections along the boundaries to provide further biodiveristy and ecological benefits. Recommend use of species rich meadow grassland such as Emorsgate EM3 'Special General Purpose Meadow Mixture'*

WETLAND GRASSLAND & VEGETATION - *Appropriate wetland grassland and vegetation will be planted around the existing / proposed watercourse, swales and attenuation areas to enhance the wildlife value. Recommended use of meadow grassland mix along pond edges such as Emorsgate EM8 'Meadow Mixture for Wetlands.*

0m 50m 100m 200m

Key:

- Application Site Boundary
- Existing Vegetation Structure
- Proposed Tree Planting
- Proposed Hedgrows and Shrub Planting
- Proposed Native Structural Woodland Planting
- Proposed Swale and Wetland Planting
- Proposed Wildflower Meadow
- Proposed Marginal Planting
- Pedestrian Links & Public Right of Way Network
- Redway (Shared Cycle & Footpath)
- Landmark with Feature Landscaping / Public Art
- Gas Pipe & 3m Easement (No Tree Planting)
- 9m IDB Easement (No Planting)
- Proposed Highway Ditch

REV	DATE	NOTE	DRAWN	CHK'D
A	03.07.19	Updated to client comments and IDB easement.	SB	CJ

REVISIONS

aspect landscape planning

TITLE
Land at South Caldecotte
Illustrative Landscape Strategy Plan

CLIENT
HB (South Caldecotte) Ltd

SCALE	DATE	DRAWN	CHK'D
1:5,000@A3	JUN 2019	SB	CJ

DRAWING NUMBER	REVISION
6340 / LSP / ASP4	A

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Appendix 5263/AB2:

Extract: A Preliminary Botanical Survey and Assessment of Unimproved Grassland in Buckinghamshire (G. Steven; English Nature, 1993)

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P

ENGLISH NATURE

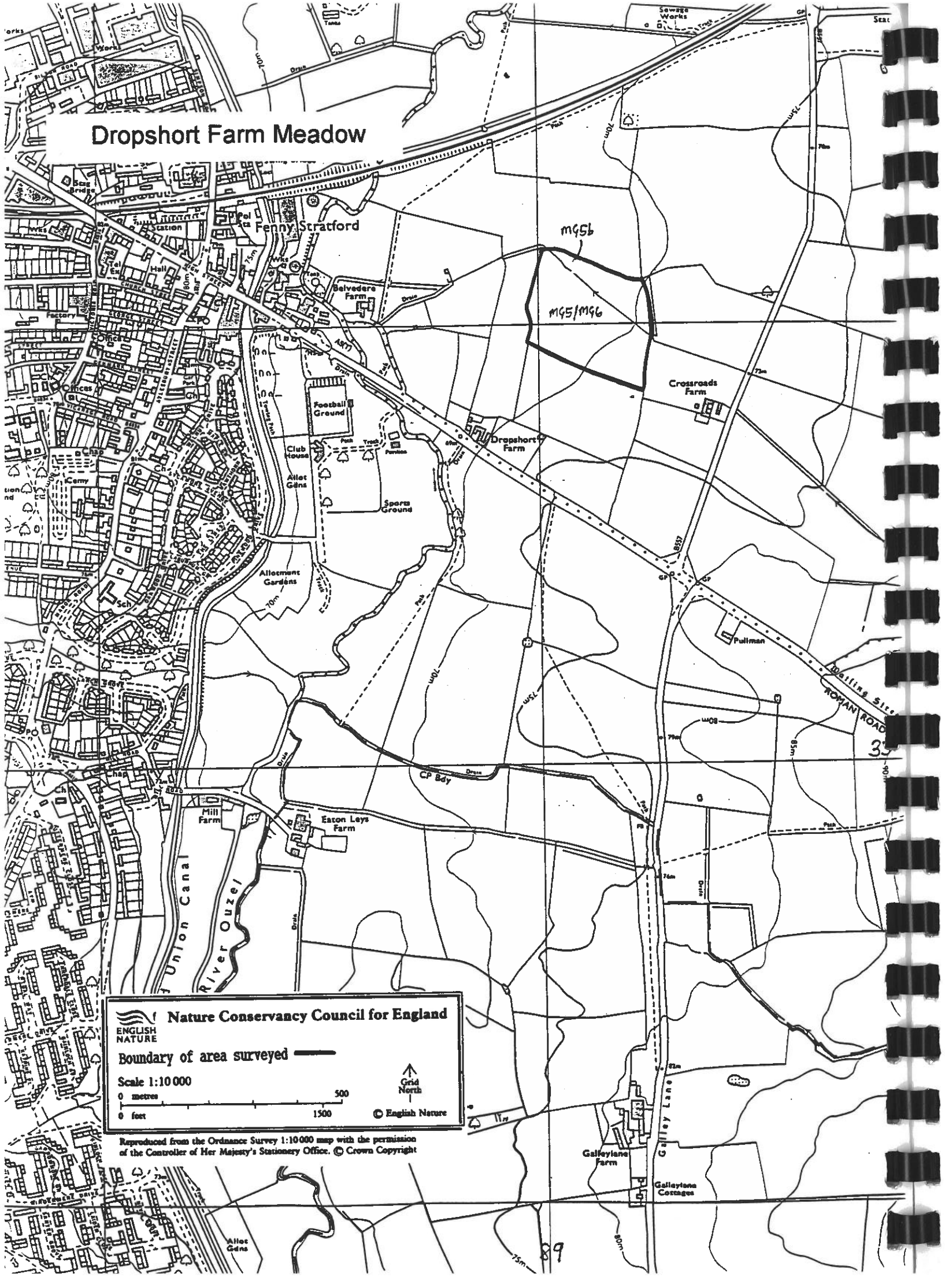
Information and Library Services
Nature Conservancy Council for England
Northminster House
Peterborough PE 1UA
Telephone (0733) 340345 Fax (0733) 68834

A PRELIMINARY BOTANICAL SURVEY AND ASSESSMENT OF UNIMPROVED GRASSLAND IN BUCKINGHAMSHIRE

G Steven

1993

English Nature
Foxhold House
Crookham Common
Newbury
Berkshire



Dropshort Farm, Milton Keynes. SP891340 **Area 6.4 ha**

A field on the alluvial plain of the River Ouzel on the south eastern periphery of Milton Keynes. The grassland has been degraded through nutrient input, but retains some botanical interest in the presence of a range of species characteristic of the moderately calcareous soils of the area including *Briza media*, *Ranunculus bulbosus* and *Galium verum*. *Sanguisorba officinalis* is present, but rare. A few large ant hills are scattered through the field. Management is by low intensity cattle grazing.

The most frequent grasses are *Cynosurus cristatus*, *Anthoxanthum odoratum*, *Festuca rubra* and *Holcus lanatus*. There is occasional *Alopecurus pratensis*, *Lolium perenne*, *Arrhenatherum elatius*, *Trisetum flavescens* and *Hordeum secalinum*. *Centaurea nigra*, *Ranunculus acris*, *Lotus corniculatus*, *Trifolium pratense* and *Plantago lanceolata* are very frequent with smaller amounts of *Ranunculus bulbosus*, *Galium verum* and Conopodium majus. The calcicolous component in the community is best developed at the northern end of the field where there is occasional *Briza media* and *Trisetum* is quite frequent. A few individuals of *Sanguisorba officinalis* were noted here. The east side of the field has localised areas of more sandy soil where *Hypochaeris radicata* and *Leucanthemum vulgare* are frequent.

No quadrats were recorded, but the community is likely to have a reasonably close similarity to NVC type MG5b (*Centaurea nigra-Cynosurus cristatus* pasture: *Galium verum* sub-community) although the low diversity of much of the field suggests affinities to MG6 (*Lolium perenne-Cynosurus cristatus* pasture).

Considering the relatively low diversity of the field it is of local conservation interest only.

Date of survey: 11 June 1993

4. DISCUSSION

The amount of grassland recorded

A total of 99.4 hectares of grassland and flush communities was recorded. The area of all the communities is shown in Appendix 1. Of this only 37.9 hectares was classified as communities of high conservation interest (Table 1). An additional 26.4 hectares was classified as intermediate between MG5 and MG6 which represents grassland of moderate diversity which, in many cases, is of local conservation interest in supporting locally uncommon plants. In comparison, the intensive neutral grassland survey in north Wiltshire (Darby and Steven, in prep.) recorded 166 hectares of MG4 and MG5 while 180 hectares of MG5 and U4 were recorded in East Sussex (Steven, 1990).

Table 1: The amount of high quality grassland recorded (hectares)

NVC Type	Area
MG4	8.4
MG5	18.8
U4	1.2
M22	3.2
M23	6.3

The representation of grassland types

MG4

The survey emphasises the extreme rarity of MG4 in Buckinghamshire. It was recorded at two sites, Oxley Mead and Long Herdon Meadows. MG4 is a grassland type which is particularly sensitive to management and is strongly dependent upon a long continuity of traditional management. However, it is quite possible that further examples of the community survive in the county. There are many areas of suitable habitat for the community and the clay vales of south central England represent its centre of distribution, with examples in Oxfordshire at Pixey and Yarnton Meads SSSI, and in Wiltshire at North Meadow NNR and Upper Waterhay Meadow SSSI. Several sites with relict populations of the characteristic plants of MG4 were encountered in the course of the survey suggesting that the community was widespread in Buckinghamshire in the past. Further searching may bring other examples to light.

Of the known examples, Long Herdon Meadows is mostly rather atypical as there is an abundance of rushes with only a small area of more typical MG4. Oxley Mead represents a very good example of MG4 similar in species composition to sites such as North Meadow. Its relatively small size renders it highly vulnerable to changes in the local environment, however.

MG5 and M22

Over most of the clay vale the characteristic unimproved grassland type appears to be MG5b or moderately calcicolous MG5a with more localised areas of MG5c on slightly acidic substrates. Sloping sites typically have areas of M22. A suite of locally uncommon plants appears to be associated with these communities including *Alchemilla filicaulis, Ophioglossum vulgatum, Cirsium acaule, Orchis morio, Stachys officinalis* and *Valeriana dioica*. MG5 is a widespread community nationally, but the *Galium verum* and *Danthonia decumbens* sub-communities (MG5b and MG5c) are very scarce and highly fragmented. Of the sites surveyed only Pilch Fields and Tingewick Meadows could be regarded as exhibiting good examples of the characteristic range of grassland types on sloping sites with flushes. Barnhill Farm and Soulbury Meadow also have this range of communities, but are somewhat degraded. Good examples of MG5 on more or less flat ground are represented by Shabbington Meadows and Pokers Pond Meadow. Other slightly degraded examples are at Rushbeds Wood Meadows and Dropshort Farm Meadow. It is highly likely that MG5 survives at many other

sites as further examples were encountered at Quainton (a very species-rich and strongly calcicolous, but very small site) and adjacent to Grendon Wood. A small site at Wing surveyed by Payne (1987) also appears to support MG5b.

U4

This community was only recorded at one site, Moorend Common, but other areas may be present at other sites in the Chilterns such as Coombe Hill SSSI, Stoke Common SSSI and Black Park SSSI. Any remaining examples are likely to be small, however, as the community is susceptible to tree and bracken invasion.

Grassland of low conservation interest in designated areas

Some of the grassland currently included in SSSIs is of low conservation interest, At present the grassland at Kingcup Meadows SSSI is of little conservation interest as it is predominantly MG9, but there is potential for improvement through changes in management, perhaps by encouraging the spread of M23. Grassland of interest occupies a very small part of Old Rectory Meadows SSSI, although the site also has fen communities of interest. Finemere wood SSSI is designated primarily for its woodland interest, but the grassland included in the site is of marginal conservation interest with only a very small species-rich remnant. Similarly, Foxcote Reservoir SSSI is designated primarily as a wintering wildfowl site and the grassland included has low conservation interest apart from the occurrence of a large population of *Ophioglossum vulgatum.*

Summary assessment of the conservation interest and current management of sites

Barnhill Farm: The grassland interest is confined to a very small remnant of MG5b although there are also large areas of semi-improved grassland. Additional interest is provided by areas of M22. The grassland is well managed, but damage by vehicles is evident in the M22.

Dropshort Farm: Includes a moderately diverse area of MG5b, but most of the field has relatively low diversity (due to nutrient input?). Management is adequate.

Finemere Wood: The grassland interest is confined to a very small remnant of MG5b. The small size and lack of management make the site highly vulnerable to scrub encroachment.

Foxcote Reservoir: Only a small proportion of the grassland has moderate diversity, but of note is the presence of a large population of *Ophioglossum vulgatum*. Some of the grassland has very low diversity. Well managed.

Frogmore Meadows: Not surveyed.

Kingcup Meadows: Most of the grassland is extremely tussocky and has low diversity. Of low conservation interest. Management to decrease dominance of *Deschampsia cespitosa* is required.

Long Herdon Meadows: SSSI field has a rather unusual, but very diverse community close to MG4. The western field has a small area of MG4, but remainder is of low interest due to past neglect or nutrient input. Well managed.

Moorend Common: The only example of U4 recorded. A small but species-rich example of a grassland type rare in the lowlands. Well managed.

Old Rectory Meadows: The communities of interest are confined to a relatively small proportion of the site. The small area of MG5c present is vulnerable to overshading by tall species. More regular cropping of areas of interest should be secured.

Oxley Mead: A small but very good example of MG4. The community is remarkably uniform and the whole field has high species diversity. Well managed.

Pilch Fields: Has very good species-rich examples of calcareous flush and spring-line communities. Also has good examples of MG5b and MG5c. Grassland on upper parts somewhat degraded (through past nutrient input?), however. Includes an outstanding range of notable plants. Management is good.

Pokers Pond Meadows: A small site with grassland with high diversity confined to relatively small proportion of site. Remainder of grassland has only moderate diversity. Current management is good, but further use of organic fertiliser could be detrimental.

Rushbeds Wood Meadows: Grassland with high diversity is confined to a very small proportion of site. Most of the grassland has moderate diversity though several plants of interest present. Mostly well managed, but southern part suffering from lack of grazing.

Shabbington Meadows: Very rich and uniform throughout. A good example of moderately calcicolous MG5 grassland. Notable for large population of *Ophioglossum vulgatum*. Well managed.

Tingewick Meadows: Very species-rich in places and has several plants of interest. The communities of greatest interest are rather patchy and make up a small proportion of site, however. *Cirsium arvense* requires control. Use of horses in grazing regime could be detrimental to the grassland.

Recommendations

1. Optimise the management of the known resource

   The very small size of the known neutral grassland resource makes it essential that the management of the most important sites is optimal for their conservation interest. Any opportunities for increasing the area of the communities of greatest interest should be seized upon and directed to the most important sites. For example, the area of U4 at Moorend Common could be extended through clearance of bracken.

2. Continue search for more neutral grassland

   Considering the small amount of unimproved grassland of high conservation interest currently in protected sites, it is recommended that work to uncover and secure more examples is continued. A logical step forward would be to compare the grassland in 'second tier' sites (SNCIs/notification map sites) with the sites in the survey. The second tier sites include a large amount of grassland considered to be of local conservation interest but few have been surveyed in detail. Particular emphasis should be placed on uncovering more examples of MG4 and sites with both MG5 and M22, the characteristic grassland types of north Buckinghamshire.

3. Consider Oxley Mead for SSSI designation

   With only one example of MG4 currently afforded statutory protection it is strongly recommended that Oxley Mead is considered for SSSI designation.

5. ACKNOWLEDGEMENTS

Grateful thanks are extended to the owners and tenants of the sites visited for allowing access to their land. Thanks are also due to Emma Lansdell, Jeremy Halls and Mike Street for invaluable help and advice in the location of sites of potential interest. Access to the SSSIs was arranged by Corinna Woodall and Jonathan Spencer. The project was initiated and co-ordinated by Jonathan Spencer.

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DARBY P and STEVEN G (in prep). A Botanical Survey of Unimproved Neutral Grassland in north Wiltshire. English Nature, Newbury.

MALLOCH A (1990). Match, a computer programme to aid assignment of vegetation data to the communities of the National Vegetation Classification. University of Lancaster.

McDONALD A W and SILVESTER Y (1987). A Botanical Survey of Neutral Grassland in Gloucestershire, Herefordshire and Worcestershire. NCC West Midlands Region.

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RODWELL J S (1992). British Plant Communities, Vol. 3: Grasslands and Montane Communities. Cambridge.

STEVEN G (1990). A Botanical Survey of Unimproved Neutral Grassland in East Sussex. NCC South East Region.

WYATT G (1991). A Review of Phase 1 Habitat Survey in England. NCC Peterborough.

Appendix 1

Area of NVC communities recorded (hectares)

Site name	MG4	MG5a	MG5b	MG5c	MG5/MG6	MG6	MG7	MG9	MG10	MG1	U4	M22	M23	Total
Barnhill Farm			0.3									1.4		1.7
Dropshort Farm Meadow			1.2		5.2									6.4
Finemere Wood SSSI			<0.1							1.1				1.1
Foxcote Reservoir SSSI					1.7	2.6	4.1							8.4
Freith Meadows SSSI		1.0		<0.1	1.2	0.6								2.8
Frogmore Meadows SSSI				1.1*		1.1*							2.2*	4.4
Kingcup Meadows SSSI					1.6		2.6	4.9					0.5	9.6
Long Herdon Meadows (part SSSI)	5.0					3.9					1.2			8.9
Moorend Common SSSI														1.2
Old Rectory Meadows SSSI				<0.1		0.9			1.2				1.6	3.7#
Oxley Mead	3.4													3.4
Pilch Fields SSSI			4.1	1.2		2.5	0.4		0.1			0.9		9.2
Pokers Pond Meadow SSSI		0.7			0.4	0.1								1.2
Rushbeds Wood Meadows SSSI			0.3		11.8	0.4				0.5				13.0#
Shabbington Wood Meadows SSSI			7.0											7.0
Soulbury Meadow			0.2	0.5	0.2	4.6							2.0	7.5
Tingewick Meadows SSSI			1.2		4.3	3.5						0.9		9.9
Total	8.4	1.7	14.3	2.8	26.4	20.2	7.1	4.9	1.3	1.6	1.2	3.2	6.3	99.4

* provisional classification
\# excludes unsurveyed part of site

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Appendix 5263/AB3:

Site Check Report from MAGIC for Lowland Meadow Habitat

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Site Check Report Report generated on Fri Aug 31 2018
You selected the location: Centroid Grid Ref: SP89143400
The following features have been found in your search area:

Counties, Metropolitan Districts and Unitary Authorities (GB)

Name	Milton Keynes (B)
Geographic Level	Unitary Authority
Hectares	30862.673

Priority Habitat Inventory - Lowland Meadows (England)

Main Habitat Present	Lowland meadows
Confidence in Main Habitat Classification	Medium
Name of 1st Data Source	Unimproved Grassland Survey EN (paper) 1993
Date of 1st Data Source	Null
Habitat Class of 1st Data Source	National Vegetation Classification
Habitat Type of 1st Data Source	MG5
Name of 2nd Data Source	Aerial photos 2003 (digitised)
Date of 2nd Data Source	01/01/2003
Habitat Class of 2nd Data Source	none
Habitat Type of 2nd Data Source	uncoded
Name of 3rd Data Source	Null
Date of 3rd Data Source	Null
Habitat Class of 3rd Data Source	Null
Habitat Type of 3rd Data Source	Null
Habitats Directive Annex 1	Null
Other Priority Habitats Present	Null
Identified Candidate Habitats	Main habitat: LMEAD (INV > 50%)
Decision Made By Rulesets	Null
Determination Comment for Main Habitat	NVC survey report 1993 states MG5b and MG5/6 - 'reasonably close similarity to NVC type MG5b although the low diversity of much of the field suggests affinities to MG6'.NVC report also states cattle grazing. Survey map easy to interpret.
Area (Hectares)	6.124933
Unique Parcel Reference Number (OS Grid Reference of centre point)	SP8911734017

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Appendix 5263/AB4:

UK Biodiversity Action Plan; Priority Habitat Descriptions BRIG (ed. Ant Maddock) 2008:

AB4(a) Lowland Meadows

AB4(b) Traditional Orchards

AB4(c) Ponds

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AB4(a) Lowland Meadows

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UK Biodiversity Action Plan
Priority Habitat Descriptions

Lowland Meadows

From:
UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008.

This document is available from:
http://jncc.defra.gov.uk/page-5706

For more information about the UK Biodiversity Action Plan (UK BAP) visit
http://www.jncc.defra.gov.uk/page-5155

Lowland Meadows

The definition of this habitat remains unchanged from the pre-existing Habitat Action Plan (https://webarchive.nationalarchives.gov.uk/20110303150139/http://www.ukbap.org.uk/UKPlans.aspx?ID=10), a summary of which appears below. Following the 2007 review, occurrences of this habitat on roadside verges are also covered by the definition.

A wide-ranging approach is adopted in this plan to lowland grasslands treated as lowland meadows. They are taken to include most forms of unimproved neutral grassland across the enclosed lowland landscapes of the UK. In terms of National Vegetation Classification plant communities, they primarily embrace each type of *Cynosurus cristatus-Centaurea nigra* grassland, *Alopecurus pratensis-Sanguisorba officinalis* floodplain meadow and *Cynosurus cristatus-Caltha palustris* flood-pasture. The plan is not restricted to grasslands cut for hay, but also takes into account unimproved neutral pastures where livestock grazing is the main land use. On many farms in different parts of the UK, use of particular fields for grazing pasture and hay cropping changes over time, but the characteristic plant community may persist with subtle changes in floristic composition.

In non-agricultural settings, such grasslands are less frequent but additional examples may be found in recreational sites, church-yards, roadside verges and a variety of other localities. Excluded from this plan are maritime grassland communities confined to coastal habitats (which will be covered in maritime cliff and machair action plans), *Anthoxanthum odoratum-Geranium sylvaticum* grasslands (which are treated in a companion action plan for upland hay meadows) and *Molinia-Juncus* pastures (which are covered in the purple moor grass and rush pasture (*Molinia-Juncus*) plan).

As indicated in the Habitat Statement included in *Biodiversity: the UK Steering Group Report, Vol 2* (1995), unimproved neutral grassland habitat has undergone a remarkable decline in the 20th century, almost entirely due to changing agricultural practice. It is estimated that by 1984 in lowland England and Wales, semi-natural grassland had declined by 97% over the previous 50 years to approximately 0.2 million hectares. Losses have continued during the 1980s and 1990s, and have been recorded at 2–10% per annum in some parts of England. Extensive agricultural modification of unimproved grasslands has also been recorded in Scotland between the 1940s and 1970s. Recent conservation survey findings in Britain and Northern Ireland reveal that the impact has been pervasive, and an estimated extent of less than 15,000ha of species-rich neutral grassland surviving today in the UK is given in the Habitat Statement.

The plan concentrates on meadows and pastures associated with low-input nutrient regimes, and covers the major forms of neutral grassland which have a specialist group of scarce and declining plant species. Among flowering plants, these include fritillary *Fritillaria meleagris*, Dyer's greenweed *Genista tinctoria*, green-winged orchid *Orchis morio*, greater butterfly orchid *Platanthera chlorantha*, pepper saxifrage *Silaum silaus* and wood bitter vetch *Vicia orobus*. Lowland meadows and pastures are important habitats for skylark and a number of other farmland birds, notably corncrake which has experienced a major range contraction across the UK.

The overall outcome of habitat change in the lowland agricultural zone is that *Cynosurus - Centaurea* grassland, the mainstream community of unimproved hay meadows and pastures over much of Britain, is now highly localised, fragmented and in small stands. Recent estimates for cover in England and Wales indicate that there is between 5,000–10,000ha of this community in total. There is an especially important concentration in Worcestershire and other particularly important areas include south-west England (Somerset, Dorset and Wiltshire), the East Midlands & East Anglia (Leicestershire, Northamptonshire,

Cambridgeshire and Suffolk), in various parts of Wales and in West Fermanagh and Erne Lakeland in Northern Ireland. In certain areas, such as in the old district of Brecknock in Powys, remnant examples are locally aggregated. Scotland is estimated to have between 2,000–3,000ha of this community, with particular concentrations in the crofting areas of Lochaber, Skye and the Western Isles. Local data for Northern Ireland are less complete, but the West Fermanagh and Erne Lakeland ESA in Northern Ireland contains an important concentration of the resource.

Unimproved seasonally-flooded grasslands are less widely distributed. They have lower overall cover, but there are still a few quite large stands. *Alopecurus-Sanguisorba* flood-meadow has a total cover of <1,500ha and is found in scattered sites from the Thames valley through the Midlands and Welsh borders to the Ouse catchment in Yorkshire. These include well-known but now very rare Lammas meadows, such as North Meadow, Cricklade, and Pixey and Yarnton Meads near Oxford, which are shut up for hay in early spring, cropped in July, with aftermath grazing from early August; nutrients are supplied by flooding episodes in winter. *Cynosurus-Caltha* flood-pasture is also now scarce and localised, with probably <1,000ha cover in England and Wales. Scotland is estimated to have 600–800ha of this community.

It will be important to ensure that such periodically flooded grasslands are taken into account during implementation of the action plan for coastal and floodplain grazing marshes; actions in the two plans need to be closely integrated.

Agricultural intensification has led to the extensive development of nutrient-demanding, productive *Lolium perenne* grasslands. These are managed for grazing and also silage production which has widely replaced traditional hay-making. Where fertiliser input is relaxed or in swards which have only been partially improved, *Lolium-Cynosurus* grassland is common; in many respects this is intermediate between improved and unimproved lowland neutral grasslands but has few uncommon species and is generally of low botanical value.

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AB4(b) Traditional Orchards

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UK Biodiversity Action Plan
Priority Habitat Descriptions

Traditional Orchards

From:
UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008.

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http://www.jncc.defra.gov.uk/page-5155

Traditional Orchards: Description, Definition and Extent

Correspondence with existing habitats

- UK BAP broad habitat*:* Broadleaved, mixed and yew woodland (the proposed habitat is a habitat complex like lowland wood-pasture and parkland, which is in this broad habitat)
- Phase 1: A. Woodland and scrub, A 1.1.2. Broadleaved plantation, orchard, to be identified by existing/added symbols (England Field Unit 1990).
- NVC: Incorporates several types as part of the orchard habitat complex (e.g. MG5, MG6, W24).
- Annex I: Incorporates parts of several Annex I types, for example lowland calcareous grassland in some sites within the Annex I type H6210 semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*).

Description

Habitat structure rather than vegetation type, topography or soils, is the defining feature of the habitat.

Traditional orchards are structurally and ecologically similar to wood-pasture and parkland, with open-grown trees set in herbaceous vegetation, but are generally distinguished from these priority habitat complexes by the following characteristics: the species composition of the trees, these being primarily in the family Rosaceae; the usually denser arrangement of the trees; the small scale of individual habitat patches; the wider dispersion and greater frequency of occurrence of habitat patches in the countryside. Traditional orchards include plantings for nuts, principally hazel nuts, but also walnuts. Management of the trees is the other main feature distinguishing traditional orchards and wood-pasture and parkland. Trees in traditional orchards are, or were, grown for fruit and nut production, usually achieved through activities such as grafting and pruning; whereas timber has been the main product from trees in wood-pastures and parkland, mostly derived from pollarding or selective felling. Grazing or cutting of herbaceous vegetation are integral to orchard management, as they are in wood-pastures and parkland. The presence of scrub, mostly in the form of hedgerows on the site boundaries, or sometimes, especially in unmanaged orchards, among the orchard trees, is analogous to the frequent occurrence of scrub in wood-pastures and parkland and plays a similar ecological role (see under biodiversity characteristics described below). Ponds and other wetland features are often present; being used now, or in the past, for watering livestock.

Orchards are hotspots for biodiversity in the countryside, supporting a wide range of wildlife and containing UK BAP priority habitats and species, as well as an array of Nationally Rare and Nationally Scarce species. The wildlife of orchard sites depends on the mosaic of habitats they encompass, including fruit trees, scrub, hedgerows, hedgerow trees, non-fruit trees within the orchard, the orchard floor habitats, fallen dead wood and associated features such as ponds and streams. A feature of the biodiversity of traditional orchards is the great variety of fruit cultivars that they contain. For example, Luckwill and Pollard (1963) list 101 varieties of perry pear distributed across the parishes of Gloucestershire. This agricultural biological diversity is not an explicit part of the current UK BAP, although the UK Government is a signatory to the Global Strategy for Plant Conservation (2001). The Government response (Cheffings and others 2004) includes a target for conserving crop diversity.

Traditional orchards are defined for priority habitat purposes as orchards managed in a low intensity way, in contrast with orchards managed intensively for fruit production by the input of chemicals such as pesticides and inorganic fertilisers, frequent mowing of the orchard

floor rather than grazing or cutting for hay, and planting of short-lived, high-density, dwarf or bush fruit trees.

Spacing of trees in traditional orchards can vary quite widely (from *c*3m in some plum orchards and traditional cobnut plats, to over 20m in some large perry pear and cherry orchards). There is some overlap of density of planting with intensive orchards, but these orchards often have densities at least twice as high as the most closely-spaced traditional orchard.

Like wood-pastures and parklands, traditional orchards can occur on a wide range of soil types, from slightly acid, relatively infertile soils to fertile river floodplain soils and lime-rich soils. Orchards can be found on slopes ranging from steep to level, and with any aspect. Generally, sites do not have badly impeded drainage, although locally, within sites, there may be wetter areas. Orchards are found in the lowland landscape in the UK, defined as the land below the altitudinal limit of enclosure (i.e. below the 'moor wall').

Traditional orchards can easily be distinguished from other wooded habitats based on the preponderance of domestic fruit and nut species: apple, plum, pear, damson, cherry, walnut and cobnut. Only in a very few cases will there be a significant number of other tree species in a traditional orchard, unless the orchard is becoming woodland through neglect. An arbitrary distinction of requiring, say, 50% of trees to be domestic fruit or nut species in an orchard, is rarely likely to be invoked for distinguishing orchards from wood-pasture/parkland.

Traditional orchards contrast with orchards managed intensively for fruit production, where there are inputs of chemicals such as pesticides and inorganic fertilisers, frequent mowing of the orchard floor rather than grazing or cutting for hay, and planting of short-lived, high-density, dwarf or bush fruit trees (stems generally 75cm or less).

The simplest visual indicator of intensive management is the presence of herbicided strips along the tree rows, where the ground is generally bare or with some annual plant re-growth; contrasting with the permanent grassland of the between-row spaces. Such strips are readily observable on aerial photographs. According to orchard pesticide usage surveys by the Central Science Laboratory (CSL), use of herbicide is associated with other pesticide use and intensive mowing between tree-rows, while in contrast, orchards with fully grassed floors can be considered traditional (Dr Joe Crocker, CSL, pers. comm.). There may potentially be cases where other pesticides or inorganic fertilisers or other intensive management practices are used without herbicide. As a consequence, for instance where herbicide strips are not evident but the trees appear small and closely spaced, there may occasionally be instances for limited ground-truthing by checking density / spacing (see below) and stature of trees on the ground. Spacing of trees in traditional orchards can vary quite widely, from around 3m to over 20m between trees (see above). There is some overlap of density of planting with intensive orchards, so a density distinction is not useful on its own. However, non-traditional orchards often have densities at least twice the density of the most closely-spaced traditional orchard, and density/planting distance (< 3m in many intensive orchards) can help in the distinction of intensive orchards as described above.

Traditional Orchards: UK HAP Definition

Traditional orchards are defined, for priority habitat purposes, as groups of fruit and nut trees planted on vigorous rootstocks at low densities in permanent grassland; and managed in a low intensity way. Cobnut plats are also included.

Background / Explanation to Definition

Traditional orchards are a long-established and widely distributed habitat and make a significant contribution to biodiversity, landscape character and local distinctiveness across the UK. There are many regional variations on this theme, including apple, pear, cherry, plum, damson, and walnut orchards. Although cobnut plat structure and management varies from fruit tree orchards and has affinities with coppice woodland, they are also included in the definition.

They are a composite habitat (similar to wood-pasture and parkland), defined by their structure rather than vegetation type, which can include trees, scrub, grassland, ponds, walls, hedgerows and hedgerow trees. Traditional orchards can take several different distribution patterns, including small and large patches, along linear boundaries, and trees dispersed among settlements.

Prime traditional orchard habitat consists of grazed grassland with fruit trees of varying age structure, with an abundance of standing and fallen dead and decaying wood. Young trees and newly planted orchards that are managed in a low intensity way are also included in the definition.

Low intensity management refers to orchards that are managed extensively, with little or no use of chemicals such as pesticides, herbicides and inorganic fertilisers, with relatively long-lived trees that are allowed to reach the veteran stage, and with a permanent grass sward that is usually grazed by cattle or sheep or cut for hay. Although traditional orchards have sometimes been established with soft fruit or other crops grown between rows, where these are managed extensively the orchard floor has usually been grassed over once the trees have matured and the canopy has closed over.

In contrast, intensive management refers to orchards managed to maximise fruit production, usually including several of the following management practices; dense planting of short-lived trees on dwarfing rootstocks, high chemical inputs, intensive pruning to remove dead and decaying wood and maintain the trees in a restricted form, and frequent mowing and spraying of the orchard floor.

Planting density depends on the species of tree. For apple, pear and cherry this will usually be less than 150 trees/ha. (approximately 8m spacing between the trees), but for other species such as plum and damson this density may be higher. Tree form will usually be standards or half-standards, but will vary accordingly to species and local practice. Vigorous rootstocks include trees that are grown on their own rootstock, seedling rootstocks, and named rootstocks that allow the tree to develop to its full size.

The minimum size of a traditional orchard is defined as five trees with crown edges less than 20m apart. However, the potential biological and genetic interest of sites with fewer trees, such as relict orchards and individual trees within gardens, is noted. Where appropriate these should be considered as potential restoration sites. It is recognised that other sites which fall outside the definition, such as organic bush orchards and fruit collections in walled gardens, may also have biodiversity value, as well as historic, cultural and genetic importance.

Extent of Resource

Traditional orchards are found in all countries of the UK, although England has the bulk of the resource. Areas digitally mapped by the Ordnance Survey have been found to provide a relatively accurate estimate of total orchard area, as a result of testing by ground-truthing and aerial photograph interpretation (Natural England, in prep.). Together with country information on extent of commercial orchards in agricultural census returns, digital Master

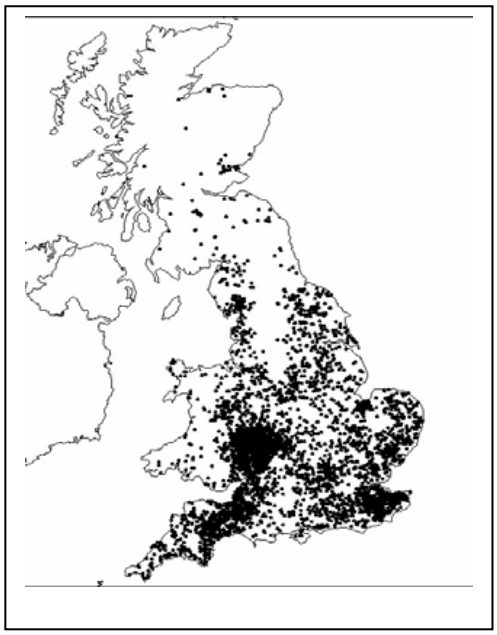
Map polygons can be used to make initial estimates of the extent of the resource (see table below).

The estimated extent of traditional orchards in the UK is 25,350ha. This puts the habitat at the rarer end of the scale compared to existing priority habitats. These range from Upland hay meadows (1,100ha), Lowland wood-pasture and parkland (35,000ha), Lowland heathland (over 60,000ha), Upland oakwood (85,000ha) to Upland heath (2,109,400ha).

Country	***Orchard area (ha)**	****Traditional orchard area (ha)**
England	39,600	24,600
Scotland	290	250
Wales	840	440
Northern Ireland	(1,600)	60

*Ordnance Survey area except for Northern Ireland where area under fruit (top and soft) is given from the agricultural census 2004.
** England: Ordnance Survey area in 2006 minus area of commercial orchards in Agricultural census of 2006 defined as intensive (84%) by lack of fully grassed orchard floor (Central Science Laboratory data). Scotland and Wales: Ordnance Survey area minus area of commercial orchards in agricultural censuses of 2003 and 2002 respectively. Note that some of the commercial orchards in Scotland and Wales may be traditional orchards; thus the estimate of traditional orchard area may be an underestimate. Northern Ireland: estimate from figure given in the Environmentally Sensitive Areas scheme booklet, traditional orchards option.

The Ordnance Survey data, which do not distinguish traditional and intensive orchards, show that orchards are dispersed throughout the lowlands of Britain, although there are concentrations in some areas particularly Kent, Cambridgeshire, Somerset and the Three Counties (Herefordshire, Worcestershire and Gloucestershire). The bulk (78%) of the commercial fruit production occurs in these concentrations in England, which implies that traditional orchards comprise the majority of the orchards elsewhere, as well as being known to occur in the orchard concentration areas.



Map: Orchard distribution in England, Scotland and Wales. Reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceeding. English Nature 100017954 [2005].

An inventory of traditional orchards in England is currently in progress and is due to be completed in March 2011. The data set can be downloaded via the GIS Digital Boundary Datasets page on the Natural England Website and can be viewed via the MAGIC interactive map online resource http://www.magic.gov.uk/home.htm.

A simple mappable definition has been adopted and is based on the rules adopted for the Natural England orchard project. The minimum size of a traditional orchard is defined as five trees with crown edges less than 20m apart.

For further information visit Orchard Network www.orchardnetwork.org.uk (From April 2010).

References:

Cheffings, C., Harper, M. and Jackson, A. 2004. *Plant diversity challenge: the UK's response to the Global Strategy for Plant Conservation*. Peterborough: Joint Nature Conservation Committee.

Luckwill, L.C. and Pollard, A. 1963. *Perry pears*. Bristol: Published for the National Fruit and Cider Institute by the University of Bristol.

AB4(c) Ponds

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UK Biodiversity Action Plan
Priority Habitat Descriptions

Ponds

From:
UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008.

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http://www.jncc.defra.gov.uk/page-5155

Ponds

Correspondence with existing habitats

- UK BAP broad habitat: Standing open waters and canals
- Phase 1: G1 Standing water
- NVC: Various aquatic, swamp and fen communities; OV28–OV35; and others
- Annex I: Includes H3170 Mediterranean temporary ponds; H3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflora*) (part); H3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* (part); H3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. (part); H3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation (part); and H3160 Natural dystrophic lakes and ponds (part)

Description

Ponds, for the purpose of UK BAP priority habitat classification, are defined as permanent and seasonal standing water bodies up to 2ha in extent, which meet one or more of the following criteria:

- Habitats of international importance: Ponds that meet criteria under Annex I of the Habitats Directive.
- Species of high conservation importance: Ponds supporting Red Data Book species, UK BAP species, species fully protected under the Wildlife and Countryside Act Schedule 5 and 8, Habitats Directive Annex II species, a Nationally Scarce wetland plant species, or three Nationally Scarce aquatic invertebrate species.
- Exceptional assemblages of key biotic groups: Ponds supporting exceptional populations or numbers of key species. Based on (i) criteria specified in guidelines for the selection of biological SSSIs (currently amphibians and dragonflies only), and (ii) exceptionally rich sites for plants or invertebrates (i.e. supporting ≥30 wetland plant species or ≥50 aquatic macroinvertebrate species).
- Ponds of high ecological quality: Ponds classified in the top PSYM category (“high”) for ecological quality (i.e. having a PSYM score ≥75%). [PSYM (the Predictive SYstem for Multimetrics) is a method for assessing the biological quality of still waters in England and Wales; plant species and / or invertebrate families are surveyed using a standard method; the PSYM model makes predictions for the site based on environmental data and using a minimally impaired pond dataset; comparison of the prediction and observed data gives a % score for ponds quality].
- Other important ponds: Individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context (e.g. pingos, duneslack ponds, machair ponds).

Priority habitat ponds can be readily identified by standard survey techniques such as those developed for NVC, Common Standards Monitoring, the National Pond Survey or for specific species groups. Ponds will need to be distinguished from other existing priority habitat types. The general principle to be applied is that where the standing water element is functionally a component of another priority habitat and that priority habitat definition takes account of the standing water element then it should be treated as part of that habitat. For example small waterbodies within blanket bog should be considered as part of the blanket bog priority habitat, but ponds in heathland (which are not dealt with through the heathland HAP) should be considered under the pond priority habitat. Agreement has been reached with the lake HAP group that the pond priority habitat will cover most water bodies up to 2ha while the lake priority habitat will cover most water bodies greater than 2ha. As with other potentially overlapping priority habitat types a small proportion of cases will need to be individually assessed to decide how they are best dealt with.

Ponds are widespread throughout the UK, but high-quality examples are now highly localised, especially in the lowlands. In certain areas high quality ponds form particularly significant elements of the landscape, for example Cheshire Plan marl pits, the New Forest ponds, pingos of East Anglia, mid-Wales mawn pools, the North East Wales pond landscape, the forest and moorland pools of Speyside, dune slack pools, the machair pools in the Western Isles of Scotland, and examples of Habitats Directive Annex I pond habitats across Northern Ireland.

Estimates, based on the relatively small pond data sets currently available, suggest that around 20% of the *c*400,000 ponds outside curtilage in the UK might meet one or more of the above criteria.

An inventory of ponds, including many high quality sites, has been established as part of the National Pond Monitoring Network and work is in progress to add further known sites to this database. This is publicly accessible (for non-sensitive sites/species) at www.pondnetwork.org.uk. Currently about 500 high quality sites are listed on this database. The National Pond Monitoring Network (NPMN) will provide the main mechanism for monitoring priority habitat ponds. The NPMN was established in 2002 as a partnership of organisations involved in pond monitoring led by the Environment Agency and Pond Conservation.

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Appendix 5263/AB5:

Botanical Assessment of Grassland (I. Johnson; Blackstone Ecology, June 2020)

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SOUTH CALDECOTTE, MILTON KEYNES

BOTANICAL ASSESSMENT OF GRASSLAND

PREPARED BY: IAN JOHNSON BA MA (Cantab) PhD MCIEEM

On behalf of: Aspect Ecology Ltd

JUNE 2020

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1 Introduction

1.1 Blackstone Ecology has been commissioned to undertake a botanical survey and assessment of two fields at a site at South Caldecotte, Milton Keynes (NGR: SP 89112 34019). The two fields are identified on the MAGIC database as supporting Lowland Meadow priority habitat, on the basis of a survey undertaken by English Nature in 1993. Although the survey was not undertaken in line with standard NVC methodologies (i.e. it was not a quadrat-based survey) the vegetation was provisionally identified as MG5b, although the low diversity of much of the field suggested affinities to MG6 grassland[1].

1.2 In July 2018 Aspect Ecology undertook an in-house botanical assessment of these fields, reported in *South Caldecotte, Milton Keynes Ecological Appraisal* (Aspect Ecology Ltd, June 2019). Results from a series of five quadrat surveys within each field were analysed using MAVIS[2] to assist in classification of the NVC communities present. The analysis indicated that the grassland present in both fields was a poor match to MG5, with a slightly closer (but still poor) match for both fields being the semi-improved MG6 community.

1.3 The present survey has been commissioned to provide an independent assessment of the grassland type(s) present and to assess their condition. In particular, the survey was intended to identify whether the fields support MG5 grassland (one of the unimproved grassland communities which comprise Lowland Meadow priority habitat) and, if so, to ascertain its condition.

[1] A Preliminary Botanical Survey and Assessment of Unimproved Grassland in Buckinghamshire. English Nature. 1993

[2] Modular Analysis of Vegetation Information System, CEH 2016

2 Methodology

2.1 The survey was undertaken on 10th June 2020 by Dr Ian Johnson, an experienced botanist with a particular interest in lowland grasslands. Weather conditions were calm and largely dry, with a brief spell of light rain.

2.2 The larger, southern field, F3, had been cattle grazed until shortly before the survey. Consequently, the sward was generally short (<5cm). Field F4, adjoining to the north, had not been grazed for a number of weeks and the sward was longer, generally being approximately 30cm high.

2.3 An initial walkover survey of field F4 was undertaken, recording all plant species noted within the field boundaries. During the walkover, areas considered to support a homogeneous plant community were identified; these were then subject to more detailed survey, using a series of five 2mx2m quadrats, recording all vascular plant species present within each quadrat, together with an estimate of the level of ground cover provided by each species, using the Domin scale (See Table 2.1). The same procedure was then followed for Field F3.

Table 2.1 Domin Scale to record species cover

Cover	Domin	Cover	Domin
91 - 100%	10	11 – 25%	5
76 - 90%	9	4 – 10%	4
51 - 75%	8	<4% (many individuals)	3
34 - 50%	7	<4% (several individuals)	2
26 – 33%	6	<4% (few individuals)	1

2.4 Within field F4 it was noted that certain prominent plant species (e.g. Oxeye Daisy *Leucanthemum vulgare*) tended to occur in patches, rather than having a uniform distribution across the field. However, these patches were well distributed within the grassland and did not appear to relate to other variation within the sward. Accordingly, it was concluded that the field could be considered to be a homogeneous stand of vegetation, other than within close proximity (1-2m) to boundary hedgerows and scrub. A single series of five quadrats was, therefore, surveyed within F4. The quadrats were spaced out to provide samples across the field (see Plan 1) but the precise location of each quadrat was selected at random.

2.5 In the case of F3, the field supports distinct ridge and furrow across most of its area. It was apparent from scanning the field that the ridge tops supported a more extensive and diverse herb community than the bottom of the furrows. A number of areas within F3 also showed signs of disturbance, including the loss of the ridge and furrow pattern and a higher incidence of weed species, particularly docks *Rumex* spp. and thistles *Cirsium* spp.. It was also noted that the area west of the in-field Oak tree generally appeared somewhat disturbed, with a higher frequency of ruderal and injurious weed species and of lower quality than grassland to the east.

2.6 Since the aim of the survey was to identify whether unimproved grassland was present within these fields, detailed NVC survey within F3 was restricted to the more diverse, undisturbed areas of the field. While survey was restricted to the undisturbed ridges within F3, quadrats were well spaced across the field east of the mature Oak *Quercus* (see Plan 1), with the precise locations of each quadrat again being selected at random.

Constraints

2.7 Not all species are apparent throughout the year, but the survey was undertaken at the optimum time of year for such work, in reasonable weather conditions. Recent cattle grazing of F3 may have slightly constrained grass identification, but is not considered to have significantly impeded identification of herb species.

3 Results

3.1 Lists of all species recorded within each field are provided within Annex 1, together with full data from the five quadrat surveys undertaken in each field. Survey results are considered for each field below

Field F3

3.2 A total of 35 plant species were recorded within F3, including 25 forb species. The number of species recorded within each quadrat ranged from 12 to 16, with a mean of 14.6 species per quadrat. Of the 35 species recorded across F3, 27 (77%) were present within one or more quadrat.

3.3 Results of the analysis using MAVIS are shown below, with screen shots of the results also provided at Annex 1. Based on the MAVIS analysis, the grassland community within F3 most closely matches MG6 *Lolium perenne-Cynosurus cristatus* grassland, with a 'fair' goodness-of-fit (matching coefficient of 64.93).

Table 1 MAVIS output: Field F3

NVC Community	Matching Coefficient
MG6	64.93
MG6b	64.81
MG6a	64.52
MG4b	57.86
MG5a	55.87
MG5	55.67
MG7	54.86
MG4v2	53.82
MG7c	53.45
MG6cc	53.37

Field F4

3.4 A total of 60 herbaceous species were recorded within F4, including 16 grass, 2 sedge and a wood-rush species. Numbers of species recorded within quadrats ranged from 15 to 30, with an average of 21 species per quadrat. Of the species recorded within the whole field, 39 (65%) were recorded within one or more quadrat.

3.5 Results of the MAVIS analysis are shown below, with screen shots of the results also provided at Annex 1. Based on the MAVIS analysis, the grassland community within F4 most closely matches MG6 *Lolium perenne-Cynosurus cristatus* grassland, with a 'fair' goodness-of-fit (matching coefficient of 62.57).

3.6 The survey results, including the results of the MAVIS analysis are considered further within Section 4 below.

Table 2 MAVIS output: Field F4

NVC Community	Matching Coefficient
MG6a	62.57
MG6	59.67
MG6b	58.86
MG5a	57.52
MG5	55.60
MG4b	55.38
MG5b	54.94
MG6c	53.99
MG4a	52.85
MG5c	52.52

4 Discussion

4.1 Although the swards of fields F3 and F4 have some similarities, that of F4 appears considerably more diverse. Therefore, the two fields are discussed separately.

Field F3

4.2 The species recorded within F3 on initial inspection appear to reflect those found within the MG5 *Cynosurus cristatus-Centaurea nigra* Lowland Meadow grassland community. Indeed, all eleven of the constant species listed within the floristic table for MG5[3] are present within the sward, and five were recorded as constant species, as would be anticipated if the sward were an MG5 community. The number of species recorded within each quadrat (12 to 16) also fall within the expected range for MG5, albeit at the lower end of the range recorded within the floristic table (12-38).

4.3 However, upon a closer inspection, the sward also shows marked discrepancies from the MG5 community, as reflected in the results of the MAVIS analysis. Six of the MG5 constant species are present at a reduced frequency, three being recorded only in a single quadrat. (It may also be noted in respect of the MG5 constant species, that all are common and widespread and occur in a great many grassland community types. Further, the survey recorded none of the less common species that are largely restricted to unimproved grasslands).

4.4 Perhaps of greater significance is the relative scarcity of other positive indicators of the MG5 community. Of the 34 species recorded in F3 as a whole, three are injurious weeds (Creeping and Spear Thistles and Broad-leaved Dock) while another four are either negative indicators or ruderal species with no particular affinity to the MG5 community, namely Creeping Buttercup *Ranunculus repens*, Greater Plantain *Plantago major*, Scented Mayweed *Matricaria recutita* and Hedge Mustard *Sisymbrium officinale*. Meadow Barley *Hordeum secalinum* is also not listed in the MG5 floristic table, but is nonetheless understood to occasionally occur at moderate to high frequency in some examples of MG5.

4.5 The species recorded within F3 are also very largely characteristic of the semi-improved MG6 *Lolium perenne-Cynosurus cristatus* grassland and the relatively low level of cover provided by forbs is consistent with this community, White Clover *Trifolium repens* achieving higher levels of cover than any other forb. The frequency and abundance of Perennial Rye-grass (constant within the sward with cover at Domin 5-7), in combination with the frequency and abundance of White Clover is indicative of some level of agricultural improvement[4].

4.6 As Rodwell (1992) notes, there is a complete gradation between rich, unimproved stands of MG5 and very species-poor, agriculturally improved grassland and "in many cases, the best that can be hoped for is to place a stand at particular points along a line of continuous variation". The use of computer programmes such as MAVIS provides a means of doing this in an objective manner.

4.7 The conclusion from MAVIS that field F3 supports semi-improved MG6 grassland is supported by consideration of the neutral grasslands key (28a-d) within the UK Habitat

[3] British Plant Communities Volume 3: Grasslands and Montane Communities 1992 (Rodwell, J.S., Ed)
[4] See, e.g., Key 2a in Farm Environment Plan (FEP) Manual, Natural England 2010

Classification (May, 2018), with the abundance of Perennial Rye-grass and White Clover being significant, as is the relative lack of forb indicator species for MG5 such that UK Habitat codes 29b / 30e most accurately reflect the community (see Annex 2). The level of plant diversity within the quadrats, at less than 15 species $4m^{-2}$, is further evidence that the sward most closely resembles MG6 grassland.

4.8 Having considered the results of the quadrat survey, together with the walkover assessment of the wider sward within F3, there is no clear reason why the conclusions of the MAVIS analysis should be discounted. It is concluded that the sward within field F3 is best considered as an example of an MG6 community, albeit one of moderate species-richness.

Field F4

4.9 As with F3, the results of the MAVIS analysis indicate that the sward of field F4 is best described as an MG6 community. This output is somewhat surprising and therefore close attention should be paid to the floristic keys (Rodwell 1992), especially given the presence within the sward of a number of indicators of MG5 or other unimproved grassland, including Oxeye Daisy *Leucanthemum vulgare,* Great Burnet *Sanguisorba officinale,* Rough Hawkbit *Leontodon hispidus*, Lady's Bedstraw *Galium verum*, Pignut *Conopodium majus* and Quaking Grass *Briza media*.

4.10 As noted above, the distribution of some forb species was noted to be 'patchy' within F4, although without a clear pattern that would justify dividing the sward into two or more distinct types to be sampled separately. As such, the field was treated as supporting a homogenous stand of vegetation and quadrats were set at random across the field.

4.11 A review of the results of the quadrat survey reveal a complete absence within the quadrats of three of the indicator species noted above, with the other three, Rough Hawkbit, Great Burnet and Oxeye Daisy, each being restricted to a single quadrat. It is considered that this result from the quadrat sampling does not accurately reflect the abundance of at least some of these species within the wider sward, with Oxeye Daisy, Lady's Bedstraw and Rough Hawkbit being considered at least occasional and locally frequent.

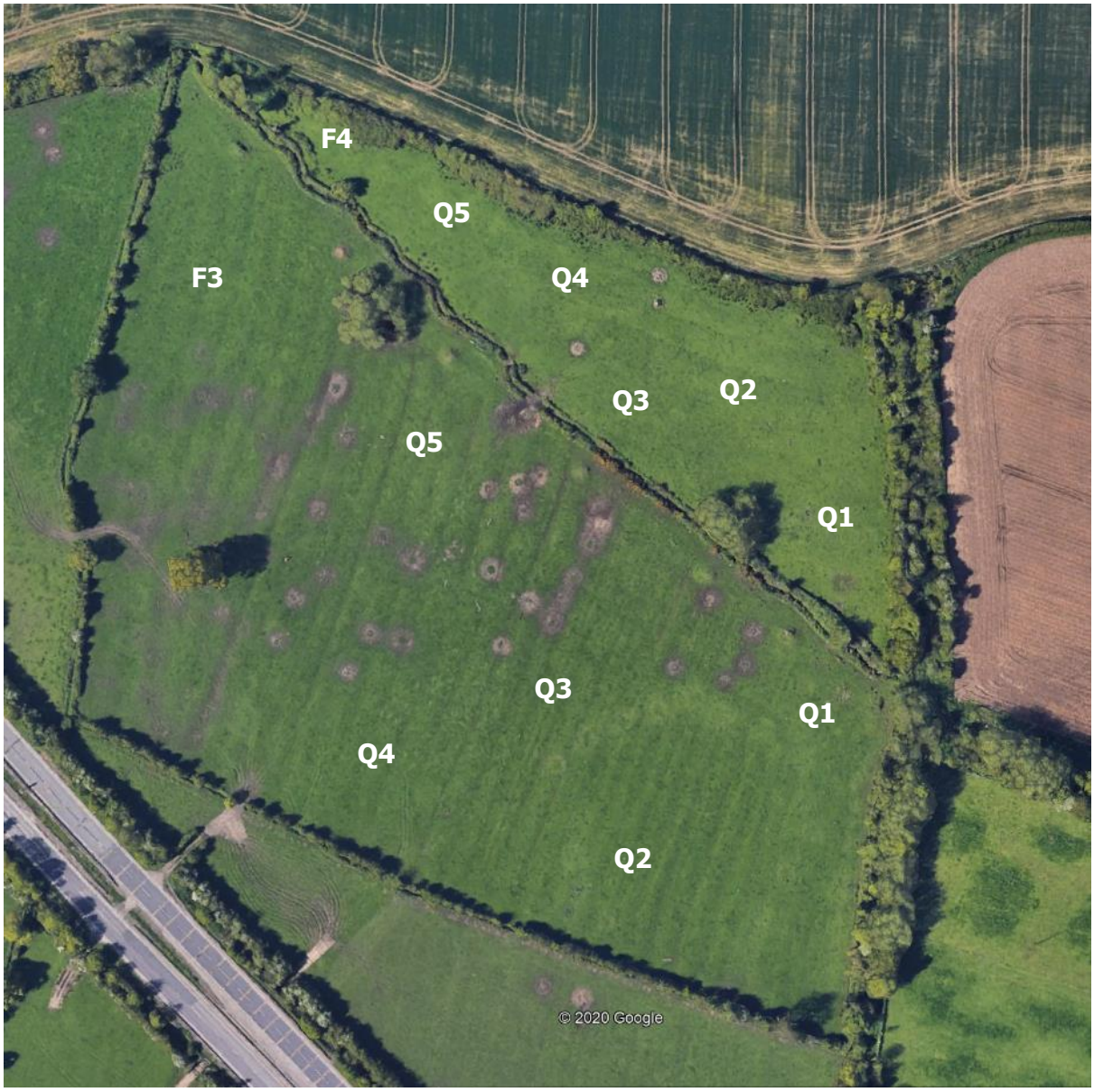
4.12 The diversity of plants within the quadrats in F4 averaged 21 species, suggesting the sward more closely resembles an unimproved grassland. This is represented by habitat code 28b of the UK Habitat Classification (see Field Key at Annex 2).

4.13 Following the key to mesotrophic grasslands within Rodwell (1992) the sward keys out as the MG5 community. On the basis of this and the above observations, it is considered that F4 supports an unimproved neutral grassland sward closely resembling MG5, but that the sward is in sub-optimal condition.

4.14 Apart from the patchy distribution of a number of herb species within the sward, the frequency and abundance of Perennial Rye-grass is higher than would be expected (present in 100% of quadrats with Domin scores of 3-7). This suggests that the sward may have been subject to some disturbance which has locally reduced levels of cover of some of the species indicative of unimproved grassland. Alternatively, or in addition, the grassland may have been subject to some attempts at improvement or to mismanagement (in relation to the nature conservation ideal), possibly through over-application of farmyard manure or through chemical treatments, or through inappropriate stocking levels.

4.15 Regardless of how the present condition of the sward has been arrived at, what can be concluded is that, in the author's opinion, the grassland within field F4 is best considered to represent an MG5 grassland in poor to moderate condition.

PLAN 1: Quadrat Locations



Annex 1: Survey Results

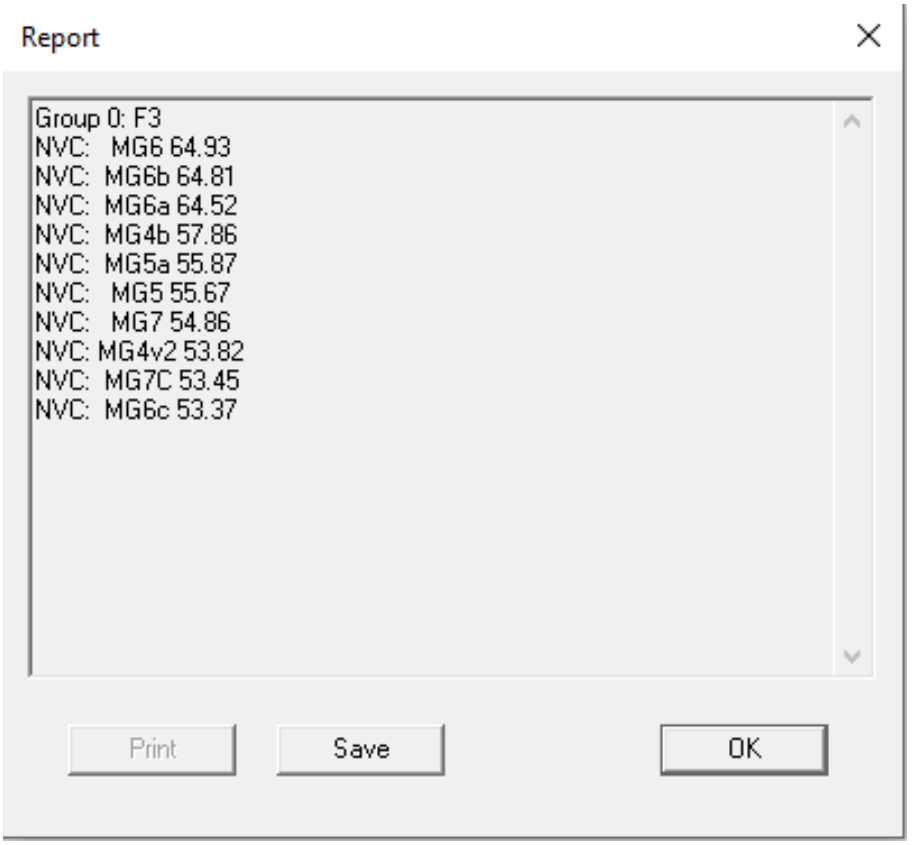
Field F3: Quadrat Results Summary

Species	Domin Cover Value per Quadrat						Summary
	Q1	Q2	Q3	Q4	Q5		
Lolium perenne	5	5	7	7	6		**V (5-7)**
Trifolium pratense	4	3	-	2	2		**IV (2-4)**
Trifolium repens	6	7	4	3	2		**V (2-7)**
Leontodon saxatilis	3	-	-	-	-		**I (3)**
Cerastium fontanum	3	3	2	-	-		**III (2-3)**
Cynosurus cristatus	6	3	4	3	4		**V (3-6)**
Holcus lanatus	4	-	-	-	-		**I (4)**
Cirsium vulgare	3	-	2	-	-		**II (2-3)**
Ranunculus acris	3	2	-	1	-		**III (1-3)**
Centaurea nigra	1	-	-	3	2		**III (1-3)**
Poa trivialis	3	-	3	3	2		**IV (2-3)**
Hordeum secalinum	3	-	-	-	-		**I (3)**
Ranunculus repens	1	-	-	-	-		**I (1)**
Agrostis capillaris	7	7	7	6	6		**V (6-7)**
Lotus corniculatus	-	3	5	5	4		**IV (3-5)**
Plantago lanceolata	-	3	4	4	4		**IV (3-4)**
Plantago major	-	3	-	-	-		**I (3)**
Anthoxanthum odoratum	-	2	-	-	-		**I (2)**
Achillea millefolium	-	3	3	5	4		**IV (3-5)**
Hypochaeris radicata	-	-	3	2	3		**III (2-3)**
Leontodon autumnalis	-	-	3	3	2		**III (2-3)**
Taraxacum agg.	-	-	1	-	-		**I (1)**
Dactylis glomerate	-	-	1	-	-		**I (1)**
Rumex acetosa	-	-	1	2	1		**III (1-2)**
Stellaria media	-	-	-	1	1		**II (1)**
Festuca rubra	-	-	-	2	1		**II (1-2)**
Geranium dissectum	-	-	-	-	1		**I (1)**
Total species	**14**	**12**	**15**	**16**	**16**		

Field F3: All Plant Species recorded

Agrostis capillaris	Common Bent
Anthoxanthum odoratum	Sweet Vernal-grass
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot
Festuca rubra	Red Fescue
Holcus lanatus	Yorkshire Fog
Hordeum secalinum	Meadow Barley
Lolium perenne	Perennial Rye-grass
Poa trivialis	Rough Meadow-grass
Carex hirta	Hairy Sedge
Achillea millefolium	Yarrow
Centaurea nigra	Black Knapweed
Cirsium arvense	Creeping Thistle
Cirsium vulgare	Spear Thistle
Cerastium fontanum	Common Mouse-ear
Geranium dissectum	Cut-leaved Crane's-bill
Helminthotheca echioides	Bristly Ox-tongue
Hypochaeris radicata	Cat's-ear
Leontodon autumnalis	Autumn Hawkbit
Leontodon saxatilis	Lesser Hawkbit
Lotus corniculatus	Bird's-foot Trefoil
Matricaria recutita	Scented Mayweed
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Potentilla repens	Creeping Cinquefoil
Prunella vulgaris	Selfheal
Ranunculus acris	Meadow buttercup
Ranunculus repens	Creeping Buttercup
Rumex acetosa	Common Sorrel
Rumex obtusifolius	Broad-leaved Dock
Sisymbrium officinale	Hedge Mustard
Stellaria media	Chickweed
Taraxacum agg.	Dandelion
Trifolium pratense	Red Clover
Trifolium repens	White Clover

Field F3: MAVIS Report



Field F4: Quadrat Results Summary

Species	Domin Cover Value per Quadrat						Summary
	Q1	Q2	Q3	Q4	Q5		
Alopecurus pratensis	2	-	-	3	4		**III (2-4)**
Poa annua	1	1	-	1	-		**III (1)**
Leucanthemum vulgare	3	-	-	-	-		**I (3)**
Sanguisorba officinalis	3	-	-	-	-		**I (3)**
Cynosurus cristatus	5	4	7	-	5		**IV (4-7)**
Lotus corniculatus	3	2	4	3	5		**V (2-5)**
Cerastium fontanum	2	1	-	3	3		**IV (1-3)**
Trifolium pratense	5	3	2	2	3		**V (2-5)**
Potentilla reptans	3	-	-	-	-		**I (3)**
Centaurea nigra	3	4	3	5	5		**V (3-5)**
Holcus lanatus	4	5	4	5	5		**V (4-5)**
Achillea millefolium	4	3	4	3	3		**V (3-4)**
Lolium perenne	3	5	7	7	4		**V (3-7)**
Dactylis glomerata	1	3	4	3	4		**V (1-4)**
Agrostis capillaris	7	7	5	7	6		**V (5-7)**
Ranunculus repens	3	4	3	3	4		**V (3-4)**
Trifolium repens	3	2	2	-	2		**IV (2-3)**
Plantago lanceolata	3	3	3	4	5		**V (3-5)**
Senecio jacobaea	1	-	-	-	-		**I (1)**
Hordeum secalinum	1	-	-	3	-		**II (1-3)**
Prunella vulgaris	3	-	-	-	-		**I (3)**
Leontodon hispidus	2	-	-	-	-		**I (2)**
Ranunculus acris	2	3	-	1	-		**III (1-3)**
Cirsium vulgare	1	1	-	1	1		**IV (1)**
Leontodon saxatilis	1	-	-	-	1		**II (1)**
Geranium dissectum	1	-	-	-	-		**I (1)**
Sonchus oleraceus	1	-	-	1	-		**II (1)**
Helminthotheca echioides	1	-	-	-	-		**I (1)**
Poa pratensis	1	-	-	-	3		**II (1-3)**
Hypochaeris radicata	1	-	3	-	1		**III (1-3)**
Cirsium arvense	-	3	-	-	-		**I (3)**
Plantago major	-	1	-	-	-		**I (1)**
Carex spicata	-	2	-	-	-		**I (2)**
Poa trivialis	-	3	-	-	-		**I (3)**
Luzula campestris	-	-	2	-	-		**I (2)**
Festuca rubra	-	-	3	2	4		**III (2-4)**
Convolvulus arvensis	-	-	-	1	-		**I (1)**
Phleum bertolonii	-	-	-	2	-		**I (2)**

Rumex acetosa	-	-	-	-	1		**I (1)**
Total species	**30**	**20**	**15**	**20**	**20**		

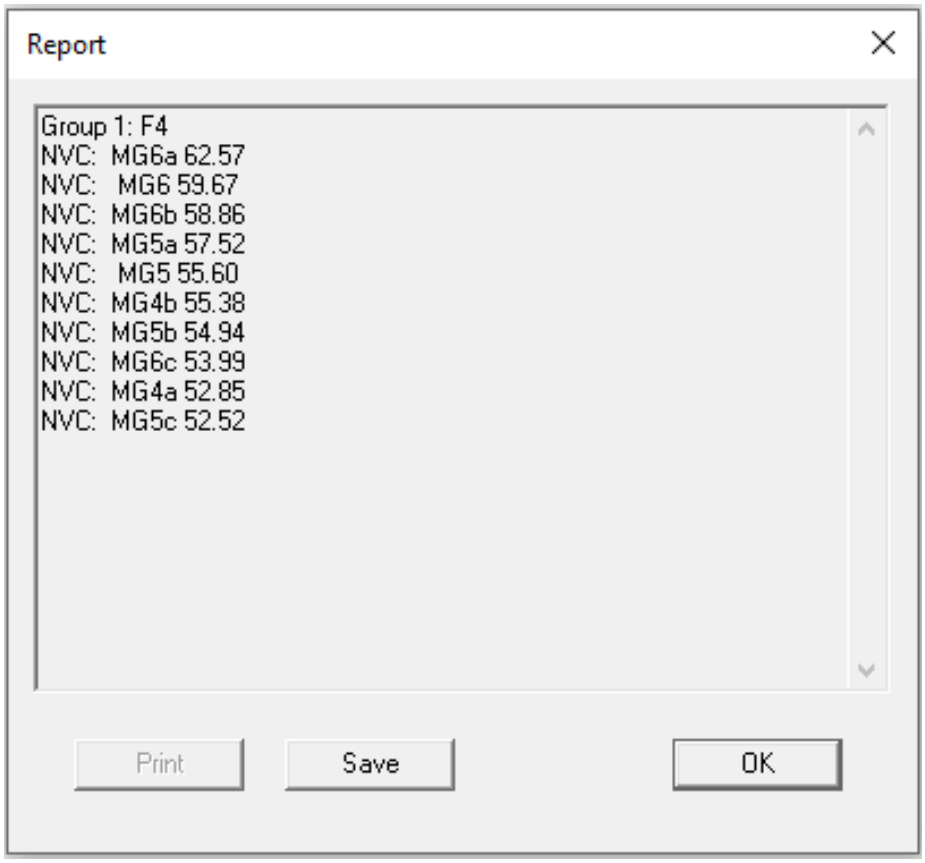
Field F4: All Plant Species recorded

Agrostis capillaris	Common Bent
Alopecurus pratensis	Meadow Foxtail
Anthoxanthum odoratum	Sweet Vernal-grass
Briza media	Quaking Grass
Bromus hordeaceus	Soft Brome
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot
Festuca rubra	Red Fescue
Holcus lanatus	Yorkshire Fog
Hordeum secalinum	Meadow Barley
Lolium perenne	Perennial Rye-grass
Phleum bertolonii	Smaller Cat's-tail
Poa annua	Annual Meadow-grass
Poa pratensis	Smooth Meadow-grass
Poa trivialis	Rough Meadow-grass
Trisetum flavescens	Yellow Oat-grass
Carex hirta	Hairy Sedge
Carex spicata	Spiked Sedge
Luzula campestris	Field Wood-rush
Achillea millefolium	Yarrow
Arctium sp.	Burdock
Bellis perennis	Daisy
Carduus crispus	Welted Thistle
Centaurea nigra	Black Knapweed
Cirsium arvense	Creeping Thistle
Cirsium vulgare	Spear Thistle
Cerastium fontanum	Common Mouse-ear
Conopodium majus	Pignut
Convolvulus arvensis	Field Bindweed
Galium verum	Lady's Bedstraw
Geranium dissectum	Cut-leaved Crane's-bill
Geranium molle	Dove's-foot Crane's-bill
Helminthotheca echioides	Bristly Ox-tongue
Heracleum sphondylium	Hogweed
Hypochaeris radicata	Cat's-ear

Field F4: All Plant Species recorded (cont.)

Lathyrus pratensis	Meadow Vetchling
Leontodon saxatilis	Lesser Hawkbit
Leontodon hispidus	Rough Hawkbit
Leucanthemum vulgare	Oxeye Daisy
Lotus corniculatus	Bird's-foot Trefoil
Matricaria recutita	Scented Mayweed
Medicago lupulina	Black Medick
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Potentilla reptans	Creeping Cinquefoil
Prunella vulgaris	Selfheal
Ranunculus acris	Meadow buttercup
Ranunculus repens	Creeping Buttercup
Rumex acetosa	Common Sorrel
Rumex obtusifolius	Broad-leaved Dock
Sanguisorba officinalis	Great Burnet
Senecio jacobaea	Common Ragwort
Silene dioica	Red Campion
Sisymbrium officinale	Hedge Mustard
Sonchus oleraceus	Smooth Sow-thistle
Stellaria graminea	Lesser Stitchwort
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Urtica dioica	Common Nettle
Vicia sativa ssp. segetalis	Common Vetch
Prunus spinosa	Blackthorn
Rubus fruticosus agg.	Bramble

Field F4: MAVIS Report



Annex 2: Extract from UK Habitat Classification Field Key

UK Habitat Classification Field Key

	FIRST DIVISION FOR GRASSLANDS UNDER REGULAR MANAGEMENT	Numbered links plus Broad and Priority Habitats	Scottish EUNIS Code	UK Hab Code	NVC units (indicative list only)
27h	Halophytic species (Ellenberg salt values >0 – see postscript 1) in inland situations	**19**			
27i	Metallophytes present e.g. Spring Sandwort (*Minuartia verna*), Field Pennycress (*Thlapsi arvense*), Thrift (*Armeria maritima*), Sea-campion (*Silene uniflora*), Alpine Pennycress (*Thlapsi caerulescens*), Alpine Catchfly (*Lychnis alpina*), Shetland Mouse-ear (*Cerastium nigrescens*)	**Back to 26f**			
28a-d	**DIVISION OF PRIORITY HABITAT NEUTRAL GRASSLANDS FROM NEUTRAL AND IMPROVED GRASSLANDS**				
28a	Productive grasses and White Clover (*Trifolium repens*) usually (see below) predominate mainly Rye Grasses (*Lolium*), Timothy (*Phleum*), Cocksfoot (*Dactylis glomerata*), Yorkshire Fog (*Holcus lanatus*), False Oat Grass (*Arrhenatherum elatius*) and the larger Fescues (*Festuca* spp.). Common Bent (*Agrostis capillaris*), Crested Dog's-tail (*Cynosurus cristatus*) and Sweet Vernal Grass (*Anthoxanthum odoratum*) may be present at the less fertile end of the gradient. In wet grasslands Soft Rush (*Juncus effusus*), Tufted Hair-grass (*Deschampsia cespitosa*), Floating Sweet Grass (*Glyceria fluitans*), Marsh Foxtail (*Alopecurus geniculatus*) and Tall Fescue (*Festuca arundinacea*) may be abundant. Varies from pure grass to moderately species rich grassland but hay meadow Priority Habitat indicators are always rare or absent. Some fields may be dominated by Buttercup (*Ranunculus* spp.) and/or White Clover (*Trifolium repens*).	**29**			
28b	Cover of Rye grass (*Lolium perenne*), White Clover (*Trifolium repens*) and sown Red Clover (*T. pratense*) usually less than 10% cover. Typically rich in forb species (>15 m^{-2}) with frequent Priority Habitat lowland meadow indicators incuding: Meadow Vetchling (*Lathyrus pratensis*), Bird's-foot Trefoil (*Lotus corniculatus*), Ox-eye Daisy (*Leucanthemum vulgare*), Lady's Bedstraw (*Galium verum*), Cowslip (*Primula veris*), Black Knapweed (*Centaurea nigra*), Rough Hawkbit (*Leontodon hispidus*), Bulbous Buttercup (*Ranunculus bulbosus*) or on flood meadows some of Marsh-marigold (*Caltha palustris*), Great Burnet (*Sanguisorba officinalis*), Meadowsweet (*Filipendula ulmaria*) and Meadow Foxtail (*Alopecurus pratensis*). Note that vegetation dominated by F.ulmaria keys out at 22e.	Annex I 6510 – Lowland hay meadows (Alopecurus pratensis – Sanguisorba officinalis). Lowland hay meadows Priority Habitat (Neutral Grassland BH)	E2.212	g3a5	MG4, MG5, MG8
28c	Cover of grass species and clover usually less than 50% cover with a high proportion of Priority Habitat upland meadow indicators such as Wood Cranesbill (*Geranium sylvaticum*), Lady's Mantles (*Alchemilla spp.*), Yellow Oat Grass (*Trisetum flavescens*), Pignut (*Conopodium majus*) and Sweet Vernal Grass (*Anthoxanthum odoratum*) or Globeflower (*Trollius europaeus*) and Northern Hawksbeard (*Crepis mollis*)	Annex 6520 – Mountain Hay Meadows. Upland hay meadows Priority Habitat (Neutral Grassland BH)	E2.242	g3b5	MG3, MG8 (upland form)
28d	Neutral flushes typically marking enriched springlines and water seepage zones in lowland or upland situations. Acidic and calcareous indicators are absent or rare. Characteristic species include Creeping Bent (*Agrostis stolonifera*), Calliergonella cuspidata, Greater Bird's-foot trefoil (*Lotus pedunculatus*), Blinks (*Montia Fontana*), Marsh Foxtail (*Alopecurus geniculatus*), Jointed Rush (*Juncus articulatus*), Toadrush (*J.bufonius*), Floating Sweet Grass (*Glyceria fluitans*), Meadow Buttercup (*Ranunculus acris*).	Fen, Marsh, Swamp Broad Habitat (BH)	D5.3?	f2 (secondary codes 182, 183 or 185 are possible)	

29a-b	**DIVISION OF NEUTRAL AND IMPROVED GRASSLANDS**	Numbered links plus Broad and Priority Habitats	Scottish EUNIS Code	UK Hab Code	NVC units (indicative list only)
29a	Palatable grasses dominate mainly Rye grasses (*Lolium* spp.), Timothy (*Phleum pratense*), Cocksfoot (*Dactylis glomerata*), Crested Dog's-tail (*Cynosurus cristatus*), Yorkshire Fog (*Holcus lanatus*). Grass cover usually over 75%. Broadleaved species restricted mainly to White Clover (*Trifolium repens*), Creeping Buttercup (*Ranunculus repens*), Greater Plantain (*Plantago major*), Dandelion (*Taraxacum*), Broad-leaved Dock (*Rumex obtusifolius*) and Chickweed (*Stellaria media*). Fertile but wetter situations may support occasional Soft Rush (*Juncus effusus*) or Hard Rush (*J.inflexus*), Floating Sweet Grass (*Glyceria fluitans*), Creeping Bent (*Agrostis stolonifera*) and Rough Meadow Grass (*Poa trivialis*), but accompanying species will always indicate high fertility. Species poor <9 species m^{-2}.	Improved Grassland (BH)	E2.6	g4	MG6, MG7
29b	Palatable grasses predominate, usually Rye Grasses (*Lolium* spp.), White Clover (*Trifloium repens*) and Timothy (*Phleum pratense*) 40% or below and other grasses more prominent such as Crested Dog's-tail (*Cynosurus*), Common Bent (*Agrostis capillaris*), Yellow Oat Grass (*Trisetum flavescens*), Soft Brome (*Bromus hordeaceus*) and Sweet Vernal Grass (*Anthoxanthum odoratum*). Semi-improved but wetter situations may support abundant Soft Rush (*Juncus effusus*) or Hard Rush (*J.inflexus*), Floating Sweet Grass (*Glyceria fluitans*), Creeping Bent (*Agrostis stolonifera*) and Rough Meadow Grass (*Poa trivialis*). Total grass cover usually between 50 and 75%. Forbs up to 50% cover and associated with less fertile soil e.g. Ribwort Plantain (*Plantago lanceolata*), Sorrel (*Rumex acetosa*), Meadow Buttercup (*Ranunculus acris*), Creeping Buttercup (*R.repens*), Self-heal (*Prunella vulgaris*), Yarrow (*Achillea millefolium*), Silverweed (*Potentilla anserina*), Meadow Thistle (*Cirsium palustre*) and Lady's smock (*Cardamine pratensis*). However, indicators of the two hay meadow Priority Habitats will be rare or absent.	**30**			
29c	False Oat Grass (*Arrhenatherum elatius*) abundant. Total grass cover usually between 50 and 75%. Forbs up to 50% cover and associated with less fertile soil e.g. Ribwort Plantain (*Plantago lanceolata*), Sorrel (*Rumex acetosa*), Meadow Buttercup (*Ranunculus acris*), Creeping Buttercup (*R.repens*), Self-heal (*Prunella vulgaris*), Yarrow (*Achillea millefolium*), Silverweed (*Potentilla anserina*). Often associated with formerly disturbed sites, road verges etc.	**Neutral Grassland**	E2.2	g3c5	
30a-e	**OTHER NEUTRAL GRASSLANDS**				
30a	Recently sown mixtures of light grasses for agri-environment schemes or habitat creation/restoration such as Sweet Vernal Grass (*Anthoxanthum odoratum*), Smooth Meadow Grass (*Poa pratensis*), Red Fescue (*Festuca rubra*), Crested Dog's-tail (*Cynosurus cristatus*) and Yellow Oat Grass (*Trisetum flavescens*). Grass cover 50-100%. Herb species rare or absent. Often on sown field margins.	Arable Field Margins Priority Habitat (if on margin). (Neutral Grassland BH)	No code	c1a5 or g3	
30b	As above but with high cover of sown mixtures of legumes such as Red Clover (*Trifolium pratense*), Alsike Clover (*T.hybridum*) and Bird's-foot Trefoil (*Lotus corniculatus*). Often on sown field margins.	Arable Field Margins Priority Habitat (if on margin). (Neutral Grassland BH)	No Code	c1a6 or g3	
30c	Wet meadows with frequent to dominant cover of rushes but not waterlogged (see wetland key) nor species rich (see 31a) often with Yorkshire Fog (*Holcus lanatus*)	Neutral Grassland (BH)	E3.4131	g3c8 secondary code 14 15	M22,M23b, MG8

	OTHER NEUTRAL GRASSLANDS (continued)	Numbered links plus Broad and Priority Habitats	Scottish EUNIS Code	UK Hab Code	NVC units
30d	Meadows with abundant Tufted HairGrass aka Hassock (*Deschampsia cespitosa*) and Yorkshire Fog (*Holcus lanatus*)	Neutral Grassland (BH)	E3.4131	g3c7	MG9
30e	Description as 29b but not one of 30a-d. Moderate number of species (9-15 m^{-2}). Rye Grass (*Lolium perenne*) and Crested Dog's-tail (*Cynosurus cristatus*) are often abundant.	Neutral Grassland (BH)	E2.112	g3c6	MG6, MG9-13
31a-f	**CALCAREOUS GRASSLANDS**				
31a	Vegetation on dry ground with scattered sedges and many species indicative of calcareous soils present. Can be relatively species poor (CG4) but more often species rich with >50% forb cover. On calcareous soils, usually rendzinas on chalk or limestone in lowland Britain. Indicators include Upright Brome (*Bromopsis erecta*), Tor-grass (*Brachypodium pinnatum*), Fairy Flax (*Linum catharticum*), Salad Burnet (*Sanguisorba minor*), Carline Thistle (*Carlina vulgaris*), Stemless Thistle (*Cirsium acaule*), Horseshoe Vetch (*Hippocrepis comosa*) and Squinancywort (*Asperula cynanchica*), Dropwort (*Filipendula vulgaris*), Lady's Bedstraw (*Galium verum*), Quaking Grass (*Briza media*), Crested Hair-grass (*Koeleria macrantha*) and Rockrose (*Helianthemum nummularium*).	Annex I 6210 - Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia). Lowland Calcareous Grassland Priority Habitat (Calcareous Grassland BH)	E1.26	g2a5	CG1-CG7,CG10
31b	As 31a but often low in species richness. Often dominated by Blue Moor-grass (*Sesleria caerulea*) with Sheep's Fescue (*Festuca ovina*), Thyme (*Thymus polytrichus*), Limestone Bedstraw (*Galium sterneri*) and Common Bent (*Agrostis capillaris*) characteristic. Stands may comprise a confusing mix of species indicative of acidic and calcareous conditions. Arctic-Alpine species absent or very rare.	Annex I 6210 - Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia). Upland Calcareous Grassland Priority Habitat (Calcareous Grassland BH)	E1.26	g2b7	CG8,CG9
31c	As above (31a and 31b) but with Juniper (*Juniperus communis*) present at <30% cover.	Annex I 5130 - Juniperus communis formations on heaths or calcareous grasslands. Lowland Calcareous Grassland Priority Habitat.	F3.16#1	g2a5 or g2b7 secondary code 22	
31d	Arctic-Alpine plants, such as Alpine Lady's-mantle (*Alchemilla alpina*), Alpine Bistort (*Persicaria vivipara*) and Moss Campion (*Silene acaulis*). Mountain Avens (*Dryas octopetala*) forming grass/sedge 'heath' where conditions are harsh either at sea-level (in north west of Scotland) or high altitudes. Rare species include Scottish Primrose (*Primula scotica*).	Annex I 6170 – Alpine and sub-alpine calcareous grasslands. Upland Calcareous Grassland Priority Habitat (Calcareous Grassland BH)	E4.12€	g2b5	CG11-CG14
31e	Localised areas of vegetation, often visibly associated with seepage zones where water movement is vertical (topogenous mires) or lateral (soligenous mires). Usually with several sedge species and species of wet calcareous soils, springs and flushes including many bryophytes (see note on page 2 for Transition Fens/Alkaline Fens.	**Wetland key section - 50**			
31f	If not 31a-31e move on or consider 30e	**32**			

Appendix 5263/AB6:

National Vegetation Classification: MG5 grassland. TIN 147 (Natural England, 2013)

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Natural England Technical Information Note TIN147

National Vegetation Classification: MG5 grassland

Unimproved neutral grassland, including hay meadows, known under the National Vegetation Classification (NVC) system as MG5 grassland, was once the ubiquitous type of old meadow and pasture in the English lowlands. Since the late 1960's it has sustained large losses due to drainage, ploughing and re-seeding and from the use of high rates of fertilisers. There is now less than 6,000 ha remaining in England. This technical note has been developed to explain the characteristics and value of MG5 grassland and to consider how further losses can be prevented.

What are MG5 grasslands?

The primary biological interest of MG5 grassland *Cynosurus cristatus – Centaurea nigra* or in English crested dog's-tail – common knapweed, is the rich assemblage of mostly widespread, unsown, native plants rather than the presence of rare species (Rodwell 1992). Herbaceous plants usually comprise a substantial proportion of the herbage and exceptionally may be as high as 95% cover (Cooper 1997). MG5 grasslands are species-rich ranging from around 12 to 38 plant species in a 4 m^2 quadrat with an average of around 23/species/4 m^2 (Rodwell 1992).

MG5 grassland in spring © Dave Mitchell

MG5 grassland in early summer © Stuart Smith/CCW

Characteristic herbs include:

- common knapweed *Centaurea nigra;*
- ox-eye daisy *Leucanthemum vulgare;*
- bird's-foot trefoil *Lotus corniculatus;*
- lady's bedstraw *Galium verum;*
- common sorrel *Rumex acetosa;*
- yellow meadow vetchling *Lathyrus pratensis;*
- meadow buttercup *Ranunculus acris;*
- ribwort plantain *Plantago lanceolata;*
- cowslip *Primula veris;*
- common cat's-ear *Hypochaeris radicata.*

Characteristic grasses include:

- crested dog's-tail *Cynosurus cristatus;*
- quaking grass *Briza media;*

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- sweet vernal grass *Anthoxanthum odoratum;*
- yellow oat-grass *Trisetum flavescens*;
- red fescue *Festuca rubra;*
- common bent *Agrostis capillaris*.

Rare or scarce species that do occur in MG5 grassland include:

- sulphur clover *Trifolium ochroleucon;*
- meadow saffron *Colchicum autumnale;*
- green-winged orchid *Anacamptis morio;*
- greater butterfly orchid *Platanthera chlorantha;*
- French oat-grass, *Gaudinia fragilis;*
- whorled caraway *Carum verticillatum;*
- wood bitter vetch *Vicia orobus.*

Exceptionally, sites exceeding 40 species/4 m^2 have been documented (Gibson 1997, 1998) and these have probably had a long continuity of low-intensity 'traditional' grassland management and exhibit micro-scale spatial variation in soils (especially pH), slope, aspect and hydrology (Gibson 1998).

MG5 is now known to be more diverse in its floristic composition across its geographical range than the account in Rodwell (1992) indicates (Rodwell *et al* 2000). Although not listed in the published floristic table (Rodwell 1992), great burnet *Sanguisorba officinalis* can sometimes occur at high frequency and cover in MG5 grassland, especially in the east Midlands and eastern England. This has sometimes led to such swards being incorrectly labelled as MG4 (seasonally flooded unimproved neutral grassland). In the latter community great burnet is a constant species along with meadow foxtail *Alopecurus pratensis* and meadow sweet *Filipendula ulmaria,* which are generally much less frequent in MG5.

Species normally associated with woodlands that are sometimes found in MG5 grasslands include:

- wood anemone *Anemone nemorosa;*
- bluebell, *Hyacinthoides non-scripta;*
- wild daffodil *Narcissus pseudonarcissus;*
- goldilocks *Ranunculus auricomus;* and exceptionally
- oxlip *Primula elatior*.

MG5 grassland with greater butterfly and common spotted orchids © Stuart Smith/CCW

Some species are probable indicators of long continuity of 'traditional' management (ie no phase of land use change such as ploughing and conversion to crops, woodland establishment etc). These include:

- betony *Stachys officinalis;*
- devil's-bit scabious *Succisa pratensis;*
- dyer's greenweed *Genista tinctoria;*
- saw wort *Serratula tinctoria;*
- wood anemone *Anemone nemorosa;*
- pignut *Conopodium majus;*
- bitter vetch *Lathyrus linifolius;*
- meadow saxifrage *Saxifraga granulata;*
- burnet saxifrage *Pimpinella saxifraga;*
- pepper saxifrage *Silaum silaus*;
- small sedges, in particular, spring sedge *Carex carophyllea*.

However, this is not a universal rule and a few of these species (eg pignut) can tolerate a certain amount of *in situ* improvement through addition of fertilisers. Damper forms of MG5 may include some species more typical of purple moor grass and rush pasture communities (M22-26) (albeit at lower frequency), such as:

- rushes *Juncus spp*;
- greater bird's-foot trefoil *Lotus pedunculatus*;
- meadowsweet *Filipendula ulmaria*;
- carnation sedge *Carex panicea*;
- flea sedge *Carex pulicaris;*
- cuckoo flower *Cardamine pratensis*.

MG5 grasslands are not known for their richness of mosses, liverworts or lichens. Those species that do occur are widespread ubiquitous species such as the mosses:

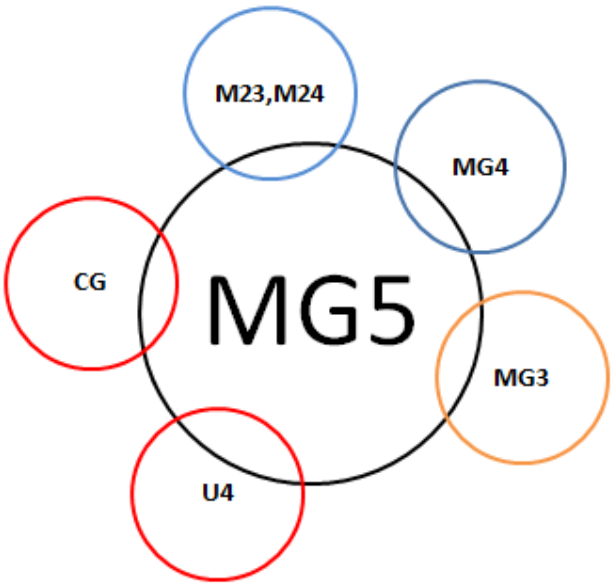
- *Brachythecium rutabulum;*
- *Kindbergia praelonga;*
- *Scleropodium purum; and*
- *Rhytidiadelphus squarrosus*

Transitions

MG5 can form transitions with other semi-natural vegetation communities. These may be related to changes in geology, soil type (notably pH), slope, topography and hydrology.

Common transitions are to:

- Various types of calcareous grassland (CG).
- Fen meadows/rush pastures eg M23 *Juncus effusus/acutiflorus-Galium palustre* rush-pasture and M24 *Molinia caerulea – Cirsium dissectum* purple moor-grass–meadow thistle fen meadow.
- Acid grassland especially U4 *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland.
- Neutral grassland eg MG4 as discussed above and, in the northern uplands, MG3 *Anthoxanthum odoratum-Geranium sylvaticum*.



Possible vegetation transitions between MG5 and other semi-natural grasslands

Key to transition factors

- Blue = hydrology, topography;
- Red = soil type especially pH and nutrient status;
- Orange = altitude/latitude.

MG5 grassland for fungi

Along with other drier semi-natural grasslands, MG5 grasslands can provide a habitat for communities of macrofungi, including waxcaps and pinkgills and, indeed some may independently qualify as SSSI for their fungal interest. Further information on the importance of semi-natural grasslands for fungi can be found in Genney *et al* 2009 and Griffith *et al* 2004.

MG5 grassland for birds

A large proportion of bird species in Britain use grassland at some time during the year and many species show preferences for this habitat. However, few can be termed grassland specialists as most also make some use of arable habitat.

In general, the remaining small and fragmented individual areas of MG5 grassland are rarely important for their bird interest in a national context although the large losses of such grasslands since WWII have undoubtedly contributed to the declines in farmland bird populations across Great Britain (Vickery *et al* 2001). Nonetheless, existing areas of MG5 may support ‘generalist’ farmland birds for breeding and/or foraging in summer or winter such as meadow pipit, skylark, yellowhammer, starling, fieldfare, species of gulls and rook.

Hedgerows, where present, may also support a range of species for breeding, shelter and foraging throughout the year, including species of conservation concern such as blackbird, bullfinch, dunnock, marsh tit, mistle thrush, turtle dove and whitethroat.

MG5 grassland and mammals

The majority of native mammals are primarily adapted to woodland and few are grassland specialists. However, there are quite a few species that use grassland (including MG5) and associated hedgerows for shelter, breeding and feeding including mole, brown hare, badger and various species of bats may forage over grasslands (see Crofts & Jefferson 1999, Harris & Yalden 2008).

MG5 grassland and invertebrates

The invertebrate assemblages found on MG5 grassland have not been intensively studied but evidence suggests that MG5 pastures, in particular, may have significant invertebrate interest. There is some data available on invertebrates associated with MG5 from a research study undertaken for Defra and English Nature on a site in Somerset (Tallowin 2005).

In particular, plant-feeding species are well represented such as:

- grasshoppers and crickets;
- butterflies and moths;
- plant hoppers;
- plant bugs.

Common butterflies such as meadow brown *Maniola jurtina*, ringlet *Aphantopus hyperanthus*, common blue *Polyommatus icarus*, small copper *Lycaena phlaeas* and small heath *Coenonympha pamphilus* can often be found on these grasslands either breeding or utilising the nectar resource.

Various day-flying moths occur on MG5 and other unimproved grasslands. These include several widespread species whose larva feed on leguminous plants such as the 5-spot burnet *Zygaena trifollii*, burnet companion *Euclidia glyphica* and mother shipton *Callistege mi*. Others include chimney sweeper *Odezia atrata* and the endangered grass rivulet *Perizoma albulata* the larva feeding on pignut *Conopodium majus* and yellow rattle *Rhinanthus minor* respectively.

Flowers and seed heads of meadow plants, particularly in the families *Asteraceae* (yellow/white flowered daisies, hawkweeds etc), *Fabaceae* (legumes including clovers and trefoils), and *Umbelliferae* (carrot family), support specialist seed and gall forming insects, especially larvae of micro-moths, weevils and small flies. In addition, nectar and pollen feeding species such as bumblebees are well represented (see Dicks 2002).

In Wales, clusters of MG5 are important for invertebrates and, in particular, scarce and declining species such as the shrill carder bee *Bombus sylvarum* and the hornet robber fly *Asilus crabroniformis* (Stevens *et al* 2010).

The historic value of MG5 grassland

As a result of the long continuity of management, MG5 grassland can also contain some of the nation's best-preserved archaeological sites as ‘earthworks’ - visible 'humps and bumps'. These sites, which can include ancient ridge and furrow or deserted medieval villages, provide us with valuable information about how our ancestors lived and worked.

Maintaining them in grassland is their best form of management, as this ensures their long-term preservation and visibility. However, careful site management is still needed as these sites are susceptible to damage from livestock poaching, burrowing animals and the encroachment of vegetation, as well as more obvious issues such as new planting or fencing and land drainage.

All known sites are recorded on Historic Environment Records maintained by local authorities and some are nationally important sites – ‘Scheduled Monuments’; that are protected by law from damaging works.

It is thought that MG5 grassland is an artefact of post-Neolithic farming. However, if the prehistoric vegetation was more parkland than closed woodland (Vera 2000) then it is possible that vegetation analogous to MG5 and other neutral grassland types could be construed as being near natural vegetation (Peterken 2009).

MG5 grassland and ecosystem services

Ecosystem services are the benefits society gets from the natural environment. These include cultural services such as:

- the conservation of biodiversity and people's enjoyment of the countryside;
- regulating services, such as carbon storage, flood protection, clean air and water; and
- provisioning services such as the production of food, timber and other resources.

MG5 grasslands contribute to the provision of ecosystem services, for example, carbon storage, pollination and predator services and they are a source of seed/hay for grassland restoration - see Bullock *et al* 2011, for more information.

Where does MG5 grassland occur?

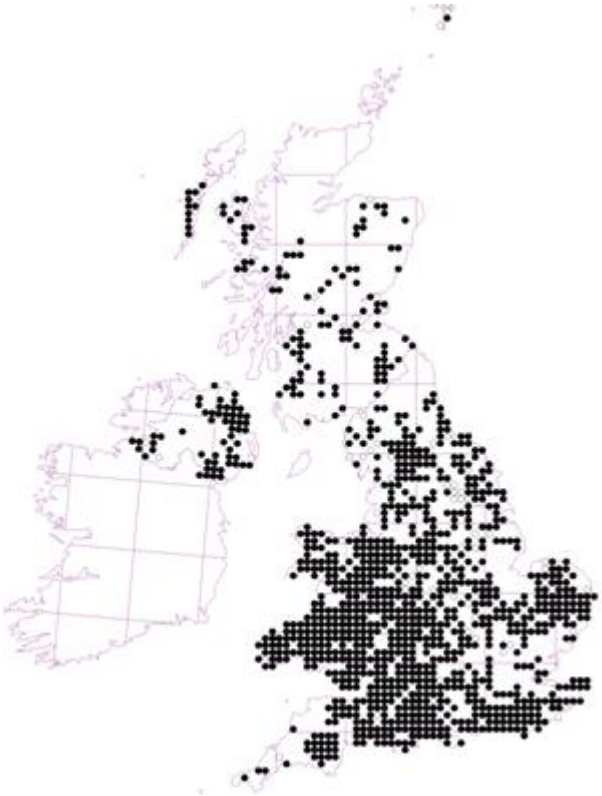
MG5 grasslands are largely confined to the UK and Ireland. Outside the British Isles, related grasslands only occur in the Atlantic/sub-Atlantic regions of Europe, in lowland and sub-montane areas, notably in northern France and Spain (Rodwell *et al* 2007).

MG5 old meadows and pastures occur on infertile/moderately fertile (phosphorus index of 0 or 1), well-drained or moist brown soils such as clay loams that are neither very acid nor very lime-rich (neutral) (Rodwell *et al* 2007), pH ranges from around 5.2 to 6.2 depending on the sub-community (see below, Rodwell 1992, Stevens *et al* 2010). The soils are often developed over superficial deposits (eg head deposits, drift, till or alluvium).

MG5 mostly occurs within enclosed field systems and as part of less enclosed limestone/chalk 'downland' landscapes in association with, and often transitional to, calcareous grassland throughout the lowlands (less than 300 m, Rodwell 1992).

A few sites occur in more upland situations where they can show floristic transitions to MG3 *Anthoxanthum odoratum-Geranium sylvaticum* grassland.

Fragmentary stands of MG5 can be found in churchyards, woodland rides or road and railway verges (Rodwell 1992).



 10 km square distribution map of MG5 grassland in the UK. Source Rodwell *et al* 2007.

MG5 grasslands vary in their plant species composition across England and Wales due to the nature of past grassland and land management, soil type (especially pH), hydrology, altitude and topography (Rodwell 1992, Stevens *et al* 2010).

The three sub-types of MG5 tend to pick out soil conditions, especially pH (Rodwell 1992).

- MG5a is the 'typical' MG5 grassland on soils with pH between 6.5 and 7.5.
- MG5b supports a range of species that prefer more lime-rich soils such as lady's bedstraw *Galium verum*, salad burnet *Sanguisorba minor*, upright brome *Bromopsis erecta* and hoary plantain *Plantago media.*
- On more acid soils, MG5c is typical, with heath grass *Danthonia decumbens*, tormentil *Potentilla erecta* and bitter vetch *Lathyrus linifolius* often prominent.

Conserving MG5 grasslands

Until the early 1970s, it seems that ecologists and conservation scientists had neglected the need to consider the conservation of neutral meadows and pastures (Ratcliffe 1977) despite the first accessible description of their botanical composition being published in 1939 (Tansley 1939). This is in contrast to other grassland types such as chalk and limestone grasslands whose botanical and conservation value was recognised much earlier.

This was possibly because neutral grasslands were seen as commonplace in the farmed landscape. For example, the list of 735 key nature conservation sites published in 1977 (Ratcliffe 1977) only lists 9 sites (1.2%) equivalent to MG5 (NCR neutral grassland groups 8 and 9).

Realisation that neutral grasslands were rapidly being improved for agriculture and that they had considerable nature conservation value led to increased conservation effort from the late 1970s onwards.

MG5 is one of three component unimproved grassland types of the UK BAP priority habitat known as Lowland Meadows (UK Biodiversity Group 1998), which is listed as a habitat of principal importance under section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (see Annex 1 on page 9 for more details).

MG5 covers less than 6,000 ha in England (Robertson & Jefferson 2000), 0.06% of non-urban land area of England. The total estimated resource of MG5 currently in Sites of Special Scientific Interest (SSSIs) is approximately 55%, and around 616 SSSIs have MG5 as an interest feature.

For the other UK countries, Scotland, Wales and Northern Ireland, the estimates are 1500, 1595 and 937 hectares respectively.

The site size profile for lowland meadows (MG4, MG5 & MG8) shows that 80% of sites are less than 5 hectares, and only 9% of sites are over 10 hectares (Bullock *et al* 2011 based on data from Natural England Priority Habitat Inventories).

The main mechanisms for conserving MG5 grassland include :

- notification as SSSI;
- purchase by conservation organisations and establishment of nature reserves;
- agreements under the Environmental Stewardship Higher Level Scheme (HLS).

As part of a priority habitat, listed under section 41 of the NERC Act, MG5 sites exceeding 2 hectares are within the scope of the Environmental Impact Assessment (Agriculture) Regulations, 2006, which seek to ensure that activities designed to increase agricultural productivity do not have significant negative impacts on uncultivated land and semi-natural areas including high-value grasslands. Unfortunately, there is evidence that the Regulations have been ineffective as a mechanism for the conservation of semi-natural grasslands (The Grasslands Trust 2011).

Creation of lowland meadows, including MG5, is an objective of the England Biodiversity Strategy (Biodiversity 2020) and precursor strategies. The Higher Level Scheme is the main delivery mechanism for funding grassland creation on farmland, although some County Wildlife Trusts and other non-governmental organisations have embarked on grassland creation projects (see Hewins & Wilson 2013, Critchley et al 2004).

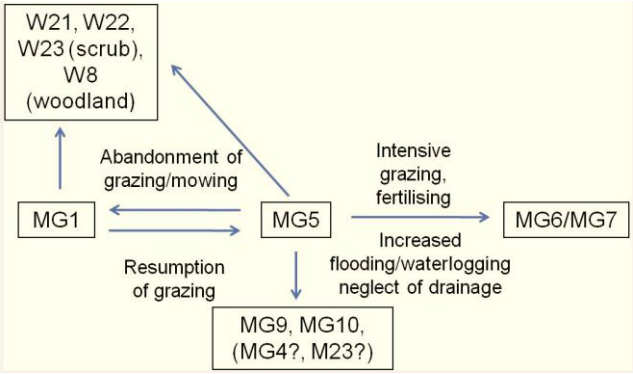
Vegetation that approximates to MG5 (and indeed some other types of dry calcareous and acid grassland) can be created on suitable arable soils using hay strewing or seed mixtures over timescales of 10-20 years (Hewins & Wilson 2013). However, such grasslands should not be confused with long-established grasslands including MG5 which are very different in character in terms of:

- species richness and diversity;
- presence of local or scarce species;
- presence of so-called species indicative of long continuity and/or species that are difficult to establish in new swards;
- soil structure and topographical heterogeneity;
- other components of the ecosystem including above and below ground biota.

Typically neutral and calcareous grasslands that closely resemble ancient semi-natural grassland take a minimum of 100 years to develop (Fagan et al, Gibson 1998, Gibson & Brown 1991, Morris *et al* 2006). However, the abiotic and biotic conditions under which such grasslands formed were very different to those pertaining today (Gibson 1998, Morris *et al* 2006).

Conservation management

Lack of cutting or grazing will initially result in an increase in coarser more competitive grasses and herbs and given time, ultimately scrub and woodland (Duffey *et al* 1974). In the absence of management, MG5 will undergo a succession often initially to MG1 *Arrhenatherum elatius* grassland followed by scrub (eg W21 *Crataegus monogyna- Hedera helix* scrub) and ultimately woodland (eg W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland).



Management relationships between MG5 and other vegetation types

The biodiversity value of MG5 grassland can only can be sustained by either

- hay meadow management (hay cut typically early July) and late summer/autumn aftermath grazing); or
- pasture management by sheep, cattle or horses.

Species composition may vary depending on the broad management type (Duffey *et al* 1974, Rodwell 1992, Gibson 1996, Crofts & Jefferson 1999, Robertson & Jefferson 2000, Rodwell *et al* 2007). For example, sustained overgrazing can also lead to a shift from MG5 to semi-improved MG6 grassland (Gibson 1997).

Further information on appropriate stocking rates and livestock management can be found in Crofts & Jefferson 1999, Kirkham *et al* 2003, Gibson 1996, 1997).

There is some evidence that, for at least some of the MG5 meadow resource, the botanical composition of MG5, which is now valued in the 21st Century, has been strongly influenced by historic traditional management involving the use of applications of farmyard manure (FYM) and lime. In some cases, MG5 may have been originally 'won' from different vegetation by enclosure, limited drainage, manuring and liming such as on Dartmoor and the Shropshire Hills from dwarf shrub- heath and acid grassland.

Generic guidance for hay meadow sites to maintain biodiversity is to allow applications of FYM up to 12 t/ha/year for sites with a history of manuring or 4 – 6 t/ha/year or 8 – 12t/ha every other year for sites with no recent history of manuring.

However, ideally, vegetation composition, conservation objectives, soil physical and chemical status, past nutrient management and other environmental variables such as rainfall and temperature should guide what level of FYM is likely to be ecologically sustainable at specific sites.

Higher rates of nutrient application to MG5 meadows or pastures (including from atmospheric deposition of nitrogen) will result in a decline in species-richness moving the community from MG5 towards MG6 and MG7 semi-improved and improved grasslands (Kirkham *et al* 2008, Kirkham *et al* submitted).

The maintenance and restoration of the biodiversity value of species-rich neutral grassland (including MG5) and some types of fen meadows on soils prone to acidity through leaching is dependent on the periodic application of lime. Further detailed guidance as to when and where this is appropriate can be found in Walsh *et al* 2012.

MG5 and agriculture

As mentioned above it is essential for the conservation of these biodiverse grasslands that they are managed by cutting and /or grazing.

This is most readily achieved when they form part of livestock farming enterprises. They are more readily integrated into beef or sheep rearing systems than dairying because of the requirement for high yields and digestibility of herbage for dairy cows. This is most easily satisfied by reseeded or improved pastures.

When MG5 is managed as pasture, not surprisingly, the growth rates of beef cattle tend to be below that expected for beef cattle on improved, fertilised pasture. However, the growth rates that can be achieved on MG5 can still be respectable and range from around 60% up to rates almost equivalent to growing beef cattle on agriculturally-improved grassland under comparable grazing management conditions. Indeed the legume component of MG5, the high mineral content and the relatively high herbage production in late spring and summer, means they can be a valuable complement to agriculturally-improved grassland.

However, there is some evidence that these grasslands may be less suitable for maintaining the performance and the health of growing or productive cattle in the late summer/autumn. At this time, they could be grazed by less productive stock such as dry suckler cows.

Sheep production systems generally tend to be compatible with the utilisation of MG5 although feed supplementation or movement onto more productive grassland may be necessary during mating and lambing.

For MG5 sites managed as meadows, the hay is used as winter feed for livestock. Yields range from around 40-80% of yields from intensively managed improved grasslands. Also, the energy value of the hay may be between 10 and 40% lower and they tend to have lower spring growth rates. From an agricultural perspective, the yield and quality (digestibility) of hay is likely to be maximised by cutting in late June or early July. After this, there is a decline in the digestibility of the hay crop. The utilized metabolizable energy (UME) output of unfertilised, semi-natural grasslands cut for hay and then grazed in autumn may be at best only 60% of that achieved on improved grasslands.

Adapting to climate change

The component plant species of MG5 grassland mostly belong to the southern temperate, widespread temperate and temperate biogeographical elements of the British flora (Preston & Hill 1997). This suggests it might be relatively resilient to climate change scenarios, especially those related to temperature.

Bird's-foot trefoil a component species of MG5 © Stuart Smith CCW

However, the situation is complex. Increased spring temperatures (and legacy of wetter winters) may boost total biomass and favour competitive species. Drier summers on the other hand will favour stress tolerant (eg deep-rooted species) and ruderal species but retard competitors/stress-tolerant competitors.

It is also possible that the phenology of characteristic lowland meadow plant species may change significantly in response to climatic prompts.

Conclusion

MG5 grassland is a valuable resource that needs continued management, monitoring, research and protection for it to survive. There is also a need to raise awareness of the value of this grassland type and the methods available to manage and protect it.

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Further information

Natural England publications and English Nature Research Reports are available to download from the Natural England website: **www.naturalengland.org.uk**. In particular see:

- TIN045: *The use of lime on semi-natural grassland in agri-environment schemes*
- TIN060: *The use of yellow rattle to facilitate grassland diversification*
- TIN110: *Assessing whether created or restored grassland is a BAP Priority Habitat*

Natural England is currently undertaking a comprehensive review of the evidence regarding the management of a related hay meadow type, MG3, that occurs in the uplands. This will be published later in 2013.

For further information contact the Natural England Enquiry Service on 0300 060 0863 or e-mail **enquiries@naturalengland.org.uk**.

- Historic Environment Records maintained by local authorities **www.heritagegateway.org.uk/gateway/chr/default.aspx**
- Guide on how to manage archaeology under grass **www.english-heritage.org.uk/content/publications/publicationsNew/guidelines-standards/farming-the-historic-landscape-grassland/farming-the-historic-landscape.-caring-for-archaeological-sites-in-grassland2004.pdf**

Acknowledgements and copyright

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Annex 1: Classification and nomenclature of neutral grasslands

Name	NVC types	Notes
Unimproved neutral grassland (also Level 1 code B21 and Phase 1 code B2.1)	MG2-MG5, MG8, MG11-MG13	Some sub-types of MG1 could possibly be classed as unimproved/semi-natural. Also, some stands of MG11, MG12 and MG13 may possibly be semi-improved
Lowland meadows (s41 priority)	MG4, MG5, MG8	
Upland Meadows (s41 priority)	MG3, MG8	Upland forms of MG8 are now included in the upland meadows s41 priority type
Level 1 Unimproved Neutral Grassland, lowland	MG4, MG5, MG8	
Improved Grassland (also Phase 1 code B4)	MG7	
Semi-improved neutral grassland (also Phase 1 code B2.2)	MG1, MG6, MG7, MG9, MG10	Some vegetation that conforms to MG7 may be semi-improved where more botanically diverse
Neutral grassland	MG1- MG13	
Annex 1 Mountain hay meadows H6520	MG3	
Annex 1 Lowland hay meadows H6510	MG4	

Footnote: s41 priority habitats are those listed as of principal importance for the conservation of biological diversity in England under section 41 of the Natural Environment and Rural Communities Act 2006. These were also listed as BAP priority habitats under the UK Biodiversity Action Plan.

Appendix 5263/AB7:

Technical Briefing Note TN03: Addendum to Ecological Appraisal (Aspect Ecology, July 2020)

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Technical Briefing Note

Project: South Caldecotte, Milton Keynes

Technical Briefing Note TN03: Addendum to Ecological Appraisal

Date: 28 July 2020

1. Introduction

1.1. Aspect was originally commissioned by HB (South Caldecotte) Ltd in September 2017 to establish the ecological baseline of land at South Caldecotte, Milton Keynes, herein referred to as `the site` centred at grid reference SP 8923 3419. The baseline was established through a suite of survey work between September 2017 and May 2019 including: Desktop study and extended Phase 1 habitat survey, botanical surveys of the woodland and grassland, and faunal specific surveys; the results were set out in an Ecological Appraisal (1005263 Eco App dv4) dated June 2019.

1.2. Given the time which has passed, Aspect Ecology was commissioned by HB (South Caldecotte) Ltd in March 2020 to undertake an update Phase 1 survey of the site and botanical assessment of the grassland identified as Lowland Meadow on MAGIC, along with a number of specific update faunal surveys, to review the current ecological status of the site and establish whether there have been any significant changes in the ecological status of the site since the previous survey work. The results of the update survey work are detailed below.

2. Update Survey Work

2.1. In order to provide an up to date understanding of the site, an update Phase 1 survey was completed in April 2020, along with update bat potential roost assessments and building inspections, Badger, Otter and Water Vole surveys. Update suitability assessments were undertaken for reptiles, amphibians and other fauna. In regard to Great Crested Newts, where ponds were considered to be suitable to support the species, update eDNA surveys were undertaken in April 2020.

2.2. An update National Vegetation Classification (NVC) survey of the area within the site classified as Lowland Meadow has been undertaken by Blackstone Ecology; the findings from which are set out in their report entitled `South Caldecotte, Milton Keynes: Botanical Assessment of Grassland` dated June 2020 (See Annex 5263/TN2). A summary of the findings is presented herein, although it is advised Blackstone Ecology's report be read in conjunction with this note.

3. Methodology

3.1. Update survey work followed the methodology below:

3.2. Ecological Designations

3.2.1. An updated desk study has been undertaken sourcing information from the online Multi-Agency Geographic Information for the Countryside (MAGIC) database, on a basis of a 25km search radius. In addition, the Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) was contacted, with data requested on the basis of a search radius of 2km. No new areas have been designated on the basis of nature conservation interest in the local area; however, the boundary to the A5 Milton Keynes Wildlife Corridor has been updated to align with the adopted Policies Map (sheet 4) for Plan:MK. Accordingly, an updated Ecological Designations plan (Plan 5263/ECO2 Rev A) is incorporated herein.

3.3. Update Phase 1 Habitat Survey

3.3.1. The site was surveyed in April 2020 to record any changes to the main habitats and ecological features present, since the previous surveys, that would require a reassessment of their ecological value. The site was surveyed based on standard Phase 1 Habitat Survey methodology[1], whereby the habitat types present are identified and mapped, together with an assessment of the species composition of each habitat. This technique provides an inventory of the basic habitat types present and allows identification of areas of greater potential.

3.3.2. General faunal activity, such as mammals or birds observed visually or by call during the course of the survey was recorded. Specific attention was also paid to the potential presence of any protected, rare or notable species, and specific consideration was given to bats, Badger, Otter, Water Vole and Great Crested Newt, as described in the relevant sections below.

3.4. Grassland Botanical Survey

3.4.1. Blackstone Ecology was commissioned to undertake a National Vegetation Classification (NVC) survey of the grassland within the site identified as Lowland Meadow on MAGIC (see Annex 5263/TN1). The methodology is detailed within Blackstone Ecology's report entitled `South Caldecotte, Milton Keynes: Botanical Assessment of Grassland`, dated June 2020 (see Annex 5263/TN2). In summary, the assessment was carried out according to standard methodology[2], using five 2m x 2m quadrats in each field to record species present and cover values using the Domin scale. Quadrats were located within stands of homogenous vegetation, i.e. avoiding localised patches of ruderal vegetation or disturbed ground, but with the precise quadrat locations otherwise selected at random. In addition, a general species audit was also undertaken to further inform the assessment of the grassland community type and condition.

3.4.2. The data collected was entered into the Modular Analysis of Vegetation Information System (MAVIS) computer program (Centre for Ecology and Hydrology 2016) in order to classify the type of grassland community present.

[1] Joint Nature Conservation Committee (2010) *'Handbook for Phase 1 habitat survey: A technique for environmental audit.'*
[2] National Vegetation Classification. Rodwell. 2006..

3.5. Bats[3]

Update Visual Inspection Surveys

3.5.1. **Buildings.** Update inspection surveys using ladders, torches and binoculars, where necessary, were undertaken in April 2020.

3.5.2. During the external inspections, particular attention was given to any potential roost features or access points, such as broken or lifted roof tiles, lifted lead flashing, soffit boxes, weatherboarding, hanging tiles, etc. and for any external signs of use by bats such as accumulations of bat droppings or staining. Binoculars were used to inspect any inaccessible areas more closely where appropriate.

3.5.3. During the internal inspections, evidence for the presence of bats was searched for with particular attention paid to any loft voids and relevant potential roost features and locations, such as ridge boards, rafters, purlins, gable walls, and mortise joints. Specific searches were made for bat droppings that can indicate present or past use and extent of use, whilst other signs that can indicate the possible presence of bats were also searched for, e.g. presence of stained areas, feeding remains, corpses, etc. Any droppings collected during the course of the surveys were visually assessed and attributed to a species where possible on the basis of size/shape/texture[4].

3.5.4. **Trees.** Trees were assessed for their potential to support roosting bats based on the presence of features such as holes, cracks, splits or loose bark. The suitability for roosting bats was categorised based on best practice guidance[5] as:

- High;
- Moderate;
- Low; or
- Negligible.

3.5.5. Any potential roost features identified were also inspected for any signs indicating possible use by bats, e.g. staining, scratch marks, bat droppings, etc.

3.6. Badger

3.6.1. A detailed update Badger survey was carried out in April 2020, which comprised two main elements. The first element involved searching for evidence of Badger setts. The second element involved searching for signs of Badger activity such as well-worn paths and push-throughs, snagged hair, footprints, latrines and foraging signs, so as to build up a picture of any use of the site by Badger.

3.7. Otter

3.7.1. An update Otter survey was undertaken in April 2020 during which the watercourse within the site was thoroughly searched for signs of Otter. Such signs include holts (underground chambers used for lying up), spraints, prints, paths and slides. The banks of the watercourse

[3] Surveys based on: English Nature (2004) '*Bat Mitigation Guidelines'* and Collins, J. (ed.) (2016) '*Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn).' Bat Conservation Trust

[4] Stebbings, RE, Yalden DW and Herman, JS (2007). '*Which bat is it? A guide to bat identification in Great Britain and Ireland.'* The Mammal Society

[5] Collins, J. (ed.) (2016) '*Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn).' Bat Conservation Trust

were examined thoroughly from both sides (where accessible) and from the watercourse itself where scrub and water depth allowed.

3.8. Water Vole

3.8.1. The watercourse within the site was thoroughly searched for signs of Water Vole in April 2020. Such signs include latrines, tunnels, lawns (small areas of vegetation grazed by Water Vole) and footprints. The banks of the watercourse were examined thoroughly from both sides (where accessible) and from the watercourse itself where scrub and water depth allowed.

3.9. Great Crested Newt

Habitat Suitability Index (HSI)

3.9.1. Update HSI assessments were undertaken of all relevant waterbodies within 250m of the site boundary in April 2020 (based on a review of Ordnance Survey mapping and satellite imagery), where access was gained. The methodology followed for these assessments was the same as detailed within the 2019 Ecological Appraisal.

Environmental DNA (eDNA)

3.9.2. Update eDNA surveys were carried out to determine the presence/likely absence of Great Crested Newt within two on-site ponds (P1 and P2; see Plan 5263/ECO6 of the 2019 Ecological Appraisal) and three off-site ponds (P4, P10 and P11). Water samples were collected on the 16th April for pond P10, and 20th April 2020 for ponds P1, P2, P4 and P11, following the procedure outlined in the methods manual prepared for DEFRA by Biggs *et al.* (2014). The survey fell within the acceptable seasonal window set by Natural England (15th April to 30th June). Samples were collected by suitably experienced Aspect Ecology staff. The water samples were sent for laboratory analysis which was conducted by 'Fera' and also followed the procedures set out by Biggs *et al.* (2014)[6].

3.10. Survey Constraints/Limitations

3.10.1. All of the species that occur in each habitat would not necessarily be detectable during survey work carried out at any given time of the year, since different species are apparent during different seasons. The Phase 1 habitat survey was undertaken within the optimal season therefore allowing a robust assessment of habitats and botanical interest across the site.

3.10.2. Attention was paid to the presence of any invasive species listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). However, the detectability of such species varies due to a number of factors, e.g. time of year, site management, etc., and hence the absence of invasive species should not be assumed even if no such species were detected during the Phase 1 survey.

3.10.3. Internal access was not available to buildings B1 and B2 at the time of survey due to health and safety concerns caused by the Coronavirus pandemic. Nonetheless, a comprehensive external survey was carried out.

[6] Biggs J., Ewald N., Valentini A., Gaboriaud C., Griffiths R.A., Foster J., Wilkinson J., Arnett A., Williams P. and Dunn F. (2014). '*Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA*'. Freshwater Habitats Trust, Oxford.

3.10.4. Densely vegetated habitats within the site have the potential to reduce the detectability of field signs for faunal species such as Badger. A detailed survey was able to be completed and, whilst dense scrub vegetation is present within the site, it is considered that the survey results do provide an accurate baseline to assess the potential for impacts on Badger under the development proposals.

3.10.5. Access was requested to off-site ponds within 250m of the site, however this was not granted for four ponds (P5-7 and P9). Ponds P5-P7 could be viewed from public roads and therefore a HSI assessment was completed (P5 and P6 were found to be 'good' and P7 'below average' suitability), however an eDNA survey was not carried out as access the pond was not possible. No HSI assessment or eDNA survey could be completed for pond P9.

4. Results

4.1. Designations

Statutory Designations

4.1.1. As described within the 2019 Ecological Appraisal, the nearest statutory designation is Blue Lagoon Local Nature Reserve (LNR), located approximately 2.3km south-west of the site and the next nearest statutory designation is Wavendon Heath Ponds Site of Special Scientific Interest (SSSI), located approximately 3.3km to the east of the site. The site does not lie within any Impact Risk Zones (IRZs) which apply to the proposed development. IRZs were developed by Natural England as an initial tool to help assess the risk of developments adversely affecting SSSIs. No statutory designations of European or international importance are present within 20km of the site.

Non-statutory Designations

4.1.2. Information obtained from BMERC in 2018 showed an arbitrary boundary to the A5 Milton Keynes Wildlife Corridor extending into the west of the site along the entire length of the boundary. However, the adopted Policies Map (sheet 4) for Plan:MK shows the boundary to the A5 Milton Keynes Wildlife Corridor has been realigned, such that it now only extends into the south of the site where it covers an area of ~3.72ha and incorporates fields F1, F2 and F12: these grassland fields exhibit varying levels of improvement, are bound to some extent by defunct hedgerows, and are therefore generally of limited ecological interest.

4.1.3. Another Milton Keynes Wildlife Corridor associated with the Marston Vale railway line lies immediately beyond the northern site boundary, whilst the next closest non-statutory designation is the Caldecotte Lake Local Wildlife Site (LWS), located approximately 35m north of the site. The boundaries to these designations remain unchanged.

4.1.4. The update review has confirmed that no new statutory or non-statutory designations are present in the vicinity of the site. Notwithstanding the changes to boundary of the A5 Milton Keynes Wildlife Corridor, the significance of which is discussed further at Section 5, the assessment of the impact of the proposals on statutory designations made within the 2019 Ecological Appraisal is considered to remain valid.

4.2. Habitats

Update Phase 1 Habitat Survey

4.2.1. The update Phase 1 habitat survey work undertaken in April 2020 recorded the site to remain broadly as previously described. Minor changes in the sward height of grassland and the height/width of hedgerows were observed due to the timing of the survey work and management practices. A number of other small changes in habitats were also observed during the 2020 update survey, which are described below:

- Fields F3, F5 and F6 (see Plan 5263/ECO3 Rev C) were poached in areas where supplementary feed had been provided, and areas of patchy/disturbed ground were noted in Fields F3 and F4 where archaeological investigations had taken place since 2018.

- Fields F9 and F10, which were previously grazed by Alpacas, are no longer subject to grazing and the fence dividing the fields has been removed. The fields are now managed by mowing with the arisings left *in-situ*. At the time of survey in April 2020 the sward height of the grassland within fields F9 and F10 was approximately 5-10cm.

- F13 is an arable field that was recorded as ploughed in 2018; this field was noted to be planted with a grass ley with a sward height of approximately 20-30cm in height in April 2020. The grass ley is a monoculture with very few arable weeds and is likely part of an arable rotation to improve soil organic matter and fertility.

- A Pear previously recorded as *Pyrus* Sp., within hedgerow H5, has been confirmed as Wild Pear *Pyrus pyraster*.

4.2.2. Notwithstanding the above, the habitats within the site were recorded to remain largely as previously described, with the value of the habitats unchanged since the original survey work was undertaken between 2017 and 2018; with exception of the grassland classified as Lowland Meadow on MAGIC, which is discussed below.

Update National Vegetation Classification (NVC) Survey

4.2.3. An update NVC survey was undertaken in June 2020 by Blackstone Ecology. The findings were broadly similar to those reported in the 2019 Ecological Appraisal, and recorded by Natural England in 1993, in that the field north of the stream (F4) exhibited relatively greater diversity within the grassland sward compared to the field (F3) south of the stream. Also, on all three occasions field F4 has been confirmed to have an MG5 grassland community, albeit of sub-optimal condition due to the extent of Perennial Rye-grass, a grass of higher nutrient soils, within the sward.

4.2.4. However, in regard to field F3, Blackstone Ecology concluded that the relative species richness and herb cover was much reduced compared to F4 as were indicators of Lowland Meadow, while there is an increased incidence of species that indicate some level of agricultural improvement has occurred. As such that the grassland is clearly distinct to the community in F4 and should be classified as semi-improved MG6 *Lolium perenne-Cynosurus cristatus* grassland. This result closely aligns with the findings of English Nature's 1993 survey which also recorded the 'relatively low diversity' of the field and its affinity to MG6, a finding also reached within Aspect Ecology's 2018 NVC survey.

4.2.5. Overall, the update NVC survey work confirms the presence of Priority Habitat Lowland Meadow within the site, which is confined to field F4. Field F3 represents non-Priority habitat in the form of moderately species-rich semi-improved grassland.

4.3. Fauna

4.3.1. Update specific survey work has been undertaken at the site between April and May 2020, in respect of bats, Badgers, Otters, Water Vole and Great Crested Newts. A general assessment of the habitats has also been undertaken to determine whether the suitability of the site in regard to other fauna has changed.

Bats

4.3.2. **Bats: Roosting – Buildings.** The 2019 Ecological Appraisal identified the presence of summer non-breeding roosts for low numbers of Common Pipistrelle, Soprano Pipistrelle and potentially Brown Long-eared bat within buildings B1, B2, B4 and B6. Evidence of bats was also recorded in B3 and B5 although no bats were recorded emerging or re-entering these buildings during the presence/likely absence survey work. It was therefore concluded that these two buildings may be entered on occasion by exploratory bats, but the poor suitability of the buildings discourages roosting.

4.3.3. The 2020 update survey work confirmed that the condition of the buildings within the site is largely the same as reported in the 2019 Ecological Appraisal and evidence of bats in the form of very small of droppings was recorded within buildings B3 and B5. The 2020 update survey work confirmed that the condition of the buildings within the site remains essentially the same as recorded in 2017/18, and no evidence was found to indicate that the use of the buildings by roosting bats had significantly changed. Accordingly, further update survey work in the form of dusk emergence/dawn re-entry surveys was considered unnecessary at this time given the results are unlikely to be significantly different to those previously recorded. On this basis, the 2019 assessment of impacts of the proposals on these species remains valid.

4.3.4. **Bats: Roosting – Trees.** A number of trees with potential to support roosting bats were previously recorded with site. The 2020 update survey work identified three further trees with bat roosting potential labelled T5b, T8b and T25b on Plan 5263/ECO3 Rev C; all three trees were considered to afford low suitability to support roosting bats. All three trees would be lost to development. None of the trees need to be subject to further survey work, however, in accordance with relevant best practice guidelines it is recommended precautionary measures be undertaken at the time of felling; as per measures proposed at Section 6 of the 2019 Ecological Appraisal.

4.3.5. **Bats: Foraging and Commuting.** The habitats within the site remain largely unchanged since the 2017/2018 survey work and opportunities for foraging/commuting bats have therefore not changed significantly. The results of the 2017/2018 survey work are therefore considered likely to reflect the current use of the site by foraging/commuting bats, and the 2019 assessment of impacts of the proposals on this species remains valid.

4.3.6. Based on the above, further update survey work in regard to bat activity at the site was therefore considered unnecessary at this time.

Badger

4.3.7. No Badger setts were found within or immediately adjacent to the site during the 2020 update survey. As recorded previously, a low number of foraging scrapes were noted within the site, particularly within areas of grassland. Mammal push-throughs were recorded along the northern boundary, adjacent to the railway line, and also along the northern end of the western site boundary. Overall, update survey work indicates that the use of the site by Badger has not changed significantly since the previous survey work, and therefore the 2019 assessment of impacts of the proposals on this species remains valid.

Otter/Water Vole

4.3.8. No evidence to indicate the use of the watercourse by Otter or Water Vole was recorded during an update survey of the on-site stream in April 2020. Accordingly, the 2019 assessment of impacts of the proposals on these species remains valid.

Amphibians

4.3.9. Update Habitat Suitability Index (HSI) assessments were undertaken for all waterbodies within the site, and all off-site waterbodies within 250m of the site (where access could be gained). Access to P10 was not available in 2017/18, but was gained during the 2020 surveys and, accordingly, this pond was subject to a HSI assessment also. As previously, access to pond P9 was not granted.

4.3.10. The results of the update HSI surveys revealed the ponds offer the same suitability for Great Crested Newt as was previously recorded. Those with 'average' suitability or higher (ponds P1, P2, P4 and P10) were subject to further survey work in the form of eDNA surveys. Despite affording 'poor' suitability for Great Crested Newts, in order to provide a robust assessment, pond P4 was also subject to an eDNA survey given its close proximity to P11.

4.3.11. The eDNA results for all five ponds were returned as negative, indicating the likely absence of Great Crested Newt from these ponds. Accordingly, the 2019 assessment of impacts of the proposals on this species, and other amphibians, remains valid.

Other Fauna

4.3.12. The 2019 Ecological Appraisal report identified the presence, and potential for presence, of reptiles, Priority Species of mammal such as Hedgehog, and a range of breeding/wintering birds.

4.3.13. During a site visit in June 2020, Willow trees adjacent the stream in the western corner of field F4 were examined for signs of use by Barn Owl, with small numbers of Barn Owl pellets recorded within a cavity of a cut limb. Barn Owls and their young receive year-round protection under Sch. 1 of the Wildlife and Countryside Act 1981 (as amended) from being intentionally or recklessly disturbed at, on or near an active nest. However, given the absence of other natural debris which typically accumulates within a nest and the small size and exposed location of the cavity, the location identified was considered to be a non-breeding roost.

4.3.14. Overall, no significant changes with regard to other fauna were recorded during the 2020 update survey, as the on-site and adjacent habitats remain largely unchanged. Accordingly, no further update survey work with regard to other fauna was undertaken.

4.4. Summary

4.5. Overall, the update survey work completed has found the site to remain broadly similar to that surveyed between 2017 and 2019, such that the evaluations within the 2019 Ecological Appraisal remain unaltered save for minor updates in respect of Wild Pear and Barn Owl.

5. Update Assessment of Impact

5.1. As summarised above, the update survey work has confirmed the site remains broadly similar to that surveyed between 2017 and 2019, such that the findings and evaluations within the 2019 Ecological Appraisal remain valid. Nonetheless, for completeness a re-assessment of impacts is undertaken below in light of new information recorded during the update survey work.

5.2. Ecological Designations

5.2.1. The boundary to the A5 Milton Keynes Wildlife Corridor has changed, such that it is now defined by the margins of the grassland fields in the south of the site. Notwithstanding the designation that has been applied to the fields, the habitats themselves are of minor ecological interest.

5.2.2. It is estimated that 50% of the designation which lies within the site will be lost to development, the remainder of which would be incorporated into the proposed linear park which covers ~5.42ha and would extend along the entire length of the western site boundary and therefore the A5. Accordingly, whilst the width of the corridor will be reduced, it will be extended in length, achieving a significant overall increase in area of ~46%. In addition, the linear park will incorporate a mosaic of relatively higher value habitats including the re-routed watercourse, species-rich grassland and pockets of tree and shrub planting, providing an enhanced corridor of elevated ecological interest compared to the semi-improved/improved grassland that would be lost under the proposals. In addition, the habitats within the linear park will be subject to management incorporating ecological principles to benefit wildlife.

5.2.3. Overall, the proposals provide a betterment to the A5 Milton Keynes Wildlife Corridor compared to the existing situation, such that the functionality of the wildlife corridor will be enhanced. The assessment of impacts for all other ecological designations, as reported within the 2019 Ecological Assessment, remains valid.

5.3. Habitats

5.3.1. The update botanical assessment recorded field F4 as Priority Habitat Lowland Meadow which is in a sub-optimal condition, while field F3 was recorded to represent non-Priority Habitat semi-improved grassland of moderate species-richness. Accordingly, the extent of Priority Habitat Lowland Meadow within the site has been updated at ~0.76ha, which represents a reduction in the area which was included on a precautionary basis in the 2019 Ecological Appraisal. However, with the data available, the previous inclusion in the assessment of the grassland in field F3 as Lowland Meadow on a precautionary basis has been shown to be technically inappropriate. Rather, the grassland in field F3 is clearly distinct from field F4 Priority Habitat and represents a non-Priority Habitat type.

5.3.2. The area of Lowland Meadow (in field F4) remains of value at least at the district level, however the small extent (~0.76ha; which represents just ~1% of the site) can be readily

compensated for within the site. Species-rich grassland, covering an area estimated at ~2.86ha, will be created in the linear park in the west of the site, and managed for floristic diversity. This area could accommodate material translocated from the Lowland Meadow (field F4) as either turf, soils and/or a green hay cut. In any case, at an area nearly four times greater than the extent of Lowland Meadow current within the site, the proposals present the opportunity to create a larger area of grassland characteristic of Lowland Meadow that will also be accessible and can be appreciated by the general public. In addition to this, Lowland Meadow will be a focus of the offsetting scheme to restore/create Lowland Meadow at an off-site location in Milton Keynes with a minimum increase of 33% of extent of Lowland Meadow lost from field F4, which would further the objectives within the Local BAP for this habitat type. In this regard, the Environment Bank has been engaged as the off-set provider and has confirmed the availability of suitable offsetting sites in Milton Keynes, based on the updated Biodiversity Impact Assessment undertaken in July 2020 by Aspect Ecology.

5.3.3. Based on the above, the extent of Lowland Meadow within the site is now re-defined, such that the scale of impacts are accordingly reduced. Nonetheless, the loss of this important feature is considered to remain of minor to moderate ecological significance, in line with the assessment of impacts on this habitat type within the 2019 Ecological Appraisal. However, given the smaller extent of Lowland Meadow present, there is now potential to readily compensate for the loss of this habitat through translocation to a sustainable future location within the west of the site.

5.3.4. In regard to field F3, the value of the grassland in this field has been updated compared to that included on a precautionary basis within the 2019 Ecological Appraisal. Accordingly, an updated assessment of its loss under the proposals finds this to be of minor ecological significance. Where not fully compensated for within the site, the loss of semi-improved grassland under the proposals will be compensated for through the off-site offsetting scheme.

5.3.5. A Pear previously recorded as *Pyrus* Sp., within hedgerow H5, has been confirmed as Wild Pear *Pyrus pyraster*, and is considered to be an important ecological feature, such that its loss to development is considered to be of moderate ecological significance. To retain Wild Pear at the site, fruit will be harvested from the Wild Pear and seeds will be planted and grown on in a local nursery. If these are successful then the resulting young trees will be planted back out onto site within the green infrastructure post development.

5.3.6. Changes to other habitats recorded in 2020 are relatively insignificant and do not materially alter their ecological value. Accordingly, the assessment of impacts for all other habitats, as reported within the 2019 Ecological Appraisal, remains valid.

5.4. Fauna

Roosting Bats

5.4.1. Three further trees with bat potential were identified during the update survey work undertaken in April 2020. However, all three trees are considered to afford low suitability to support roosting bats. Trees with low suitability to support roosting bats are on the basis they have one or more roost sites that could be used by individual bats opportunistically, but are unlikely to be used on a regular basis or by large numbers of bats, and therefore likely only to support roosts of lower conservation significance.

5.4.2. On this basis, the value of the site for roosting bats is considered unchanged from that reported within the 2019 Ecological Appraisal.

Barn Owl

5.4.3. Whilst a single Barn Owl roost has been recorded within the site, it is a non-breeding roost and therefore is of lower value to this species such that its loss to development is of minor ecological significance. The grassland habitats, arable margins and woodland edge on site are potentially suitable foraging habitat for this species. Whilst this habitat will be lost from the interior of the site, suitable foraging habitat will be incorporated within the linear park and landscape buffers. In addition, any losses of suitable habitat would be compensated by the biodiversity offsetting scheme, which would seek the reversion of extensive areas of currently arable land to meadow habitat.

5.4.4. To compensate for the known roost (non-breeding) lost to development, the siting of at least two purpose built Barn owl nesting boxes, either on poles or on mature trees will be included in the post development proposals.

5.4.5. The assessment of impacts for all other fauna, as reported within the 2019 Ecological Assessment, remains unchanged.

6. Conclusion

6.1. It is considered that the site remains by and large unchanged from that recorded between 2017 and 2019, such that the evaluations within the 2019 Ecological Appraisal remain unaltered save for minor updates in respect of the scale of effects on lowland meadow and associated compensation proposals alongside those for Wild Pear and Barn Owl.

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Plan 5263/ECO2 Rev A:

Ecological Designations

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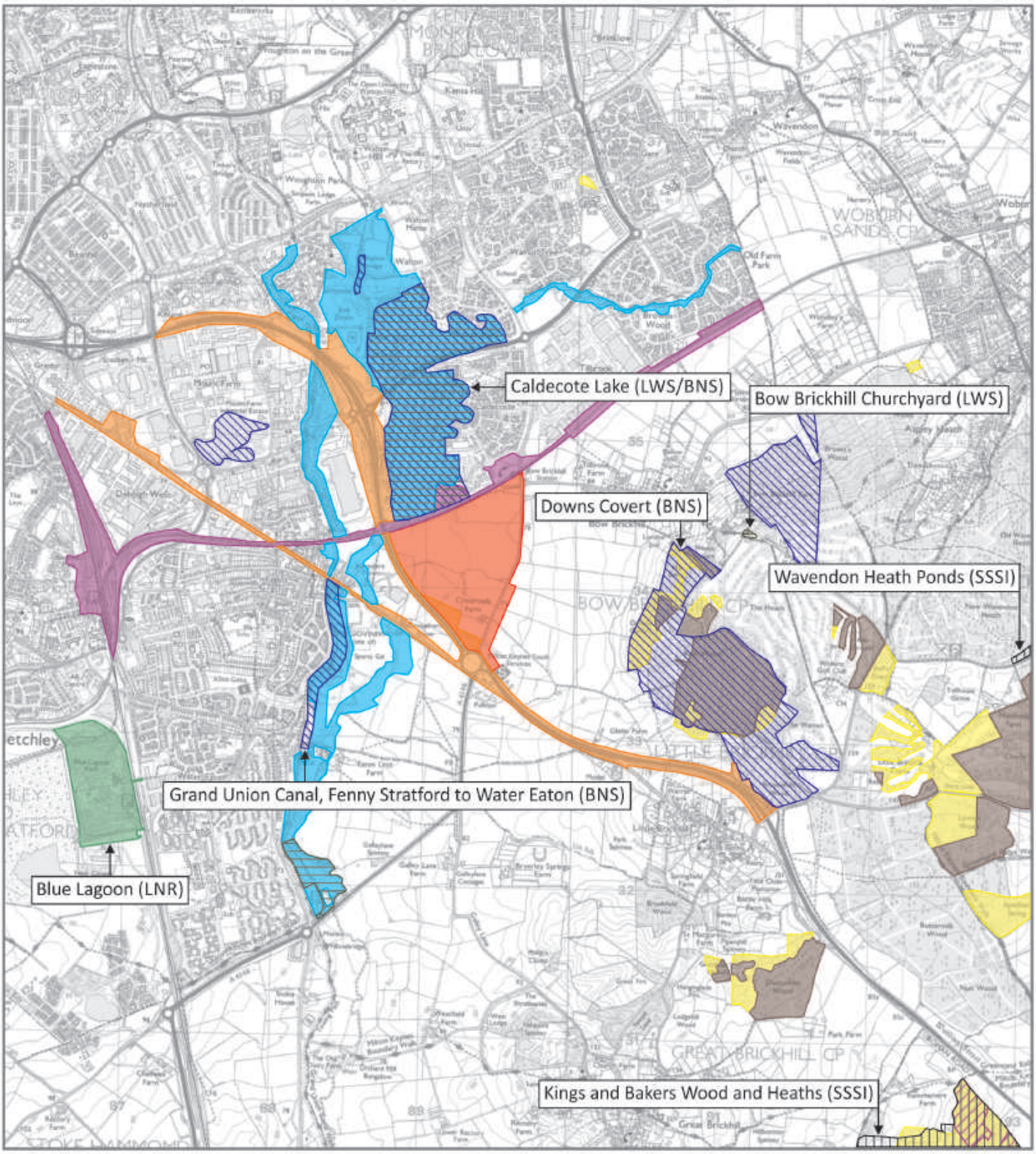

Key:

- Site Location
- Sites of Special Scientific Interest (SSSI)
- National Nature Reserve (NNR)
- Local Nature Reserve (LNR)
- Ancient & Semi - Natural Woodland (ASW)
- Ancient Replanted Woodland (ARW)
- Local Wildlife Site (LWS)
- Biological Notification Site (BNS)
- MK Railway Corridors
- MK Road Corridors
- MK Wetland Corridors

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South Caldecotte, Milton Keynes — PROJECT

Ecological Designations — TITLE

5263/ECO2 — DRAWING NO.

A — REV.

July 2020 — DATE

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Plan 5263/ECO3 Rev C:

Habitats and Ecological Features

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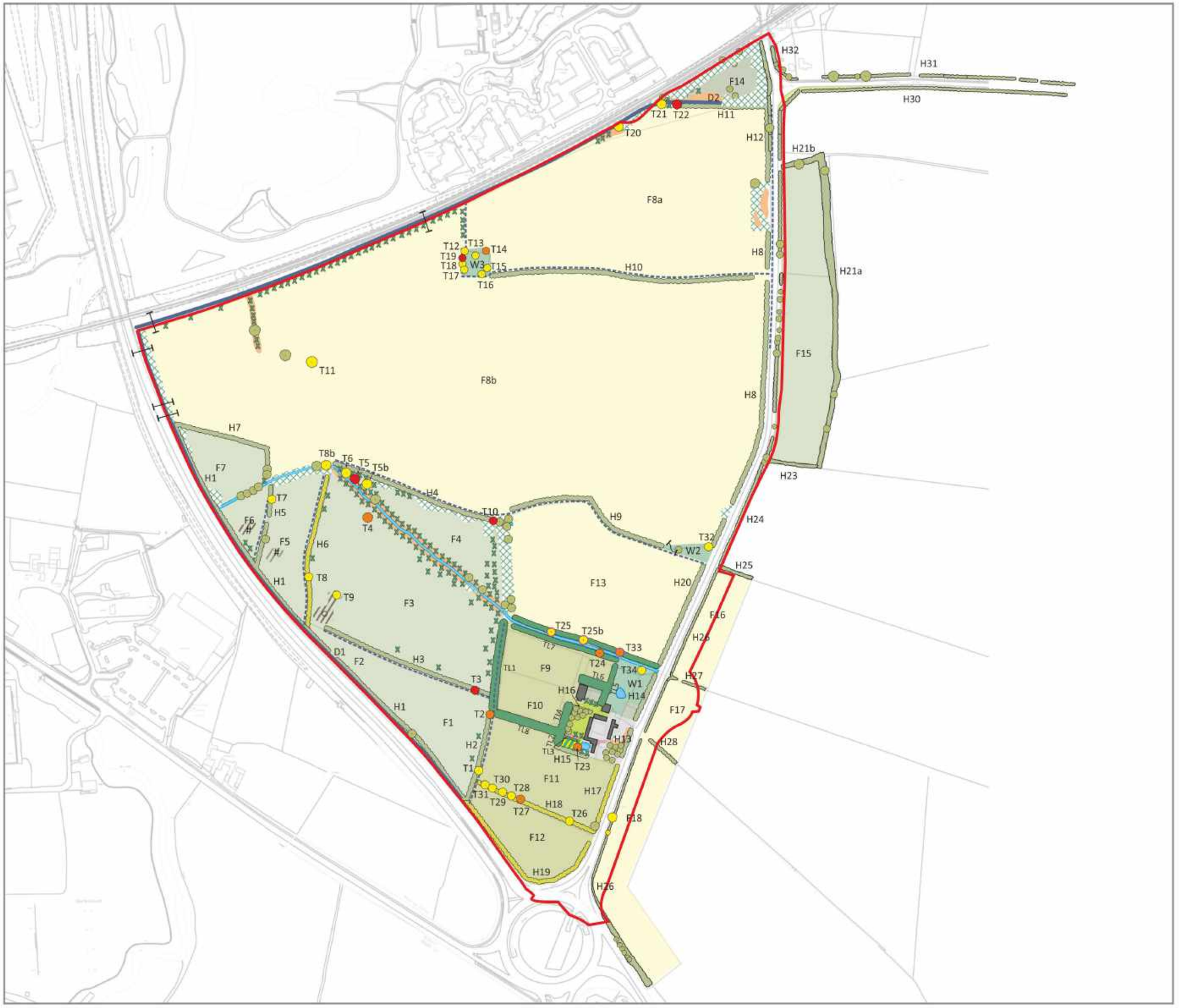

Key:

- Site Boundary
- Arable
- Amenity Grassland
- Semi Improved Grassland
- Improved Grassland
- Rough Grassland
- Orchard
- Amenity Planting
- Tall Ruderal Vegetation
- Woodland
- Dense Scrub
- Scattered Scrub
- Tree
- Tree with Moderate Potential to Support Roosting Bats
- Tree with Low Potential to Support Roosting Bats
- Tree with High Potential to Support Roosting Bats
- Mature Black Poplar
- Treeline
- Hedgerow
- Defunct Hedgerow
- Pond
- Stream
- Dry Ditch
- Wet Ditch
- Poached Ground
- Cattle Feeder/Cattle Feed
- Mammal Push-through
- Hardstanding
- Building

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South Caldecotte, Milton Keynes	PROJECT
Habitats and Ecological Features	TITLE
5263/ECO3	DRAWING NO.
C	REV.
June 2020	DATE

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Annex 5263/TN1:

MAGIC Map – Lowland Meadow

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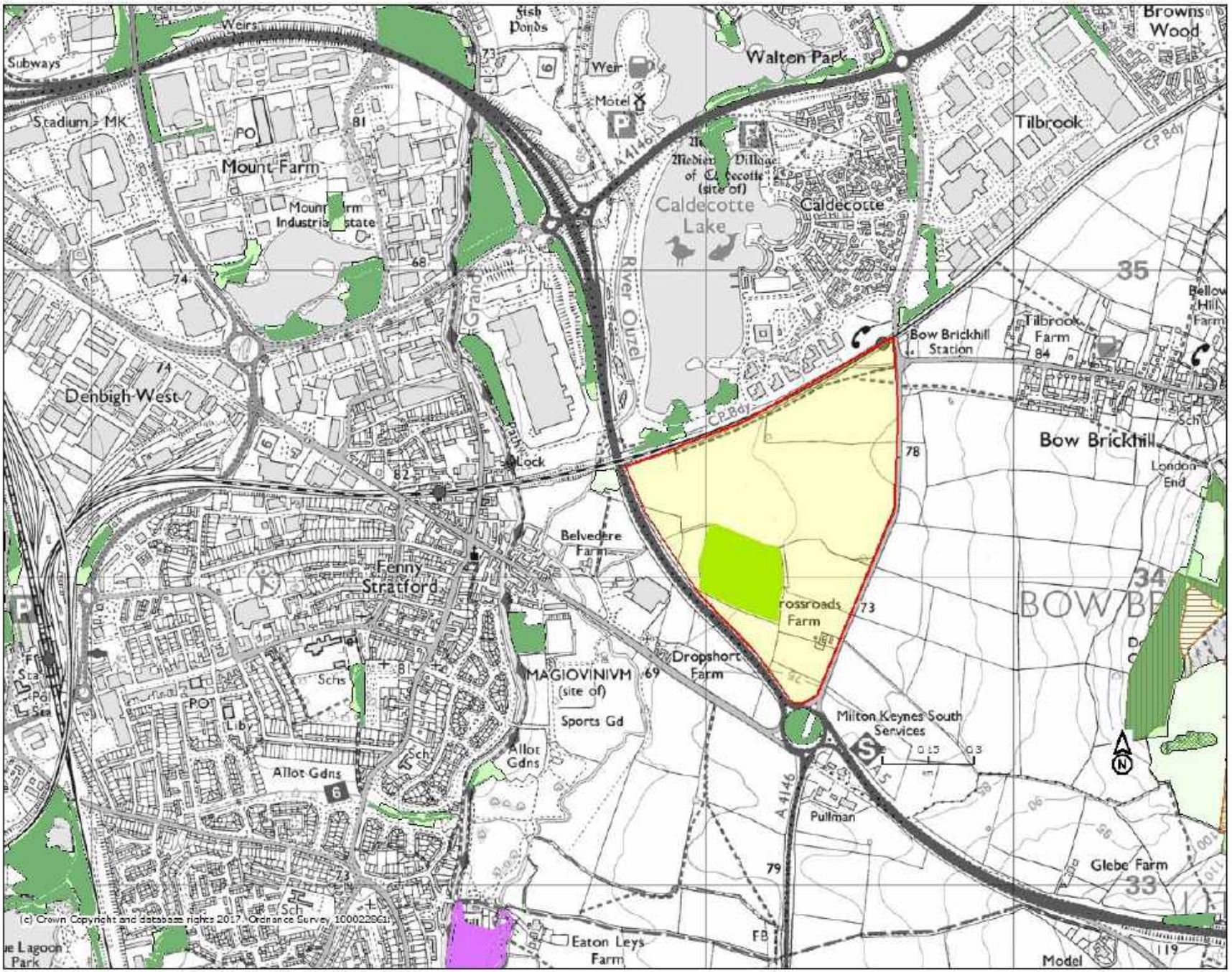
MAGiC

Magic Map



Legend

- Priority Habitat Inventory - Calaminarian Grassland (England)
- Priority Habitat Inventory - Coastal and Floodplain Grazing Marsh (England)
- Priority Habitat Inventory - Good quality semi-improved grassland (Non Priority) (England)
- Priority Habitat Inventory - Lowland Calcareous Grassland (England)
- Priority Habitat Inventory - Lowland Dry Acid Grassland (England)
- Priority Habitat Inventory - Lowland Meadows (England)
- Priority Habitat Inventory - Purple Moor Grass and Rush Pasture (England)
- Priority Habitat Inventory - Upland Calcareous Grassland (England)
- Priority Habitat Inventory - Upland Hay Meadows (England)

Projection = OSGB36
xmin = 485500
ymin = 232800
xmax = 491900
ymax = 235800

Map produced by MAGIC on 10 October, 2017.

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Annex 5263/TN2:

Blackstone Ecology's Report

South Caldecotte, Milton Keynes: Botanical Assessment of Grassland

(June 2020)

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SOUTH CALDECOTTE, MILTON KEYNES

BOTANICAL ASSESSMENT OF GRASSLAND

PREPARED BY: IAN JOHNSON BA MA (Cantab) PhD MCIEEM

On behalf of: Aspect Ecology Ltd

JUNE 2020

1 Introduction

1.1 Blackstone Ecology has been commissioned to undertake a botanical survey and assessment of two fields at a site at South Caldecotte, Milton Keynes (NGR: SP 89112 34019). The two fields are identified on the MAGIC database as supporting Lowland Meadow priority habitat, on the basis of a survey undertaken by English Nature in 1993. Although the survey was not undertaken in line with standard NVC methodologies (i.e. it was not a quadrat-based survey) the vegetation was provisionally identified as MG5b, although the low diversity of much of the field suggested affinities to MG6 grassland[1].

1.2 In July 2018 Aspect Ecology undertook an in-house botanical assessment of these fields, reported in *South Caldecotte, Milton Keynes Ecological Appraisal* (Aspect Ecology Ltd, June 2019). Results from a series of five quadrat surveys within each field were analysed using MAVIS[2] to assist in classification of the NVC communities present. The analysis indicated that the grassland present in both fields was a poor match to MG5, with a slightly closer (but still poor) match for both fields being the semi-improved MG6 community.

1.3 The present survey has been commissioned to provide an independent assessment of the grassland type(s) present and to assess their condition. In particular, the survey was intended to identify whether the fields support MG5 grassland (one of the unimproved grassland communities which comprise Lowland Meadow priority habitat) and, if so, to ascertain its condition.

[1] A Preliminary Botanical Survey and Assessment of Unimproved Grassland in Buckinghamshire. English Nature. 1993

[2] Modular Analysis of Vegetation Information System, CEH 2016

2 Methodology

2.1 The survey was undertaken on 10th June 2020 by Dr Ian Johnson, an experienced botanist with a particular interest in lowland grasslands. Weather conditions were calm and largely dry, with a brief spell of light rain.

2.2 The larger, southern field, F3, had been cattle grazed until shortly before the survey. Consequently, the sward was generally short (<5cm). Field F4, adjoining to the north, had not been grazed for a number of weeks and the sward was longer, generally being approximately 30cm high.

2.3 An initial walkover survey of field F4 was undertaken, recording all plant species noted within the field boundaries. During the walkover, areas considered to support a homogeneous plant community were identified; these were then subject to more detailed survey, using a series of five 2mx2m quadrats, recording all vascular plant species present within each quadrat, together with an estimate of the level of ground cover provided by each species, using the Domin scale (See Table 2.1). The same procedure was then followed for Field F3.

Table 2.1 Domin Scale to record species cover

Cover	Domin	Cover	Domin
91 - 100%	10	11 – 25%	5
76 - 90%	9	4 – 10%	4
51 - 75%	8	<4% (many individuals)	3
34 - 50%	7	<4% (several individuals)	2
26 – 33%	6	<4% (few individuals)	1

2.4 Within field F4 it was noted that certain prominent plant species (e.g. Oxeye Daisy *Leucanthemum vulgare*) tended to occur in patches, rather than having a uniform distribution across the field. However, these patches were well distributed within the grassland and did not appear to relate to other variation within the sward. Accordingly, it was concluded that the field could be considered to be a homogeneous stand of vegetation, other than within close proximity (1-2m) to boundary hedgerows and scrub. A single series of five quadrats was, therefore, surveyed within F4. The quadrats were spaced out to provide samples across the field (see Plan 1) but the precise location of each quadrat was selected at random.

2.5 In the case of F3, the field supports distinct ridge and furrow across most of its area. It was apparent from scanning the field that the ridge tops supported a more extensive and diverse herb community than the bottom of the furrows. A number of areas within F3 also showed signs of disturbance, including the loss of the ridge and furrow pattern and a higher incidence of weed species, particularly docks *Rumex* spp. and thistles *Cirsium* spp.. It was also noted that the area west of the in-field Oak tree generally appeared somewhat disturbed, with a higher frequency of ruderal and injurious weed species and of lower quality than grassland to the east.

2.6 Since the aim of the survey was to identify whether unimproved grassland was present within these fields, detailed NVC survey within F3 was restricted to the more diverse, undisturbed areas of the field. While survey was restricted to the undisturbed ridges within F3, quadrats were well spaced across the field east of the mature Oak *Quercus* (see Plan 1), with the precise locations of each quadrat again being selected at random.

Constraints

2.7 Not all species are apparent throughout the year, but the survey was undertaken at the optimum time of year for such work, in reasonable weather conditions. Recent cattle grazing of F3 may have slightly constrained grass identification, but is not considered to have significantly impeded identification of herb species.

3 Results

3.1 Lists of all species recorded within each field are provided within Annex 1, together with full data from the five quadrat surveys undertaken in each field. Survey results are considered for each field below

Field F3

3.2 A total of 35 plant species were recorded within F3, including 25 forb species. The number of species recorded within each quadrat ranged from 12 to 16, with a mean of 14.6 species per quadrat. Of the 35 species recorded across F3, 27 (77%) were present within one or more quadrat.

3.3 Results of the analysis using MAVIS are shown below, with screen shots of the results also provided at Annex 1. Based on the MAVIS analysis, the grassland community within F3 most closely matches MG6 *Lolium perenne-Cynosurus cristatus* grassland, with a 'fair' goodness-of-fit (matching coefficient of 64.93).

Table 1 MAVIS output: Field F3

NVC Community	Matching Coefficient
MG6	64.93
MG6b	64.81
MG6a	64.52
MG4b	57.86
MG5a	55.87
MG5	55.67
MG7	54.86
MG4v2	53.82
MG7c	53.45
MG6cc	53.37

Field F4

3.4 A total of 60 herbaceous species were recorded within F4, including 16 grass, 2 sedge and a wood-rush species. Numbers of species recorded within quadrats ranged from 15 to 30, with an average of 21 species per quadrat. Of the species recorded within the whole field, 39 (65%) were recorded within one or more quadrat.

3.5 Results of the MAVIS analysis are shown below, with screen shots of the results also provided at Annex 1. Based on the MAVIS analysis, the grassland community within F4 most closely matches MG6 *Lolium perenne-Cynosurus cristatus* grassland, with a 'fair' goodness-of-fit (matching coefficient of 62.57).

3.6 The survey results, including the results of the MAVIS analysis are considered further within Section 4 below.

Table 2 MAVIS output: Field F4

NVC Community	Matching Coefficient
MG6a	62.57
MG6	59.67
MG6b	58.86
MG5a	57.52
MG5	55.60
MG4b	55.38
MG5b	54.94
MG6c	53.99
MG4a	52.85
MG5c	52.52

4 Discussion

4.1 Although the swards of fields F3 and F4 have some similarities, that of F4 appears considerably more diverse. Therefore, the two fields are discussed separately.

Field F3

4.2 The species recorded within F3 on initial inspection appear to reflect those found within the MG5 *Cynosurus cristatus-Centaurea nigra* Lowland Meadow grassland community. Indeed, all eleven of the constant species listed within the floristic table for MG5[3] are present within the sward, and five were recorded as constant species, as would be anticipated if the sward were an MG5 community. The number of species recorded within each quadrat (12 to 16) also fall within the expected range for MG5, albeit at the lower end of the range recorded within the floristic table (12-38).

4.3 However, upon a closer inspection, the sward also shows marked discrepancies from the MG5 community, as reflected in the results of the MAVIS analysis. Six of the MG5 constant species are present at a reduced frequency, three being recorded only in a single quadrat. (It may also be noted in respect of the MG5 constant species, that all are common and widespread and occur in a great many grassland community types. Further, the survey recorded none of the less common species that are largely restricted to unimproved grasslands).

4.4 Perhaps of greater significance is the relative scarcity of other positive indicators of the MG5 community. Of the 34 species recorded in F3 as a whole, three are injurious weeds (Creeping and Spear Thistles and Broad-leaved Dock) while another four are either negative indicators or ruderal species with no particular affinity to the MG5 community, namely Creeping Buttercup *Ranunculus repens*, Greater Plantain *Plantago major*, Scented Mayweed *Matricaria recutita* and Hedge Mustard *Sisymbrium officinale*. Meadow Barley *Hordeum secalinum* is also not listed in the MG5 floristic table, but is nonetheless understood to occasionally occur at moderate to high frequency in some examples of MG5.

4.5 The species recorded within F3 are also very largely characteristic of the semi-improved MG6 *Lolium perenne-Cynosurus cristatus* grassland and the relatively low level of cover provided by forbs is consistent with this community, White Clover *Trifolium repens* achieving higher levels of cover than any other forb. The frequency and abundance of Perennial Rye-grass (constant within the sward with cover at Domin 5-7), in combination with the frequency and abundance of White Clover is indicative of some level of agricultural improvement[4].

4.6 As Rodwell (1992) notes, there is a complete gradation between rich, unimproved stands of MG5 and very species-poor, agriculturally improved grassland and "in many cases, the best that can be hoped for is to place a stand at particular points along a line of continuous variation". The use of computer programmes such as MAVIS provides a means of doing this in an objective manner.

4.7 The conclusion from MAVIS that field F3 supports semi-improved MG6 grassland is supported by consideration of the neutral grasslands key (28a-d) within the UK Habitat

[3] British Plant Communities Volume 3: Grasslands and Montane Communities 1992 (Rodwell, J.S., Ed)
[4] See, e.g., Key 2a in Farm Environment Plan (FEP) Manual, Natural England 2010

Classification (May, 2018), with the abundance of Perennial Rye-grass and White Clover being significant, as is the relative lack of forb indicator species for MG5 such that UK Habitat codes 29b / 30e most accurately reflect the community (see Annex 2). The level of plant diversity within the quadrats, at less than 15 species $4m^{-2}$, is further evidence that the sward most closely resembles MG6 grassland.

4.8 Having considered the results of the quadrat survey, together with the walkover assessment of the wider sward within F3, there is no clear reason why the conclusions of the MAVIS analysis should be discounted. It is concluded that the sward within field F3 is best considered as an example of an MG6 community, albeit one of moderate species-richness.

Field F4

4.9 As with F3, the results of the MAVIS analysis indicate that the sward of field F4 is best described as an MG6 community. This output is somewhat surprising and therefore close attention should be paid to the floristic keys (Rodwell 1992), especially given the presence within the sward of a number of indicators of MG5 or other unimproved grassland, including Oxeye Daisy *Leucanthemum vulgare,* Great Burnet *Sanguisorba officinale,* Rough Hawkbit *Leontodon hispidus*, Lady's Bedstraw *Galium verum*, Pignut *Conopodium majus* and Quaking Grass *Briza media*.

4.10 As noted above, the distribution of some forb species was noted to be 'patchy' within F4, although without a clear pattern that would justify dividing the sward into two or more distinct types to be sampled separately. As such, the field was treated as supporting a homogenous stand of vegetation and quadrats were set at random across the field.

4.11 A review of the results of the quadrat survey reveal a complete absence within the quadrats of three of the indicator species noted above, with the other three, Rough Hawkbit, Great Burnet and Oxeye Daisy, each being restricted to a single quadrat. It is considered that this result from the quadrat sampling does not accurately reflect the abundance of at least some of these species within the wider sward, with Oxeye Daisy, Lady's Bedstraw and Rough Hawkbit being considered at least occasional and locally frequent.

4.12 The diversity of plants within the quadrats in F4 averaged 21 species, suggesting the sward more closely resembles an unimproved grassland. This is represented by habitat code 28b of the UK Habitat Classification (see Field Key at Annex 2).

4.13 Following the key to mesotrophic grasslands within Rodwell (1992) the sward keys out as the MG5 community. On the basis of this and the above observations, it is considered that F4 supports an unimproved neutral grassland sward closely resembling MG5, but that the sward is in sub-optimal condition.

4.14 Apart from the patchy distribution of a number of herb species within the sward, the frequency and abundance of Perennial Rye-grass is higher than would be expected (present in 100% of quadrats with Domin scores of 3-7). This suggests that the sward may have been subject to some disturbance which has locally reduced levels of cover of some of the species indicative of unimproved grassland. Alternatively, or in addition, the grassland may have been subject to some attempts at improvement or to mismanagement (in relation to the nature conservation ideal), possibly through over-application of farmyard manure or through chemical treatments, or through inappropriate stocking levels.

4.15 Regardless of how the present condition of the sward has been arrived at, what can be concluded is that, in the author's opinion, the grassland within field F4 is best considered to represent an MG5 grassland in poor to moderate condition.

PLAN 1: Quadrat Locations

Annex 1: Survey Results

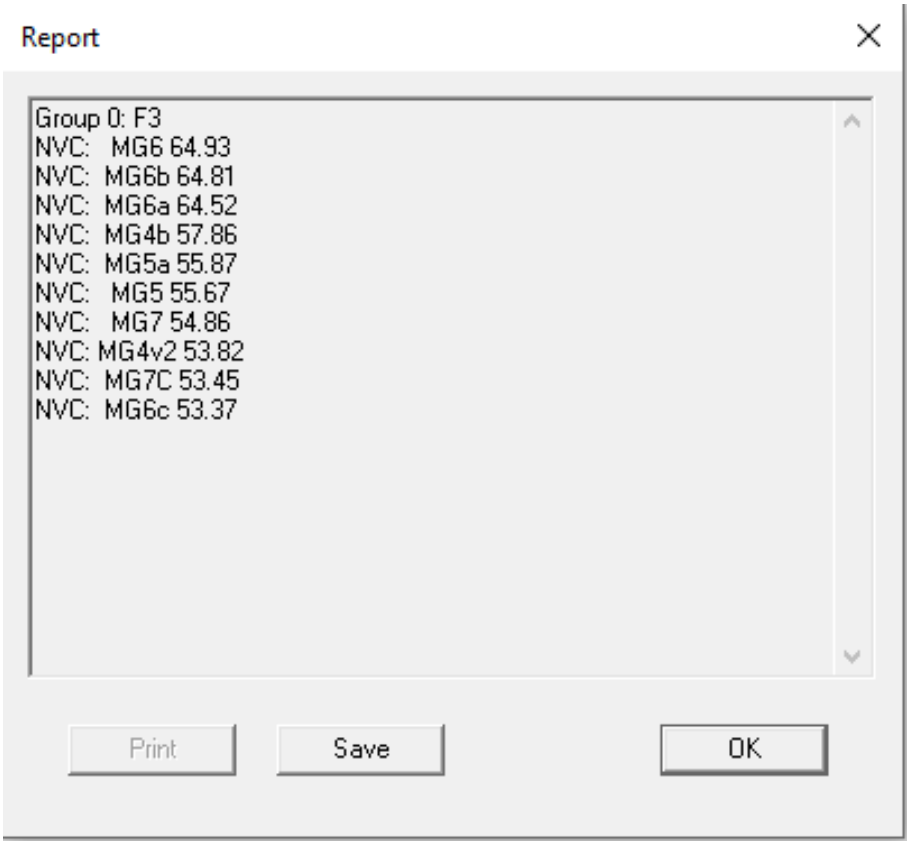
Field F3: Quadrat Results Summary

Species	Domin Cover Value per Quadrat						Summary
	Q1	Q2	Q3	Q4	Q5		
Lolium perenne	5	5	7	7	6		**V (5-7)**
Trifolium pratense	4	3	-	2	2		**IV (2-4)**
Trifolium repens	6	7	4	3	2		**V (2-7)**
Leontodon saxatilis	3	-	-	-	-		**I (3)**
Cerastium fontanum	3	3	2	-	-		**III (2-3)**
Cynosurus cristatus	6	3	4	3	4		**V (3-6)**
Holcus lanatus	4	-	-	-	-		**I (4)**
Cirsium vulgare	3	-	2	-	-		**II (2-3)**
Ranunculus acris	3	2	-	1	-		**III (1-3)**
Centaurea nigra	1	-	-	3	2		**III (1-3)**
Poa trivialis	3	-	3	3	2		**IV (2-3)**
Hordeum secalinum	3	-	-	-	-		**I (3)**
Ranunculus repens	1	-	-	-	-		**I (1)**
Agrostis capillaris	7	7	7	6	6		**V (6-7)**
Lotus corniculatus	-	3	5	5	4		**IV (3-5)**
Plantago lanceolata	-	3	4	4	4		**IV (3-4)**
Plantago major	-	3	-	-	-		**I (3)**
Anthoxanthum odoratum	-	2	-	-	-		**I (2)**
Achillea millefolium	-	3	3	5	4		**IV (3-5)**
Hypochaeris radicata	-	-	3	2	3		**III (2-3)**
Leontodon autumnalis	-	-	3	3	2		**III (2-3)**
Taraxacum agg.	-	-	1	-	-		**I (1)**
Dactylis glomerate	-	-	1	-	-		**I (1)**
Rumex acetosa	-	-	1	2	1		**III (1-2)**
Stellaria media	-	-	-	1	1		**II (1)**
Festuca rubra	-	-	-	2	1		**II (1-2)**
Geranium dissectum	-	-	-	-	1		**I (1)**
Total species	**14**	**12**	**15**	**16**	**16**		

Field F3: All Plant Species recorded

Agrostis capillaris	Common Bent
Anthoxanthum odoratum	Sweet Vernal-grass
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot
Festuca rubra	Red Fescue
Holcus lanatus	Yorkshire Fog
Hordeum secalinum	Meadow Barley
Lolium perenne	Perennial Rye-grass
Poa trivialis	Rough Meadow-grass
Carex hirta	Hairy Sedge
Achillea millefolium	Yarrow
Centaurea nigra	Black Knapweed
Cirsium arvense	Creeping Thistle
Cirsium vulgare	Spear Thistle
Cerastium fontanum	Common Mouse-ear
Geranium dissectum	Cut-leaved Crane's-bill
Helminthotheca echioides	Bristly Ox-tongue
Hypochaeris radicata	Cat's-ear
Leontodon autumnalis	Autumn Hawkbit
Leontodon saxatilis	Lesser Hawkbit
Lotus corniculatus	Bird's-foot Trefoil
Matricaria recutita	Scented Mayweed
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Potentilla repens	Creeping Cinquefoil
Prunella vulgaris	Selfheal
Ranunculus acris	Meadow buttercup
Ranunculus repens	Creeping Buttercup
Rumex acetosa	Common Sorrel
Rumex obtusifolius	Broad-leaved Dock
Sisymbrium officinale	Hedge Mustard
Stellaria media	Chickweed
Taraxacum agg.	Dandelion
Trifolium pratense	Red Clover
Trifolium repens	White Clover

Field F3: MAVIS Report



Field F4: Quadrat Results Summary

Species	Domin Cover Value per Quadrat						Summary
	Q1	Q2	Q3	Q4	Q5		
Alopecurus pratensis	2	-	-	3	4		**III (2-4)**
Poa annua	1	1	-	1	-		**III (1)**
Leucanthemum vulgare	3	-	-	-	-		**I (3)**
Sanguisorba officinalis	3	-	-	-	-		**I (3)**
Cynosurus cristatus	5	4	7	-	5		**IV (4-7)**
Lotus corniculatus	3	2	4	3	5		**V (2-5)**
Cerastium fontanum	2	1	-	3	3		**IV (1-3)**
Trifolium pratense	5	3	2	2	3		**V (2-5)**
Potentilla reptans	3	-	-	-	-		**I (3)**
Centaurea nigra	3	4	3	5	5		**V (3-5)**
Holcus lanatus	4	5	4	5	5		**V (4-5)**
Achillea millefolium	4	3	4	3	3		**V (3-4)**
Lolium perenne	3	5	7	7	4		**V (3-7)**
Dactylis glomerata	1	3	4	3	4		**V (1-4)**
Agrostis capillaris	7	7	5	7	6		**V (5-7)**
Ranunculus repens	3	4	3	3	4		**V (3-4)**
Trifolium repens	3	2	2	-	2		**IV (2-3)**
Plantago lanceolata	3	3	3	4	5		**V (3-5)**
Senecio jacobaea	1	-	-	-	-		**I (1)**
Hordeum secalinum	1	-	-	3	-		**II (1-3)**
Prunella vulgaris	3	-	-	-	-		**I (3)**
Leontodon hispidus	2	-	-	-	-		**I (2)**
Ranunculus acris	2	3	-	1	-		**III (1-3)**
Cirsium vulgare	1	1	-	1	1		**IV (1)**
Leontodon saxatilis	1	-	-	-	1		**II (1)**
Geranium dissectum	1	-	-	-	-		**I (1)**
Sonchus oleraceus	1	-	-	1	-		**II (1)**
Helminthotheca echioides	1	-	-	-	-		**I (1)**
Poa pratensis	1	-	-	-	3		**II (1-3)**
Hypochaeris radicata	1	-	3	-	1		**III (1-3)**
Cirsium arvense	-	3	-	-	-		**I (3)**
Plantago major	-	1	-	-	-		**I (1)**
Carex spicata	-	2	-	-	-		**I (2)**
Poa trivialis	-	3	-	-	-		**I (3)**
Luzula campestris	-	-	2	-	-		**I (2)**
Festuca rubra	-	-	3	2	4		**III (2-4)**
Convolvulus arvensis	-	-	-	1	-		**I (1)**
Phleum bertolonii	-	-	-	2	-		**I (2)**

Rumex acetosa	-	-	-	-	1		**I (1)**
Total species	**30**	**20**	**15**	**20**	**20**		

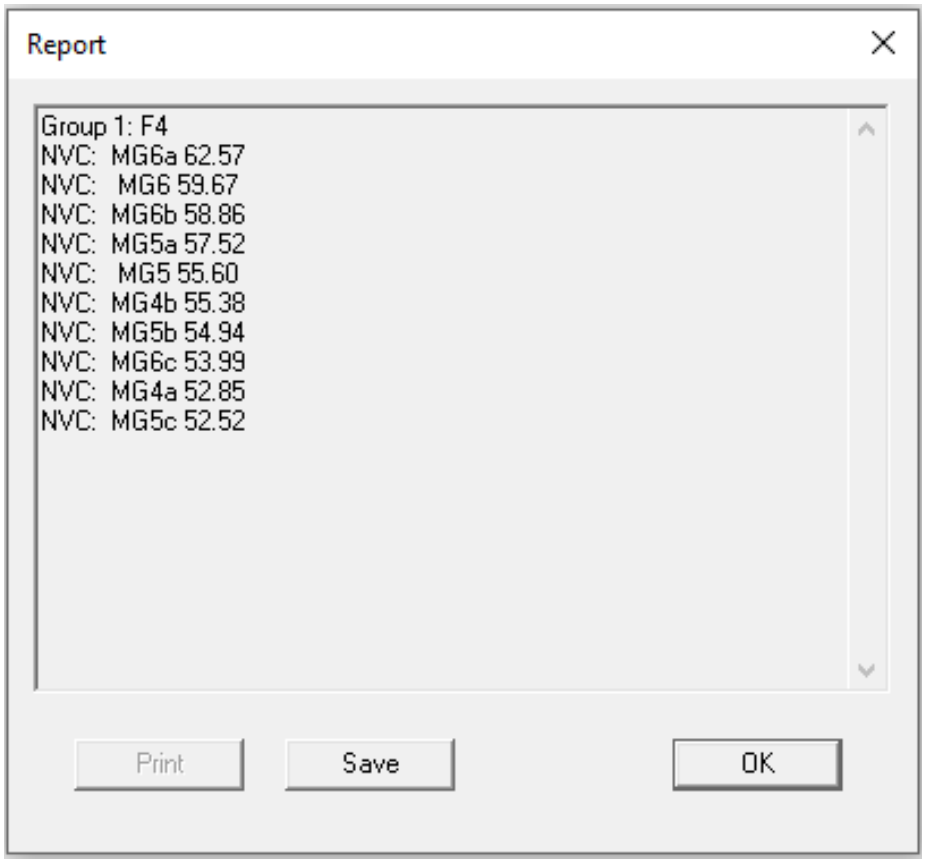
Field F4: All Plant Species recorded

Agrostis capillaris	Common Bent
Alopecurus pratensis	Meadow Foxtail
Anthoxanthum odoratum	Sweet Vernal-grass
Briza media	Quaking Grass
Bromus hordeaceus	Soft Brome
Cynosurus cristatus	Crested Dog's-tail
Dactylis glomerata	Cock's-foot
Festuca rubra	Red Fescue
Holcus lanatus	Yorkshire Fog
Hordeum secalinum	Meadow Barley
Lolium perenne	Perennial Rye-grass
Phleum bertolonii	Smaller Cat's-tail
Poa annua	Annual Meadow-grass
Poa pratensis	Smooth Meadow-grass
Poa trivialis	Rough Meadow-grass
Trisetum flavescens	Yellow Oat-grass
Carex hirta	Hairy Sedge
Carex spicata	Spiked Sedge
Luzula campestris	Field Wood-rush
Achillea millefolium	Yarrow
Arctium sp.	Burdock
Bellis perennis	Daisy
Carduus crispus	Welted Thistle
Centaurea nigra	Black Knapweed
Cirsium arvense	Creeping Thistle
Cirsium vulgare	Spear Thistle
Cerastium fontanum	Common Mouse-ear
Conopodium majus	Pignut
Convolvulus arvensis	Field Bindweed
Galium verum	Lady's Bedstraw
Geranium dissectum	Cut-leaved Crane's-bill
Geranium molle	Dove's-foot Crane's-bill
Helminthotheca echioides	Bristly Ox-tongue
Heracleum sphondylium	Hogweed
Hypochaeris radicata	Cat's-ear

Field F4: All Plant Species recorded (cont.)

Lathyrus pratensis	Meadow Vetchling
Leontodon saxatilis	Lesser Hawkbit
Leontodon hispidus	Rough Hawkbit
Leucanthemum vulgare	Oxeye Daisy
Lotus corniculatus	Bird's-foot Trefoil
Matricaria recutita	Scented Mayweed
Medicago lupulina	Black Medick
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Potentilla reptans	Creeping Cinquefoil
Prunella vulgaris	Selfheal
Ranunculus acris	Meadow buttercup
Ranunculus repens	Creeping Buttercup
Rumex acetosa	Common Sorrel
Rumex obtusifolius	Broad-leaved Dock
Sanguisorba officinalis	Great Burnet
Senecio jacobaea	Common Ragwort
Silene dioica	Red Campion
Sisymbrium officinale	Hedge Mustard
Sonchus oleraceus	Smooth Sow-thistle
Stellaria graminea	Lesser Stitchwort
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Urtica dioica	Common Nettle
Vicia sativa ssp. segetalis	Common Vetch
Prunus spinosa	Blackthorn
Rubus fruticosus agg.	Bramble

Field F4: MAVIS Report



Annex 2: Extract from UK Habitat Classification Field Key

UK Habitat Classification Field Key

	FIRST DIVISION FOR GRASSLANDS UNDER REGULAR MANAGEMENT	Numbered links plus Broad and Priority Habitats	Scottish EUNIS Code	UK Hab Code	NVC units (indicative list only)
27h	Halophytic species (Ellenberg salt values >0 – see postscript 1) in inland situations	**19**			
27i	Metallophytes present e.g. Spring Sandwort (*Minuartia verna*), Field Pennycress (*Thlapsi arvense*), Thrift (*Armeria maritima*), Sea-campion (*Silene uniflora*), Alpine Pennycress (*Thlapsi caerulescens*), Alpine Catchfly (*Lychnis alpina*), Shetland Mouse-ear (*Cerastium nigrescens*)	**Back to 26f**			
28a-d	**DIVISION OF PRIORITY HABITAT NEUTRAL GRASSLANDS FROM NEUTRAL AND IMPROVED GRASSLANDS**				
28a	Productive grasses and White Clover (*Trifolium repens*) usually (see below) predominate mainly Rye Grasses (*Lolium*), Timothy (*Phleum*), Cocksfoot (*Dactylis glomerata*), Yorkshire Fog (*Holcus lanatus*), False Oat Grass (*Arrhenatherum elatius*) and the larger Fescues (*Festuca* spp.). Common Bent (*Agrostis capillaris*), Crested Dog's-tail (*Cynosurus cristatus*) and Sweet Vernal Grass (*Anthoxanthum odoratum*) may be present at the less fertile end of the gradient. In wet grasslands Soft Rush (*Juncus effusus*), Tufted Hair-grass (*Deschampsia cespitosa*), Floating Sweet Grass (*Glyceria fluitans*), Marsh Foxtail (*Alopecurus geniculatus*) and Tall Fescue (*Festuca arundinacea*) may be abundant. Varies from pure grass to moderately species rich grassland but hay meadow Priority Habitat indicators are always rare or absent. Some fields may be dominated by Buttercup (*Ranunculus* spp.) and/or White Clover (*Trifolium repens*).	**29**			
28b	Cover of Rye grass (*Lolium perenne*), White Clover (*Trifolium repens*) and sown Red Clover (*T. pratense*) usually less than 10% cover. Typically rich in forb species (>15 m^{-2}) with frequent Priority Habitat lowland meadow indicators incuding: Meadow Vetchling (*Lathyrus pratensis*), Bird's-foot Trefoil (*Lotus corniculatus*), Ox-eye Daisy (*Leucanthemum vulgare*), Lady's Bedstraw (*Galium verum*), Cowslip (*Primula veris*), Black Knapweed (*Centaurea nigra*), Rough Hawkbit (*Leontodon hispidus*), Bulbous Buttercup (*Ranunculus bulbosus*) or on flood meadows some of Marsh-marigold (*Caltha palustris*), Great Burnet (*Sanguisorba officinalis*), Meadowsweet (*Filipendula ulmaria*) and Meadow Foxtail (*Alopecurus pratensis*). Note that vegetation dominated by F.ulmaria keys out at 22e.	Annex I 6510 – Lowland hay meadows (Alopecurus pratensis – Sanguisorba officinalis). Lowland hay meadows Priority Habitat (Neutral Grassland BH)	E2.212	g3a5	MG4, MG5, MG8
28c	Cover of grass species and clover usually less than 50% cover with a high proportion of Priority Habitat upland meadow indicators such as Wood Cranesbill (*Geranium sylvaticum*), Lady's Mantles (*Alchemilla spp.*), Yellow Oat Grass (*Trisetum flavescens*), Pignut (*Conopodium majus*) and Sweet Vernal Grass (*Anthoxanthum odoratum*) or Globeflower (*Trollius europaeus*) and Northern Hawksbeard (*Crepis mollis*)	Annex 6520 – Mountain Hay Meadows. Upland hay meadows Priority Habitat (Neutral Grassland BH)	E2.242	g3b5	MG3, MG8 (upland form)
28d	Neutral flushes typically marking enriched springlines and water seepage zones in lowland or upland situations. Acidic and calcareous indicators are absent or rare. Characteristic species include Creeping Bent (*Agrostis stolonifera*), Calliergonella cuspidata, Greater Bird's-foot trefoil (*Lotus pedunculatus*), Blinks (*Montia Fontana*), Marsh Foxtail (*Alopecurus geniculatus*), Jointed Rush (*Juncus articulatus*), Toadrush (*J.bufonius*), Floating Sweet Grass (*Glyceria fluitans*), Meadow Buttercup (*Ranunculus acris*).	Fen, Marsh, Swamp Broad Habitat (BH)	D5.3?	f2 (secondary codes 182, 183 or 185 are possible)	

29a-b	**DIVISION OF NEUTRAL AND IMPROVED GRASSLANDS**	Numbered links plus Broad and Priority Habitats	Scottish EUNIS Code	UK Hab Code	NVC units (indicative list only)
29a	Palatable grasses dominate mainly Rye grasses (*Lolium* spp.), Timothy (*Phleum pratense*), Cocksfoot (*Dactylis glomerata*), Crested Dog's-tail (*Cynosurus cristatus*), Yorkshire Fog (*Holcus lanatus*). Grass cover usually over 75%. Broadleaved species restricted mainly to White Clover (*Trifolium repens*), Creeping Buttercup (*Ranunculus repens*), Greater Plantain (*Plantago major*), Dandelion (*Taraxacum*), Broad-leaved Dock (*Rumex obtusifolius*) and Chickweed (*Stellaria media*). Fertile but wetter situations may support occasional Soft Rush (*Juncus effusus*) or Hard Rush (*J.inflexus*), Floating Sweet Grass (*Glyceria fluitans*), Creeping Bent (*Agrostis stolonifera*) and Rough Meadow Grass (*Poa trivialis*), but accompanying species will always indicate high fertility. Species poor <9 species m^{-2}.	Improved Grassland (BH)	E2.6	g4	MG6, MG7
29b	Palatable grasses predominate, usually Rye Grasses (*Lolium* spp.), White Clover (*Trifloium repens*) and Timothy (*Phleum pratense*) 40% or below and other grasses more prominent such as Crested Dog's-tail (*Cynosurus*), Common Bent (*Agrostis capillaris*), Yellow Oat Grass (*Trisetum flavescens*), Soft Brome (*Bromus hordeaceus*) and Sweet Vernal Grass (*Anthoxanthum odoratum*). Semi-improved but wetter situations may support abundant Soft Rush (*Juncus effusus*) or Hard Rush (*J.inflexus*), Floating Sweet Grass (*Glyceria fluitans*), Creeping Bent (*Agrostis stolonifera*) and Rough Meadow Grass (*Poa trivialis*). Total grass cover usually between 50 and 75%. Forbs up to 50% cover and associated with less fertile soil e.g. Ribwort Plantain (*Plantago lanceolata*), Sorrel (*Rumex acetosa*), Meadow Buttercup (*Ranunculus acris*), Creeping Buttercup (*R.repens*), Self-heal (*Prunella vulgaris*), Yarrow (*Achillea millefolium*), Silverweed (*Potentilla anserina*), Meadow Thistle (*Cirsium palustre*) and Lady's smock (*Cardamine pratensis*). However, indicators of the two hay meadow Priority Habitats will be rare or absent.	**30**			
29c	False Oat Grass (*Arrhenatherum elatius*) abundant. Total grass cover usually between 50 and 75%. Forbs up to 50% cover and associated with less fertile soil e.g. Ribwort Plantain (*Plantago lanceolata*), Sorrel (*Rumex acetosa*), Meadow Buttercup (*Ranunculus acris*), Creeping Buttercup (*R.repens*), Self-heal (*Prunella vulgaris*), Yarrow (*Achillea millefolium*), Silverweed (*Potentilla anserina*). Often associated with formerly disturbed sites, road verges etc.	**Neutral Grassland**	E2.2	g3c5	
30a-e	**OTHER NEUTRAL GRASSLANDS**				
30a	Recently sown mixtures of light grasses for agri-environment schemes or habitat creation/restoration such as Sweet Vernal Grass (*Anthoxanthum odoratum*), Smooth Meadow Grass (*Poa pratensis*), Red Fescue (*Festuca rubra*), Crested Dog's-tail (*Cynosurus cristatus*) and Yellow Oat Grass (*Trisetum flavescens*). Grass cover 50-100%. Herb species rare or absent. Often on sown field margins.	Arable Field Margins Priority Habitat (if on margin). (Neutral Grassland BH)	No code	c1a5 or g3	
30b	As above but with high cover of sown mixtures of legumes such as Red Clover (*Trifolium pratense*), Alsike Clover (*T.hybridum*) and Bird's-foot Trefoil (*Lotus corniculatus*). Often on sown field margins.	Arable Field Margins Priority Habitat (if on margin). (Neutral Grassland BH)	No Code	c1a6 or g3	
30c	Wet meadows with frequent to dominant cover of rushes but not waterlogged (see wetland key) nor species rich (see 31a) often with Yorkshire Fog (*Holcus lanatus*)	Neutral Grassland (BH)	E3.4131	g3c8 secondary code 14 15	M22,M23b, MG8

	OTHER NEUTRAL GRASSLANDS (continued)	Numbered links plus Broad and Priority Habitats	Scottish EUNIS Code	UK Hab Code	NVC units
30d	Meadows with abundant Tufted HairGrass aka Hassock (*Deschampsia cespitosa*) and Yorkshire Fog (*Holcus lanatus*)	Neutral Grassland (BH)	E3.4131	g3c7	MG9
30e	Description as 29b but not one of 30a-d. Moderate number of species (9-15 m^{-2}). Rye Grass (*Lolium perenne*) and Crested Dog's-tail (*Cynosurus cristatus*) are often abundant.	Neutral Grassland (BH)	E2.112	g3c6	MG6, MG9-13
31a-f	**CALCAREOUS GRASSLANDS**				
31a	Vegetation on dry ground with scattered sedges and many species indicative of calcareous soils present. Can be relatively species poor (CG4) but more often species rich with >50% forb cover. On calcareous soils, usually rendzinas on chalk or limestone in lowland Britain. Indicators include Upright Brome (*Bromopsis erecta*), Tor-grass (*Brachypodium pinnatum*), Fairy Flax (*Linum catharticum*), Salad Burnet (*Sanguisorba minor*), Carline Thistle (*Carlina vulgaris*), Stemless Thistle (*Cirsium acaule*), Horseshoe Vetch (*Hippocrepis comosa*) and Squinancywort (*Asperula cynanchica*), Dropwort (*Filipendula vulgaris*), Lady's Bedstraw (*Galium verum*), Quaking Grass (*Briza media*), Crested Hair-grass (*Koeleria macrantha*) and Rockrose (*Helianthemum nummularium*).	Annex I 6210 - Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia). Lowland Calcareous Grassland Priority Habitat (Calcareous Grassland BH)	E1.26	g2a5	CG1-CG7,CG10
31b	As 31a but often low in species richness. Often dominated by Blue Moor-grass (*Sesleria caerulea*) with Sheep's Fescue (*Festuca ovina*), Thyme (*Thymus polytrichus*), Limestone Bedstraw (*Galium sterneri*) and Common Bent (*Agrostis capillaris*) characteristic. Stands may comprise a confusing mix of species indicative of acidic and calcareous conditions. Arctic-Alpine species absent or very rare.	Annex I 6210 - Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia). Upland Calcareous Grassland Priority Habitat (Calcareous Grassland BH)	E1.26	g2b7	CG8,CG9
31c	As above (31a and 31b) but with Juniper (*Juniperus communis*) present at <30% cover.	Annex I 5130 - Juniperus communis formations on heaths or calcareous grasslands. Lowland Calcareous Grassland Priority Habitat.	F3.16#1	g2a5 or g2b7 secondary code 22	
31d	Arctic-Alpine plants, such as Alpine Lady's-mantle (*Alchemilla alpina*), Alpine Bistort (*Persicaria vivipara*) and Moss Campion (*Silene acaulis*). Mountain Avens (*Dryas octopetala*) forming grass/sedge 'heath' where conditions are harsh either at sea-level (in north west of Scotland) or high altitudes. Rare species include Scottish Primrose (*Primula scotica*).	Annex I 6170 – Alpine and sub-alpine calcareous grasslands. Upland Calcareous Grassland Priority Habitat (Calcareous Grassland BH)	E4.12€	g2b5	CG11-CG14
31e	Localised areas of vegetation, often visibly associated with seepage zones where water movement is vertical (topogenous mires) or lateral (soligenous mires). Usually with several sedge species and species of wet calcareous soils, springs and flushes including many bryophytes (see note on page 2 for Transition Fens/Alkaline Fens.	**Wetland key section - 50**			
31f	If not 31a-31e move on or consider 30e	**32**			

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Appendix 5263/AB8:

Milton Keynes Council Ecologist Consultation Response

(10 December 2019)

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milton keynes council

DEVELOPMENT MANAGEMENT CONSULTATION

To: Ecologist
Bleak Hall
Milton Keynes

My ref: 19/01818/OUT

Date: Updated comments
Application Type: Major
Outline application including access for the development of the site for employment uses, comprising of warehousing and distribution (Use Class B8) floorspace (including mezzanine floors) with ancillary B1a office space, general industrial (Use Class B2) floorspace (including mezzanine floors) with ancillary B1a office space, a small standalone office (Use Class B1) and small café (Use Class A3) to serve the development; car and HGV parking areas, with earthworks, drainage and attenuation features and other associated infrastructure, a new primary access off Brickhill Street, alterations to Brickhill Street and provision of Grid Road reserve to Brickhill Street with appearance, landscaping, layout and scale to be determined as reserved matters.
At: Land At Brickhill Street, South Caldecotte, Milton Keynes MK17 9FE

Milton Keynes Council have received the above planning application and would be grateful for any comments you may have. If you have any comments, please provide these electronically by**.** If for any reason a reply is not possible within this period of time, please make the Case Officer aware should you wish to make any comments, otherwise it will be assumed that you have no comments to make.

Please note, comments should only be made in regards to the material planning considerations of the application. Comments should relate to your specialist area of advice and make reference to the policies and guidance outlined in National Policy, Planning Legislation, the Development Plan, which includes Plan:MK and relevant Neighbourhood Plan (if any), and Supplementary Planning Documents.

The documents relating to this application can be accessed online using the Public Access for Planning webpages (www.milton-keynes.gov.uk/publicaccess), or by using the Information@Work system.

From: **David Buckley**
David.Buckley@milton-keynes.gov.uk

DEVELOPMENT MANAGEMENT CONSULTATION

From: Diane Evans, Ecologist	Our Ref:

Application no: 19/01818/OUT
Proposal: Outline application including access for the development of the site for employment uses, comprising of warehousing and distribution (Use Class B8) floorspace (including mezzanine floors) with ancillary B1a office space, general industrial (Use Class B2) floorspace (including mezzanine floors) with ancillary B1a office space, a small standalone office (Use Class B1) and small café (Use Class A3) to serve the development; car and HGV parking areas, with earthworks, drainage and attenuation features and other associated infrastructure, a new primary access off Brickhill Street, alterations to Brickhill Street and provision of Grid Road reserve to Brickhill Street with appearance, landscaping, layout and scale to be determined as reserved matters.
At: Land At Brickhill Street, South Caldecotte, Milton Keynes, MK17 9FE,

PLEASE COMPLETE THE BELOW FORM AND RETURN TO:

David.Buckley@milton-keynes.gov.uk

CONSULTEE ADVICE

Based on the information provided (please tick one):

[ ]	No Objection	[X]	Amendments/additional information requested
[X]	Objection*	[ ]	Comments Only

* Where the Consultee believes their objection cannot be overcome by any amendments or additional information.

RELEVANT POLICY (if known – Comments should relate to the policies and guidance outlined in National Policy, Planning Legislation, the Development Plan, which includes Plan:MK and relevant Neighbourhood Plan (if any), and the Supplementary Planning Documents)

- Plan: MK Policy NE1, NE2, NE3, NE4, NE5, DS5
- NPPF 170, 174, 175, 180.
- Planning Practice Guidance updated 21 July 2019: Natural Environment paragraphs 19, 20, 24, 25
- ODPM Government Circular 06/2005: BIODIVERSITY AND GEOLOGICAL CONSERVATION – STATUTORY OBLIGATIONS AND THEIR IMPACT WITHIN THE PLANNING SYSTEM Part IV – Conservation of Species Protected by Law

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- Natural Environment and Rural Communities Act 2006 Section 41: Species & Habitats of Principal Importance in England.
- Forward to 2020: Buckinghamshire & Milton Keynes Biodiversity Action Plan.
- Biodiversity and Planning in Buckinghamshire V.2 (2014).
- RTPI Practice Advice, Biodiversity in Planning, November 2019
- CIEEM Advice Note on the Lifespan of Ecological Reports & Surveys (2019).
- Institute of Lighting Professionals Guidance Note 8 – "Bats and Artificial Lighting" (2018).
- English Nature Badgers and Development (2002).

KEY CONSIDERATIONS (These should relate solely to your specialist area of advice and be in bullet point form as a summary)

- The proposed development is located within a designated area of Open Countryside.
- The proposed development site is identified for employment on the strategic site allocations map.
- The site contains biodiversity features that have the potential to provide wildlife habitats.
- The proposal fails to demonstrate that it would not have an adverse effect on biodiversity on or nearby the site.
- The proposal fails to demonstrate it would not have an adverse effect on designated sites.
- The development proposal will impact on species or habitats of protected and priority status.
- The development proposal fails to demonstrate a measurable net gain for biodiversity.
- The proposal fails to demonstrate compliance with local and national biodiversity policies.

CONSULTEE ASSESSMENT (Detailed Consultee assessment)

The proposed development site is located within an area of Open Countryside. Development of Open Countryside is contrary to Plan:MK policies NE5 and DS5. However, should development of designated Open Countryside be considered acceptable, the following should be taken into consideration:

It is the responsibility of the developer to demonstrate that development of the site would not have a significant adverse effect on flora, fauna or habitats on or nearby the site.

The proposed development site is identified for employment on the strategic site allocations map.

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However, the site allocation should not take precedence over the developer's responsibility to preserve and where possible, enhance important and priority habitats, for the development to result in net gains for biodiversity or for the developer to fully engage with the mitigation hierarchy in conformity with both local and national policies. It is not acceptable for any development proposal to fail to comply with local and national biodiversity targets and policies.

Planning Practice Guidance was updated in July 2019 and contains the following in paragraph 19 which describes the Mitigation Hierarchy:

Avoidance Can significant harm to wildlife species and habitats be avoided; for example by locating on an alternative site with less harmful impacts?

Mitigation Where significant harm cannot be wholly or partially avoided, can it be minimised by design or by the use of effective mitigation measures that can be secured by, for example, conditions or planning obligations?

Compensation Where, despite mitigation, there would still be significant residual harm, as a last resort, can this be properly compensated for by measures to provide for an equivalent or greater value of biodiversity?

Where a development cannot satisfy the requirements of the 'mitigation hierarchy', planning permission should be refused as indicated in paragraph 175 of the National Planning Policy Framework.

Paragraph 24 of the same document refers to biodiversity net gain and the mitigation hierarchy:

Biodiversity net gain complements and works with the biodiversity mitigation hierarchy set out in NPPF paragraph 175a. It does not override the protection for designated sites, protected or priority species and irreplaceable or priority habitats set out in the NPPF. Local planning authorities need to ensure that habitat improvement will be a genuine additional benefit, and go further than measures already required to implement a compensation strategy.

The indicative layout provides little evidence that the developer has attempted to retain existing Habitats of Principal Importance or Priority Habitats. Development proposals must demonstrate compliance with the mitigation hierarchy within their proposals. Impacts on biodiversity shall be avoided in the first instance, such as developing a less biodiverse-rich site or avoiding the most biodiverse-rich areas within the development zone. The next step would be investigating a reduction in impacts by reducing the scale of the development by employing measures such as focusing the development on low value agricultural land within the site. If this is not considered possible after thorough investigation of alternatives then full, proactive and appropriate measures must be evidenced to mitigate and compensate for impacts on biodiversity. Every reasonable effort should be made to ensure biodiversity net gains are achieved within the development site itself. Off-site offsetting is only acceptable as an absolute last resort and then only if the developer is able to demonstrate the mitigation hierarchy has been fully employed before this decision is made.

The developer should seriously consider modifying the layout to retain and incorporate existing features with wildlife potential, particularly those which are identified as Habitats of Principal Importance and/or Priority Habitats. The retention of as many existing low quality but high distinctiveness/value habitats as possible and their subsequent restoration to high quality habitats will minimise the overall impact on biodiversity on the site and in conjunction with new high quality

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habitat creation in other areas of the development has the potential to result in the provision of a net gain for biodiversity within the development.

NPPF 174 b) quite clearly refers to the conservation, restoration and enhancement of priority habitats, a number of which currently exist on this site and which must be taken into consideration. Hedgerows, ponds, lowland meadow, woodland and orchard exist on the site and are all priority habitats. This has been verified by the content of the ecology report. These priority habitats should be retained and incorporated into the layout in order to minimise any adverse effects caused by development. Restoration and enhancement of these habitats in addition to the creation of new on-site habitats have the potential to make a significant contribution towards the development's ability to result in a net gain for biodiversity without the need to consider off-site offsetting.

National and local Biodiversity Action Plan targets relate to priority habitats such as those mentioned previously. In 2011, the Department for Environment, Food and Rural Affairs (Defra) published Biodiversity 2020: A Strategy for England's wildlife and ecosystem services. Outcome 1b states: 'More, bigger and less fragmented areas for wildlife, with no net loss of priority habitat and an increase in overall extent of priority habitats by at least 200,000 ha.' In order to achieve this target, Forward to 2020, the Buckinghamshire and Milton Keynes Biodiversity Action Plan, seeks to increase areas or restore existing poorly managed areas of priority habitats to good condition by an overall amount of 20% locally, though each habitat type has its own individual target.

Lowland Meadow is both nationally and locally rare and of significant biodiversity value, especially to pollinators and Red List ground-nesting birds such as Yellowhammer and Skylark which are named as key species in the local BAP, Forward to 2020. It is estimated that Milton Keynes holds a total of just 9.5 hectares of Lowland Meadow so the loss of some 6 hectares would result in an overall reduction of more than 60% of this valuable habitat from the borough. This loss is unacceptable and is contrary to both local and national policies. Retention and restoration of this increasingly rare habitat would not only prevent a loss but would make a significant contribution towards achieving the overall target gain for the borough. Details of management proposals and habitat creation or enhancement should be detailed in the applicants Biodiversity Enhancement Scheme. **The local BAP target is to increase Lowland Meadow by 33%.**

The hedgerow pattern across the site is largely the same as shown on the 1880 map. Some hedgerows have been removed from the northern part of the site but others, particularly in the southern half of the site appear to be in exactly the same locations as in 1880, indicating historic hedges in excess of 140 years old. A reduction in mature hedgerows will have a significant adverse effect on breeding and overwintering birds, bat species, small mammals, etc.

Hedgerows are a Priority Habitat under the Bucks & MK BAP as well as a Habitat of Principle Importance under the NERC Act 2006. They hold significant biodiversity value through the provision of nesting, foraging, commuting and pollination opportunities as well as wider environmental benefits such carbon sequestration and preventing soil erosion. They are of direct value to almost all terrestrial fauna within the borough. The local BAP target is to create or restore 10 km of new hedgerow per year. The on-site hedgerows should be retained and incorporated into the layout wherever possible. Restoration and enhancement to create higher quality habitat increase the potential to provide on-site net gains for biodiversity. If the removal of hedgerows is essential for the successful operation of the development, this should only be in short sections and should ensure that connectivity within the site and beyond is maintained.

The ecology report discusses trees and states that many of them are likely to be of substantial

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size and may be of considerable age. However, although they are frequently described as mature or over-mature, there is no discussion about whether any of these trees contain veteran features or might qualify as veteran trees, which are afforded protection as they are considered to be irreplaceable habitat which by definition, cannot be replaced or compensated for. The potential for any of the on-site trees to have veteran tree status should be thoroughly investigated prior to any significant tree works or their removal. The removal of three mature Black Poplars considered to have district level value is proposed. Although replacement Black Poplar planting is also proposed, any newly planted trees will take many years to provide the same biodiversity value to the mature trees removed. A traditional orchard, also a Habitat of Principal Importance nationally and a declining Priority Habitat locally exists on the site. If the loss of the orchard to the development is unavoidable, it should be replaced with clusters of fruit trees that have the potential to develop the features of traditional orchards rather than individual fruiting species dispersed throughout the site. Orchard management should be included in the habitat management plan.

Ponds, which are a Habitat of Principle Importance as well as a Priority Habitat locally exist on the site. The local BAP target is to create 50 new ponds a year in addition to the numbers that already exist. Ponds are of significant biodiversity value and have direct benefits to wildlife and sustainable flooding management. Wherever possible, development proposals should aim to retain and enhance existing ponds to benefit wildlife and achieve a net gain for biodiversity. Where ponds are retained, their long term management should improve their status and be secured through the Biodiversity Enhancement Scheme. If ponds must be lost, damaged or degraded to facilitate development, proposals to reinstate must seek to ensure a habitat of higher quality is provided as compensation. Pond design should be completed by a suitably qualified ecologist, with particular care given to preventing pollution and ensuring a buffer of transitory habitat is in place around the pond to enhance overall ecological quality. Further to this, pond loss should only be permitted where ecological information shows that it is not a habitat utilised by any protected species or that appropriate mitigation measures have been adopted.

Development proposals, wherever possible, should seek to retain and enhance habitats through a conservation focused management plan. This will aid in increasing the restoration of dwindling priority habitats as well as contributing to biodiversity net gain. Where a habitat must be lost, reduced or damaged to facilitate development, the developer should seek to reinstate a similar habitat of higher ecological quality. Details of habitat creation or restoration/enhancement and management proposals should be detailed in the Biodiversity Enhancement Scheme and Habitat Management Plans.

The proposed development is located within the A5, River Ouzel and Woburn – Bletchley Wildlife Corridors. In Milton Keynes, Wildlife Corridors are recognised as being important habitats which are afforded the same importance as Local Wildlife Sites, protected by Plan:MK policy NE1. They are a linear habitat safeguarded from excessive development pressure to allow the movement of flora and fauna throughout the built environment. It is likely that their immediate area has higher species richness and diversity and this presents significant opportunity for development to be completed in a manner than enhances biodiversity through the provision of wildlife features. However, Wildlife Corridors become subject to edge effects, more so when they are incorporated into developments. Therefore it is essential that retained or newly created Wildlife Corridors are sufficiently wide in order to continue to provide enough undisturbed space for the feature to continue to provide benefits for wildlife.

Caldecotte Lake immediately to the north of the proposed development site is a designated Local Wildlife Site and has been successfully incorporated into a development. Local Wildlife Sites have high ecological value and it is likely that sites in close proximity will also have higher species

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richness and diversity. The provision of sufficiently wide Wildlife Corridors strategically located within this development will provide significant benefits for biodiversity.

Local Planning Authorities have a duty under the NERC Act 2006 to have regard for the conservation of biodiversity in all our functions. Further to this, the NPPF is clear that pursuing sustainable development includes moving from a net loss of biodiversity to achieve net gains for nature, and that a core principle for planning is to contribute to conserving and enhancing the natural environment.

The requirement for development proposals to demonstrate a biodiversity net gain is secured in Policy NE3 of Plan: MK. Under this policy, where development results in significant harm to biodiversity, planning permission should be refused. Proposals to provide net gain shall seek to protect, restore and create opportunities for protected and priority species.

If, after all other avenues have been thoroughly investigated, development would result in a biodiversity loss, off-site offsetting may be considered and there are a number of options for its provision. Offsetting may be provided on other land that is under the control of the developer and managed in an appropriate manner that maintains optimum biodiversity in perpetuity. The developer may nominate a third party such as the Environment Bank or a charitable trust to provide and manage the offset in perpetuity on their behalf. If neither of these options are possible, the developer may request the local authority takes the responsibility for the provision of the offset on payment of an appropriate fee that covers the creation and suitable management of the habitat for the benefit of biodiversity in perpetuity. However, the local authority is not bound to agree to take the obligation, particularly if any sum offered is inadequate for the local authority to be confident the offset can be provided and maintained in an appropriate manner in perpetuity without subsidy from the public purse. Any off-site offsetting shall be secured by a S106 agreement and therefore, all relevant supporting documents shall be submitted to the LPA and agreements shall be in place prior to determination of the proposal.

Plan:MK Policy NE3 requires all development proposals of five or more dwellings or non-residential floor space in excess of 1000 sq. m to provide a completed DEFRA or locally approved Biodiversity Impact Assessment Metric calculation to demonstrate the impact on biodiversity and demonstrate the ability of the development to result in net gains in biodiversity in accord with both local and national policy. The metric must be completed by a suitably qualified ecologist and submitted in support of the planning application. Planning permission should not be granted in absence of the submission of this document for assessment by the LPA.

To demonstrate that proposals can physically deliver a net gain for biodiversity a Biodiversity Enhancement Scheme is required. The scheme proposal must include provision for priority or protected species and habitats relevant to the site. This shall include the integration of specific features such as Hedgehog Passes/Domes, Bird & Bat Bricks within the fabric of buildings, soft landscaping of biodiversity value, green or brown roofs, etc. The BES shall include rationales for the *enhancement* of any retained habitats on site alongside proposals for creation of new habitats. Particular consideration shall be given to the coherency and connectivity of local ecological networks. The safe and free movement of wildlife across the landscape is pivotal in ensuring biodiversity is resilient within the built environment. The BES must detail the specifications, locations and ongoing maintenance of any habitats or features installed to provide net gain for biodiversity and must be informed by a suitably qualified ecologist.

Lighting and disturbance for a development of this scale has the potential to disrupt foraging and commuting bats. A lighting scheme should be completed in line with the most recent guidance published by the Institute of Lighting Professionals and Bat Conservation Trust. The scheme must

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show the locations of Bat features and habitats overlaid with locations of lighting features, intensity and spill. Any temporary or permanent external lighting required during the development phase should be low level and sensor operated with short duration timers.

In order to fulfil our statutory duties as an LPA to consider the impacts of development on biodiversity, ecological data supplied in support of planning applications must hold a high degree of validity. This ensures compliance with the ODPM guidance, NPPF and Policy NE2 of Plan: MK. Validity of information diminishes over time or following significant changes to the surveyed site. MKC generally considers ecological data to be valid for a maximum of two years, or until significant site changes occur – whichever is sooner. This is in line with advice published by the Chartered Institute of Ecologists and Environmental Managers (CIEEM, 2019). Any surveys that rely on data in excess of 2 years old at the commencement of the development will be considered to be past their "shelf life" and must be updated prior to any works on site that may affect habitats.

RECOMMENDATION (Please draft any suggested reasons for refusal or suggested conditions including reference to relevant Planning Policy. If amendments or additional information is required please make your requirements clear)

The following supporting documents shall be submitted to the LPA for assessment prior to determination of this application;

- A Biodiversity Impact Assessment calculation using the LPA approved metric demonstrating the impact on the site in biodiversity units. This document must not be abridged and must be submitted in its entirety.
- A Biodiversity Enhancement Scheme that demonstrates a measurable net gain for biodiversity.
- A habitat management plan for on-site biodiversity features.
- A habitat management plan that demonstrates any off-site offsetting will be appropriately managed in perpetuity or if that is not possible, for a minimum of 30 years.

When this application is suitably ready to be determined and if planning permission is granted, the following must be secured through condition;

- Trees shall be assessed for veteran tree features prior to their removal or significant tree works to ensure that irreplaceable habitats are not destroyed.
- Any ecological surveys in excess of 2 years old at the commencement of development shall be updated and submitted to the LPA for approval. For the purposes of clarity relating to updated surveys, development shall include any removal of vegetation or site clearance.
- Works shall proceed in accordance with all recommendations and measures set out in Chapter 6 of the Ecological Appraisal (Aspect Ecology, June 2019).

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- A Lighting Scheme showing the location, intensity and spill of lighting features overlaid with the location of any created or natural features of Bat interest.

Informative: An updated Biodiversity Impact Assessment (BIA) metric calculation demonstrating the eventual impact on the site shall be submitted in support of the Reserved Matters proposal.

Date response sent:	10th December 2019

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Appendix 5263/AB9:

Biodiversity Impact Assessment (July 2020)

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Biodiversity Impact Assessment

Project: South Caldecotte, Milton Keynes

Technical Briefing Note 02: Biodiversity Impact Assessment

Date: 06 July 2020

1. Introduction

1.1. Aspect Ecology was commissioned by Hampton Brook in November 2019 to undertake a Biodiversity Impact Assessment (BIA) for new strategic employment development, including nine warehouses, with offices, parking and associated access and infrastructure at South Caldecotte, Milton Keynes, hereafter referred to as 'the site'.

1.2. The DEFRA 2.0 Biodiversity Impact Calculation Tool was used to conduct the BIA in accordance with Policy NE3 of the Milton Keynes Council Plan:MK 2016-2031 which states `*Development proposals of 5 or more dwellings or non-residential floorspace in excess of 1,000 sq. m will be required to use the* ***Defra metric*** *or locally approved Biodiversity Impact Assessment Metric to demonstrate any loss or gain of biodiversity*` [our emphasis]. A BIA, based on the findings set out in Aspect Ecology's Ecological Appraisal dated June 2019, was submitted in January 2020 to inform planning application 19/01818/OUT.

1.3. Since this time, update ecology survey work has since been undertaken at the site between April and June 2020, including an update National Vegetation Classification (NVC) survey of the fields previously classified as Lowland Meadow undertaken by Blackstone Ecology[1].

1.4. In line with Planning Policy Guidance: Natural Environment[2], which advises under the heading 'what is the baseline for assessing net gain?', that *"The existing biodiversity value of a development site will need to be assessed at the point that planning permission is applied for"*, the BIA has been updated to reflect the results of the updated NVC survey. This note appends extracts from the DEFRA Impact Calculation Tool (see Annex 5263/1) and provides a summary of the results and justifies the choice of habitat definitions, distinctiveness, target habitat condition and temporal factors where appropriate.

2. Approach and Methodology

2.1. A BIA calculation tool requires information on the site pre and post development to determine any change in 'biodiversity units' for 'Habitat units' and 'Hedgerow units' and 'River units'. Where a BIA calculates a *net loss* in biodiversity, and does not provide an offset compensation estimate for the re-creation/restoration of habitats off-site, this can be calculated by a suitable third-party biodiversity offsetting service provider such as the Environment Bank.

[1] Johnson, I (June 2020) South Caldecotte, Milton Keynes: Botanical Assessment of Grassland. Blackstone Ecology

[2] https://www.gov.uk/guidance/natural-environment

2.2. Pre development information used to inform the DEFRA 2.0 Biodiversity Impact Calculation Tool has been based on the results of the Phase 1 habitat survey set out within Aspect Ecology's Ecological Appraisal dated June 2019 and the recent botanical assessment of grassland fields F3 and F4 undertaken by Blackstone Ecology (see the Pre-development Metric Habitat Plan at Annex 5263/2). Whilst an update Phase 1 habitat survey of the remainder of the site was undertaken in April 2020, no significant changes to the habitats or their condition was recorded that would necessitate adjustment to the 2019 pre-development information. Post development information has been taken from the illustrative Landscape Strategy Plan (see Post-development Metric Habitat Plan at Annex 5263/3).

3. Updates from January 2020

3.1. The following updates to the BIA have been made since the previous version was issued to Milton Keynes Council in January 2020 (where `Ref` is stated this relates to the row on the relevant worksheet):

A-1 Site Habitat Baseline

- **Ref 4** – This row relates to field F3 only (previously fields F3 and F4), which based on the update botanical assessment undertaken in June 2020 has been re-classified as moderately species-rich neutral grassland (non-priority habitat). Accordingly, the area for field F4 has been split out and inputted at Ref 15 (see below, and Pre-development Metric Habitat Plan at Annex 5263/2).
- **Ref 6** – The connectivity category has been updated to `medium` to accord with the User Guide[3] in respect of high distinctiveness habitats. The strategic significance category has been updated to 'within area formally identified in the local strategy' as Traditional Orchards are a Local BAP habitat.
- **Refs 7 & 8** - The strategic significance category has been updated to `within area formally identified in the local strategy` as Native Woodland is a Local BAP habitat.
- **Ref 13** – The connectivity category has been updated to `medium` to accord with the User Guide in respect of high distinctiveness habitats.
- **Ref 15** – This is a new row within the calculation tool to account for field F4, which has been classified as Priority Habitat Lowland Meadow following the update botanical assessment undertaken in June 2020. A proxy input (which is discussed further at section 4) has been utilised in the metric to enable functionality and achieve an at least equivalent multiplier scoring to the Lowland Meadow category. The connectivity category has been updated to `medium` to accord with the User Guide in respect of very high distinctiveness habitats. The strategic significance category has been updated to `within area formally identified in the local strategy` as Lowland Meadow is a Local BAP habitat.

A-2 Site Habitat Creation

- **Grassland – Other neutral grassland -** The connectivity category has been updated to `low` to accord with the User Guide in respect of medium distinctiveness habitats.
- **Urban Amenity Grassland -** The connectivity category has been updated to `low` to accord with the User Guide in respect of low distinctiveness habitats.
- **Woodland and forest - Other woodland; broadleaved –** The condition has been changed to `good` on the basis a diverse native planting strategy and appropriate long-term management plan are implemented. The strategic significance category has been updated to `within area formally identified in the local strategy` as Native Woodland is a Local BAP habitat.

[3] The Biodiversity Metric 2.0 – User Guide. Natural England Joint Publication JP029. July 2019

B-1 Site Hedge Baseline

- **Ref 2** – The strategic significance category has been updated to `within area formally identified in the local strategy` as Hedgerows are a Local BAP habitat.
- **Ref 3** – The strategic significance category has been updated to `within area formally identified in the local strategy` as Hedgerows are a Local BAP habitat.

B-2 Site Hedge Creation

- **Ref 1** – The strategic significance category has been updated to `within area formally identified in the local strategy` as Hedgerows are a Local BAP habitat.

4. Biodiversity Impact Assessment

4.1. The following section provides a systematic review of the input information, referencing, justifying and discussing the habitat categories and their condition chosen from the drop-down menus of the BIA calculator. The BIA Calculator has been completed following the guidance set out within 'The Biodiversity Metric 2.0 (Beta version) auditing and accounting for biodiversity user guide' published 29 July 2019 and 'The Biodiversity Metric 2.0 (Beta version) auditing and accounting for biodiversity technical supplement' published 29 July 2019.

4.2. Worksheets from the completed DEFRA 2.0 Biodiversity Impact Assessment Calculation Tool are provided at Annex 5263/1. The completed calculator can be made available to Milton Keynes Council on request.

Lowland Meadow

4.3. The first step in the BIA process is to enter the habitats present on the site within the baseline section of the spreadsheet. When Lowland Meadow, represented by field F4, is inputted to the spreadsheet (at Ref 15) it generates an output 'bespoke compensation likely to be required'. This is automatically generated when any habitat of 'high distinctiveness' is present. The generation of the advisory of 'bespoke compensation likely to be required', effectively prevents the metric from being run (a function of its beta testing status, with this expected to be resolved in the final version). Accordingly, to move forward, it is first necessary to determine what level of bespoke compensation is necessary so this can be entered into the metric.

4.4. In terms of lowland meadow, the bespoke compensation required, will be dependent on the value of the existing habitat. This is defined (under the Defra 2.0 metric) by reference to its distinctiveness, condition, connectivity and strategic significance. These parameters are discussed below:

4.5. Distinctiveness: The Defra 2.0 metric defines the distinctiveness of lowland meadow as 'very high' which is a pre-set parameter.

4.6. Condition: A review of the 2020 NVC survey finds that the habitat is currently in poor to moderate condition with reference to the criteria set out in the Technical Supplement[4]. This is due to the somewhat patchy cover of herbs and the elevated frequency and abundance of Rye-grass, most likely as a result of attempts at improvement or through mis-management. Referring to the metric, the available condition parameter mid value between 'poor' and 'moderate' is 'fairly poor'. However, taking a cautious approach the metric has been set to 'moderate' for condition.

[4] p19. The Biodiversity Metric 2.0. Technical Supplement. Natural England Joint Publication JP029. July 2019

4.7. Connectivity: The User Guide sets out how the connectivity parameter should be populated: "*Connectivity (high, medium and low) – N.B. in the beta version of the biodiversity metric 2.0 these scores should be set at 'low' for low and moderate distinctiveness habitats and 'medium' for high or very high distinctiveness habitats in the absence of local data."* Accordingly, the 'medium' parameter has been used[5].

4.8. Strategic significance: Instructions on how to populate this parameter of the metric are set out in the User Guide. This states: "*The idea of strategic significance works at a landscape scale. It gives additional unit value to habitats that are located in preferred locations for biodiversity and other environmental objectives. Ideally these aspirations will have been summarised in a local strategic planning document which articulates where biodiversity is of high priority and the places where it is less so. Strategic significance utilises published local plans and objectives to identify local priorities for targeting biodiversity and nature improvement, such Nature Recovery Areas, local biodiversity plans, National Character Area objectives and green infrastructure strategies*". Lowland meadow is included in the Buckingham and Milton Keynes BAP and accordingly the 'strategic significance' value in the metric has been set to 'within area formally identified in local strategy'.

4.9. Value in Biodiversity Units of lowland meadow at the site: Following a review of the above parameters, and with reference to the survey work at the site, it is considered that the lowland meadow at the site represents an unremarkable example of the habitat type and accordingly no upward bespoke adjustment of its value is required. As such, it is appropriate to utilise the stepwise scoring within the metric to define its baseline value.

4.10. Although the beta testing version of the metric does not generate this score automatically, the appropriate value can be calculated for 'very high distinctiveness' habitats by reference to the difference in biodiversity units between the other habitat distinctiveness bands, with all other parameters remaining unchanged. This calculation is presented in Table 4.1 below:

Habitat type	Area	Distinctiveness	Condition	Connectivity	Strat Sig	Units	Difference
Modified grassland	0.7646	Low	Moderate	Medium	Within area	3.87	N/A
Other neutral grassland	0.7646	Medium	Moderate	Medium	Within area	7.74	3.87
Upland calcareous grassland	0.7646	High	Moderate	Medium	Within area	11.61	3.87
Lowland Meadow	0.7646	Very high	Moderate	Medium	Within area	15.48	3.87

Table 4.1 Scoring differences between habitats of differing distinctiveness types

4.11. Accordingly, the baseline value of the lowland meadow at the site is 15.48 biodiversity units. To enable the metric to function (as the beta testing version does not currently work for 'very high distinctiveness' habitats), it is necessary to substitute the lowland meadow habitat with a proxy input. In this case 'lowland calcareous grassland' has been selected as the proxy and the parameters set to ensure at least the same number (15.48) of baseline biodiversity units are achieved. The closest output that can be achieved under the metric is 15.83 biodiversity units and this uplifted value is utilised.

[5] A new connectivity tool is also available, however this did not appear to function for this habitat on site and Natural England technical support is currently unavailable to resolve this issue. Accordingly, this tool has not been used.

Other habitats

A-1 Site Habitat Baseline (Pre-development)

4.12. **Ref 1 'Cropland – Cereal Crops'** The arable land within the site has been attributed to this category as the survey work undertaken by Aspect Ecology recorded the arable land to be seeded with cereal crops at the time of survey. In accordance with the User Guide and Technical Supplement, this habitat type is does not require an assessment of the condition or connectivity and is instead allocated a fixed score of 1 for both categories. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.13. **Ref 2 'Urban – Amenity Grassland'** The amenity grassland within the site comprises a limited diversity of common and widespread species and is under regular management to maintain a short sward height. Accordingly, a condition of 'poor' is given to the amenity grassland, whilst connectivity of `low` has been selected to accord with the User Guide in respect of low distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.14. **Ref 3 'Grassland – Other Neutral Grassland'** The semi-improved and rough grassland within the site has been included under this category. These areas of grassland are moderately species-rich and contain a number of lowland meadow indicator species, albeit these are localised and not sufficiently abundant for the grassland to qualify as a Priority Habitat. Accordingly, a 'moderate' condition is assigned to this category, whilst connectivity of `low` has been selected to accord with the User Guide in respect of medium distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.15. **Ref 4 'Grassland – Other Neutral Grassland'** The semi-improved grassland (Field F3) within the site has been included under this category. The grassland is moderately species-rich and contains a number of lowland meadow indicator species, albeit these are localised and not sufficiently abundant for the grassland to qualify as a Priority Habitat. Accordingly, a 'moderate' condition is assigned to this category, whilst connectivity of `low` has been selected to accord with the User Guide in respect of medium distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.16. **Ref 5 'Grassland – Modified Grassland'** The improved grassland within the site is dominated by a low diversity of common and widespread species, typically associated with improved grassland, such as Perennial Rye-grass. The grassland is, or has until recently been, grazed regularly and enriched through animal droppings and is therefore considered to be in a 'poor' condition, whilst connectivity of `low` is a selected to accord with the User Guide in respect of low distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.17. **Ref 6 'Cropland – Traditional Orchards'** The orchard within the site may potentially qualify as the Priority Habitat 'Traditional Orchard' as it is not intensively managed and, as such, has been included in this category in the metric. However, the orchard within the site is not a good example of a Traditional Orchard, being of a very small size, with the trees being regularly managed such that little deadwood is allowed to accumulate and the grassland regularly mown as part of the garden setting in which the orchard is located. Accordingly, the condition of the orchard is considered to be 'moderate', whilst connectivity of `medium` has been selected to accord with the User Guide in respect of high distinctiveness habitats. In terms of strategic

significance `within area formally identified within local strategy` has been selected as Traditional Orchard is a Local BAP habitat.

4.18. **Refs 7 & 8 'Woodland and Forest – Other Woodland; Broadleaved'** The plantation woodland and the broadleaved woodland within the site have been included under this category. The woodlands meet a number of the woodland condition assessment criteria within the Biodiversity Metric 2.0 Technical Supplement, but not sufficiently to qualify as 'good' condition, and therefore `moderate` condition has been selected. Connectivity of `low` has been selected to accord with the User Guide in respect of medium distinctiveness habitats. In terms of strategic significance `within area formally identified within local strategy` has been selected for the broadleaved woodland (Ref 8) the plantation woodland (Ref 7) as Native Woodland is a Local BAP habitat.

4.19. **Refs 9 & 10 'Heathland and Shrub – Mixed Scrub'** The dense and scattered scrub at the site comprises a limited range of species that are common and widespread in the local and national context. This habitat does not meet the 'high environmental value' categorisation defined in the Farm Environment Plan (FEP) Manual. Overall, the scrub within the site is considered to be in 'moderate' condition. Connectivity of `low` has been selected to accord with the User Guide in respect of medium distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.20. **Ref 11 'Urban – Introduced Shrub'** The amenity planting within the site comprises a range of common and non-native species managed for their amenity rather than biodiversity value. In accordance with the User Guide and Technical Supplement, this habitat type does not require an assessment of the condition and is instead allocated a fixed score of 1. Connectivity of `low` has been selected to accord with the User Guide in respect of low distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.21. **Ref 12 'Sparsely vegetated land – Ruderal / Ephemeral'** The tall ruderal within the site comprises a limited range of species that are common and widespread in the local area and the national context. The tall ruderal does not form an important ecological feature and overall is considered to be in `poor' condition. Connectivity of `low` was selected to accord with the User Guide in respect of low distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.22. **Ref 13 'Lakes – Ponds (Non-Priority Habitat)'** The ponds within the site are either stocked with large numbers of fish, are relatively recently cleared to contain water, or are highly ephemeral in nature. Accordingly, the ponds within the site are not considered to form important ecological features and fail to meet a number of the pond condition assessment criteria within the Biodiversity Metric 2.0 Technical Supplement, such that a condition score of 'poor' has been allocated. Connectivity of `medium` was selected to accord with the User Guide in respect of high distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as the ponds on site do not qualify as Priority Habitat.

4.23. **Ref 14 'Urban – Developed land; sealed surface'** The remainder of the site is comprised of agricultural buildings and hardstanding which are largely devoid of vegetation and do not form an important ecological feature. In accordance with the User Guide and Technical Supplement, this habitat type does not require an assessment of the condition and is instead allocated a fixed

score of 0. Selections for other categories become inconsequential due to multiplier value of `0` under condition resulting in Total Biodiversity Units of 0.

4.24. **Ref 15 'Lowland meadow': proxy input `Grassland – Lowland Calcareous Grassland`** This is discussed above at paragraphs 4.3 to 4.12.

A-2 Site Habitat Creation (Post-development)

4.25. **'Grassland – Other Neutral Grassland'** This habitat includes semi-improved grassland which will be created along the northern boundary of the site and species-rich grassland which will be created along the western site boundary. The aim will be to manage these grasslands based on ecological principles, which should enable the grasslands to reach 'good' condition within 15 years. Connectivity of `low` is selected to accord with the User Guide in respect of medium distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.26. **'Urban – Amenity Grassland'** This includes the grassland in close proximity to the built development. The amenity grassland is likely to comprise a seed mix that is tolerant of frequent mowing and is unlikely to be managed for biodiversity. Accordingly, a condition score of 'poor' has been allocated for this habitat type. Connectivity of `low` is selected to accord with the User Guide in respect of low distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.27. **'Woodland and Forest – Other Woodland: Broadleaved** Native woodland planting is to be incorporated into the scheme, planted at the boundaries of the site. The `good` condition is based on the woodland planting being native and diverse and the habitat receiving on-going management as part of the landscape strategy. Subject to this management, it is considered that the woodland should achieve 'good' condition within 32+ years. Connectivity of `low` is selected to accord with the User Guide in respect of medium distinctiveness habitats. In terms of strategic significance `within area formally identified within local strategy` has been selected for the broadleaved woodland as Native Woodland is a Local BAP habitat.

4.28. **'Urban – Introduced Shrub'**. This will include all amenity planting in proximity to the built development. In accordance with the User Guide and Technical Supplement, this habitat type does not require an assessment of the condition and is instead allocated a fixed score of 1. Connectivity of `low` has been selected to accord with the User Guide in respect of low distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.29. **'Urban – Sustainable urban drainage feature'** This habitat represents the SuDS features to be created at the north of the site. Assuming all of the SuDS are seeded with a diverse native wet grassland seed mixture and management incorporates ecological principles for the benefit of biodiversity, it is considered achievable for this habitat to be of 'good' condition in five years. Connectivity of `low` is selected to accord with the User Guide in respect of low distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

4.30. **'Urban – Developed Land; sealed surface**' This habitat includes all new buildings, roads, parking and tarmac footpaths. In accordance with the User Guide and Technical Supplement, this habitat type does not require an assessment of the condition and is instead allocated a fixed score of 0. Selections for other categories become inconsequential due to multiplier value of `0` under condition resulting in Habitat Units Delivered of 0.

Habitat Biodiversity Impact Score

4.31. The BIA calculator computes a Net Project Biodiversity Units (Habitats) score of **-166.07**, a biodiversity loss of **75.35%**.

5. Hedgerow Impact Assessment

B-2 Site Hedge Baseline (Pre-development)

5.1. **Ref 1 'Line of Trees'** A number of tree lines are present within the site which contain a range of native species and are fenced from livestock, such that they are outgrown in nature. The tree lines achieve a condition score of 'moderate' utilising the condition assessment for a line of trees, as provided in the Biodiversity Metric 2.0 Technical Supplement. Connectivity of `low` has been selected to accord with the User Guide in respect of low distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

5.2. **Ref 2 'Native Species Rich Hedgerow'** This habitat refers to the species-rich hedgerows within the site which are well connected and generally outgrown in nature. Accordingly, the species-rich hedgerows are considered to be in 'moderate' condition. Connectivity of `low` has been selected to accord with the User Guide in respect of medium distinctiveness habitats. In terms of strategic significance `within area formally identified within local strategy` has been selected as Hedgerows are a Local BAP habitat.

5.3. **Ref 3 'Native Hedgerow'** The remainder of the hedgerows within the site are species-poor; however, they are well established and provide good connectivity within the site. As such, the species-poor hedgerows are considered to be in 'moderate' condition. Connectivity of `low` has been selected to accord with the User Guide in respect of medium distinctiveness habitats. In terms of strategic significance `within area formally identified within local strategy` has been selected as Hedgerows are a Local BAP habitat.

B-2 Hedge Creation (Post-development)

5.4. **Ref 1 'Native Species Rich Hedgerow'** This includes all new hedgerows within the scheme which will be planted with a diverse range of native tree/shrub species to ensure that the hedgerows are species-rich. The hedgerows will be managed in perpetuity of the scheme to ensure their value for biodiversity is maximised and it is considered that a condition of 'good' can be achieved for the hedgerows within 10 years. Connectivity of `low` has been selected to accord with the User Guide in respect of medium distinctiveness habitats. In terms of strategic significance `within area formally identified within local strategy` has been selected as Hedgerows are a local BAP habitat.

5.5. **Ref 2 'Line of Trees'** A number of tree lines are proposed within the development scheme. These will include native species and will be managed for biodiversity in perpetuity of the scheme. It is anticipated that a condition of 'good' can be achieved for the tree lines within 30 years. Connectivity of `low` was selected to accord with the User Guide in respect of low distinctiveness habitats. In terms of strategic significance `area/compensation not in local strategy/ no local strategy` has been selected as this habitat type is not a Local BAP habitat.

Hedgerow Biodiversity Impact Score

5.6. The BIA calculator computes a Net Project Biodiversity Units (Hedgerows) Score for the proposals of **-4.17 units**, a biodiversity loss of **17.31%**.

6. River Impact Assessment

C- 1 Site River Baseline (Pre-development)

6.1. **Ref 1 'Rivers & Streams (Other)**. A small stream passes across the site from east to west. The stream is semi-natural, contains aquatic and marginal macrophytes and has well vegetated banks and bank tops. However, the stream is silted and heavily shaded over much of its reach, such that very little aquatic vegetation is present. In addition, littering is present within the stream, particularly at the eastern end. Overall, the stream is likely to function as a wildlife corridor in the local context and has been categorised as being in `fairly poor' condition. In terms of strategic significance `low potential/ action not identified in any plan` has been selected as this habitat type is not a Local BAP habitat.

C-2 Site River Creation (Post-development)

6.2. **Ref 1 'Rivers & Steams (Other)** The stream is to be diverted as part of the proposals and will achieve a greater length than the existing stream. Over time, the diverted section of the stream will become colonised with marginal and aquatic vegetation established through seeding or plug planting and natural colonisation. The stream will be managed in perpetuity over the life of the scheme to ensure that the stream does not become over-shaded and to remove any litter that may enter the stream. Furthermore, the stream will be buffered by wildflower grassland and native shrub planting which will also be managed long-term. Subject to management of the stream for the benefit of biodiversity, over time (~5 years) it is considered achievable for the stream to reach 'moderate', if not good condition. In terms of strategic significance `low potential/ action not identified in any plan` has been selected as this habitat type is not a Local BAP habitat.

River Biodiversity Impact Score

6.3. The BIA calculator computes a Net Project Biodiversity Units (Rivers) score for the proposals of **-3.75 units**, a biodiversity loss of **65.96%**.

7. Summary & Conclusion

7.1. In order to inform the proposals, a Biodiversity Impact Assessment calculation has been carried out. The BIA calculates that a net loss of -166.07 habitat units, -4.17 hedgerow units and -3.75 river units is likely to occur under the proposed development. This represents a biodiversity loss of 75.35% for habitat units, 17.31% for hedgerow units and 65.96% for river units.

8. Consultation with the Environment Bank

8.1. The Environment Bank has been approached to provide a quotation for a biodiversity compensation scheme to offset the biodiversity impact of the proposals, based on the results of the metric calculations undertaken in November 2019 and more recently in July 2020.

8.2. The DEFRA 2.0 Biodiversity Impact Calculation Tool has been provided to the Environment Bank, who have confirmed they are able to bring forward a scheme exceeding 166.07 biodiversity units and therefore achieving biodiversity net gain for the proposals. This would also include a 30 year costed management and monitoring plan and monitoring and oversight of the offset site over 30 years with reporting to the LPA.

8.3. The biodiversity compensation scheme proposes to target the creation/restoration of grassland to Lowland Meadow within the Milton Keynes authority, in combination with the enhancement

of a wider mosaic of habitats. The Environment Bank has confirmed a minimum threshold for the extent of Lowland Meadow creation/restoration can be set, in order to achieve a minimum 33% increase over the calculated Lowland Meadow biodiversity units lost from the site. This would contribute to the local BAP target to increase Lowland Meadow in Buckinghamshire and Milton Keynes by 33%[6].

Annexes:

Annex 5263/1 – Completed BIA Calculator

Annex 5263/2 – 5263/BIA1 Pre-development Metric Habitat Plan

Annex 5263/3 – 5263/BIA2 Post-development Metric Habitat Plan

[6] Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan

Annex 5263/1:

Completed BIA Calculator

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South Caldecotte
Detailed Results

Return to results menu

Summary Figures

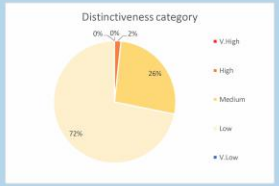
Net project biodiversity units (including all on-site & off-site habitat retention/creation)	*Habitat units*	-166.07
	Hedgerow units	-4.17
	River units	-3.75
Total project biodiversity % change (including all On-site & Off-site Habitat Creation + Retained Habitats)	*Habitat units*	-75.35%
	Hedgerow units	-17.31%
	River units	-65.96%

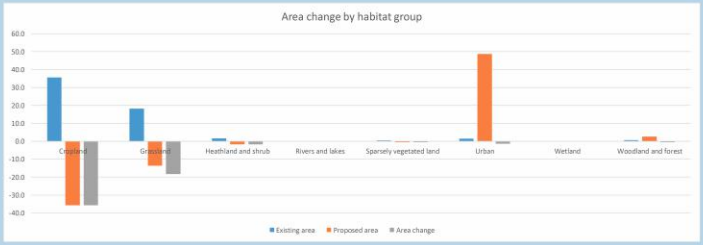
On-site habitat retention and enhancement

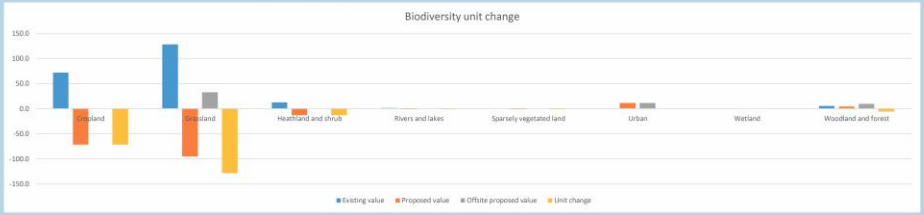
	Habitats	Hedgerows	Rivers
Total site area / length	58.16	5.02	0.71
Total site units	220.40	24.06	5.68
Area / length retained	0.04	0.10	0.00
Units Retained	0.32	0.46	0.00
Area / length enhanced	0.00	0.00	0.00
Baseline units enhanced	0.00	0.00	0.00
Area / length succession	0.00		
Units succession	0.00		
Area / length lost	58.12	4.92	0.71
Units lost	220.08	23.60	5.68

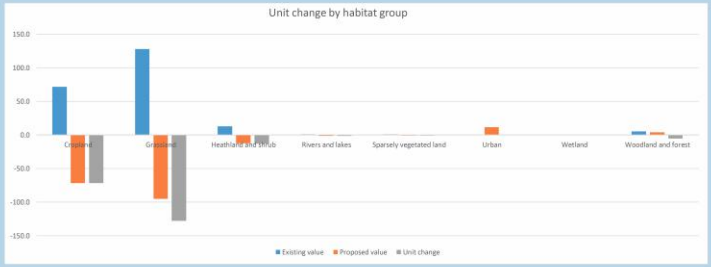
Area lost by distinctiveness band

Category	Area lost (hectares)	Area lost (%)
V.High	0	
High	0.9624	2
Medium	15.0658	27
Low	40.7285	72
V.Low	0	

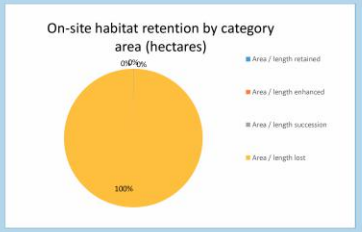


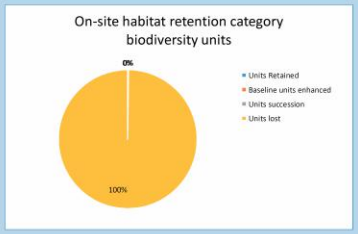






Habitat group	Pre-development		Post development on site		Post Development off site		Total post development		Change	
	Existing area	Existing value	Proposed area	Proposed value	Proposed area	Offsite proposed value	Proposed area	Proposed value	Area change	Unit change
Cropland	35.6	71.6	-35.6	-71.6	0.0	0.0	0.0	0.0	-35.6	-71.6
Grassland	18.3	128.0	-13.6	-95.1	4.7	32.9	0.0	0.0	-18.3	-128.0
Heathland and shrub	1.7	12.9	-1.6	-12.6	0.0	0.3	0.0	0.0	-1.7	-12.9
Rivers and lakes	0.2	1.1	-0.2	-1.1	0.0	0.0	0.0	0.0	-0.2	-1.1
Sparsely vegetated land	0.4	0.9	-0.4	-0.9	0.0	0.0	0.0	0.0	-0.4	-0.9
Urban	1.4	0.1	48.8	11.4	50.2	11.5	0.0	0.0	-1.4	-0.1
Wetland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Woodland and forest	0.6	5.4	2.6	4.1	3.2	9.5	0.0	0.0	-0.6	-5.4





South Caldecotte

A-1 Site Habitat Baseline

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Ref	Habitats and areas: Broad Habitat	Habitats and areas: Habitat type	Habitats and areas: Area (hectares)	Habitat distinctiveness: Distinctiveness	Habitat distinctiveness: Score	Habitat condition: Condition	Habitat condition: Score	Ecological connectivity: Ecological connecti	Ecological connectivity: Connectivity	Ecological connectivity: Connectivity multiplier	Strategic significance: Strategic significance	Strategic significance: Strategic significance	Strategic significance: Strategic position multiplier	Suggested action to address habitat losses	Ecological: Total habitat units	Retention category biodiversity value: Area retained	Area enhanced	Area succession	Baseline units	Baseline units	Baseline units successi	Area lost	Units lost
1	Cropland	Cropland - Cereal crops	35.5711	Low	2	N/A - Agricultural	1	N/A	Assessment not appropriate	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same distinctiveness or better habitat required	71.14				0.00	0.00	0.00	35.57	71.14
2	Urban	Urban - Amenity grassland	0.0582	Low	2	Poor	1	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local	Low Strategic Significance	1	Same distinctiveness or better habitat required	0.12				0.00	0.00	0.00	0.06	0.12
3	Grassland	Grassland - Other neutral grassland	8.8335	Medium	4	Moderate	2	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same broad habitat or a higher distinctiveness habitat required	70.67				0.00	0.00	0.00	8.83	70.67
4	Grassland	Grassland - Other neutral grassland	4.0306	Medium	4	Moderate	2	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same broad habitat or a higher distinctiveness habitat required	32.24				0.00	0.00	0.00	4.03	32.24
5	Grassland	Grassland - Modified grassland	4.642	Low	2	Poor	1	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local	Low Strategic Significance	1	Same distinctiveness or better habitat required	9.28				0.00	0.00	0.00	4.64	9.28
6	Cropland	Cropland - Traditional orchards	0.0293	High	6	Moderate	2	Medium	Moderately connected habitat	1.1	Within area formally identified in local strategy	High strategic significance	1.15	Same habitat required	0.44				0.00	0.00	0.00	0.03	0.44
7	Woodland and forest	Woodland and forest - Other woodland; broadleaved	0.302	Medium	4	Moderate	2	Low	Unconnected habitat	1	Within area formally identified in local strategy	High strategic significance	1.15	Same broad habitat or a higher distinctiveness habitat required	2.78				0.00	0.00	0.00	0.30	2.78
8	Woodland and forest	Woodland and forest - Other woodland; broadleaved	0.2897	Medium	4	Moderate	2	Low	Unconnected habitat	1	Within area formally identified in local strategy	High strategic significance	1.15	Same broad habitat or a higher distinctiveness habitat required	2.67				0.00	0.00	0.00	0.29	2.67
9	Heathland and shrub	Heathland and shrub - Mixed scrub	1.1522	Medium	4	Moderate	2	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same broad habitat or a higher distinctiveness habitat required	9.22	0.04			0.32	0.00	0.00	1.11	8.90
10	Heathland and shrub	Heathland and shrub - Mixed scrub	0.4978	Medium	4	Moderate	2	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same broad habitat or a higher distinctiveness habitat required	3.98				0.00	0.00	0.00	0.50	3.98
11	Urban	Urban - Introduced shrub	0.0123	Low	2	Poor	1	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local	Low Strategic Significance	1	Same distinctiveness or better habitat required	0.02				0.00	0.00	0.00	0.01	0.02
12	Sparsely vegetated land	Sparsely vegetated land - Ruderal/Ephemeral	0.4449	Low	2	Poor	1	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local	Low Strategic Significance	1	Same distinctiveness or better habitat required	0.89				0.00	0.00	0.00	0.44	0.89
13	Lakes	Lakes - Ponds (Non- Priority Habitat)	0.1685	High	6	Poor	1	Medium	Moderately connected habitat	1.1	Area/compensation not in local strategy/ no local	Low Strategic Significance	1	Same habitat required	1.11				0.00	0.00	0.00	0.17	1.11
14	Urban	Urban - Developed land; sealed surface	1.3625	V.Low	0	N/A - Other	0	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local	Low Strategic Significance	1	Compensation Not Required	0.00				0.00	0.00	0.00	1.36	0.00
15	Grassland	Grassland - Lowland calcareous grassland	0.7646	High	6	Good	3	Low	Unconnected habitat	1	Within area formally identified in local strategy	High strategic significance	1.15	Same habitat required	15.83				0.00	0.00	0.00	0.76	15.83
16																							
17																							
18																							
19																							
		Total site area ha	58.16											Total Site baseline	220.40	0.04	0.00	0.00	0.32	0.00	0.00	58.12	220.08

South Caldecotte

A-2 Site Habitat Creation

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Post development/ post intervention habitats: Proposed habitat	Area (hectares)	Distinctiveness	Score	Condition	Score	Ecological connectivity: Ecological connectivity	Connectivity	Connectivity multiplier	Strategic significance: Strategic significance	Strategic significance	Strategic position multiplier	Temporal multiplier: Time to target condition/years	Time to target multiplier	Difficulty multipliers: Difficulty of creation category	Difficulty of creation multiplier	Habitat units delivered
Grassland - Other neutral grassland	1.8255	Medium	4	Good	3	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	15	0.586	Low	1	12.84
Grassland - Other neutral grassland	2.8563	Medium	4	Good	3	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	15	0.586	Low	1	20.09
Urban - Amenity grassland	3.6907	Low	2	Poor	1	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	1	0.965	Low	1	7.12
Woodland and forest - Other woodland; broadleaved	3.2276	Medium	4	Good	3	Low	Unconnected habitat	1	Within area formally identified in local strategy	High strategic significance	1.15	32+	0.320	Medium	0.67	9.54
Urban - Introduced shrub	0.9658	Low	2	Poor	1	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	1	0.965	Low	1	1.86
Urban - Sustainable urban drainage feature	0.7585	Low	2	Good	3	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	5	0.837	Medium	0.67	2.55
Urban - Developed land; sealed surface	44.7993	V.Low	0	N/A - Other	0	N/A	Assessment not appropriate	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	0	1.000	Low	1	0.00
Totals	58.12														Total Units	54.01

South Caldecotte

B-1 Site Hedge Baseline

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	UK Habitats - existing habitats			Habitat distinctiveness		Habitat condition		Ecological connectivity			Strategic significance				Ecological baseline	Retention category biodiversity value					
Baseline ref	Hedge number	Hedgerow type	length KM	Distinctiveness	Score	Condition	Score	Ecological connectivity	Connectivity	Connectivity multiplier	Strategic significance	Strategic significance	Strategic position multiplier	Suggested action to address habitat losses	Total hedgerow units	Length retained	Length enhanced	Units retained	Units enhanced	Length lost	Units lost
1		Line of Trees	0.61	Low	2	Moderate	2	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same distinctiveness band or better	2.44			0	0	0.61	2.44
2		Native Species Rich Hedgerow	0.29	Medium	4	Moderate	2	Low	Unconnected habitat	1	Within area formally identified in local strategy	High strategic significance	1.15	Like for like or better	2.668			0	0	0.29	2.668
3		Native Hedgerow	4.12	Low	2	Moderate	2	Low	Unconnected habitat	1	Within area formally identified in local strategy	High strategic significance	1.15	Same distinctiveness band or better	18.952	0.1007		0.46322	0	4.0193	18.489
4																					
5																					
6																					
7																					
8																					
		Total Site length/KM	5.02											Total Site baseline	24.06	0.10	0.00	0.46	0.00	4.92	23.60

South Caldecotte

B-2 Site Hedge Creation

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

		Proposed habitats		Habitat distinctiveness		Habitat condition		Multipliers									
								Spatial quality						Temporal multiplier		Difficulty of creation multiplier	Hedge units delivered
								Ecological connectivity			Strategic significance						
Baseline ref	New hedge number	Habitat type	Length km	Distinctiveness	Score	Condition	Score	Ecological connectivity	Connectivity	Connectivity multiplier	Strategic significance	Strategic significance	Strategic position multiplier	Time to target condition/years	Time to target multiplier		
1		Native Species Rich Hedgerow	2.75	Medium	4	Good	3	Low	Unconnected habitat	1	Within area formally identified in local strategy	High strategic significance	1.15	10	0.700	0.67	17.81
2		Line of Trees	0.789	Low	2	Good	3	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	30	0.343	1	1.63
3																	
4																	
5																	
		Creation Length/KM	3.54														19.43

South Caldecotte

C-1 Site River Baseline

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	Existing river type			Habitat distinctiveness		Habitat condition		Strategic significance			Sugested action	Ecological baseline	Retention category biodiversity value					
	Baseline ref	River type	length KM	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic position multiplier		Total river units	Length retained	Length enhanced	Units retained	Units enhanced	Length impacted	Units Lost
	1	Rivers & Streams (Other)	0.71	Medium	4	Fairly Poor	2	Low potential/ action not identified in any plan.	Low Strategic Significance	1	Avoid	5.68			0	0	0.71	5.68
	2																	
	3																	
	4																	
	5																	
		Total site length KM	0.71								Total Site	5.68	0.00	0.00	0.00	0.00	0.71	5.68

South Caldecotte

C-2 Site River Creation

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

	Proposed habitats		Habitat distinctiveness		Habitat condition		Strategic significance			Temporal multiplier		Difficulty of creation category	Difficulty of creation multiplier	Riparian encroachment		River units delivered
Baseline ref	River type	Length km	Distinctiveness	Score	Condition	Score	Strategic significance	Strategic significance	Strategic position multiplier	Time to target condition/years	Time to target multiplier			Extent of encroachment	Multiplier	
1	Rivers & Streams (Other)	0.778	Medium	4	Moderate	3	Low potential/ action not identified in any plan.	Low Strategic Significance	1	5	0.837	High	0.33	8+ m	0.75	1.93
2																
3																
4																
5																
	Creation Length/KM	0.78														1.93

Annex 5263/2:

Plan 5263/BIA1 – Pre-development Metric Habitat Plan

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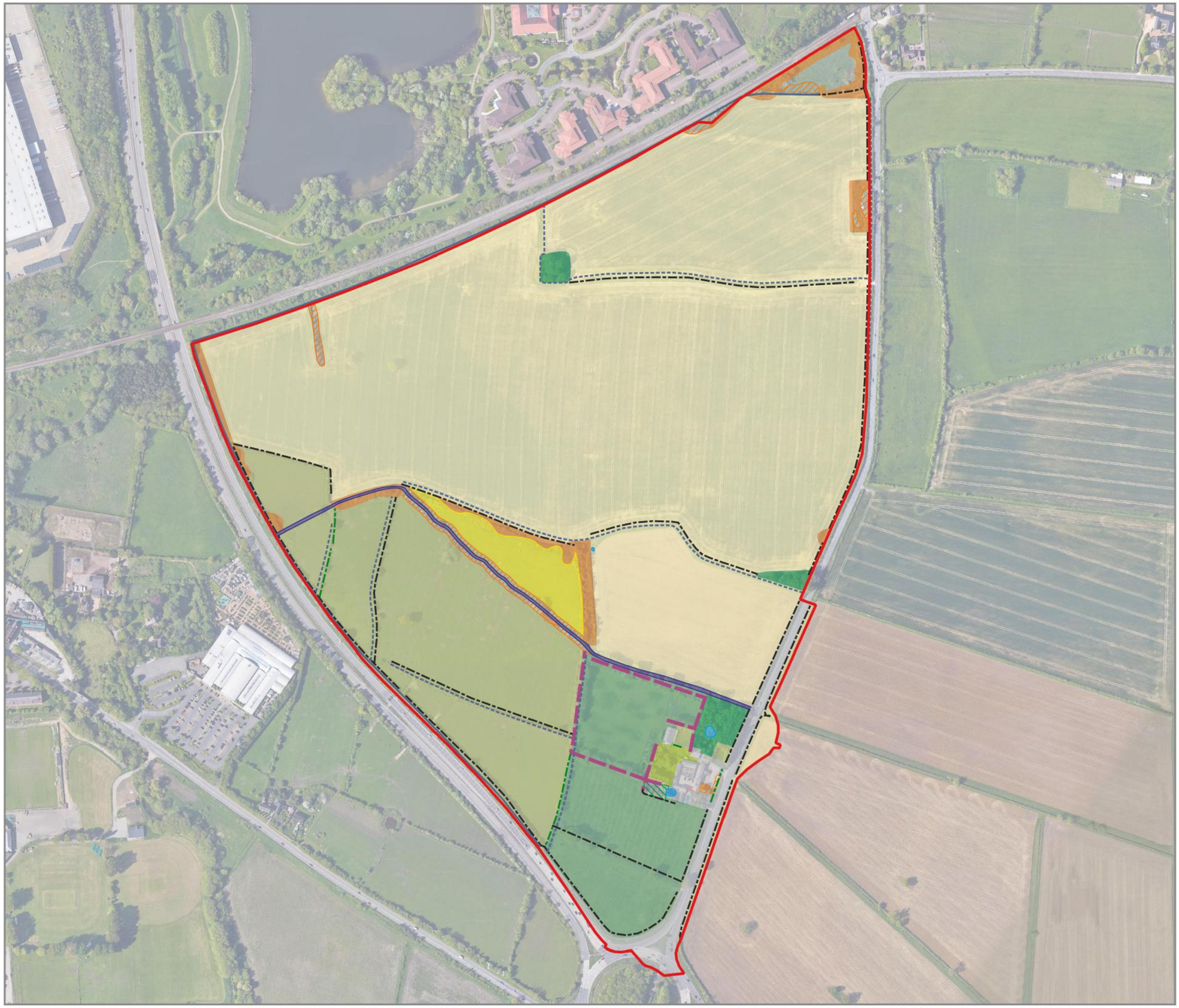

Key:

- Site Boundary
- Cropland - Cereal Crops
- Urban - Amenity Grassland
- Grassland - Other Neutral Grassland
- Grassland - Modified Grassland
- Grassland – Lowland Meadows (Proxy Input: Grassland - Lowland Calcareous Grassland)
- Cropland - Traditional Orchard
- Woodland and Forest - Other Woodland; Broadleaved
- Heathland and Shrub - Mixed Shrub
- Urban - Introduced Shrub
- Sparsley Vegetated Land - Ruderal/Ephemeral
- Lakes - Ponds (Non-Priority Habitat)
- Line of Trees
- Native Species-rich Hedgerow
- Native Hedgerow
- Urban - Development Land; Sealed Surface
- Rivers and Streams (Other)

0 70 140 210 280 m

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South Caldecotte	PROJECT
Pre-development Metric Habitat Plan	TITLE
5263/BIA1	DRAWING NO.
B	REV
July 2020	DATE

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Annex 5263/3:

Plan 5263/BIA2 – Post-development Metric Habitat Plan

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Key:

- Site Boundary
- Grassland - Other Neutral Grassland (Species-rich)
- Urban - Amenity Grassland
- Grassland - Other Neutral Grassland
- Heathland & Shrub - Mixed Scrub
- Urban - Introduced Shrub
- Woodland & Forest - Other Woodland
- Line of Trees
- Native Species-rich Hedgerow
- Native Hedgerow
- River & Streams (Other)
- Urban - Sustainable Urban Drainage Feature
- Urban - Development Land; Sealed Surface

0 70 140 210 280 m

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Appendix 5263/AB10:

AB10(a): Outline Offset Strategy Report (Environment Bank; July 2020)

AB10(b): Correspondence from Environment Bank 12 November 2019

AB10(c): Quotations from the Environment Bank 14 July 2020

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AB10(a): Outline Offset Strategy Report (Environment Bank; July 2020)

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Outline Offset Strategy Report

of Site at South Caldecotte, Milton Keynes

28 July 2020

Report Ref: EB03199-B1

Environment Bank
e: admin@environmentbank.com w: www.environmentbank.com

Project reference	EB03199
Project site	Site at South Caldecotte, Milton Keynes
Client	Aspect Ecology
Report title	Outline Offset Strategy Report
Report reference	EB03199-B1
Report version	00
Report author(s)	Rob Wreglesworth MCIEEM
Approved by	Richard Wheat ACIEEM
Final draft date	22/07/2018

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1 INTRODUCTION

Environment Bank has been instructed by Aspect Ecology on behalf of their client HB (South Caldecotte) Ltd. to carry out an outline strategy assessment report for a proposed development scheme at South Caldecotte, Milton Keynes, Buckinghamshire. The report sets out the strategy that will be employed to identify a biodiversity offset scheme sufficient to compensate for the identified losses of biodiversity value from the proposed development.

1.1 Proposed Development

The application site in the South Caldecotte area of Milton Keynes is allocated in Policy SD14 of Plan:MK (adopted March 2019) for employment development, and outline Development Proposals include nine new warehouses, with offices, parking, and associated access and infrastructure.

1.2 Biodiversity Offset Requirement

The Biodiversity Offset requirement for the proposed development has been assessed by aspect ecology a summary of which is presented in the Biodiversity Metric 2.0 – Calculation Tool for South Caldecotte, Milton Keynes (Dated 2nd July 2020). A summary of the requirements in Biodiversity Units (BU) are set out in Table 1.1 below.

Table 1.1 – Summary of biodiversity requirement by habitat feature

Feature type	Existing Value (BU)	Impact (BU)	Onsite compensation (BU)	Net change in value (BU)
Habitat	220.40	-220.08	54.01	-166.07
Hedgerows	24.06	-23.60	19.43	-4.17
Rivers and Streams	5.68	-5.68	1.93	-3.75

Specific to the compensation requirement are a series of habitats that due to their local distinctiveness and value should be compensated for on a like for like basis. These are Lowland meadow, traditional orchard, ponds and other Rivers and Streams. The value of these features that will be incorporated into a biodiversity offset scheme for the site are detailed in Table 1.2. All other low and medium distinctiveness habitats should compensated with a habitat of similar quality (Medium distinctiveness habitats) or better (low and medium distinctiveness habitats).

Table 1.2 – Breakdown of the compensation requirement for the proposed development by habitat type

Feature type	Compensation Requirement (BU)	Trading Requirement
Lowland Meadow	15.83	Like for Like
Traditional orchard	0.44	Like for Like
Ponds	1.11	Like for Like
Other rivers and streams	3.75	Like for Like

In addition to the above, it is understood that Milton Keynes Council has requested that any compensation approach for the proposed development must make a contribution towards local biodiversity targets. As such the target for lowland meadow should include the outstanding requirement of 15.83 BU plus an additional 33% or a total of 21.05 BU.

2 BIODIVERSITY OFFSETTING CONTEXT

2.1 Background

Biodiversity offsets are '*conservation activities designed to deliver biodiversity benefits in compensation for losses, in a measurable way*'. Biodiversity offsetting is distinguished from other forms of compensation by the requirement for measurable outcomes. This is achieved by quantifying net biodiversity impacts caused by development; using the same metric to assess direct and indirect negative impacts to habitats and the value of any on-site compensation, to set the framework of off-site compensation (offset) requirements and the biodiversity net gain generated by these offsets. Biodiversity offsetting ensures that off-site compensation proposed is both proportionate to the development concerned and that a measurable net gain for biodiversity can be achieved.

Biodiversity offsetting, like other forms of compensation, is the last step of the mitigation hierarchy (first avoid, then reduce, and finally, compensate) and is applied as a last resort to otherwise policy-compliant development proposals. 'Offsetting' – i.e. creating or restoring new wildlife habitat in a different place to where it was lost – is therefore complementary to existing planning policies regarding biodiversity and is recognised in the British Standard for Biodiversity in Planning (BS 42020:2013) as an appropriate mechanism for delivering biodiversity compensation.

Biodiversity accounting metrics and biodiversity offsetting have become widely used across England since their introduction in 2012. According to Environment Bank's own estimations, more than 80 Local Authorities apply the metrics and offsetting to development schemes of varying sizes either routinely through locally mandated biodiversity net gain policies, or on a case-by-case basis in advance of the forthcoming national policy requirement for net gain in all development.

In addition to providing a mechanism for quantifiable compensation and net gain, biodiversity offsets provide reliable biodiversity outcomes as they are long-term (30 years), monitored and enforceable with adaptable management plans for optimised success.

2.2 Policy and Legislation

This section details the legislative and planning policy context for biodiversity offsetting. The reader is referred to the original documents for accurate interpretation.

Natural Environment and Rural Communities Act 2006

Section 40 of the Natural Environment and Rural Communities Act 2006 places a statutory duty on all public bodies in England and Wales to have regard to the purpose of conserving biodiversity, when exercising their normal functions.

National Planning Policy Framework (NPPF)

The NPPF may be considered an important and relevant document in the determination of the Proposed Development. The NPPF sets out a broad framework of policies for the planning system in England and how they should be applied. Underpinning the framework is the principal aim of sustainable development which is to be pursued through the fulfilment of interdependent economic, social and environmental objectives.

Chapter 15 of the NPPF details core policy principles with respect to conserving and enhancing the natural environment. Securing 'net gains' for biodiversity, in accordance with the Government's 'A Green Future; Our 25 Year Plan to Improve the Environment' paper is a key theme running through the Chapter.

Planning Practice Guidance

'Planning Practice Guidance for the Natural Environment' (Planning portal, 2014) accompanies the NPPF and provides further details and explanation about the implementation of the policies. The Guidance outlines that under Section 40 of the Natural Environment and Rural Communities Act 2006, local planning authorities have a duty to embed consideration of biodiversity as an integral part of policy and decision-making and should be seeking to make a significant contribution towards the commitments of the Government's Biodiversity 2020 Strategy. The practice also introduces the process of biodiversity offsetting in the planning system as a means of providing measurable conservation outcomes to compensate for residual adverse biodiversity impacts resulting from development.

Buckinghamshire and Milton Keynes Biodiversity Accounting SPD

Buckingham and Milton Keynes Biodiversity accounting Supplementary Planning Document set out detail proposals on how developers will be required to using biodiversity accounting tools to assess their impacts on biodiversity and identify and deliver equivalent on- and offsite compensation proposals. With regards to offsite compensation proposals, developers will be required to provide the following:

a) A methodology for the identification of any receptor site(s) for accounting measures;
b) The identification of any such receptor site(s);
c) The provision of arrangements to secure the delivery of any compensation measures (including a timetable for their delivery); and
d) A Biodiversity Accounting Management and Monitoring Plan including details of the provision and maintenance of any compensation measures.

This report details the process for how these requirements will be met.

Biodiversity Net Gain

The 'Biodiversity Net Gain - good practices principles' (CIEEM *et al.,* 2016) sets out a series of principles that should be applied to development proposals in order to achieve net gain. The following principles are of most relevance to this development proposal:

Principle 5: Make a measurable net gain contribution

Achieve a measurable, overall gain for biodiversity and the services ecosystems provide whilst directly contributing to nature conservation priorities.

Principle 6: Achieve the best outcomes for biodiversity

Achieve the best outcomes for biodiversity by using robust and credible evidence, and local knowledge to make clearly justified choices when:

Delivering compensation that is ecologically equivalent in type, amount and condition, and that accounts for the location and timing of biodiversity losses.

Achieving net gain locally to the development whilst also contributing towards nature conservation priorities at local, regional and national levels.

Enhancing ecological connectivity by creating more, bigger, better and joined areas for biodiversity.

Principle 7: Be additional

Achieve nature conservation outcomes that demonstrably exceed existing obligations (i.e. do not deliver something that would occur anyway).

Principle 9: Optimise sustainability

Prioritise net gain, and where possible, optimise the wider environmental benefits for a sustainable society and economy.

2.3 Biodiversity Offsetting Standards

Good practice standards for biodiversity offsetting are set out by the Business and Biodiversity Offsets Programme (BBOP, 2012). These standards inform the approach for selection and development of suitable offset sites and projects. Of these standards, the following provide the most relevant UK framework for the preliminary offset site search:

- The proposed offset site should be identified as suitable for the creation and/or enhancement of a target habitat within the vicinity of where the impact occurs;
- The site must be available and managed for a minimum specified term (30 years in this instance).

- The landowner must agree to an enforceable delivery mechanism to secure the long-term management.
- The site must be available for monitoring to ensure appropriate management is being undertaken and to report biodiversity progress back to the local planning authority.

Further standards, with regards to offset site surveys and ensuring that appropriate target habitats and units can be achieved, will form part of the detailed site search that will proceed the preliminary site search.

3 BIODIVERSITY OFFSET SEARCH

The section outlines the following processes typically employed by Environment Bank in the identification of a biodiversity offset scheme. Biodiversity offsetting schemes, for other developments, have been identified, approved by LPA and secured and delivered, by Environment Bank, through these processes across England.

It should be noted that for this project this process is already underway with a series of potential sites already identified at time of report submission as discussed in the following chapters.

3.1 Desk Study

A desk study is carried out to determine the ecological context for the site search area. This includes reviewing existing nature conservation projects, green infrastructure proposals and local priorities for Milton Keynes and adjacent authorities in Buckinghamshire. The purpose of the exercise is to both identify and shortlist suitable strategic landowners, sites and project providers within the area of search and to ensure that any offset schemes positively contribute towards identified nature conservation objectives or project initiatives for the area. Sources identified as part of this process include

- Multi-Agency Geographical Information System for the Countryside (MAGIC) – e.g. statutory nature conservation sites, priority habitats, National habitat Network;
- The Buckinghamshire and Milton Keynes Biodiversity Opportunity Areas;
- The Milton Keynes Green Infrastructure Strategy; and;
- Biodiversity Action Plan: Forward to 2020 for Buckinghamshire and Milton Keynes.

3.2 Landowner Search

The landowner search involves contacting key landowners within Milton Keynes and surrounding boroughs using the above desk search to select those landowners with the greatest opportunities to meet the requirements of the proposed development whilst supporting local biodiversity objectives.

Environment Bank draws upon a range of existing sources and contacts to identify suitable landowners and projects including the following:

The Environment Bank Registry – This comprises an active registry of landowners who have formally registered an interest and a potential landholding with Environment Bank for participation in an offset scheme. This includes both landowners from a variety of backgrounds including small scale hobby farmers to large estate owners. The registry is subject to regular review and is expanding weekly.

Land Agents – The Environment Bank has commercial agreements with several land agents with wider connections to landowners including estate owners, private and third-sector organisations and other farming interests.

Corporate landowners – The Environment Bank has established partnerships with a range of corporate landowners, nature conservation organisations and local authority parks teams with strategic landholdings.

Marketing – Environment Bank has, in the past, successfully utilised targeted marketing activity to identify and contact new landowners in priority areas.

Environment Bank are currently exploring the following sites (Table 3.1) as potential candidates for providing offsetting opportunities for the above development. Due to the commercial nature of this data and due to the phase of the search process, detailed site names and locations cannot be provided at this stage (see Section 3.4 for Local Planning Authority review and scrutiny of offset schemes).

Table 3.1 – Summary of current exploratory sites in Milton Keynes and the wider Buckingham and Milton Keynes NEP Area

Site	Distance from development	Size (ha)	Project type	Biodiversity Opportunity Area
A	<12 km north	>10ha	Grassland enhancement with rivers and streams	Ouse Valley
B	<7 km south east	>10ha	Grassland enhancement	-
C	<5 km south east	>40ha	Woodland with grassland	-
D	<10 km west	>10ha	Grassland enhancement	Within 500 m of Claydon and Padbury Streams
E	<12km north west	>20ha	Grassland enhancement with rivers and streams	Ouse Valley

The site search process assesses sites on the following criteria that to enable a shortlist of suitable schemes for detailed review:

- The landowner is, in principle, willing to become an offset provider and is in a position to enter into a management agreement for a period of 30 years; and,
- The landowner has sites or projects that can facilitate a net gain for biodiversity above and beyond what is currently on-site or what is committed to through an existing management agreement or obligation (e.g. an extant Section 106 agreement).

3.3 Site Proposals

The following process will be undertaken for all sites shortlisted in accordance with Section 3.1 and 3.2

Baseline Data

Baseline ecological data will be collected for all shortlisted site options. This will include desk study data to identify non-statutory sites, priority habitats and protected species on or adjacent to the site and any additional site-specific information that may be relevant to the scheme for example existing management or funding commitments.

A Phase 1 Habitat Survey (JNCC 2010) will be carried out to describe the extent and current ecological condition of all habitats within the site. In addition, a condition assessment will be undertaken for each habitat, utilising the methodology and criteria detailed in the Farm Environment Plan manual (Natural England 2010) together with professional judgement to assign a condition score for use within the biodiversity metric.

Soil analysis, and where required hydrological monitoring may be required to determine the suitability of the site to support target habitats. This will typically be carried out for lowland meadow creation/restoration and in the creation of wetland habitat features.

The baseline ecological conditions will be summarised to inform the outline site proposals detailed below.

Outline Proposal

Following this, an outline proposal will be developed which will analyse the baseline data and use this to determine whether or not a project will be feasible at that particular site.

This review will also look in more detail at the ecological context and align this with local targets to ensure the maximum ecological value of the scheme.

Environment Bank will then discuss the proposals with the land manager to assess their management resources and to ensure they are able to deliver all the management requirements being proposed.

These discussions will then inform the calculation of costs for any required capital works and the ongoing 30 years of management.

Biodiversity Metric

A biodiversity metric assessment will be undertaken to accompany the scheme proposal taking account of both the existing and proposed baseline values and the subsequent increase

in biodiversity units provided by the scheme. The results of the metric will be present in an outline report to demonstrate how the scheme adheres to the conservation requirements of the proposed development.

3.4 LPA Consultation

Once an outline proposal is established and agreed in principle with the landowner, Environment Bank will consult with the local planning authority and relevant stakeholders (e.g. the Buckinghamshire and Milton Keynes NEP) to agree the principle and suitability of the scheme prior to final design. This enables local stakeholder input into the offset proposal to provide confidence in the approach and delivery prior to formal submission. Feedback on the proposals received at this stage will inform the final management proposal in Section 3.5.

3.5 Final Scheme Proposal

A 30-year, Biodiversity Accounting Management and Monitoring plan will be produced for the final scheme. This will set out an adaptive management approach for fulfilling the biodiversity targets of the scheme, together with a timeframe for delivery, a monitoring strategy, the person responsible for delivery, the biodiversity metric calculations and all other relevant information that will be necessary to ensure the Local Planning Authority can make an informed decision on the proposed scheme.

All costs including landowner fees, monitoring and contingency will be prepared ready for trade, and all delivery legal agreements (see Section 4 below) prepared with the landowner and proposed developer to completion once the proposals have outline sign off.

4 OFFSET SITE DELIVERY

This section outlines the process by which an offset agreement will be secured on identification of a suitable offset scheme. Environment Bank provides independent oversight an offset scheme from establishment, through to delivery in Year 30. This enables continuity of management objectives, legal undertakings and landowner relationships. The following section outlines how Environment Bank administers offset schemes to ensure their long-term delivery.

4.1 Delivery Agreements

A Conservation Credit Purchase Agreement (CCPA) is used to undertake a secure transfer of all funds sufficient to finance the proposed offset for the 30-year scheme period. The CCPA is a bilateral undertaking which ensures that the management actions set out in the scheme are implemented in return for the release of finance from the developer.

In parallel, the offset landowner will enter into a Conservation Bank Agreement (CBA) with Environment Bank to secure management compliance and offset scheme delivery. Environment Bank will oversee the biodiversity enhancement and management of the site for a period of 30 years from commencement and where required uphold the terms of the agreement. The CBA can provide for the relevant LPA to be a party and have an oversight role, should the particular circumstances require it.

At the time the offset is approved, exchange of legal contracts ensures a credit purchase is made by the Applicant and that long-term management of the offset is ensured. Once payment has been received, the offset will commence and the Applicant will be provided with proof of purchase in the form of a letter of sale and Conservation Credit Certificate, which can be provided to the LPA to confirm discharge of the biodiversity offsetting obligation. Funds will be held within a designated offset account and paid to the landowner in annual instalments. As per the agreements, Environment Bank will oversee and monitor the offset scheme and provide reporting on progress back to the LPA.

Conservation Bank Agreement (CBA)

The CBA is the contract between Environment Bank and the landowner managing the offset site. It signs up the landowner to the long-term, approved, management plan and contains clauses regarding payments, delivery and a restriction that is placed on the title of the land.

Clauses in the CBA will cover:

- A requirement to complete management on site, as per the approved management plan in return for annual payment.
- A title restriction to ensure any subsequent landowners take on management of the site and receive the appropriate payments to do so.

- The process if the contract is breached and management is not taking place, including as a last resort, reclaiming payments to fund a replacement offset.
- A monitoring plan to regularly review management works undertaken on site and periodic site assessment to review ecological condition.

4.2 Payment to offset providers

A payment plan to the landowner, outlining capital and annual management payments and any contingency funds, is also attached to the CBA. Environment Bank agrees the payment plan with the landowner prior to scheme commencement and is dependent on the habitat type and management involved.

Funds held by Environment Bank are ring-fenced for the specific offsetting scheme. This money is held in a designated client account and is not used for any other purpose, so it is secured for the long-term. To ensure transparency of the funds, the landowner can, at any stage, request to see the account balance to certify

Payments are linked to the fulfilment of a completed annual management review with evidence to demonstrate that the necessary works have been fulfilled. Payment are subject to review and payments released on annually according to the agreed payment schedule. Payments can be withheld in cases of non-compliance with the management plan , landowners will be expected to provide an annual report of their site's progress and completed works, accompanied by evidence as appropriate. Environment Bank will also conduct site visits to ensure work is being undertaken and that target habitat outcomes are being achieved.

4.3 Monitoring and reporting

Periodic monitoring of the scheme by Environment Bank will be undertaken to confirm appropriate management of the habitat parcels, facilitate reporting of potential issues and assess biodiversity progress at the site. This information will be used to review the potential need for amendment to the management plan for the site to addres changes in site environmental conditions and management resposnes. Receipt of successful monitoring outcomes will be required to proceed with annual payment.

Site assessments

Site assessments are typically carried out in year 2, 5, 10 and every 5 years thereafter unless non-standard assessment is required in response to issues raised within the monitoring form. A site assessment will be completed on site to inspect works undertaken, the progress of habitat establishment and biodiversity targets generated from site management together with a review of general site condition.

Access to the site is for the monitoring survey to be undertaken as per the terms of the Conservation Bank Agreement (see above). Site Assessments may be undertaken by suitably qualified ecologists within Environment Bank or an approve third party.

Annual Management Review

Desk based monitoring of the site(s) will be in the form of phone conversations to help maintain land manager engagement and understanding of the aims and required works together with monitoring forms to record what works have been undertaken.

Typical acceptable evidence information required may include time-stamped site photographs, stocking records, contractor invoices or other receipts. Payments may be withheld subject to insufficient evidence of works. Site visits will also be undertaken if deemed necessary on receipt of the monitoring form and evidence or in response to queries raised by the land manager.

Reporting

Following each monitoring visit Environment Bank will produce a report for submission to the LPA which will provide periodic feedback on the offset project to date.

The report will directly comment and refer to the progress of the project against the agreed management plan, and report if ecological objectives are being reached.

Any tweaks to the management to help maximise biodiversity on site will be clearly justified and outlined within these reports so the LPA is fully aware of how the project is progressing over the long-term.

5 CONCLUSION AND NEXT STEPS

This report outlines the process Environment Bank have previously used to secure offset sites across the country. It also identifies that a number of suitable sites are already being explored within close proximity to the development and therefore should provide confidence that a suitable offset can be delivered.

The next steps in the process are as follows:

- Offset schemes are usually secured through section 106 agreement or pre-commencement planning conditions. The details of which are presented to the LPA to discharge these obligations giving the LPA sufficient opportunity to review, scrutinise and reject unsuitable offset schemes.
- Once a section 106 or condition is in place Environment Bank will commence the process described within this document upon instruction.
- All of this work should be completed including all legal agreements being signed prior to final condition sign off ensuring that works can commence immediately upon approval of planning conditions and potentially prior to discharge of reserved matters.

6 REFERENCES

Biodiversity Action Plan: Forward to 2020 for Buckinghamshire and Milton Keynes (Buckinghamshire and Milton Keynes Natural Environment Partnership) Available at: https://bucksmknep.co.uk/projects/forward-to-2020-biodiversity-action/

BUKSMKNEP (2019): Biodiversity Opportunity Areas – Buckinghamshire and Milton Keynes

British Standards Institute (2013). BSO Standards Publication: BS 42020:2013: *Biodiversity — Code of practice for planning and development.*

Department for Communities and Local Government (DCLG) (2012), National Planning Policy Framework (NPPF).

Department for Environment, Food and Rural Affairs (DEFRA) (2012), Technical Paper: *Proposed Metric for the Biodiversity Offsetting Pilot in England*.

Ecosystem Markets Task Force (2013). Realising nature's value: *The final report of the Ecosystem Markets Task Force.*

HM Government (2006). Natural Environment and Rural Communities (NERC) Act.

HM Government (2011). Natural Environment White Paper: *The Natural Choice: securing the value of nature.*

HM Government (2014). Planning Portal*: Planning Practice Guidance for the Natural Environment*

Natural England (2010). Higher Level Stewardship Farm Environment Plan (FEP) Manual: *Technical guidance on the completion of the FEP and identification, condition assessment and recording of HLS FEP features*.

APPENDIX A – CASE STUDIES

Environment Bank

Environment Bank was established in 2006 to bring the concept of biodiversity offsetting and biodiversity net gain to the UK and we are the leading business specialising in biodiversity accounting, use of metrics, offset brokerage and establishing habitat banks to generate conservation credits.

As independent brokers we work closely with a variety of stakeholders to assess development demand and design, contract, deliver, monitor and report on biodiversity status of our offset sites.

Environment Bank have secured and continue to monitor and report on a number of offset sites across the country in a variety of local authority areas. A small number of case studies have been provided below.

A. STRATFORD, WARWICKSHIRE

- *Development: 240 dwellings + sports facilities, 13 ha, 10.6 biodiversity loss*
- *Offset: 2.4 ha, priority grassland target, 6 km of development, 14.7 biodiversity compensation*

A residential and sports facility development, upon predominantly agricultural land, had very limited space within the development to achieve any on-site compensation measures. Although the habitat value of the site was low, due to the scale of loss the planning authority requested a biodiversity impact assessment and a net biodiversity loss of 10.61 units was assessed and agreed with the developer and their consultant ecologists. The requirement for compensation to be secured prior to commencement of development was included as an obligation within the s106 agreement.

Environment Bank were then contacted to undertake a search for an appropriate site. Environment Bank worked with the landowner to identify an area of land at the right scale to meet the requirement, which would deliver the best biodiversity opportunities whilst having a minimal impact to the farm business. A 2.4 ha parcel of organic land used for silage production was selected within an area identified as strategic for grassland connectivity by Warwickshire County Council.

The site was within 6 km of the development, within an area identified as strategic for grassland restoration projects and within the same Local Authority. A 30-year management plan was developed with the landowner, whereby the flora of the grassland would be enhanced and managed as a tradition, species-rich hay meadow with rough margins. The developer discharged any ongoing obligations via one payment, to cover management,

monitoring and brokerage for 30 years – the first instalments has already been paid by Environment Bank to the landowner, who has begun site management with sward enhancement works.

B. Vale of White Horse, Oxfordshire

- *Development: 3.7 ha, c. 100 dwellings, -14.6 biodiversity loss*
- *Offset: 2.1 ha, priority grassland target, 18.3 biodiversity compensation*

A local authority in Oxfordshire contacted Environment Bank to apply the metric to assess the impacts and determine biodiversity compensation scheme requirements for a housing development in the Vale of White Horse. The developer agreed to pursue use of the biodiversity offsetting as a way to deliver any residual off-site compensation and secure No Net Loss to biodiversity.

The development was was host to species-poor semi-improved habitat. Environment Bank applied the Government metric to the information available in the developer's Ecological reports and determined a biodiversity impact of 14.6 biodiversity units.

A nearby site, owned by a nature conservation organisation where poor condition calcareous grassland can be brought up to good condition over 15 years was put forward; a cost for long-term delivery was prepared accepted by the LPA and developer.

Using s106 obligations, the LPA secured the developer's commitment to fulfil the compensation requirement prior to commencement of development. Shortly after permission was granted the purchase was made, and compensation site secured, using Environment Bank's legal agreements.

Although the local authority had the opportunity to also be signatory to the landowner agreement, they trusted Environment Bank's model of delivery and decided this was not required. Based on the payment plan within the agreement, Environment Bank has been providing annual management funds to the scheme, on receipt of satisfactory monitoring. The scheme is now in its 4th year and monitoring has already shown a marked increase in diversity and abundance of target flora on site, which, among other benefits, has led to the new record of the rare Liquorice Piercer moth (*Grapholita pallifrontana*).

AB10(b): Correspondence from Environment Bank 12 November 2019

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From: Louise Martland [mailto:lmartland@environmentbank.com]
Sent: 12 November 2019 14:09
To: Rachel Lewis
Cc: Rob Wreglesworth; Bexs Benmayor; Dan Walker
Subject: RE: Defra Metric

Hi Rachel

Thanks for the chat just now.
Attached is a fee proposal for the offset incl. 10% net gain as requested.

As discussed, I'd be happy to speak/meet with you and the client to discuss next steps and process if that'd be helpful.
This can include staging offset preparation to work along side reporting as part of the planning process.

As to your previous query with regard to the calculator. The calculator is still in Beta test mode. It was flashing errors when you had Lowland Meadow in there as it is currently set up to discourage impact of this habitat, and so the summaries do not work. As you have seen this is a problem which will be fixed in due course and we have previously reported this to NE. In this instance what you have done is fine as it creates no honest trading conflicts and the compensation requirement for each habitat can be easily calculated. I'd just make clear to the LPA what you have done, and in future editions of the calculator you should refrain from lowering distinctiveness of habitats.

Best wishes

Louise

Louise Martland
Conservation Director
Environment Bank
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The Environment Bank

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AB10(c): Quotations from the Environment Bank 14 July 2020

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Dan Carter
Aspect Ecology Ltd
Hardwick Business Park
Noral Way
Banbury
Oxfordshire
OX16 2AF

(by email to dan.walker@aspect-ecology.com)

14-Jul-20

Ref: EB03199-A-RevD1

Revised Quote for a biodiversity compensation scheme for development at Caldecotte, Milton Keynes

Dear Dan,

Please find attached a revised all-in-one quote for the above development proposal. This quote is based on the assumption of delivering a biodiversity compensation requirement of -167.00 biodiversity units (BU) for habitats, -4.17 BU for hedgerows and -3.75 BU for rivers and streams features, reflecting the biodiversity metric received on 9th July 2020.

It is understood that the offset is to compensate for development impact to, predominantly, semi-improved grassland but there is also loss on 0.44 units of orchard, 1.11 units of non-priority pond and 15.83 units of unimproved grassland (lowland meadow). It is recommended that an offset, with a focus of grassland enhancement, is sought within the Milton Keynes authority area.

For the purchase cost of 167.00 biodiversity units (Habitats), 4.17 BU of hedgerows and -3.75 BU of river and stream features: £1,680,000 + VAT
(inclusive of all fees)

The sum above will include the following:

- A biodiversity offset scheme adhering to local standards of delivery,
- Liaison with local planning authority on offset approval,
- Ecological assessment of the offset site,
- Negotiations with the offset landowner,
- Preparation of legal agreements for long-term offset delivery,
- A 30 year* costed management and monitoring plan; and,
- Monitoring and oversight of the offset site over 30 years* with reporting to the LPA.

*Recommended delivery period by Natural England.

Provisional target for offset receptor site:

- To include a range of habitats but with a primary target to achieve 21.05 BU (15.83 BU + 33% increase*) of lowland meadow restoration or, where restoration opportunities are not available, the creation of species-rich neutral grassland,
- Generate 167.00 biodiversity units for habitats, 4.17 BU of hedgerows and 3.75 BU of river and stream features,
- To be managed for a minimum 30-year period,
- Within the local authority and in a location to contribute to landscape connectivity, utilising the local strategy, where available.

* 33% increase based on local authority recommendations.

By accepting this fee proposal you agree to Environment Bank's terms and conditions (see attached). The quote is valid for 90 days from the date of this letter.

10% of the fee will be invoiced upon commencement of the work, with the remainder due upon offset approval by the local planning authority.

Any queries please do not hesitate to contact us.

Yours sincerely,

Richard Wheat ACIEEM

Biodiversity Project Officer

Environment Bank

e: rwheat@environmentbank.com

m: 07395 820960

THE ENVIRONMENT BANK LTD
STANDARD TERMS AND CONDITIONS FOR ENVIRONMENTAL SERVICES

1. DUTIES

Duties under this contract by The Environment Bank Ltd (EBL) will be provided for the client strictly as laid out in the proposal or brief, including fees, and disbursements as itemised below. All terms and conditions as laid out in the following Articles are pertinent to this project and commissioning of EBL to undertake the work as laid out in the brief automatically requires the adoption of EBL's terms and conditions as laid out here.

2. PAYMENT

Invoices are due and payable upon receipt, Interest at the rate of 3% per month is due on all payments not paid on or before the 45th day after the invoice date. Interest shall be computed from the date of the invoice. In the event legal proceedings are necessary to collect payments not paid when due, CLIENT shall pay, in addition to such payments, EBL's reasonable solicitor's fees and legal costs associated therewith, including EBL's fees for document preparation based on our standard charge out rates. In addition, EBL may, after giving 7 days written notice to the CLIENT, suspend services under this AGREEMENT until EBL has been paid in full all amounts due for services, expenses and charges. The contract value shall be increased accordingly by the amount of EBL's reasonable costs of shutdown, delay and start up.

If CLIENT disputes any portion of a request for payment CLIENT shall pay the undisputed portion of such request as provided herein and shall promptly notify EBL of the amount in dispute and the reason therefore. Any portion of the disputed amount which is ultimately agreed upon by the CLIENT and EBL, to be owed to EBL, shall accrue interest at the rate and commencing upon the date stipulated in this Article.

3. INTERPRETATION

This AGREEMENT, together with any exhibits attached hereto, and all documents, drawings, specifications and instruments specifically referred to herein and made a part thereof shall constitute the entire AGREEMENT between the parties, and no other proposals, conversations, bids, memoranda, or other matter shall vary, alter, or interpret the terms thereof.

Failure of either party to exercise any option, right or privilege under this AGREEMENT or to demand compliance as to any obligation or covenant of the other party shall not constitute a waiver of any such right, privilege or option, or of the performance thereof, unless waiver is expressly required in such event or is evidenced by a properly executed instrument.

4. SEVERABILITY

It is understood and agreed by the parties hereto that if any part, term or provision of this AGREEMENT is held illegal or in conflict with any law of the Country or State where made or having jurisdiction over any of the parties hereto, validity if the remaining portions or provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the AGREEMENT did not contain the particular part, term or provisions held to be invalid.

5. GOVERNING LAW/FORUM

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7. WARRANTY

EBL warrants that all the services to be rendered pursuant to this AGREEMENT shall be performed in accordance with the standards customarily provided by an experienced and competent professional scientific organisation rendering the same or similar services. EBL shall perform any of said services which were not performed in accordance with this standard provided that EBL is notified in writing of the non-conformity within 180 days after the completion of the non-conforming service. EBL will perform the remedial services at cost as provided in the AGREEMENT, but without a fee.

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EBL shall place and maintain with responsibility insurance carriers the following insurance. At CLIENT's request, EBL shall deliver to CLIENT, certificates of insurance which shall provide thirty (30) days notice given to CLIENT in the event of a cancellation. EBL's total liability in respect of any breach of contract or breach of duty, fault, negligence or otherwise whatsoever arising out of, or in connection with, the engagement, shall be limited to £500,000 to cover claims of any sort whatsoever made by the client (including interest and cost) arising out of or in connection with any engagement. This provision shall have no application for any liability for death or personal injury or any other liability which EBL is prohibited by law from excluding or restricting.

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10. CLIENT FURNISHED DATA, DRAWINGS AND SPECIFICATIONS

EBL shall have no liability for defects in the WORK attributable to EBL's reliance upon the use of data, design criteria, drawings, specifications or other information furnished by CLIENT and CLIENT agrees to indemnify and hold EBL harmless from any and all claims and judgments, and all losses, costs and expenses arising therefrom. EBL shall disclose to CLIENT, prior to use thereof, defects or omissions in the data, design criteria, drawings specifications or other information furnished by CLIENT to EBL that EBL may reasonably discover in its review and inspection thereof.

11. REUSE OF DOCUMENTS

All documents including drawings and specifications prepared by EBL pursuant to this AGREEMENT are instruments of his services in respect of the PROJECT. They are not intended or presented to be suitable for reuse by CLIENT or others on extension of the PROJECT or any other project. Any reuse without specific written verification or adaptation by EBL will be at CLIENT's sole risk and within liability or legal exposure to EBL, and CLIENT shall indemnify and hold harmless EBL from all claims, damages, losses and expenses including solicitor's fees arising out of or resulting therefrom. Any such verification or adaptation will entitle EBL to further compensation at rates to be agreed upon by CLIENT and EBL.

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2. The Report shall not constitute a warranty, guarantee, or representation of the absolute absence of e.g. protected species following surveys, but shall be based on best available information. This also relates to interpretation of data. EBL shall use all reasonable means to interpret data correctly and independently, to undertake ecological impact assessment, habitat design and creation and all such works etc., based on best available techniques, methods and practices.

3. EBL shall evaluate the reasonableness and completeness of all relevant information, but EBL shall assume no responsibility for the truth or accuracy of any information provided to EBL by others or for lack of information that is intentionally or negligently withheld from EBL by others.

4. After termination of the AGREEMENT, if EBL obtains information that it believes warrants further exploration and development, EBL will endeavour to provide it to the CLIENT, but EBL will not be liable for doing so.

5. In acceptance of these terms CLIENT shall accept that the maximum professional liability of EBL shall be £500,000 inclusive in the aggregate (not each and every or any one claim).

6. The Report shall contain the following or a substantially similar "Notice to interested Parties" or if not stated in the Report shall be deemed to have been so stated as per these terms and conditions:

"To achieve the study objectives stated in this report, we were required to base our conclusions on the best information available during the period of the investigation and within the limits prescribed by our client in the agreement. Where information is provided by others, EBL shall bear no liability in respect of any advice given on the basis of that information".

"No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information. Thus, we cannot guarantee that the investigations (date, work, interpretation of that data or work) completely defined the degree or extent of eg. species abundances, habitat management efficacy, conservation credit calculations and hence credit requirements, described in the report. Nor does EBL accept any liability for any decisions made by the CLIENT on the basis of the information, consultancy or advice provided by EBL".

7. Should a prepared compensation SCHEME be withdrawn by the SCHEME provider for reasons outside of EBL's control, the client will be required to pay, as a minimum, the costs specified under the accepted fee proposal and carried out to date. To secure a replacement SCHEME the CLIENT will be required to agree to payment of further work as necessary to prepare the replacement SCHEME. This will be discussed with the CLIENT prior to commencement of works.

8. If EBL is made a party to any action instituted by CLIENT against third party or by a third party against CLIENT arising out of or resulting from the occurrence or non-occurrence of any transaction concerning any Premises subject to the consultant's services hereunder, or otherwise, CLIENT shall be at its cost and at EBL's option defend EBL therefrom and further, except to the extent EBL is found separately liable for it's sole negligence or willful misconduct, indemnity and hold EBL harmless from any judgment rendered in connection therewith and all cost and expenses (including reasonable attorney's fees) incurred by EBL in connection with such action.

   In addition, CLIENT shall reimburse EBL costs, including but not limited to hourly fees for EBL expert, technical or other testimony and related travel, preparation and copying costs, required of EBL by CLIENT or by other third parties in any action instituted by CLIENT or a third party involving EBL services provided hereunder, but not involving EBL as a party to such action. "Third Party" shall include government organisations as well as private parties.

DISBURSEMENTS

The following disbursements apply:

Mileage	65 pence per mile
Subsistence	£110 overnight (or actual cost)
Travel	All other travel at cost
Materials/equipment	At cost plus 10%
Copy charges	10 pence per B&W A4 copy; £2 per colour A4 copy; £5 per colour A3 copy
Fax	£1 per A4 sheet
Reports	£15/25 per copy (depending on size) including covers, binding and bound-up
Literature searches	£120
Tel/fax/copying etc	A single charge of 3.95% of fees may be made to cover the costs of these items

EBL August 2019

Dan Carter
Aspect Ecology Ltd
Hardwick Business Park
Noral Way
Banbury
Oxfordshire
OX16 2AF

(by email to dan.walker@aspect-ecology.com)

14-Jul-20

Ref: EB03199-A-RevD2

Revised Quote for a biodiversity compensation scheme for development at Caldecotte, Milton Keynes

Dear Dan,

Please find attached a revised all-in-one quote for the above development proposal. This quote is based on the assumption of delivering a 10% net gain in biodiversity over the existing compensation requirement of -167 biodiversity units (BU) for habitats, -4.17 BU for hedgerows and -3.75 BU for rivers and stream feature, as set out in the biodiversity metric received on 9th July 2020. The revised figure is calculated based on 10% of the gross impact (impact prior to compensation), therefore requiring a total of 188.08 BU of habitats, 6.53 BU of hedgerows and 6.25 BU of rivers and stream features to secure a minimum 10% biodiversity net gain overall.

It is understood that the offset is to compensate for development impact to, predominantly, semi-improved grassland but there is also loss on 0.44 units of orchard, 1.11 units of non-priority pond and 15.83 units of unimproved neutral grassland (lowland meadow). It is recommended that an offset, with a focus of grassland enhancement, is sought within the Milton Keynes authority area.

For the purchase cost of 188.08 biodiversity units (Habitats), 6.53 BU of hedgerows and 6.25 BU of river and stream features: £1,885,000 + VAT
(inclusive of all fees)

The sum above will include the following:

- A biodiversity offset scheme adhering to local standards of delivery,
- Liaison with local planning authority on offset approval,
- Ecological assessment of the offset site,
- Negotiations with the offset landowner,
- Preparation of legal agreements for long-term offset delivery,
- A 30 year* costed management and monitoring plan; and
- Monitoring and oversight of the offset site over 30 years* with reporting to the LPA.

*Recommended delivery period by Natural England.

Provisional target for offset receptor site:

- To include a range of habitats but with a primary target to achieve 21.05 BU (15.83 BU + 33% increase*) of lowland meadow restoration or, where restoration opportunities are not available, the creation of species-rich neutral grassland,
- Generate a minimum 188.08 biodiversity units for habitats, 6.53 BU of hedgerows and 6.25 BU of river and stream features (inclusive of 10% biodiversity net gain overall),
- To be managed for a minimum 30-year period,
- Within the local authority and in a location to contribute to landscape connectivity, utilising the local strategy, where available.

* 33% increase based on local authority recommendations.

By accepting this fee proposal you agree to Environment Bank's terms and conditions (see attached). The quote is valid for 90 days from the date of this letter.

10% of the fee will be invoiced upon commencement of the work, with the remainder due upon offset approval by the local planning authority.

Any queries please do not hesitate to contact us.

Yours sincerely,

Richard Wheat ACIEEM

Biodiversity Project Officer

Environment Bank

e: rwheat@environmentbank.com

m: 07395 820960

THE ENVIRONMENT BANK LTD
STANDARD TERMS AND CONDITIONS FOR ENVIRONMENTAL SERVICES

1. DUTIES

Duties under this contract by The Environment Bank Ltd (EBL) will be provided for the client strictly as laid out in the proposal or brief, including fees, and disbursements as itemised below. All terms and conditions as laid out in the following Articles are pertinent to this project and commissioning of EBL to undertake the work as laid out in the brief automatically requires the adoption of EBL's terms and conditions as laid out here.

2. PAYMENT

Invoices are due and payable upon receipt, Interest at the rate of 3% per month is due on all payments not paid on or before the 45th day after the invoice date. Interest shall be computed from the date of the invoice. In the event legal proceedings are necessary to collect payments not paid when due, CLIENT shall pay, in addition to such payments, EBL's reasonable solicitor's fees and legal costs associated therewith, including EBL's fees for document preparation based on our standard charge out rates. In addition, EBL may, after giving 7 days written notice to the CLIENT, suspend services under this AGREEMENT until EBL has been paid in full all amounts due for services, expenses and charges. The contract value shall be increased accordingly by the amount of EBL's reasonable costs of shutdown, delay and start up.

If CLIENT disputes any portion of a request for payment CLIENT shall pay the undisputed portion of such request as provided herein and shall promptly notify EBL of the amount in dispute and the reason therefore. Any portion of the disputed amount which is ultimately agreed upon by the CLIENT and EBL, to be owed to EBL, shall accrue interest at the rate and commencing upon the date stipulated in this Article.

3. INTERPRETATION

This AGREEMENT, together with any exhibits attached hereto, and all documents, drawings, specifications and instruments specifically referred to herein and made a part thereof shall constitute the entire AGREEMENT between the parties, and no other proposals, conversations, bids, memoranda, or other matter shall vary, alter, or interpret the terms thereof.

Failure of either party to exercise any option, right or privilege under this AGREEMENT or to demand compliance as to any obligation or covenant of the other party shall not constitute a waiver of any such right, privilege or option, or of the performance thereof, unless waiver is expressly required in such event or is evidenced by a properly executed instrument.

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Tel/fax/copying etc	A single charge of 3.95% of fees may be made to cover the costs of these items

EBL August 2019

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Appendix 5263/AB11:

AB11(a): Milton Keynes draft SPD: Biodiversity

AB11(b): NEP Model SPD: Biodiversity Accounting

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AB11(a): Milton Keynes draft SPD: Biodiversity

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Biodiversity: Supplementary Planning Document

milton keynes council

Contents

Part 1: Biodiversity Accounting Supplementary Planning Document

1 Executive Summary

1.1 This Supplementary Planning Document (SPD) expands upon policies of the Milton Keynes Local Plan- Plan:MK.

1.2 It provides developers with a clear "plain English" step-by-step guide for working with protected and priority species and habitats which are likely to be impacted upon by their proposed developments. The SPD details the Council's requirements for applicants to build nature conservation features into developments, ensuring that a measurable net-gain to the districts biodiversity is achieved in accordance with Plan:MK and national planning policies.

1.3 This SPD highlights the importance that applicants protect and enhance existing nature conversation features within proposed developments, following best practice guidance and the mitigation hierarchy. On occasions where it is not possible the SPD details what the Council requires a developer to consider when incorporating ecological compensation (including Biodiversity Offsets) within their development scheme.

1.4 Biodiversity should not be seen as a hindrance to development rather as a way to add value to a well-conceived design. The SPD also provides developers with a list of useful links and contacts where further information on all the issues discussed can be found.

2 Introduction

2.1 Biodiversity can be simply defined as the 'variety of life on earth'. This Supplementary Planning Document (SPD) forms part of the Plan:MK and expands on policies that ensure biodiversity is adequately protected and enhanced throughout the development process. The SPD provides additional information on how these policies will be implemented and provides guidance on biodiversity and nature conservation for development applicants concerned with the conservation of biodiversity in development.

2.2 Buckinghamshire supports a diversity of habitats and species. Much of it may look green and pleasant, but compared with other English counties it is not well served in terms of its biodiversity resources. Buckinghamshire in fact has a very low percentage area of land designated as Sites of Special Scientific Interest (SSSI). SSSI's only account for 1.4% of Buckinghamshire, compared to a national figure of 7.7% (England). Even Greater London has a higher proportion of land designated as SSSI at 2.4%. A recent national

report by Plantlife entitled "Our Vanishing Flora" ranked Buckinghamshire and Milton Keynes 39th out of 52 counties in terms of the rate of plant extinctions. For these and other reasons planning and development needs to protect, and enhance biodiversity.

2.3 Milton Keynes City itself has its vision to be ' (…) *the world's greenest and most sustainable city* (…) according to MK Sustainability Strategy 2019-2050 with one of the priorities for action being to encourage biodiversity by working with the landowners.[1]

2.4 The aim of this guidance is to provide step-by-step advice throughout the planning process and to supplement the policies within the Environment, Biodiversity and Geodiversity chapter of the current Milton Keynes Local Plan- Plan:MK.

2.5 This document explains what Milton Keynes Council expects to be considered with any planning application and the detailed information that needs to be submitted. Other SPD's[2] to be consulted in relation to biodiversity conservation in Milton Keynes include:

Sustainable Construction

3 Legislation & Policy Context

3.1 There is a wide variety of legislation and policy provision relating to biodiversity conservation ranging from international to local level. The key legislation, policies and strategies includes:

- **The Conservation (Natural Habitats etc.) Regulations 1994 (as amended 2010)**;
- **The Wildlife and Countryside Act 1981 (as amended 2010);** the principal act relating to the protection of wildlife in Great Britain.
- **The Protection of Badgers Act 1992**
- **Natural Environment And Rural Communities Act 2006 –** Milton Keynes Council must, in exercising its functions, have regard, so far as is consistent with the proper exercise of its functions, to the purpose of conserving biodiversity.
- **BS 42020:2013 - Biodiversity** – Code of Practice for planning and development
- **The Countryside and Rights of Way Act 2000**
- **National Parks and Access to the Countryside Act 1949**
- **The Environment Act 1990**
- **The Hedgerow Regulations 1997**
- **The National Planning Policy Framework 2019 -** Conserving and enhancing the natural environment
  Paragraph 170: 'Planning policies and decisions should contribute to and enhance the natural and local environment by: (…)
  d) minimising impacts on and providing net gains for biodiversity (…).
  Paragraph 174 says that 'To protect and enhance biodiversity and geodiversity, plans should :(…)

[1] (https://www.milton-keynes.gov.uk/environmental-health-and-trading-standards/mk-low-carbon-living/the-2019-2050-sustainability-strategy).

[2] Currently there are 5 planning obligation SPD's which will soon be replaced by one main Planning Obligation SPD.

b) (…) identify and pursue opportunities for securing measurable net gains for biodiversity (…)'.

- **Governments Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services**
- **Government circular 06/2005**
- **UK Biodiversity Action Plan**
- **Buckinghamshire & Milton Keynes Local Nature Partnership** Biodiversity Opportunity Areas and Biodiversity Action Plan

3.2 Nature conservation is regarded as a key test of sustainable development. The local planning process addresses this duty by the inclusion of a number of nature conservation polices in local planning documents. These include:

- Policy NE1: Protection of sites
- Policy NE2: Protected species and priority species and habitats
- Policy NE3: Biodiversity and geological enhancement
- Policy NE4: Green infrastructure
- Policy NE5: Conserving and enhancing landscape character
- Policy NE6: Environmental pollution

3.3 Other policies within the Plan:MK that set principles for a new development and consider biodiversity net gain through the use of connected green infrastructure include:

- Policy SD1: Place-making principles for development
- Policy CT8: Grid road network

4 The Importance of Biodiversity within Development

4.1 Any development has the potential to impact (both negatively and positively) on local biodiversity through its effects on nature conservation features. Biodiversity is the genetic diversity within species, species diversity within ecosystems, and ecosystem diversity across landscapes. Furthermore, the services provided by healthy ecosystems indirectly benefit humans by, for example, purifying air and water, regulating climate, generating atmospheric oxygen and providing recreational opportunities.

4.2 Within this document the term "Natural environment" refers to: *Plants, wild animals and other living organisms, their habitats, land (except buildings and other structures, air and water the natural systems, cycles and processes through which they interact.*

4.3 The natural environment can be defined as having a dual function of contributing to local biodiversity and providing opportunities for people to experience and benefit from them. The benefits to local people provided by can be far ranging. They include valuable ecosystem services such as mitigating the damaging effects of air pollution and climate change, as well as aesthetic and amenity benefits.

4.4 Developments have the potential to impact upon the natural environment both within the boundaries of the development as well sites adjacent and in certain circumstances a

significant distance away. As part of the development process these impacts need to be assessed and (if found to be negative) avoided, mitigated or as a last resort compensated for.

4.5 The natural environment can vary greatly from site to site in both appearance and size. Some features are obvious to identify and the impact of a development upon them equally obvious: the destruction through development of mature gardens or large areas of habitat, the removal of hedgerow, the removal of mature trees, destruction of badger setts within the development area etc. However, other nature conservation features are cryptic and can often be overlooked: bat roost under raised roof tiles and within roof voids, Great Crested Newt breeding pools in water bodies that dry out for part of the year etc.

4.6 Developments which take into account the role and value of biodiversity can support economic diversification and contribute to delivering high quality environments throughout the Borough and therefore improving the quality of life benefits. Policy NE2 of the Plan:MK underlines the importance of protecting species and habitats. It does state that on sites that contains priority species or habitats, development should wherever possible promote their preservation, restoration, expansion and/or re-creation in line with Policy NE3.

4.7 Policy NE3 which addresses the biodiversity and geological enhancement matters requires development proposals to maintain and protect biodiversity and geological resources, and where possible deliver a measurable net gain in biodiversity. The recent NPPF goes further and requires under para 170 for the natural local environment to be protected by minimising impacts on the environment and providing net gains for biodiversity and para 174 speaks about pursuing opportunities for securing measurable net gains for biodiversity. Any future development proposals therefore shall enhance the structure and function of ecological networks and the ecological status of water bodies in accordance with the vision and principles set out by the Buckinghamshire and Milton Keynes Natural Environment Partneships (NEP).

4.8 If significant harm to biodiversity resulting from a development cannot be avoided, adequately mitigated or, as a last resort, compensated for then planning permission should be refused (Policy NE3).

4.9 Milton Keynes supports a variety of wildlife rich priority habitats. These priority habitats include ancient semi-natural woodland and semi-improved grasslands, along with rivers and ponds which support a wide range of flora and fauna including many different mammals, birds, insects and plants.

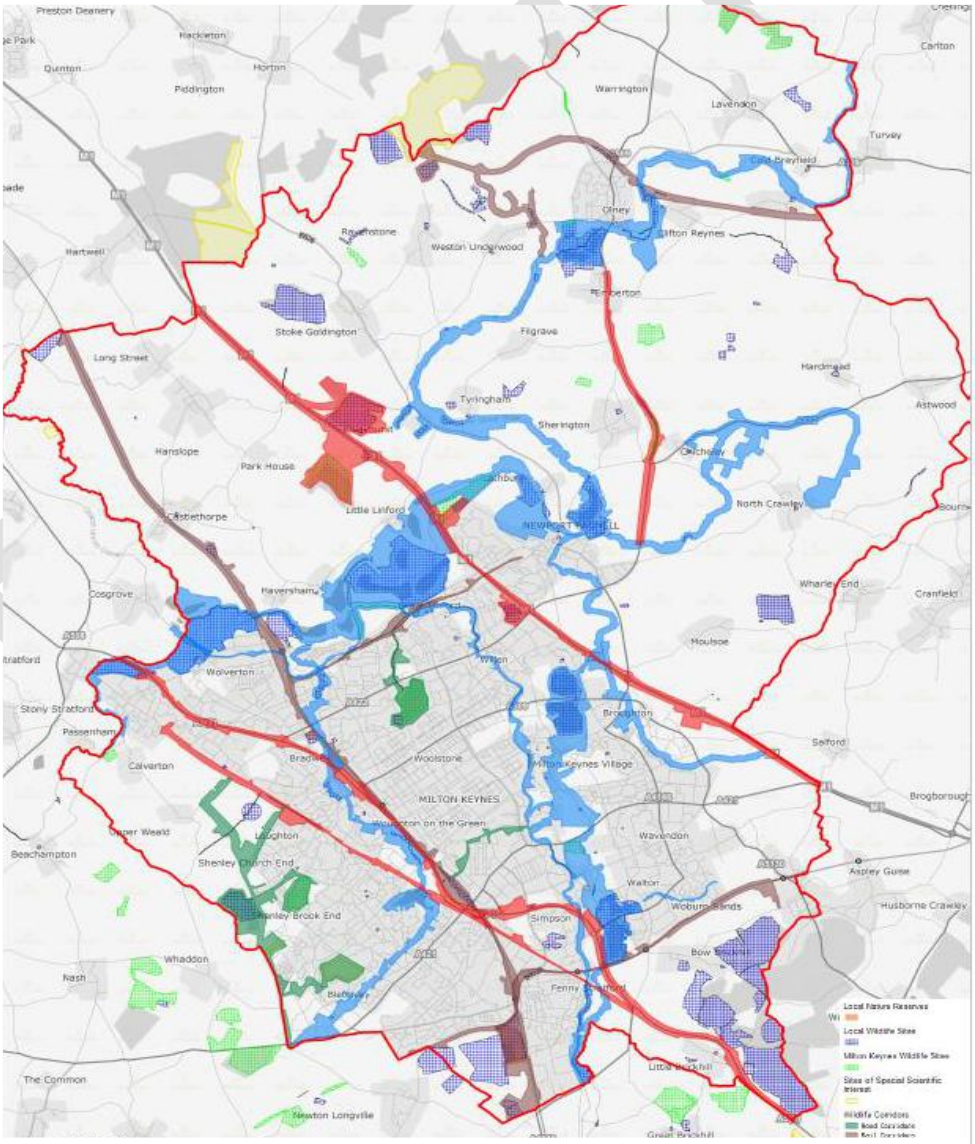
4.10 Legal protection for the natural conservation features varies, but all are protected through the planning system. In Milton Keynes Borough those are: Sites of Specific Scientific Interest, Biodiversity Opportunity Areas, Biological Notifications Sites, Milton Keynes Wildlife Corridors, Milton Keynes Wildlife Sites, Priority Habitats, Priority Species, Irreplaceable Habitats (e.g. Ancient Woodland, veteran Trees), and Local Geological Sites.

4.11 There are currently 3 statutory **Sites of Special Scientific Interest (**SSSI) in the District which can be found in the Local Plan. These sites are considered to be of national importance for nature conservation and are protected from damaging activities. They are designated by Natural England:

- Howe Park Wood
- Oxley Mead
- Yardley Chase

Biodiversity Opportunity Areas (BOAs), Wildlife Corridors and Biological Notification Sites

4.12 Biodiversity Opportunity Areas are the key focus areas for the creation of ecological networks. The creation of Nature Improvement Areas, as proposed by the Natural Environment White Paper, is also a potential way of taking forward ecological networks, working alongside BOAs.



Map 1. Local nature designations

Key

- Local Nature Reserves
- Local Wildlife Sites
- Milton Keynes Wildlife Sites
- Sites of Special Scientific Interest
- Wildlife Corridor - Wood
- Wildlife Corridor - Rail
- Wildlife Corridor - Wet
- Wildlife Corridor - Road

4.13 Throughout the borough, wildlife corridors have been "designed in" to interact and connect to form a network of interconnecting habitats, they also serve to link people and wildlife. The corridors are dynamic and complex allowing different plant and animals to feed reproduce and disperse. The grid road and parkway system is also a component of the wildlife corridor network[3]. Within the network there many types and sizes of corridor, these have been classified into two equally important types:

- **Local Wildlife Corridors**: narrow and localised, generally of a single habitat such as hedgerows.
- **Major Wildlife Corridors:** larger corridors linking urban and rural areas through a variety of semi-native habitats. They may connect wildlife sites and maybe linear parks, disused railways, canal, rivers and larger streams.

Biological Notification Sites (BNS)

4.14 Those are sites within the borough which are important at a county wide level and are presently under review and where appropriate will be subsumed in to the Local Wildlife sites designation.

Milton Keynes Wildlife Sites

4.15 There are 16 and are equivalent of Local Wildlife Sites in other Buckinghamshire districts. These are special places recognised for having high wildlife value or containing rare or threatened habitats and species.

Local Nature Reserve's (LNR's)

4.16 LNR's are statutory protected sites designated under Section 21 of the National Parks and Access to the Countryside Act 1949. A LNR designation demonstrates a commitment by the local authority to manage land for biodiversity, protect it from inappropriate development and provide opportunities for local people to enjoy wildlife. There is currently one LNR within Milton Keynes, the Blue Lagoon LNR.

Priority Habitats and Priority Species

4.17 Priority species and priority habitats are those that have been identified as being the most threatened and requiring conservation action under the UK Biodiversity Action Plan (UK BAP). The priority list is produced by the Joint Nature Conservation Committee (JNCC) and currently contains **1150 species**, and **65 habitats**.

4.18 These priority habitats and species are listed on the Section 41 list of the National Environment and Rural Communities Act 2006 and are considered to be Species of Principle Importance. Additionally, the Buckingham and Milton Keynes Biodiversity Action Plan[4] identify those habitats of importance for the county and include plans for their conservation and management.

[3] Grid road corridors not indicated on Map 1 due to scale

[4] https://bucksmknep.co.uk/projects/forward-to-2020-biodiversity-action/

4.19 A proposed developments impacts on any of these priority habitats, whether within a locally designated site or not (i.e. non-protected sites), it will be a material consideration in the determination of a planning application (Para 175 NPPF).

5 Biodiversity Information & Impact Assessments Required to Support Planning Proposals

5.1 **The Council welcomes pre-application discussions, which are encouraged in national guidance as a means of dealing with any issues at the first stage of a proposed development being considered.** Such discussions may establish the potential impact of a development; helping to outline the scope of surveys and assessments required to support an application. Additionally changes to the proposed design, such as the inclusion of green roofs, rain gardens, and landscape design may increase biodiversity on site illuminating or reducing the need to seek offsetting.

5.2 Where there is potential for a proposed development to cause harm to internationally, nationally or locally designated sites, protected or priority species or habitats, then the applicant shall undertake appropriate surveys and assessment to a nationally recognised standard prior to the submission of a planning proposal (see Natural England Standing advice on protected species survey requirements for more details see Part 2). The information gained from the site survey and assessment should be up-to- and sufficient to allow the impact of the development to be appropriately assessed.

5.3 The likelihood that a nature conservation feature will be affected by development proposals should be established before a planning application is submitted (Policy NE2). For further guidance to assess the likelihood of a nature conservation feature being affected by a development proposal see the Natural England's Standing Advice and Planning Application Validation: Milton Keynes Requirements for Biodiversity (see Part 2).

5.4 Failure to provide accurate information in relation to biodiversity is a reason to refuse the registration of a planning application or will result in its subsequent refusal when considered against policy. The advance planning of ecological works should always be considered early in a project. Some developments may require the collation of ecological data over an extended period of time in order to present the most suitable scheme of mitigation.

5.5 Development proposals in Milton Keynes shouldmaintain and protect biodiversity and should result in a measurable net gain in biodiversity, and if significant harm to biodiversity resulting from a development cannot be avoided, adequately mitigated or, as a last resort, compensated for then planning permission should be refused (Policy NE3, Para 170 and 174 NPPF). The net gains will have to be demonstrated when a planning application is submitted.

6 A Step by Step Guide to Building Biodiversity into Development

6.1 By adopting the approach summarised in **Table 1** below, applications are likely to progress expediently in relation to ecology and will comply with domestic and European legislation and demonstrate best practice. Each stage is expanded in greater detail after the table 1.

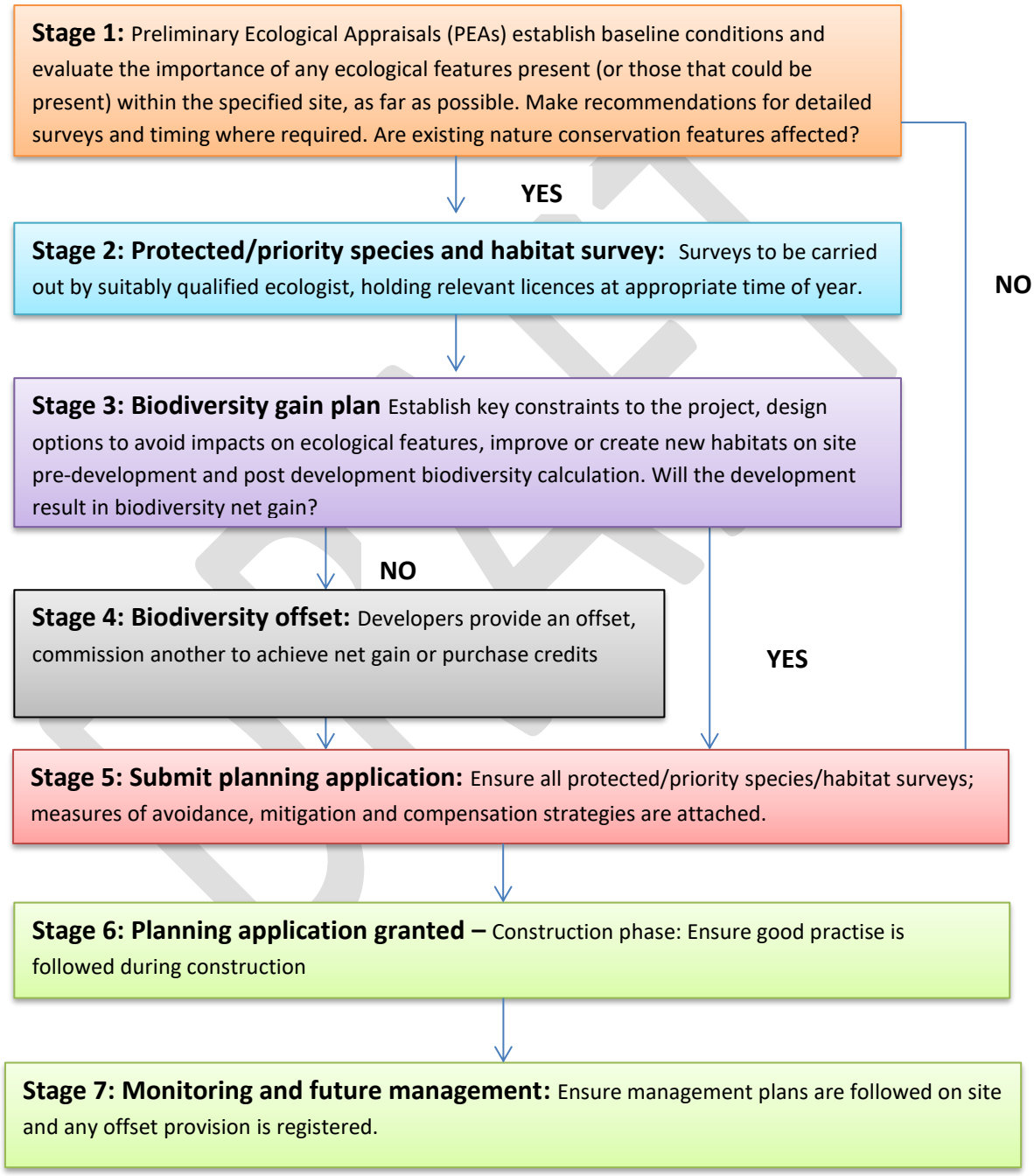


Table 1: Successfully Integrating Biodiversity into Development.

Stage 1: Preparing to submit a planning application

6.2 Planning proposals in Milton Keynes have the potential of having a significant effect on existing nature conservation features. In most cases such damage can be avoided if the threat is established at the earliest stage in the development proposal. The likelihood of a proposed development negatively impacting upon a protected or priority species and/or habitat and/or other nature conservation can be understood by referring to the checklists and flow charts within both Natural England's Standing Advice and the Planning Application Validation: Milton Keynes Requirements for Biodiversity (Part 2).

6.3 If after consulting the aforementioned documents it appears likely that protected/priority species/habitats and/or other nature conservation features may be affected by the proposed development then ecological surveys will be required to be conducted and their results submitted to the authority. Applicants are welcome to contact the council's in house Ecology Team for guidance regarding ecological surveys they may need to conduct prior to submitting an application and the minimum required survey effort.

6.4 Attempts to exclude or remove nature conservation features could constitute a criminal offence and should never be undertaken. Pre-development biodiversity value is that on the date the application is submitted. However, if activities are carried out on the land after 30th January 2020 which would lower the biodiversity value then the pre-development biodiversity value immediately before the activities took place will be taken.[5]

6.5 To encourage and support our ecological networks every development is expected to provide a net-gain to biodiversity.[6] The level of gain will be set by negotiation with the LPA and should form part of pre-app discussions. Developments of 5 or more dwellings or non-residential with a floor space in excess of 1000m^2 must carry out a biodiversity impact assessment (Policy NE3). Policy NE4 requires the network of Green Infrastructure to be protected extended and enhanced for its biodiversity, recreational, accessibility, health and landscape value. This is in accordance with the vision and principles set out in the Milton Keynes Green infrastructure Strategy (2018)[7]

Stage 2: Protected/Priority species and Habitat Surveys

6.6 Applicants are advised to refer to Planning Application Validation: Milton Keynes Requirements for Biodiversity (Part 2), as well as Natural England's Standing Advice for required survey standards Surveys must be carried out by suitably qualified, licensed and experienced ecologists. It is important that planning decisions are based on up-to-date ecological reports and survey data. It is difficult to set a specific timeframe over which reports or survey data should be considered valid, as this will vary in different circumstances. However, surveys older than 18 months are likely to require updating

[5] Draft Environment Bill references 30th January 2020 as a base line

[6] Draft Environment Bill includes a requirement for a mandatory 10% biodiversity net gain which will be required to maintain for 30 years. If the Bill becomes Act of Parliament this will be compulsory

[7] https://www.milton-keynes.gov.uk/planning-and-building/planning-policy/green-infrastructure-strategy

and those 3 years or more will be invalid. If in doubt contact the council's ecology department.

6.7 It is important to note that even should an ecological survey conclude that no protected or priority species are present on the application site, or that the development proposed will not cause habitat loss or have negative effect on biodiversity it is still required that the survey be submitted in full as part of the planning application.

Sharing Data

6.8 Survey data submitted with planning applications should also be provided to the Buckinghamshire and Milton Keynes Biological Records Centre (BMERC[8]) to ensure that knowledge of the sites nature conservation features are not lost.

Stage 3: Biodiversity gain plan

6.9 The plan details the approach to onsite mitigation to minimise adverse effects from the development, details the pre–development biodiversity and the post-development value and how any short fall in the net gain is to be compensated for. The plan should include the proposed management structure and future maintenance regime to ensure sustainability.

Mitigation

6.10 Mitigation consists of measures taken to avoid or reduce negative impacts on species or habitats. Measures may include: locating a development and its working areas and access routes away from areas of high ecological interest, fencing-off sensitive areas during a construction period, or timing works to avoid sensitive periods.

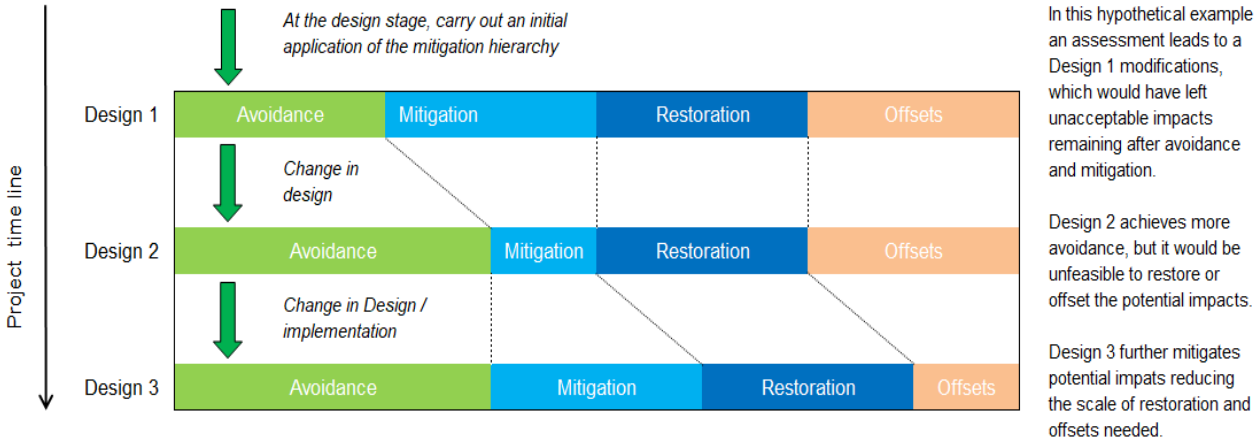


Table 2: Mitigation hierarchy: Successfully Integrating Biodiversity into Development.

[8] erc@buckscc.gov.uk

6.11 Some forms of mitigation may be relatively simple such as avoiding the bird breeding season whilst undertaking vegetation clearance. Other requirements such as those associated with avoiding harm to bats during building works at a known bat roost may be more complex. Such works may require the input of a licensed ecologist to oversee the work.

6.12 The findings of ecological surveys should be taken into careful consideration at the earliest design stage of a development. Possible conflicts can be addressed by having the information available at the right stage and by taking an imaginative approach to site design to avoid harm, informed by advice from an ecologist as part of the design team. The objective should be to mitigate potentially negative impacts and integrate existing biodiversity into the scheme. Impacts on existing nature conservation features should be avoided wherever possible and any residual impacts should be minimised.

6.13 In assessing the potential impact of a proposal on biodiversity, applicants should ensure that all stages of the development are considered. Frequently the disturbed area of the development site during construction is greater than that normally shown on application drawings. Impacts may also extend beyond the site boundary long after construction has completed, for example due to shading, increased light pollution or predation by domestic pets. Damaging impacts on the integrity of networks of habitat through fragmentation should also be considered. One of the issues may be a potential impact of lighting on habitats (Policy NE6). There may be a need to assess the effects of proposed habitat beyond the site boundary.

6.14 Applicants should ensure that they take account of the potential effects of a development on all the life stages of protected/priority species, taking account of the following essential requirements:

- Food
- Water
- Shelter
- Reproduction Dispersal

6.15 For example, preserving a Great Crested Newt breeding pond within a development would not be sufficient to conserve the species if its terrestrial habitats (which provide the Great Crested Newts with both shelter and food) are destroyed.

6.16 The potential habitat fragmentation and isolation effects of a development on the wider environment should be considered. For example, removing a hedgerow or line of trees could sever a bat feeding route with consequential effects on a breeding colony, even if the colony itself is preserved. Developers should therefore use appropriate plant species (in relation to planting and landscaping schemes), the creation of buffer zones, stepping stone habitats and wildlife corridors to ensure the development is integrated into the wider environment.

6.17 Increased permeability across gardens by the means of hedgehog tunnels and other features should be included where appropriate. If temporary features such as log piles are included it must be demonstrated through the management plan how this will be

sustained. If such features are included the new owners of the properties must be informed as to the purpose of the features and the requirement to maintain them.

6.18 Applicants should also consider that some potential effects will be acute and easily detectable, while others may be long term and may only become apparent some months or years after construction is complete. For example hydrological changes due to the development may render a retained pond moribund without consideration to future inflows. The wider externalities of the proposed development must also be considered such as increased noise and light pollution on the biodiversity, both on site and the surrounding.

Pre–development biodiversity and the post-development value

6.19 The term Biodiversity Accounting in this guidance document is made in reference to the UK Biodiversity Net Gain Metric approach. This is also known as Biodiversity Offsetting. Government (Defra) through Natural England is developing a biodiversity net gain metric to be used within the planning system to measure biodiversity impacts of a development. At present any requirements for percentage figures for net gain will be set by negotiation with the Local Planning Authority and in accordance to Plan:MK policies, NPPF and other material considerations. The draft Environment Bill is setting the biodiversity objective to a minimum of 10% increase over the predevelopment condition and this likely will become compulsory. The 10% biodiversity net gain requirements are currently expected to come into effect during a two-year transition period which begins when the Environment Bill receives Royal Assent.

6.20 Developments should enhance, restore or add to biodiversity. Development can incorporate a range of ecological enhancements from bird nesting and bat roosting opportunities, to sustainable urban drainage systems and green roofs through to providing major new areas of biodiversity habitat alongside development. The type of ecological enhancements and measures introduced must be guided by Buckinghamshire and Milton Keynes Biodiversity Action Plan and the Biodiversity Opportunity Map. All development must clearly distinguish between the new nature conservation benefits offered and any existing features retained or compensated for.

6.21 The council requires all development proposals of 5 or more dwellings or non-residential floorspace in excess of 1,000m^2 losses/gains to the biodiversity value occurring to a site through development to be measured (Policy NE3). Where habitat is to be lost its value must first be calculated to ensure any compensatory habitat creation is of greater value. Delivering biodiversity compensation in a measurable way is essential to demonstrating that a net-gain to biodiversity value is likely to be achieved by a development. Where measurable compensation is delivered beyond the boundaries (red and blue lines) of an application it is termed ‘biodiversity offsetting’ – see stage 4. Before compensation or biodiversity offsetting can occur the value of the habitat to be lost must be calculated. Calculating biodiversity units comprises of

6 distinct steps:

Step 1 – Apply 'avoid, mitigate, compensate' hierarchy to understand the residual biodiversity loss.

Step 2 – Map the habitat type(s) impacted by your development

Step 3 – Assess the baseline condition of each habitat

Step 4 – Combine the habitat type and condition weighting to calculate an overall number of biodiversity units.

Step 5 – Work out if you have particular requirements for the type of offset you will need to provide

Step 6 – Decide how you want to provide compensation

6.22 Where, development would result in significant harm to a protected/priority species/habitat appropriate planning conditions or obligations will be required to adequately mitigate and/or compensate for the harm.

Compensation

6.23 Compensation is the process of providing species or habitat benefits specifically to make up for the loss of, or permanent damage to, biodiversity through the provision of replacement habitats. It should not be regarded as an alternative to avoidance and should only be considered if avoidance is unachievable. The integrity of a nature conservation site as a whole can be adversely effected by a damaging development affecting a proportion of it, even if compensatory measures are carried out elsewhere, see Stage 4 Biodiversity Offsetting . For compensation to be acceptable, the importance of the development must also clearly outweigh the harm caused.

6.24 It is not practically possible to compensate for the loss of some nature conservation features. Applications involving proposals to compensate for loss or damage to the following nature conservation features will be refused unless the need for, and benefits of, the development in that location has been demonstrated to outweigh their loss:

- ancient woodland,
- veteran trees
- ancient hedgerows

6.25 Compensation must be measurable and can take the form of:

- The creation of new nature conservation features/habitats within the development site to replace those lost or damaged.
- Improvement to the condition of existing habitats on site.
- Applicants should ensure that new biodiversity benefits are fully integrated through the development scheme, and not fragmented into isolated pockets or restricted to peripheral parts of the development site.
- The creation of new nature conservation features/habitats in the Borough of Milton Keynes to replace those lost or damaged i.e. biodiversity offsetting scheme.

6.26 Planning policy requires development to protect where possible and enhance nature conservation features; local planning authorities are expected to actively pursue and

maximise such improvements. All development in Milton Keynes should result in a net gain for biodiversity (Policy SD1), this must be demonstrated when a planning application is submitted. Compensation shall be considered as the last resort, with preference always given to protection in entirety followed by appropriate mitigation.

Stage 4: Biodiversity Offsetting

6.27 All applicants entering compensation stage must engage with the local authority at this time if they have not already done so. On site compensation and biodiversity offsetting schemes should produce habitats of measurably greater biodiversity value than what will be lost through the development. At present, any requirements for biodiversity offsetting increase or 'replacement percentage' are set by negotiation with the Local Planning Authority and in accordance to Plan:MK policies, NPPF and other material considerations. The draft Environment Bill is setting the minimum increased amount or 'replacement percentage' to be set at 10%[9] above the biodiversity unit value of the habitats lost. This likely will become compulsory (see para 6.19) with any off site biodiversity enhancement to be registered and maintained for at least 30 years.

6.28 Before a Biodiversity Accounting Scheme can commence, the existing baseline habitats on the land intended for compensation will need to be valued in biodiversity units by undertaking a Biodiversity Impact Assessment (BIA), using a similar method outlined in Steps 1 to 4 above. In addition to this BIA, a Spatial Factor will be included.

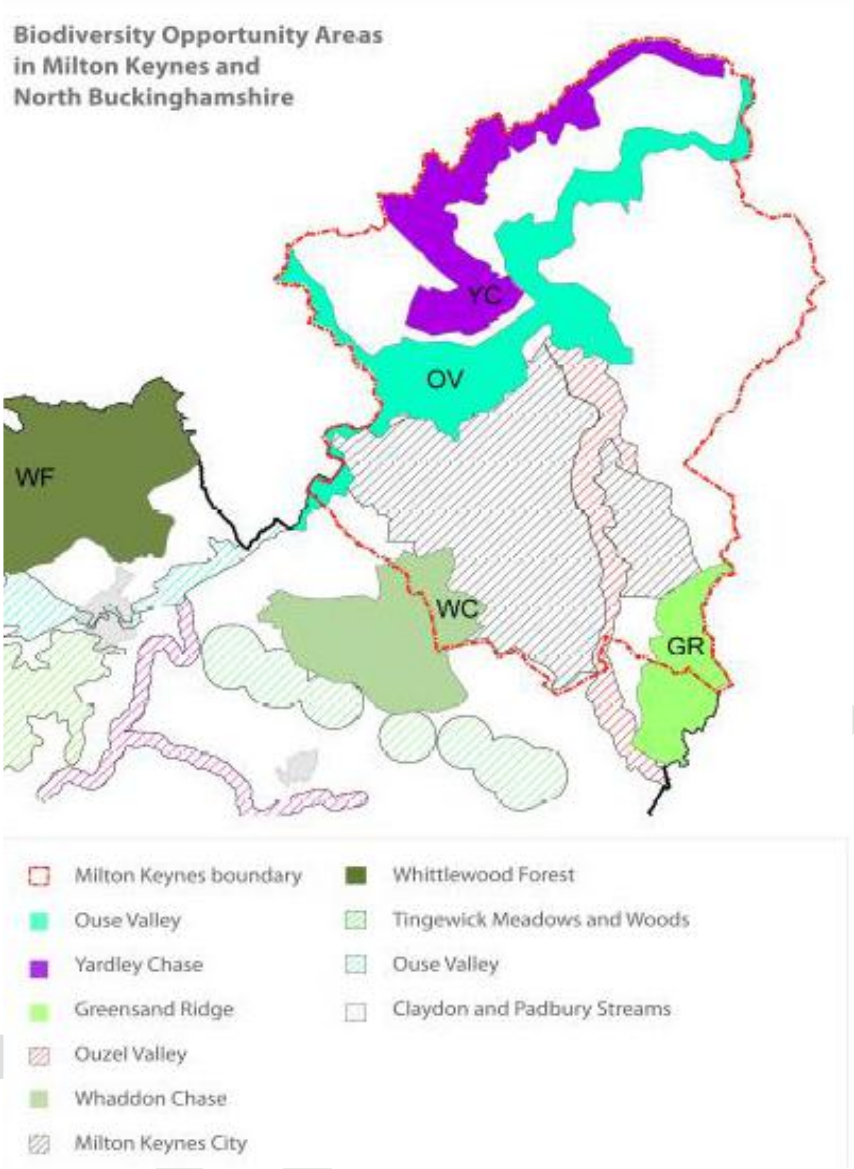
6.29 The Spatial Factor is an incentivising factor that promotes compensation to support sub-regional strategies – for example those focussing efforts in Biodiversity Opportunity Areas and other strategic sites.

6.30 The preference is that that Milton Keynes Council arranges the schemes, directed by the Ecology team. However, in cases where compensation is arranged through a third party broker, a reporting fee, payable to the Local Planning Authority will be required. This fee is to keep a register of compensation sites, monitor their progress, and ensure the NEP can monitor sub-regional priorities that have been adopted by the authority. Milton Keynes Council will also use this information in their Annual Monitoring Report to measure the effectiveness of their Biodiversity Net Gain, Nature recovery Strategy and wider environmental policies.

6.31 Proposals for off-site compensation measures, collectively referred to as a Biodiversity Accounting Scheme, will require:

a) A methodology for the identification of any receptor site(s) for accounting measures;
b) The identification of any such receptor site(s);
c) The provision of arrangements to secure the delivery of any compensation measures (including a timetable for their delivery); and
d) A Biodiversity Accounting Management and Monitoring Plan including details of the provision and maintenance of any compensation measures.

[9] Draft Environment Bill: schedule 7a 2 (3)



Map 2. Biodiversity Opportunity Areas.

To further assist applicants with any biodiversity offsetting scheme Milton Keynes Council, through the Natural Environment Partnership, has produced a Biodiversity Opportunity Map. The map highlights areas within the district where habitat creation would produce the greatest strategic gains to conservation and so would represent the authorities preferred locations. [10]

Commuted Sums

6.32 As previously detailed, in certain circumstances it may not be possible for a developer to either mitigate or compensate for the negative impact of their development on the nature environment within the development site or wider area; however the development may still be justified. In such circumstances a biodiversity offset should be provided. The appropriateness of all biodiversity offsetting schemes shall be assessed by the Ecology Team.

[10] Details of Biodiversity Opportunity Areas: https://bucksmknep.co.uk/biodiversity-opportunity-areas/

6.33 Applicants must also take account of the wider green infrastructure network and ecological context of the development to ensure opportunities to promote the connectivity of habitats are maximised (as detailed in policy NE4). Applicants must provide details of proposed biodiversity enhancements and net gains, informed by expert advice, with planning applications. The council may attach planning conditions to ensure that biodiversity enhancements are implemented.

6.34 Should the scheme be deemed as inappropriate (i.e. the wrong habitat in the wrong location; considered unlikely to succeed etc.), then the scheme will need to be amended or a biodiversity offsetting scheme on an alternative site put forward. If an applicant is unable to locate and secure an appropriate site on which an approved biodiversity offsetting scheme can be created then this will often necessitate a financial payment to the council via a planning obligation, secured through a S.106 Agreement.

6.35 The purpose of such a payment would be to pay for the council to secure adequate compensatory measures and to ensure the sustainable development objectives of local planning policy are achieved. In each instance the required commuted sum is determined by the Ecology Team via a bespoke calculation which accounts for the real costs of habitat creation/enhancement, the ongoing maintenance and a management fee to provide the offset.

6.36 The Biodiversity Financial Contribution is index-linked and is the sum total of the following three components:

1. A Biodiversity Accounting Payment (BAP) - this is the cost of the offset

BAP = Set-up Cost + Habitat Creation Cost + (Management Cost)[11]

2. A Contingency Payment (CP) – at 10% of the Biodiversity Accounting Payment (Insurance Fund)

CP = Biodiversity Accounting Payment X 0.1

3. An index linked Management Payment (MP) – at 20% of the Biodiversity Accounting Payment (Management and Monitoring Fund)

MP = Biodiversity Accounting Payment 30 X 0.2

Biodiversity Financial Contribution = BAP + CP + MP

Translocation

6.37 If legally protected species are involved, in some cases translocation may be the only compensation option available. As part of a submitted planning application, translocation proposals must be described in detail. All details regarding the creation of areas of compensatory habitat as part of a development scheme should be presented to the local authority as part of a Construction Environmental Management Plan (CEMP) or Habitat Management Plan (HMP) as appropriate.

[11] Cumulative indexation capitalised in perpetuity at 3.5% (100/3.5 = 28.571)

Stage 5: Submitting a Planning Application

6.38 By the time a planning application is ready for submission the applicant shall be able to provide to the authority:

1. All protected/priority species/habitat surveys highlighted as required by Natural England's standing advice Planning Application Validation: Milton Keynes Requirements for Biodiversity
2. A detailed mitigation and or compensation scheme guided by the results of previously undertaken surveys (where applicable);
3. Demonstrate how the development will achieve the biodiversity net gain. Developers should have regard to the draft Environment Bill. Under the future Act it is likely that the developer will need to be able to demonstrate a minimum of 10% benefit to biodiversity to be delivered by the application.

6.39 Submission of these documents will greatly assist in the speedy arrival of a decision on your planning application.

Stage 6: Planning Permission Granted: the Construction Phase

6.40 During construction it is essential that steps are taken to ensure all personnel understand the nature conservation objectives of the development. On developments which include a mitigation strategy; ensuring that appropriate steps are taken to safe-guard nature conservation features and that all individuals working on the development are suitably informed will likely be a condition of planning approval. Nature conservation reports should describe the measures which will be taken to ensure existing nature conservation features should be conserved during the construction phase. Such reports should also address:

- Identification of and contact details for responsible personnel.
- Timing of works to minimise the risk of disturbance to protected and other species.
- Procedures for dealing with unexpected discoveries, such as previously undetected protected species or injured wildlife. If a protected species is found, even after planning permission has been granted, the developer should stop work immediately and contact Natural England for further advice.

6.41 **Planning permission being granted does not in any way relinquish or diminish the applicant's legal responsibilities when dealing with any protected species (National or European). (see Part 2)**

Stage 7: Monitoring and Future Management

6.42 Planning applications should include costed maintenance specifications and monitoring proposals for each of the nature conservation features addressed and describe how these aspects would be implemented. This could include a description of the resources required, the personnel involved and a procedure for ensuring that any new owner/occupiers are made aware of their responsibilities.

Part 2: Identifying requirements for Biodiversity & Geological Conservation as part of your planning application

1 About this document

1.1 This document is based on guidance from the British Standard BS4202; Biodiversity — Code of practice for planning and development. By checking your proposal against the requirements detailed in this document, it will help you to ensure that your application is valid with regards to biodiversity and geological conservation. This primarily means that you will have provided, where required, sufficient and up-to-date information to determine the application lawfully and in accordance with relevant planning policy.

2 When is ecological information required?

2.1 Milton Keynes Council (MKC) has a duty to consider the conservation of biodiversity when determining a planning application. The presence of a protected species is a material consideration.

2.2 This includes having regard to the safeguarding of species protected under:

- The Wildlife and Countryside Act 1981,
- The Conservation of Habitats and Species Regulations 2010, as amended or the Badgers Act 1992.

2.3 There are two scenarios where additional ecological information is required. These are where:

1) The proposal could impact on species that are protected or listed in the Listed in the Milton Keynes and Buckinghamshire Biodiversity Action Plan; or

2) Where the proposal could impact on habitats or sites that are either Priority (BAP) Habitats or Habitats Listed in the Milton Keynes and Buckinghamshire Biodiversity Action Plan identified for Geological Conservation.

2.4 What is required in both these instances is detailed in this document.

3 Ensuring that ecological information provided is adequate

3.1 All information accompanying an application should be prepared and presented so that it is fit to inform the decision-making process. As such it should be:

1. Appropriate for the purpose intended and obtained using appropriate scientific methods of ecological investigation and study.

2. Sufficient in terms of:

a) The scope of study;

b) Identifying the habitats likely to be affected;

c) Identifying the species likely to be affected;

d) Consideration of the ecological processes upon which habitats and species and system function are dependent;

e) Coverage of a sufficiently wide area of study appropriate for the requirements of the species or feature of interest, including connected systems (e.g. downstream);

f) Undertaken over a sufficient period of time and at an appropriate time of year to reveal sufficient details of populations or habitat characteristics;

g) Being sufficiently up to date (e.g. should ideally be from the current year or as recent as possible and not more than 2 years old).

h) The identification of risks, e.g. spread of pathogens or invasive non-native species.

PLEASE NOTE: The shelf life of any given survey depends on the type of survey undertaken and whether environmental conditions within the study area were "normal" or unusual at the time undertaken (e.g. extreme weather), or are likely to have changed or remained the same. The greater the recent change, the greater the need for up-to-date information. Species mobility will also be relevant.

3.2 The ecological information should be understandable by non-specialists (i.e. include a nontechnical summary), be substantiated throughout with clear evidence, be true and accurate, and follow good practice guidelines.

3.3 Table 1 details a trigger list which identifies situations where biodiversity is likely to be affected by development and, where relevant, information should be submitted with the application. Part 1 with respect to protected species and species of principal importance whilst Part 2 covers designated sites, priority habitats and features of biodiversity importance, and features of geological conservation importance. These should generally include applications likely to affect:

a. Internationally and nationally designated statutory sites;

b. European and nationally protected species;

c. non-statutory designated sites;

d. Priority habitats and species; and

e. Significant populations of national or local Red List or notable species.

3.4 **Annex A** provides a guide to the process the council should use to validate a planning application using the biodiversity and geodiversity conservation requirements. Where an applicant has been advised during pre-application discussions, or have themselves identified that they need to provide information on biodiversity with their planning application, they should ensure that what is submitted is sufficient to enable the decision-maker to validate and register the application.

PLEASE NOTE:

Failure to provide all the information required might mean an application is not "valid" and is not considered or determined.

3.5 Where such information is not submitted, or is insufficient, the decision-maker should first consider any argument put forward formally by the applicant that such information is not required in their particular case. If the applicant's argument is accepted, no further information should be required. If, however, further information is required, the decision maker should delay validation and registration for a specified period to allow time for the identified information to be provided, and then, if this is not provided or is still not sufficient:

a. suggest the applicant withdraws the application;

b. judge that the application is not valid and decline to register it; or

c. register the application and then refuse it on the grounds that there is insufficient information to make a lawful determination.

3.6 The process described in Annex B recognises that, in the first instance, an application is likely to be validated by administration staff when MKC first receives an application.

3.7 The council will be able to check and verify information provided by applicants against their own data as part of the validation exercise (where they have access to GIS alert maps), for instance by checking the location of proposed development to establish whether it is near any types of designated sites specified in their local requirements checklist.

3.8 The Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) may also be able to provide invaluable information for this purpose.

Contact Details:

BMERC Office address: County Hall, Walton Street, Aylesbury, Bucks, HP20 1UY

Telephone: 01296 382431 Email: erc@buckscc.gov.uk

Local Requirements for Protected Species, UK Priority Species and Species

4 Listed in the Milton Keynes and Buckinghamshire Biodiversity Action Plan.

4.1 Where a proposed development is likely to affect protected species, the applicant must submit a *Protected Species Survey and Assessment*.

4.2 If the application involves any of the development proposals shown in Table 1 (Column 1), a protected species survey and assessment must be submitted with the application. Exceptions to when a survey and assessment may not be required are also explained in this table. The survey should be undertaken and prepared by competent persons with suitable qualifications and experience. It must be carried out at an appropriate time and month of year, in suitable weather conditions and using nationally recognised survey guidelines and methods where available1.

4.3 The survey may be informed by the results of a search for ecological data from a local environmental records centre. The survey must be to an appropriate level of scope and detail and must:

- Record which species are present and identify their numbers (may be approximate);
- Map their distribution and use of the area, site, structure or feature (e.g. for feeding, shelter, breeding).

4.4 The Assessment must identify and describe potential development impacts likely to harm the protected species and/or their habitats identified by the survey (these should include both direct and indirect effects both during construction and afterwards). Where harm is likely, evidence must be submitted to show:

- How alternatives designs or locations have been considered;
- How adverse effects will be avoided wherever possible;
- How unavoidable impacts will be mitigated or reduced;
- How impacts that cannot be avoided or mitigated will be compensated.

4.5 In addition, proposals are to be encouraged that will enhance, restore or add to features or habitats used by protected species. The Assessment should also give an indication of how species numbers are likely to change, if at all, after development e.g. whether there will be a net loss or gain.

4.6 The information provided in response to the above requirements are consistent with those required for an application to Natural England for a European Protected Species Licence. A protected species survey and assessment may form part of a wider Ecological Assessment and/or part of an Environmental Impact Assessment. Further information on appropriate survey methods can be found in Guidance on Survey Methodology published by the Chartered Institute of Ecology and Environmental Management.

5 Optimal survey times

5.1 For certain species and habitats surveys can be carried out at any time of year, but for other species, particular times of year are required to give the most reliable results, as indicated in Table 2. Surveys conducted outside of optimal times may be unreliable. For certain species (e.g. Great-crested Newt) surveys over the winter period are unlikely to yield any useful information. Similarly negative results gained outside the optimal period should not be interpreted as absence of a species and further survey work maybe required during the optimal survey season. This is especially important where existing surveys and records show the species has been found previously on site or in the surrounding area. An application may not be valid until survey information is gathered from an optimum time of year.

5.2 Species surveys are also very weather dependent so it may be necessary to delay a survey or to carry out more than one survey if the weather is not suitable, e.g. heavy rain is not good for surveying for otters, as it washes away their spraint (droppings). Likewise bat surveys carried out in wet or cold weather may not yield accurate results.

Absence of evidence of a species does not necessarily mean that the species is not there, nor that its habitat is not protected (e.g. a bat roost is protected whether any bats are present or not).

5.3 Milton Keynes and Buckinghamshire Biodiversity Recording and Monitoring Centre may have useful existing information and records. Competent ecologists should carry out any surveys. Where surveys involve disturbance, capture or handling of a protected species, then only a licensed person can undertake such surveys (e.g. issued by Natural England). Surveys should follow published national or local methodologies. Further details may be found at www.cieem.net.

Table 1: Local Requirement for Protected Species, UK BAP Species of Principal Importance (Priority Species): Criteria and Indicative Thresholds (Trigger List) for when a Survey and Assessment is Required.

Proposals for Development that will trigger a protected species survey	Bats	Barn Owls	Breeding Birds	Gt. Crested Newts	Otters	Dormouse	Water Vole	Badger	Reptiles	Amphibians	Schedule 8 Plants &Fungi	Rare Arable plants	Other BAP Species
Proposed development which includes the modification conversion demolition or removal of buildings and structures (especially roof voids) involving the following:													
Agricultural buildings (e.g. farmhouses and barns) particularly of traditional brick or stone construction and/or with exposed wooden beams greater than 20cm thick;	■	■	■										
Buildings with weather boarding and/or hanging tiles that are within 200m of woodland and/or water	■												
Pre-1960 detached buildings and structures within 200m of woodland and/or water;	■												
• pre-1914 buildings within 400m of woodland and/or water;	■												
• pre-1914 buildings with gable ends or slate roofs, regardless of location;	■												
Tunnels, mines, kilns, ice-houses, adits, military fortifications,air raid shelters, cellars and similar underground ducts and structures;	■												
Bridge structures (especially over water and wet ground).	■				■		■						
Proposals involving lighting of churches and listed buildings or flood lighting of green space within 50m of woodland, water, field hedgerows or lines of trees with obvious connectivity to woodland or water.	■	■	■			■							
Proposals affecting woodland, or field hedgerows and/or lines of trees with obvious connectivity to woodland or water bodies.	■		■			■		■			■	■	

Proposed tree work (felling or lopping) and/or development affecting: old and veteran trees that are older than 100 years; trees with obvious holes, cracks or cavities, trees with a girth greater than 1m at chest height: Note an arboricultural survey is not the same as an ecological tree survey; both aspects need to be covered.	■	■	■										
Proposals affecting gravel pits or quarries and natural cliff faces, crevices or caves.	■		■	■					■				
Major or Large proposals within 500*m of a pond/moat or Minor and Householder proposals within 100*m of pond/moat. and not be less than 250m for any small development.				■			■			■			
Proposals affecting or within 200m of rivers, streams, lakes, or other aquatic habitats such as reed bed, grazing marsh and fen.	■		■		■		■		■	■	■		■
Proposals affecting 'derelict' land (brownfield sites), allotments and railway land.			■	■				■	■	■			■
Proposals affecting farmland or field margins			■									■	■
Proposed development affecting any buildings, structures, feature or locations where protected species or species of Principal Importance (BAP) are known to be present.	■	■	■	■	■	■	■	■	■	■	■	■	■

Identified as Important Arable Plants by Plantlife

Note: A Large proposal is one that is more than 10 dwellings or more than 0.5 hectares or for non-residential development is more than 1000m^2 floor area or more than 1 hectare

Distances may be amended to suit local circumstance on the advice of the local Natural England team and/or Local Biodiversity Partnership

Confirmed as present by either a data search (for instance via the local environmental records centre) or as notified to the developer by the local planning authority, and/or by Natural England, the Environment Agency or other nature conservation organisation.

Table 2: Ecological Survey Seasons

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Badgers												
Bats (Hibernation Roosts)												
Bats (Summer Roosts)												
Bats (Foraging/Commuting)												
Birds (Breeding)												
Birds (Over Wintering)												
Dormice												
Great– crested Newts Terrestrial Habitat												
Great– crested Newts Aquatic Habitat												
Invertebrates												
Natterjack Toads												
Otters												
Reptiles												
Water Voles												
White-clawed												
Crayfish												
Habitats/Vegetation												

Key:

Optimal time to survey - Green

Survey can be completed – Light Blue

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6 Exceptions for when a full species survey and assessment may not be required

6.1 The following represent situations where a full species survey and assessment may not be required:

a. Following consultation by the applicant at the pre-application stage, MKC has stated in writing that no protected species surveys and assessments are required.

b. If it is clear that no protected species are present, despite the guidance in the above table indicating that they are likely, the applicant should provide evidence with the planning application to demonstrate that such species are absent (e.g. this might be in the form of a brief report from a suitably qualified and experienced person, or a relevant local nature conservation organisation).

c. If it is clear that the development proposal will not affect any protected species present, then only limited information needs to be submitted. This information should, however,

(i) demonstrate that there will be no significant effect on any protected species present and

(ii) include a statement acknowledging that the applicant is aware that it is a criminal offence to disturb or harm protected species should they subsequently be found or disturbed. In some situations, it may be appropriate for an applicant to provide a protected species survey and report for only one or a few of the species shown in the Table above e.g. those that are likely to be affected by a particular activity. Applicants should make clear which species are included in the report and which are not because exceptions apply. In all cases exceptions should be agreed in writing by the Council Ecologist.

Local Requirements for Designated Sites, Priority (BAP) Habitats, Habitats

7 Listed in the Milton Keynes and Buckinghamshire Bedfordshire Biodiversity Action Plan and Geological Conservation

7.1 Milton Keynes Council (MKC) has a duty to consider the conservation of biodiversity when determining a planning application; this includes having regard to the safeguarding of designated sites and priority habitats. Where a proposed development is likely to affect such a site, habitat or geological feature, the applicant must submit an Ecological/Geological Survey and Assessment.

7.2 If the application is likely to affect any of the designated sites, priority habitats or biodiversity features listed in Table 3 or geological features listed in Table 4, a survey and assessment for the relevant feature must be submitted with the application. Exceptions to when a survey and assessment may not be required are also explained in these tables.

7.3 The Survey should be undertaken and prepared by competent persons with suitable qualifications and experience and carried out at an appropriate time and month of year, in suitable weather conditions and using nationally recognised survey guidelines/methods. The survey may be informed by the results of a search for ecological or geological data from a local environmental records centre. The survey must be to an appropriate level of scope and detail and must:

- Record which habitats and features are present on and where appropriate around the site;
- Identify the extent/area/length present;
- Map their distribution on site and/or in the surrounding area shown at an appropriate scale.
- Identify and describe potential development impacts likely to harm designated sites, priority habitats, other listed biodiversity features or geological features (these should include both direct and indirect effects both during construction and afterwards).

7.4 Where harm is likely, evidence must be submitted to show:

- How alternatives designs or locations have been considered;
- How adverse effects will be avoided wherever possible;
- How unavoidable impacts will be mitigated or reduced;
- How impacts that cannot be avoided or mitigated will be compensated.

7.5 In addition, proposals are to be encouraged that will enhance, restore or add to designated sites priority habitats, other biodiversity features or geological features. The Assessment should give an indication of likely change in the area (hectares) of priority habitat on the site after development e.g. whether there will be a net loss or gain. An ecological/geological survey and assessment may form part of a wider Environmental Impact Assessment. Figure 1 shows a Biodiversity Checklist to guide applicants in considering biodiversity on a site.

Table 3. Local Requirements for Designated Sites and Priority Habitats and Habitats Listed in the Milton Keynes and Buckinghamshire Biodiversity Action Plan: Criteria (Trigger List) for When a Survey and Assessment are required

DESIGNATED SITES (as shown on the Council's Development Plan Proposals Map)
Internationally; Special Protection Area (SPA) Special Area of Conservation (SAC) Ramsar Site
Nationally; Site of Special Scientific Interest (SSSI) National Nature Reserve (NNR)
Regional and local; County Wildlife Sites (CWS) Local Nature Reserve (LNR)

PRIORITY HABITATS (Habitats of Principal Importance for Biodiversity under S.41 of the NERC Act 2006) (BAP)

- Arable field margins
- Coastal and floodplain grazing marsh
- Hedgerows
- Lowland calcareous grassland
- Lowland dry acid grassland
- Lowland fens
- Lowland heathland
- Lowland meadows
- Lowland mixed deciduous woodland (both ancient and secondary)
- Open mosaic habitats on previously developed land
- Ponds
- Purple moor-grass and rush pastures
- Reedbeds
- Rivers
- Traditional orchards
- Wet woodland

LOCAL CHARACTER BAP HABITATS (as identified by the Local Biodiversity Partnership - see paragraph 84 ODPM Circular 06/2005))

Urban / Built Environment (e.g. parks, gardens, allotments, road verges and railway embankments)

DESIGNATED SITES (as shown on the Council's Development Plan Proposals Map) Nationally; Site of Special Scientific Interest (SSSI) National Nature Reserve (NNR) Regional and local; Local Geological Sites (LGS) Local Nature Reserve (LNR)

Exposure of Extensive Sites

- Active quarries and pits
- Disused quarries and pits
- Coastal cliffs and foreshore
- River and stream sections
- Inland outcrops
- Exposure underground mines and tunnels
- Extensive buried interest
- Road, rail and canal cuttings

Integrity Site

- Static (fossil) geomorphological
- Active process geomorphological
- Caves
- Karst

Finite Site

- Finite mineral, fossil or other geological
- Mine dumps
- Finite underground mines and tunnels
- Finite buried interest

7.6 Exceptions When a Full Survey and Assessment May Not Be Required International and National Sites: A survey and report will not be required where the applicant is able to provide copies of pre-application correspondence with Natural England, where the latter confirms in writing that they are satisfied that the proposed development will not affect any statutory sites designated for their national importance.

7.7 Regional and Local Sites: A survey and report will not be required where the applicant is able to provide copies of pre-application correspondence with appropriate local geological experts that they are satisfied that the proposed development will not affect any regional or local sites designated for their local nature conservation importance.

ANNEX A

The following outlines recommended procedures for Council staff to ensure biodiversity and geological conservation issues are addressed adequately in the validation of planning applications.

Application Received

Initial Checks (see note a)

Check 1: Has the applicant answered 'yes' to questions (a), (b) and (c) of the Biodiversity and Geological Conservation question' on the standard application form?

Check 2: Has the applicant indicated with reference to Tables 1, 2 and 3 in the Local Requirements what, if any, Protected & BAP Species, Designated Sites, Priority & BAP Habitats and Geological Features could potentially be affected?

Check 3: Is MKC satisfied with the responses provided by the applicant? (See note b)

Check 4: Has the applicant submitted all necessary surveys and assessments specified in the Local Requirements (e.g. triggered by a 'yes' to any question in Tables 1, 2 or 3)? (See note c)

Check 5: Has the applicant claimed that exceptions apply – as explained in Tables 1, 2 or 3?

Check 6: Is MKC satisfied that exceptions do apply?

Initial Determination

Check 7: Do surveys and assessments submitted contain sufficient information to describe features present, to assess potential impacts and to propose adequate mitigation, compensation and enhancement? (See note e)

Final Determination The application can be determined taking account of information submitted and any other data required to evaluate the potential effects of the proposed development on biodiversity and geological conservation (see note f).

Note (a) It is intended that the initial checks should be a quick, coarse filter to 'strain out' the applications that obviously lack the key information on biodiversity/geological conservation required. Administrative staff are expected to carry out these initial checks.

Note (b) Where the applicant has answered 'No' to all parts of the biodiversity/geology question on the standard application form, MKC should, wherever possible, seek to confirm the validity of these responses by referring to its own 'environmental evidence base' (e.g. on MKC's GIS or via BMERC

Note (c) Where an applicant meets any of the criteria in Tables 1, 2 or 3; they must also provide relevant surveys and assessments for the application to be valid.

Note (d) It may be necessary to delay validation of an application where an applicant claims that exceptions apply (e.g. they do not need to submit a survey and assessment) while further checks are carried out to confirm that features specified in the requirements are not present or likely to be affected

Note (e) In consultation with consultees, MKC should confirm that the applicant's response to Tables 1, 2 and 3 are accurate.

As part of the initial determination of the application, MKC should also ensure that any surveys and assessments submitted contain all of the details required. Their content should be checked for accuracy and comprehensiveness.

These further checks should be undertaken by the planning case officer responsible for the application supported by MKC's ecologist/ecological advisor. It is unlikely that a planning case officer will be able to complete these further checks without consultation to professional ecological expertise e.g. MKC ecologist or statutory consultee.

Note (f) MKC should determine the application against national and local planning policies and following consultation with relevant stakeholders, and with reference to its own environmental evidence base.

ANNEX B

Biodiversity Checklist.	Strategic Sites - i.e. commercial	Sites up to ten homes	Plot
Has an ecological appraisal been carried out and constraints and opportunities considered? Important to use suitably qualified ecological consultants. (refer to www.cieem.net for professional directory)	EIA	Phase 1 survey	Desk Study - Protected species survey
Have Biodiversity Opportunity - Networks been addressed?	Is land identified within a biodiversity opportunity network – if so what enhancement has been proposed?	Is a biodiversity opportunity network nearby and can it be connected to the development?	Is a biodiversity opportunity network nearby and can it be connected to the development?
Is there any Protected species interest on/near the site?	Woodlands, large trees, other habitats; Retention/mitigation	Large trees, badger setts, wetlands; Retention/mitigation	Large trees/bats in loft/old buildings; Retention/mitigation
Are there any Important Hedgerows on site?	Permission to remove must be obtained from LPA	Permission to remove must be obtained from LPA	Permission to remove must be obtained from LPA
Are any habitats/species of principal importance identified?	Protection/enhancement	Protection/enhancement	Protection/enhancement
What ecological enhancements are proposed in accordance with the NPPF?	Habitat creation & wider species opportunities, use of native species	Species and habitat opportunities	Species focus, bird/bat boxes, wildlife refugia
Production and implementation of a maintenance and management plan	Site wide landscape management, adoption	Management company	Householder care / management of an area
What future management/stakeholder involvement does the site have?	Wildlife Trust, GST, local conservation groups	Local conservation groups, individual.	Individual householder care / management of an area

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AB11(b): NEP Model SPD: Biodiversity Accounting

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Biodiversity Accounting Supplementary Planning Document

Guidance

This Guidance applies to the delivery of measurable Biodiversity Net Gain in a consistent and transparent manner across the Buckinghamshire & Milton Keynes sub-region.

Buckinghamshire and Milton Keynes Natural Environment Partnership

Contents

Figures

Tables

Aims of the Guidance

Biological Diversity, more commonly known as Biodiversity is the term given to "*… the variety of life on Earth and the natural patterns it forms. The biodiversity we see today is the fruit of billions of years of evolution, shaped by natural processes and, increasingly, by the influence of humans. It forms the web of life of which we are an integral part and upon which we so fully depend"*[1].

Whilst Biodiversity has an intrinsic value, it also delivers essential human services - such as food production, climate change adaptation, flood regulation, crop pollination plus numerous other benefits including enhancing our physical and mental well-being.

State of Nature reports[2] document a steady decline in biodiversity within the UK. In response, the UK Government is mandating Biodiversity Net Gain (BNG) to ensure that new developments enhance biodiversity and help deliver thriving natural spaces for communities. Biodiversity Net Gain is an approach that '*leaves biodiversity in a better state than before*'[3].

This guidance, produced in collaboration with the Buckinghamshire and Milton Keynes Natural Environment Partnership (NEP), sets out how Biodiversity Accounting will be used to achieve Biodiversity Net Gain across Buckinghamshire and Milton Keynes. It sets out how the Local Authorities will assess new developments to ensure a biodiversity net gain is achieved in a fair and measured way.

Critical to the understanding of the process is that the **Mitigation Hierarchy** must be followed – so that all possible avoidance, mitigation or opportunities for compensation for losses of biodiversity take place on-site before considering any **off-site provision, which is the last-resort option**. Following the hierarchy means that genuine attempts must be made on-site to reduce impacts on biodiversity as a result of development, and the scheme is not a means to develop and "just pay" for biodiversity gains elsewhere. The mitigation hierarchy is illustrated below at Figure 1, Figure 3 and Figure 7.

Existing habitat and species protections remain. The requirements for Biodiversity Net Gain do not undermine the existing range of protections, outlined in planning policy and legislation, for protected sites or for irreplaceable habitats. Biodiversity Accounting does not replace the existing requirements for ecological assessment and species surveys.

In summary, this guidance covers two key areas:

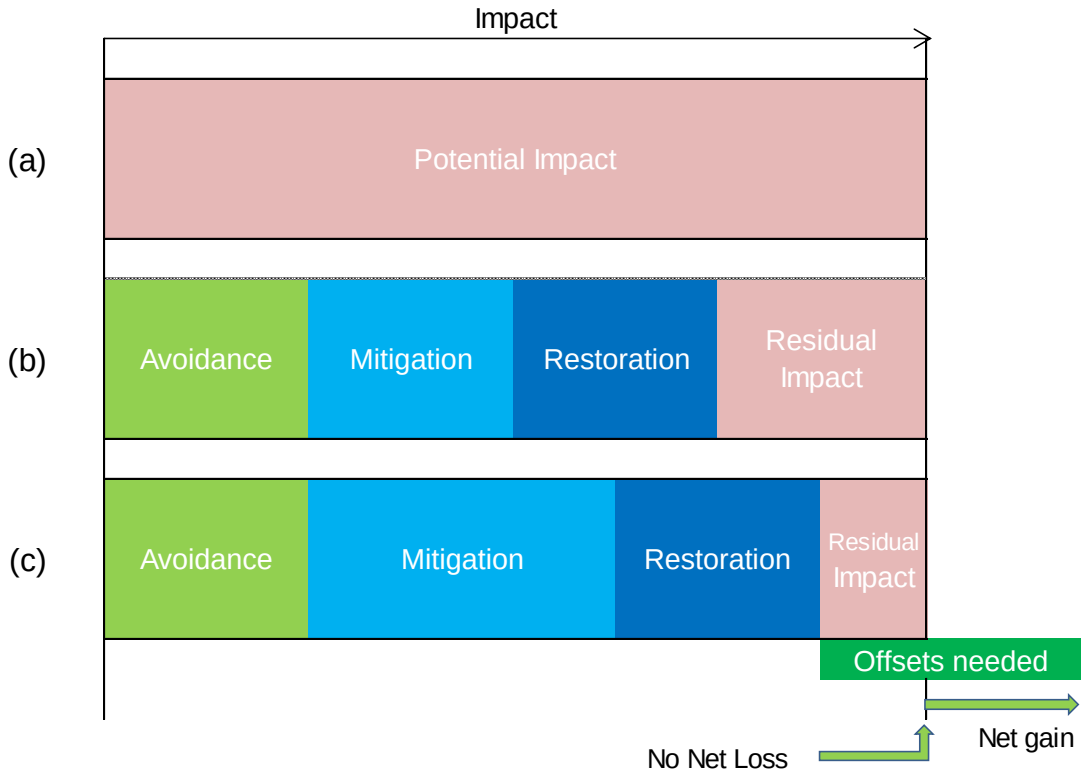
- **Biodiversity Accounting**: What is it, and how will the biodiversity value of habitats be 'measured' before, during and after a development?
- **Biodiversity Compensation:** What to do if there is a loss to the biodiversity value of habitats as a result of a development?

1 Convention on Biological Diversity (CBD), 1992-3

2 State of Nature Partnership, State of Nature Reports (2013-2019) available here: https://www.rspb.org.uk/our-work/conservation/projects/state-of-nature-reporting

3 Baker, J. 2016. Biodiversity Net Gain Good Practice Principles for Development. CIEEM, IEMA, CIRIA, UK.

Figure 1: Components of the mitigation hierarchy to identify residual impacts and subsequent compensation to deliver a Biodiversity Net Gain



Adapted from Cross sector Biodiversity Initiative, 2015. Where
(a) is the potential negative impact of the proposed scheme on biodiversity;
(b) is the implementation of the mitigation hierarchy - without net gain, leaving residual impacts on-site;
(c) illustrates how net gain can be achieved through on-site design changes; with less of a residual impact on site; and with offsets employed to ensure a net gain overall – only after the implementation of the mitigation hierachy on-site in full.

Planning Policies and Complementary Guidance

This Supplementary Planning Document (SPD) is underpinned by national and local policies and strategies including:

National

- National Planning Policy Framework (July 2019)
- Planning Practice Guidance (latest)
- Natural Environment and Rural Communities Act (2006): Biodiversity Duty[4]
- The HM Government's 'A Green Future: Our 25 Year Plan to Improve the Environment' (2012)

[4] Sections 40 and 41 of the Natural Environment and Rural Communities Act (2006)

- Forthcoming Environment Act (likely 2020) – building on the Environment Bill (2019)

Local

- Biodiversity Action Plan: Forward to 2020 for Buckinghamshire and Milton Keynes
- Vision and Principles for the Improvement of Green Infrastructure in Buckinghamshire and Milton Keynes, 2016; and the accompanying green infrastructure opportunities mapping, 2018
- Buckinghamshire Green Infrastructure Delivery Plan, 2013
- Buckinghamshire Green Infrastructure Strategy, 2009
- *[ADD ANY OTHER LOCAL STRATEGIES SPECIFIC TO LOCAL AUTHORITY]*

This guidance provides detailed explanations to deliver Policies within [Name] Local Plan [Adopted Core Strategy]. These include:

- *[SPECIFIC POLICIES AS PER ADOPTED CORE STRATEGY / LOCAL PLAN TO BE ADDED IN* HERE]

Professional Guidance

In 2016, the professional institutes of The Chartered Institute of Ecology and Environmental Management (CIEEM), the Construction Industry Research and Information Association (CIRIA) and the Institute of Environmental Management and Assessment (IEMA) jointly produced **Biodiversity Net Gain: Good practice principles for development** (see Figure 2 below). This document defines Biodiversity Net Gain as follows:

> *"Biodiversity Net Gain is development that leaves biodiversity in a better state than before. It is also an approach where developers work with local governments, wildlife groups, land owners and other stakeholders in order to support their priorities for nature conservation."*

In total, ten principles have been established:

Principle 1. Apply the Mitigation Hierarchy

Principle 2. Avoid losing biodiversity that cannot be offset by gains elsewhere

Principle 3. Be inclusive and equitable

Principle 4. Address risks

Principle 5. Make a measurable Net Gain contribution

Principle 6. Achieve the best outcomes for biodiversity

Principle 7. Be additional

Principle 8. Create a Net Gain legacy

Principle 9. Optimise sustainability

Principle 10. Be transparent

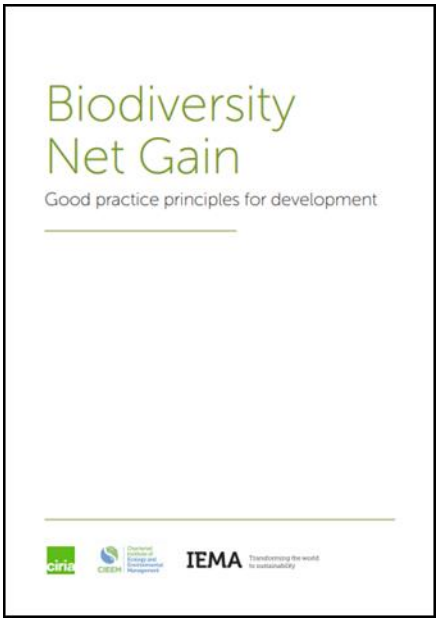


Figure 2: Biodiversity Net Gain Principles (CIRIA, 2017)

This Supplementary Planning Document will follow this good practice guidance, ensuring that development within the Buckinghamshire and Milton Keynes region delivers measurable BNG.

British Standard 868: Biodiversity Net Gain

A British Standard on BNG is currently in press. This outlines in detail the expected standard that developers must meet in order to claim that their development will deliver a biodiversity net gain. It is envisaged that this standard will come in two parts; Part 1: Construction and Part 2: Post Construction.

Once released, the Local Authority will welcome developments that adopt this standard.

Biodiversity Accounting and the Community Infrastructure Levy

The Local Authority has produced a legal position statement on how it considers biodiversity in relation to the Community Infrastructure Levy, describing why biodiversity is not considered to be infrastructure under the CIL, and therefore that the BNG mechanism does not double-charge for biodiversity alongside CIL. This position statement can be found at Appendix A, and will apply until a position statement has been formed by The Government.

How to use this Guide

What Triggers the use of the Biodiversity Accounting Tool?

Delivering BNG will be mandated for proposed developments within the scope of the Town and Country Planning Act 1990[5]. This includes buildings and structures for any use - including: commercial; industrial; institutional; leisure; and housing or other accommodation, where permission from local planning authorities is required.

This guidance document applies to all major and minor applications other than the following exemptions currently suggested by The Government[6]:

- Permitted development[7];
- Householder development, including extensions;
- Nationally significant infrastructure, which falls within scope of the Planning Act 2008[8];
- Some brownfield sites with marginal viability and substantial constraints. It is expected that full details to be set out in secondary legislation, but considerations are likely to include where sites contain a high proportion of derelict land and buildings and only a small percentage of the site is

[5] Town and Country Planning (General Permitted Development) (England) Order 2015 Available at: http://www.legislation.gov.uk/uksi/2015/596/contents/made

[6] Biodiversity Net Gain and Local Nature Recovery Strategies Impact Assessment (Oct 2019) Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/839610/net-gain-ia.pdf

[7] Development does not in all instances require a planning application to be made for permission to carry out the development. In some cases, development will be permitted under national permitted development rights. http://www.legislation.gov.uk/uksi/2015/596/contents/made

[8] Planning Act 2008 Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents

undeveloped, land values are significantly lower than average, and the site does not contain any protected habitats; and

- Developments that would not result in measurable loss or degradation of habitat, for instance change of use of or alterations to building

Local authorities in Buckinghamshire and Milton Keynes will follow these exemptions, until such time as exemptions are set out in primary or secondary legislation, at which point those exemptions will be followed.

The delivery of BNG involves the use of the Biodiversity Accounting Tool, which is used to undertake a Biodiversity Impact Assessment (BIA) to calculate the "units" of biodiversity gained or lost as a result of development on a site. **All development proposals that trigger the use of the Biodiversity Accounting Tool will need to be supported by a BIA**, whether the result overall is positive (gain), negative (loss) or neutral.

The Local Planning Authority can be contacted to clarify if a development proposal triggers the need for a BIA, although a charge may be requested for this advice.

Biodiversity Accounting – The Process

The term "Biodiversity Accounting" in this guidance document relates to the UK BNG Metric approach, which was previously known as Biodiversity Offsetting.

To achieve a BNG, a development must have a higher biodiversity value post-development compared with a pre-development, baseline value.

The Local Authorities expect applications to deliver **a minimum of 10% net gain with an aspiration to achieve 20% net gain to assist in meeting local Buckinghamshire and Milton Keynes Biodiversity Action Plan objectives.**

Biodiversity will be measured using the Buckinghamshire & Milton Keynes Biodiversity Accounting Tool (based on the revised draft Defra "test" Metric 2.0). The Buckinghamshire and Milton Keynes Biodiversity Accounting Tool (B&MKBAT) will be updated on an iterative basis to reflect the most recent Defra tool and latest good practice, and is available on the NEP webpages[9].

Please note:

- The Local Authorities may charge to review any alternative metric to the B&MKBAT submitted with an application.

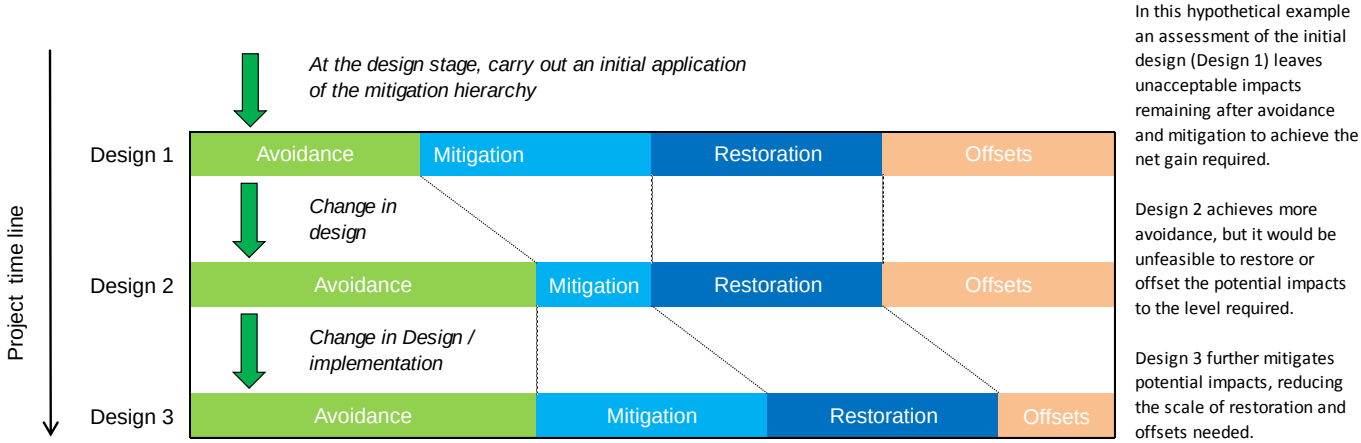
[9] https://bucksmknep.co.uk/biodiversityaccounting

- Prior to the B&MKBAT being available, applicants are recommended to use the latest Warwickshire County Council Biodiversity Impact Assessment calculator[10] .

The B&MKBAT can be used to inform conditions such as the contents of a Construction and Environmental Management Plan (CEMP) and Landscape and Ecological Management Plan (LEMP), plus any necessary legal agreements (obligations), and their subsequent discharge.

It is a decision tool that can be used in an iterative design process to continually inform successive development layouts to balance biodiversity impacts with developable areas. This is illustrated in Figure 3.

Figure 3: Increasing the use of avoidance and minimising impacts in project design through iterative application of the mitigation hierarchy using the Biodiversity Accounting Tool to inform successive designs that improve biodiversity impacts.



The Figure also shows how avoidance and **on-site mitigation and compensation must be carried out before any off-site compensation** ("offsets") are planned, i.e. the mitigation hierarchy is followed first; off-site offsets are a last-resort option for ensuring BNG.

Figure 4, below, illustrates how this process fits into the Local Authority planning function. Biodiversity Accounting can be used as evidence that Local Plan nature conservation policies are met, and an environmentally-sustainable development proposal has been submitted.

Figure 5 illustrates the four basic stages of the Biodiversity Accounting Process.

[10] Available here https://www.warwickshire.gov.uk/biodiversityoffsetting

Figure 4: Biodiversity Accounting Process Chart within the planning function.

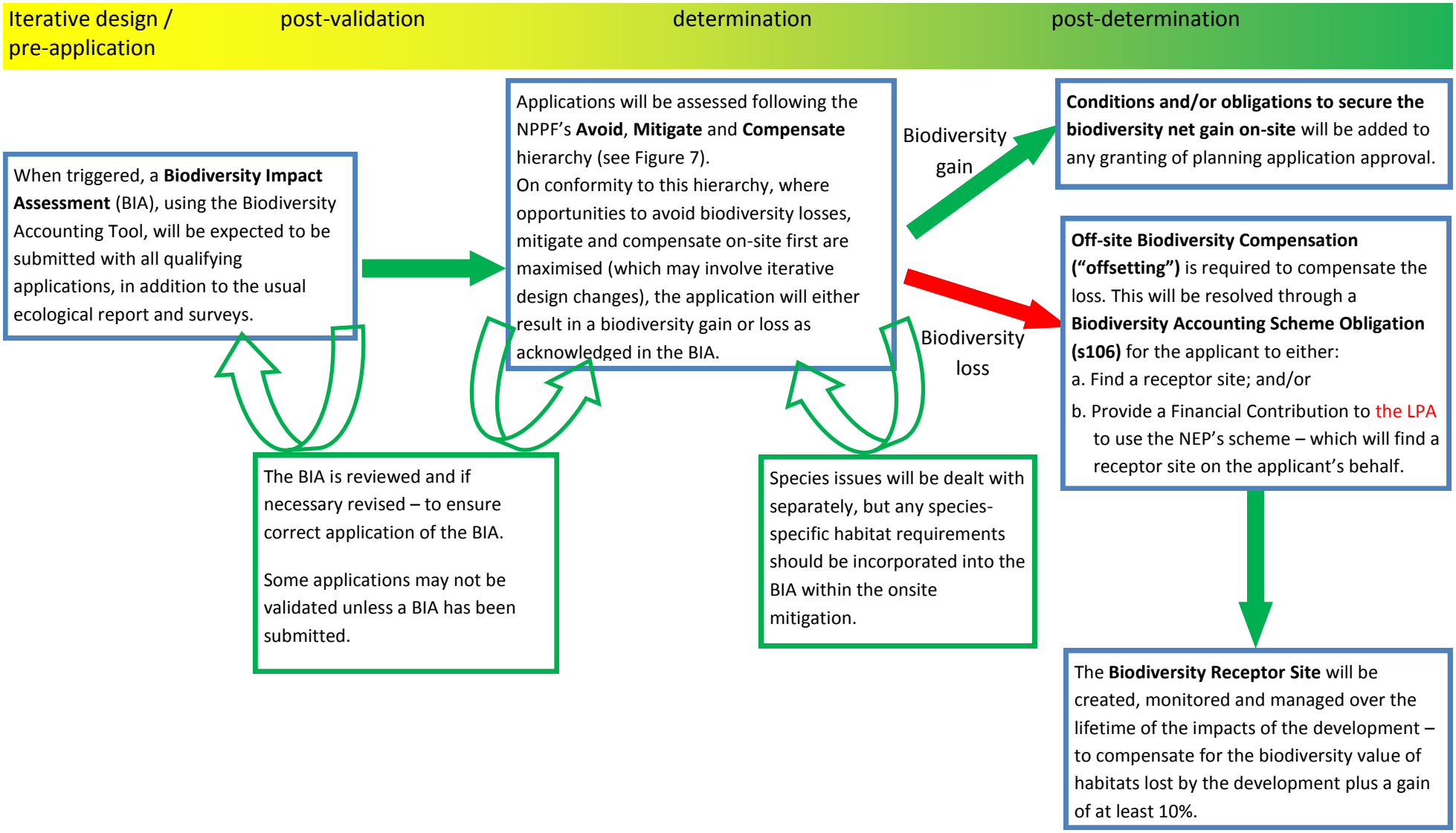


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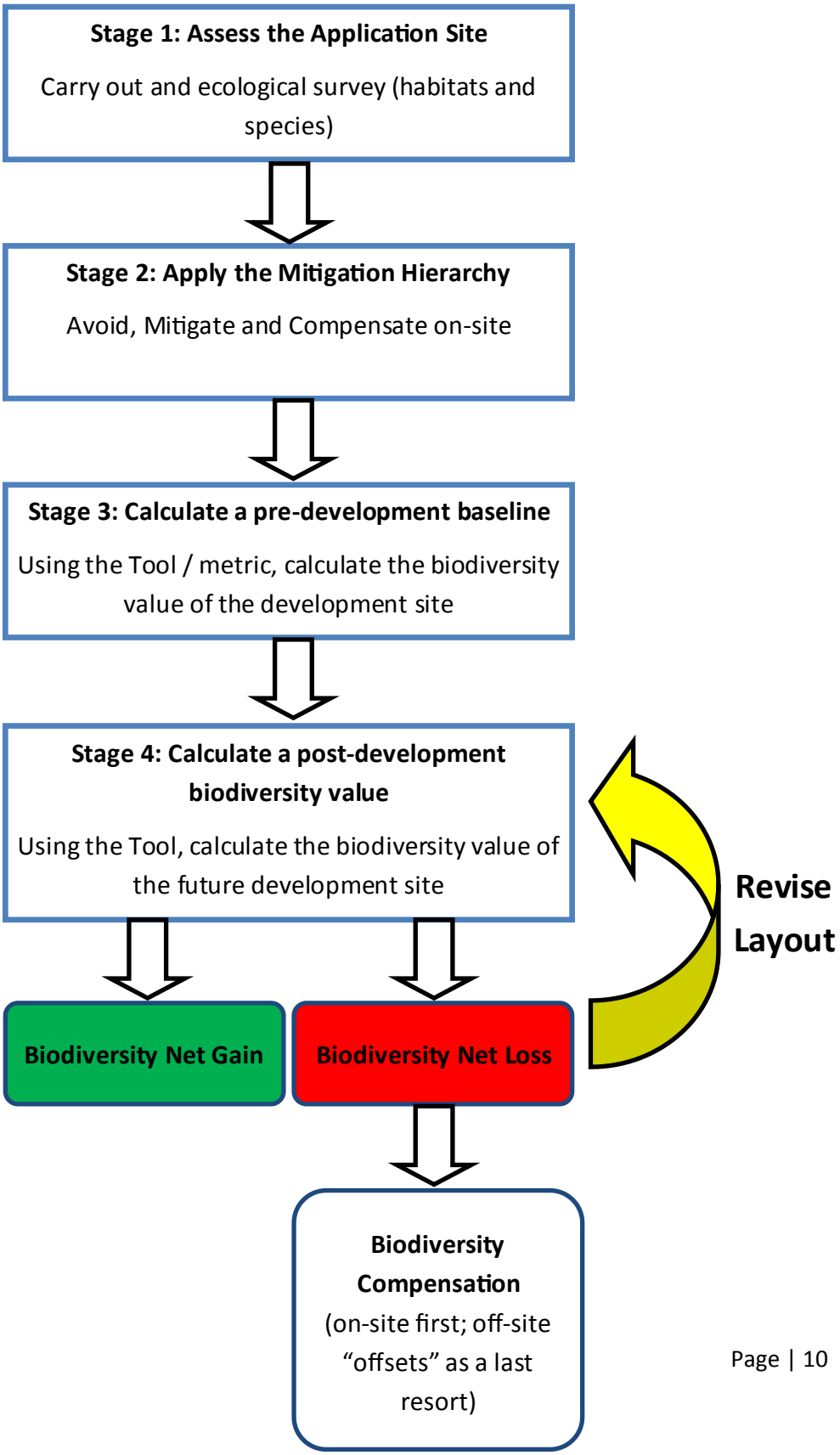
Figure 5: The Four Stages of the Biodiversity Accounting Process

The Biodiversity Accounting process consists of four basic stages, represented as follows:



How it works – overview of the Biodiversity Accounting Tool

The B&MKBAT is a spreadsheet where information is input about habitats on-site, and what is planned for habitats as a result of development. The tool applies formulae (based on the latest available Defra metric calculations and guidelines) to work out whether the plans for the habitats on-site result in an overall residual biodiversity gains or losses. The B&MBAT also includes separate assessments for hedgerows and rivers.

Overall, the tool works to calculate:

- The "units" of habitat required to ensure at least a 10% biodiversity gain compared with habitats impacted as a result of development;
- The length (in metres) of hedgerows that must be replaced, all of a "good" condition, if hedgerows are removed on-site; and
- Rivers impacts and compensation required.

For habitats - using the Biodiversity Accounting process allows a standardised formula to be used to calculate the overall biodiversity impact of a development. This "**residual habitat impact score"** is based on the condition and extent of habitats affected before development and after the proposed development. The tool also takes into account i) plans for current habitats to be retained, enhanced or lost, ii) the value of losses to habitats from indirect impacts of development, iii) proposed on-site mitigation (creation or enhancement) and iv) the required minimum percentage gain (10%).

If, after all opportunities on-site to avoid, mitigate and compensate have been exhausted (which may involve alternative designs), and the applicant's development still results in a residual loss, then compensation will be required to ensure at least a 10% biodiversity gain compared with current habitat value of the habitats affected (aspiring to 20% wherever possible).

The **Residual Habitat Impact Score is** expressed in Biodiversity "Units". The amount of compensation required must ensure that the development results in at least 10% more units of biodiversity than pre-development for the habitats affected.

Only where on-site opportunities are exhausted should off-site compensation be sought. The off-site compensation could be on land already owned by the applicant or elsewhere; and the nature of the compensation could be creating new habitat or by restoring current, degraded habitat.

For hedgerows – step 5, below, must be followed. Hedgerows (including those on the development boundary) should be retained on site. However, if they are removed, they must be replaced by a "good" condition hedgerow, of a length required depending on the condition of the hedgerow habitat lengths lost; and with either "medium" or "high" quality habitats, depending on those lost.

Rivers assessment follows a similar process to habitats (see step 6, below).

Figures 1, 3, 4 and 5 show how BNG is considered and implemented in the planning decision-making process, and emphasise the requirement of following the mitigation hierarchy. The steps outlined

below describe how the tool works in more detail. These steps need to be followed, using the B&MKBAT[11], to calculate if your planning application will have a positive (gain) or negative (loss) biodiversity impact.

Calculating a Biodiversity Impact - Positive or Negative

The B&MKBAT applies the steps outlined below using a specially-designed spreadsheet. The habitats assessment process is replicated at Figures 6a and 6b as examples, which cover steps 1-4 described below.

A more detailed guide of how to use the entire tool, and access to the tool itself, is provided on the NEP website[12].

ADVISORY NOTE: For larger minor or major applications or projects it is advised that an ecological consultancy is employed to carry out the assessment.

[11] Prior to the B&MKBAT being available, applicants are recommended to use the latest Warwickshire County Council Biodiversity Impact Assessment calculator[11] or the Natural England / Defra Metric 2.0.

[12] www.bucksmknepo/biodiversityaccounting

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Figure 6a: Indicative Image of the NEP Biodiversity Accounting Tool for Buckinghamshire and Milton Keynes – Steps 1 and 2

Buckinghamshire and Milton Keynes - Habitat Impact Assessment Calculator

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

Local Planning Authority:	Aylesbury Vale
Site name:	adb
Planning application reference number:	
Assessor:	
Date:	

Please fill in both tables
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 01926 418060

													Habitat Biodiversity Value					
		Existing habitats on site Please enter all habitats within the site boundary			**Habitat distinctiveness**		**Habitat condition**		**Spatial Factors**				**Habitats to be retained with no change within development**		**Habitats to be retained and enhanced within development**		**Habitats to be lost within development**	
Cf code	Target Note	Phase 1 habitat description	UK HabCode habitat description	*Habitat area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*connectivity*		*local plan*		*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Area (ha)*	*Current Habitat Value*
		Direct Impacts and retained habitats																
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
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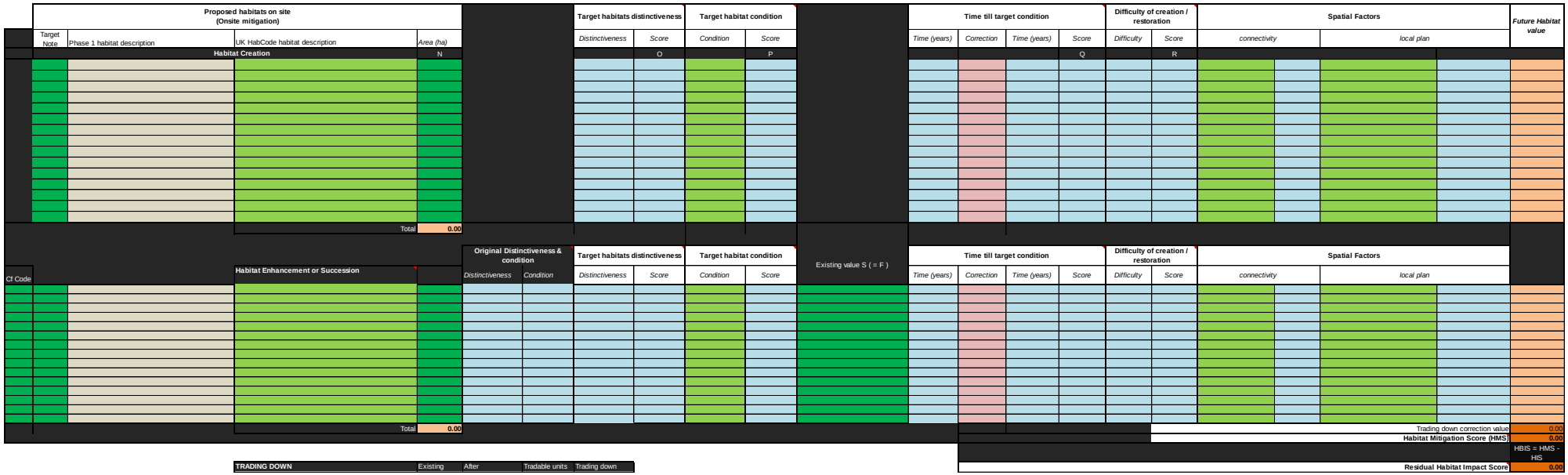
27																		
28																		
29																		
30																		
			Total	0.00								Total	0.00	0.00	0.00	0.00	0.00	0.00
																Site habitat biodiversity value		0.00
Before/after impact			**Indirect Negative Impacts** Including off site habitats	K									Value of loss from indirect impacts					
	Before																	
	After			0.00														
	Before																	
	After			0.00														
	Before																	
	After			0.00														
	Before																	
	After			0.00														
	Before															Habitat Impact Score (HIS)		0.00
	After			0.00												Replacement percentage		10%
			Total	0.00										0.00				
																Biodiversity Net Gain Target Score (BNGTS)		**0.00**

Figure 6b: Indicative Image of the NEP Biodiversity Accounting Tool for Buckinghamshire and Milton Keynes – Steps 3 and 4



Step 1 – Calculate Site Habitat Biodiversity Value and the Habitats Impact Score

(the biodiversity value of current habitats on-site taking into account what will be retained, enhanced or lost through development)

This involves the identification of all the habitats on-site and an assessment of their condition and ecological distinctiveness. The area of these habitats will need to be measured in hectares. This will also include land required for service provision (e.g. works compounds), or that may be subject to indirect impacts (e.g. the lighting of, or hydrological impacts on adjacent land).

In this step, areas that are to be 'retained' and areas to be 'retained and enhanced' within the development need to be recorded, as well as the area of habitat lost.

From this information each current habitat will have a "Current Habitat Value" that can be scored using the Biodiversity Accounting Tool – and measured in biodiversity "units". [13]

Current Habitat Value = Distinctiveness x Condition x Area (x spatial factor)

The tool adds together the current habitat value for all the habitats on-site, expressed as biodiversity "units", to give a site-wide habitat biodiversity value – the **site habitat biodiversity value**.

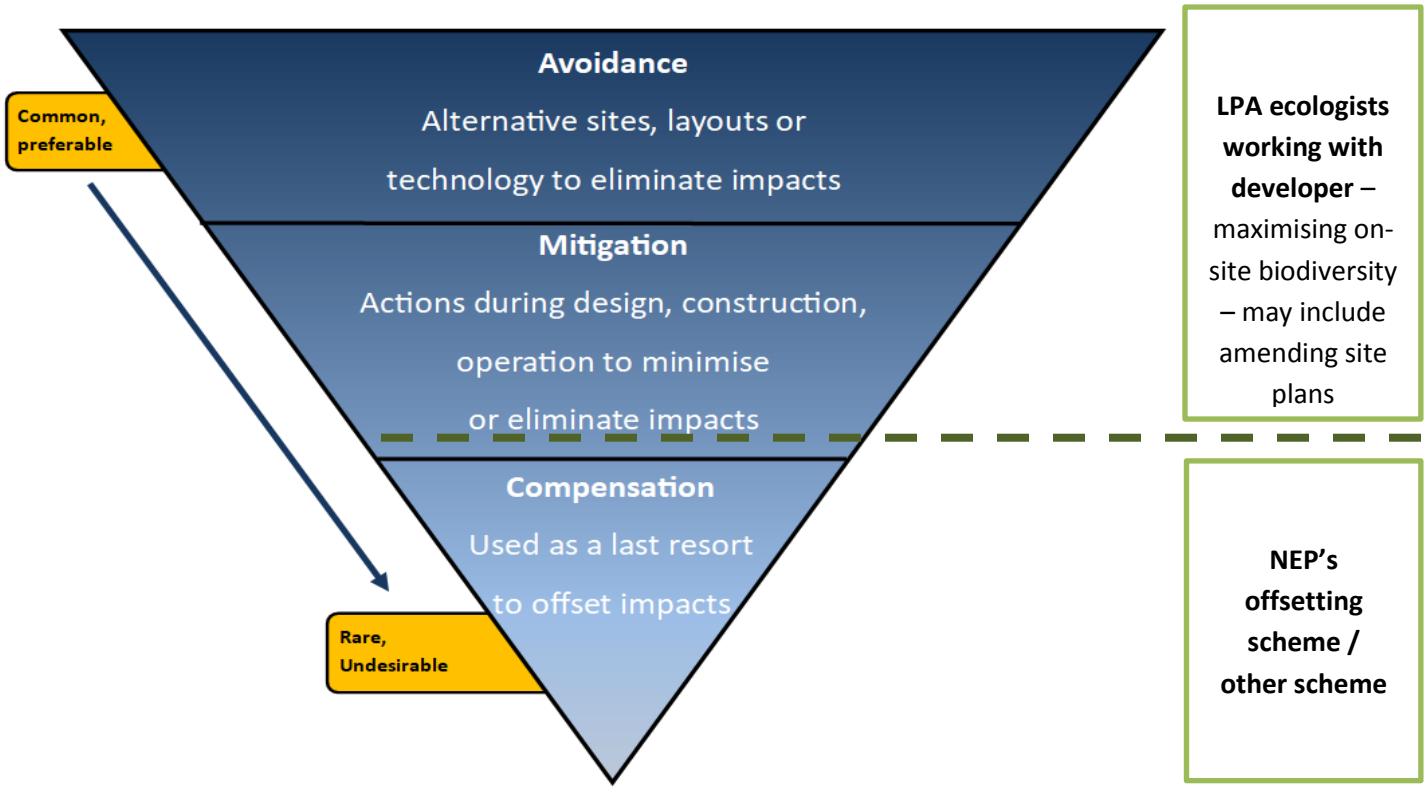
The losses to habitats as a result of indirect impacts are then also taken into account to produce an overall **Habitat Impact Score.**

Habitat Impact Score = ∑all current habitat values plus loss from indirect negative impacts

*ADVISORY NOTE: The tool will show valuable habitat that should be avoided and in so doing demonstrate whether there is compliance to **the Mitigation Hierarchy (Figure 7)** that is referenced in the NPPF and Local Plan Policies. For example, high distinctiveness habitat should be retained and enhanced. If it is to be lost it needs to be clearly justified within supporting documentation.*

[13] NB –the "Spatial factor" in the formula is an incentivising factor that promotes compensation to support sub-regional strategies – for example those lead by the NEP. Described below – see section "Sourcing a Biodiversity Accounting Scheme"

Figure 7: The Mitigation Hierarchy (adapted from RaymondSumoUniversity Online Learning and Bat Conservation Trust)



Step 2 – Ensuring Biodiversity Net Gain of at least 10% above the Habitat Impact Score

(identifying the Biodiversity Net Gain Target Score – what is required to achieve a minimum 10% gain)

A key principle of BNG is that the biodiversity compensation provided must produce habitats of measurably greater biodiversity value than that lost through the development. The existing "Forward to 2020" Buckinghamshire & Milton Keynes Local Biodiversity Action Plan (a key evidence base for all Core Strategies within the sub-region; as will be the new Biodiversity Action Plan from 2020 - 2030)[14], sets a target to increase the overall extent of Priority Habitat by 1070ha- equating overall to a 20% increase.

All Local Planning Authorities within Buckinghamshire and Milton Keynes, therefore, consider an **aspirational net gain increase or 'replacement percentage' to be 20% above the current habitat value.** However, until such time that a mandatory national net gain target is introduced, the Local Authorities **expects applications to deliver at least a 10% net gain[15]**. This is the minimum that would be expected.

[14] Biodiversity Action Plan: Forward to 2020 for Buckinghamshire and Milton Keynes (Buckinghamshire and Milton Keynes Natural Environment Partnership) Available at: https://bucksmknep.co.uk/projects/forward-to-2020-biodiversity-action/

[15] The 10% should be applied to / compared with the current habitat value – i.e. the existing habitats on-site within the red line boundary - until such time as further government guidance is released on this and becomes mandatory.

The replacement percentage may be increased if, for example, ecological networks must be maintained and/or to avoid fragmentation of important current habitats.

In the Tool, the replacement percentage biodiversity gain needed (10%) is added to the Habitat Impact Score to produce the **Biodiversity Net Gain Target Score.** This is the amount of biodiversity units needed to compensate for the anticipated impacts of the development on the on-site habitats, taking into account any habitats planned to be retained, enhanced or lost, and any indirect impacts on them. The Target Score is based on the minimum 10% gain required.

Biodiversity Net Gain Target Score = Habitat Impact Score + replacement percentage

ADVISORY NOTE: Early engagement with the Local Authority could be beneficial, either if you are unsure whether or your application will require an assessment or to a verify baseline value. This advice may be at a charge but may include advice on how to proceed that will reduce further delays and costs.

Step 3 – Calculate the Future Biodiversity Value of Habitats

(Taking account of proposed mitigation of habitats on-site, through creation or enhancement)

By using the final or indicative landscape plan, (after application of the mitigation hierarchy – see Figure 7) all future habitats are scored using the same process as Step 1, based on their target distinctiveness, condition score and area.

Additional 'factors' are included in the calculation of future habitat values to compensate for the difficulty of the creation / restoration and the time it will take for these habitats to be created or restored (temporal factor).[16]From this information a future biodiversity habitat value can be calculated for **each proposed habitat.**

Future Habitat Value = Distinctiveness x Condition x Area x Spatial x Temporal x Difficulty factors

For habitats identified for **retention and/or enhancement** in Step 1, their current habitat value will also need to be taken into consideration.

The Future Habitat Value for each proposed habitat type should then be summed together to calculate the expected total value in units of the future habitat. However, first **the principle of "No Trading Down" needs to be applied**. Trading down is when a lower distinctiveness habitat compensates for a higher distinctiveness habitat. This situation is avoided by applying a "Trading Down Correction Factor" whenever this happens.

[16] NB –the "Spatial factor" in the formula is an incentivising factor that promotes compensation to support sub-regional strategies – for example those lead by the NEP. Described below – see section "Sourcing a Biodiversity Accounting Scheme"

So the total **"Habitat Mitigation Score"** is **the sum of all future habitat values plus a trading down correction factor.**

Habitat Mitigation Score = ∑[Future Habitat Value] + Trading Down Correction Factor

ADVISORY NOTE: Landscape Plans must show all the ecological mitigation and compensation measures contained within the Biodiversity Accounting Tool or DEFRA metric. For Outline planning applications Future Habitat Values will be based on the indicative layout plan. This assessment will inform the wording of conditions or an obligation where it is likely that the actual losses will be calculated on the approval of reserve matter submissions plus mechanism to resolves any biodiversity loss to habitats.

Step 4 – Overall Biodiversity Impact

The final step, to identify the total habitat impact or the proposed development, is to work out whether the habitat mitigation score is greater or less than the biodiversity net gain target score.

Subtract the Biodiversity Net Gain Target Score from the Habitat Mitigation Score to calculate the

Residual Habitat Impact Score = Habitat Mitigation Score - Biodiversity Net Gain Target Score

Residual Habitat Impact Score for the site.

- A **positive figure/unit** illustrates a **Net Biodiversity Gain**,
- whereas a **negative figure/ unit** illustrates a **Net Biodiversity Loss**.

ADVISORY NOTE: The Biodiversity Accounting Tool should be used to inform how the development will proceed. It details which habitat will be protected and managed during construction, and how it will be managed into the future. It forms part of any Construction Environmental Management Plan (CEMP) and Landscape & Ecology Management Plan (LEMP) (or equivalent) conditions. Therefore, it is important for it to be as realistic as possible.

Step 5 – Hedgerow Assessment

Hedgerows are a very important feature of the English countryside and **should be retained on development sites wherever possible**. Their contribution, by area, to biodiversity in the landscape is far greater than even the most biodiversity rich habitats.

However, if a development results in the loss of hedgerows, **that loss will need to be compensated for with like-for-like habitat – i.e. that involves hedgerows**.

Given their importance, hedgerows cannot simply be treated as just another habitat within the Biodiversity Accounting Process Steps 1 to 4. Applicants are required to employ the NEP Hedgerow Assessment within the B&MKBAT, and not the draft Defra Hedgerow Assessment Tool proposed in their test metric 2.0. The NEP's assessment methodology is simpler and is considered by local experts to provide a better compensation for lost hedgerows than is calculated with the Defra tool.

It is also considered that **the only appropriate offset projects for hedgerows lost should be creation** (i.e. planting new hedges) – the replacement or "compensation" hedgerow. This is due to the complexity of defining restoration and assigning metres of offset requirement to hedgerow restoration work.

Subject to the hedgerow regulations[17] (which set out criteria for determining "important" hedgerows, permitted works and offences, when a hedgerow should be retained and when it could be removed) requirements relating to hedgerow replacement as a result of hedgerows affected by development are to be measured in metres, rather than in biodiversity units.

ADVISORY NOTE: Hedgerows and linear features can provide the linkages between habitat blocks and are essential for a functioning Green infrastructure. If these linkages are broken by the development, then the development may be refused despite an overall net gain being achieved.

As with other habitats, **an assessment of the quality (condition) of the hedgerows impacted by development is required. This includes the development boundary too.** The condition of the hedgerow lost will affect the compensation length requirement, which is calculated by using a simple multiplier, as shown in Table 1 below.

Table 1: Multiplier showing the lengths of compensation hedgerow required for different conditions of hedgerow lost

Condition of hedgerow lost	Multiplier applied
Good	3
Moderate	2
Poor	1

(NB – The hedgerow lost includes any on the development boundary)

[17] Hedgerow Regulations (HMG, 1997) http://www.legislation.gov.uk/uksi/1997/1160/contents/made

All hedgerows created as compensation must be of a higher quality than that lost, in order for them to qualify as a compensatory hedge. In other words, and in line with Defra rules on trading down, a lower value hedgerow cannot compensate for a higher-valued one lost to the development.

An assessment of the distinctiveness (value) of the hedgerows affected by development is also required - to ensure that any compensation hedgerow length is either of medium or high quality and there is no "trading down". (See Table 2)

Table 2: Matching the habitat lost to the habitat to be provided - distinctiveness of hedgerows lost are taken into account to ensure no "trading down" in the compensation length.

Distinctiveness of hedgerow lost	Distinctiveness of compensation hedgerow
High	High – and usually the same habitat type
Medium	Medium or High
Low	Medium or High

(NB – The hedgerow lost includes any on the development boundary)

The methodology for hedgerow creation as a result of hedgerow loss is therefore:

i) For each hedgerow habitat on the proposed site, including the development boundary, note the length (metres), condition (good, moderate or poor) and distinctiveness (high, medium or low quality).

ii) Identify the lengths, distinctiveness and condition of future (post-development) hedgerow features on the site – i.e. those created or retained.

iii) The overall offset requirement length to be created depends on the condition of the hedgerow lengths of habitat lost (Table 1). So, losing, say, 50m of poor condition hedgerow means that 50m x 1 = 50m of hedgerow should be replanted. And losing 50m of good condition hedgerow means 50 x 3 = 150m of replacement hedgerow should be planted.

iv) All replacement lengths of hedgerow must all be of higher quality than those lost. The "no trading down" principle is applied according to the distinctiveness of the hedgerows lost. All compensation lengths will be of medium or high quality according to what was lost.

The B&MKBAT applies this methodology. It takes into account the length, condition and quality (distinctiveness) of hedgerows affected by development, and the condition and distinctiveness of any future hedgerows planned for the site (e.g. retained features and those created). It then calculates the required length of good condition hedgerow that must be created to compensate for the losses and employs the "no trading down" principle to ensure the quality of hedgerow being created is at least medium or high.

Although this describes how hedgerows should be dealt with, **the approach also applies to other woody linear features such as rows of trees.**

Step 6 –Rivers

River impacts are calculated using similar formulae to that of habitats as outlined in the BIA steps 1 to 4, however they are measured in kilometres. The factors that influence the Distinctiveness, Condition and kilometre values are Time to Target Condition, Difficulty to Create, Strategic influences, and Riparian Encroachment.

Step 7 – Overall Biodiversity Net Gain – Is Compensation Required?

If the Residual Habitat Impact Score and/or the Hedgerow Impact Score are still negative (loss), despite following attempts to revise a proposal to avoid and mitigate /compensate for impacts on-site according to the mitigation hierarchy (see Figure 7), **then offsite Biodiversity Compensation ("offsets") will be required.**

To compensate for the losses, one or more Biodiversity Accounting "Schemes" (biodiversity offset projects) will be required to be delivered - either through a planning condition or obligation. These schemes must deliver biodiversity units equivalent to a 10% net gain, and ideally be of the same habitat type as that / those lost.

This offsite compensation can be achieved by either one or both of the following mechanisms:

I. The applicant sources a Biodiversity Accounting Scheme – for example the NEP's[18]; and/or

II. The applicant makes a financial contribution to the Local Planning Authority or another who undertakes Biodiversity Accounting activities on behalf of the developer

ADVISORY NOTE: The development's impact can be significantly altered by "greening" layouts, making enhancements to unused land or using green roofs.

Sourcing a Biodiversity Accounting Scheme

Before a Biodiversity Accounting Scheme can commence, the existing baseline habitats on the land intended for compensation will need to be valued in biodiversity units by undertaking a Biodiversity Impact Assessment (BIA), using a similar method outlined in Steps 1 to 4 above. In addition to this BIA, a Spatial Factor will be included.

The Spatial Factor is an incentivising factor that promotes compensation to support sub-regional strategies – for example those lead by the NEP such as focussing efforts in Biodiversity Opportunity Areas and other strategic sites. These can be found on the NEP webpages[19].

[18] See www.bucksmknep.co.uk/biodiversityaccounting for details

[19] See www.bucksmknep.co.uk/biodiversityaccounting for details

Providers of the scheme are landowners who have land available for habitat restoration or creation. The NEP or a broker company may have Biodiversity Accounting Schemes or approved mechanisms that match development losses.

ADVISORY NOTE: The ultimate decision regarding whether the proposed compensation is acceptable or not lies with the local planning authority. Developers should consult with the relevant local planning authority early in the process when securing a receptor site to check its suitability.

Use of the Buckinghamshire and Milton Keynes Natural Environment Partnership (NEP), to arrange the schemes, is preferred.

However, in cases where compensation is arranged through a third party broker, the NEP will require an additional 10% Reporting Fee[20], payable to the Local Planning Authority. This fee is to keep a register of compensation sites, monitor their progress, and ensure the NEP can monitor sub-regional priorities that have been adopted by this authority. The Local Authorities may also use this information in their Annual Monitoring Report to measure the effectiveness of their Biodiversity Net Gain policies.

Compensation sites will need to meet the standards outlined on the NEP website[21] and will be secured by condition or legal agreement associated with any planning consent.

Proposals for off-site compensation measures, collectively referred to as a Biodiversity Accounting Scheme, will require:

a) A methodology for the identification of any receptor site(s) for accounting measures;

b) The identification of any such receptor site(s);

c) The provision of arrangements to secure the delivery of any compensation measures (including a timetable for their delivery); and

d) A Biodiversity Accounting Management and Monitoring Plan (BAMMP) including details of the provision and maintenance of any compensation measures.

Collectively, these are referred to as a **Biodiversity Accounting Scheme**. More information can be found on the NEP website.

ADVISORY NOTE: The BAMMP is the evidence that the Biodiversity Impact caused by the development will be compensated, and that a Biodiversity Net Gain will be achieved. Assurances to this effect should be provided to the local planning authority as part of planning application. It may take some time to prepare this evidence, as ecological surveys are often seasonal. It is therefore important not to leave producing a BAMMP until the last minute.

promised net gains, and formal reporting over 30 years.

[21] See www.bucksmknep.co.uk/biodiversityaccounting for details

Biodiversity net gains should be secured for the lifetime of the impacts of the development. Under the NEP Scheme, the priority for offsets, therefore, will be on already-owned land (e.g. by local authorities or willing landowners) or land purchased to secure net gains for the lifetime of the impacts of the development[22].

Biodiversity Financial Contribution

Should a developer wish not to arrange their own biodiversity offset project(s), either on their own site or on a brokered site, then the Local Authorities, in partnership with the NEP, operate an alternative option - a **financial payment option - known as a Biodiversity Financial Contribution.**

This is where developers pay a contribution, under full cost recovery, for the NEP to organise the required biodiversity accounting schemes, monitor their progress towards meeting the required units of biodiversity gain, take action where necessary to ensure the gains are achieved, and to formally report on their progress.

The **Biodiversity Financial Contribution is index-linked and is the sum total of the following three components:**

1. A **Biodiversity Accounting Payment (BAP)-** this is the cost of the offset

BAP = Set-up Cost + Habitat Creation Cost + (Management Cost^30)[23]

2. A **Contingency Payment (CP)** – at 10% of the Biodiversity Accounting Payment (Insurance Fund)

CP = Biodiversity Accounting Payment X 0.1

3. An **index linked Management Payment (MP)** – at 20% of the Biodiversity Accounting Payment (Management and Monitoring Fund)

MP = Biodiversity Accounting Payment^30 X 0.2

[22] NB - The current Government proposed text for the Environment Act states that a site's enhancement must be maintained for at least 30 years after completion of a development, which also accords to the length of compensation required under the Hedgerow Regulations 2007, Section 8.4b. The Government's response to the net gain consultation states that "*…in practice, a thirty year minimum can sometimes amount to funding in perpetuity if the funds for 30 years are invested prudently*". The NEP's scheme requires both on-site and off-site biodiversity net gains to be maintained for the lifetime of the impacts of the development, in line with the BNG Good Practice Principles and the underlying intentions of the Government's emerging policy.

[23] Cumulative indexation for a 30-year management period.

So, overall,

Biodiversity Financial Contribution = BAP + CP + MP

The NEP webpages[24] include a financial calculator that can be used to determine the Biodiversity Financial Contribution.

This **Biodiversity Financial Contribution** will be made payable to the Local Authorities in accordance with the planning condition or legal agreement. On receipt of the agreed sum, monies will be transferred to the NEP, which will distribute them into three funds, based on full cost recovery principles. These funds will be spent as set out below.

- **Biodiversity Accounting Fund**

  The NEP will use this fund to arrange one or more providers to compensate for the loss associated with the development. While the preference is to use the NEP's scheme this could be arranged through a broker, or a separate legal agreement arranged by a lead Local Authority. These arrangements will be detailed within a legal agreement, in accordance with an approved Biodiversity Accounting Management and Monitoring Plan.

- **Contingency Fund**

  This fund will be formed from the pooling of the individual contingency payments and will be used to secure additional biodiversity enhancements or other ecological projects that enhance biodiversity. These enhancements will compensate for Biodiversity Accounting Schemes that do not fulfil their ecological objectives.

- **Management and Monitoring Fund**

  This fund will cover the costs associated with collecting data, managing databases, strategic mapping, supporting the NEP's Expert Panel, to be used to determine where best to locate offsets based on supply of units and meeting agreed biodiversity priorities, for sample on-site monitoring and formal reporting of scheme progress. It will also cover distribution of all three funds where necessary.

Further information on how the NEP's scheme works is available on the NEP website[25], including the process for how its Expert Panel will determine how the Biodiversity accounting fund is spent, and the selection criteria to be taken into account by that Panel in selecting suitable offset sites (including, for example, that biodiversity accounting schemes must be located as close as possible to the area of loss, contribute to local biodiversity priorities as set out in the NEP's Biodiversity Action Plan and strategic mapping).
A "how to" guide for applying biodiversity accounting is also provided on the NEP website.

[24] www.bucksmknep.co.uk/biodiversityaccounting
[25] See www.bucksmknep.co.uk/biodiversityaccounting

Glossary

Biodiversity Accounting Tool	An excel spreadsheet tool used to calculate the habitat biodiversity impact of a development.
Biodiversity Accounting Payment (BAP)	The element of a financial contribution that covers the costs to find, establish and pay for the management of a Biodiversity Accounting Scheme.
Biodiversity Accounting Scheme	A scheme that will deliver biodiversity enhancements that shall not be less than the Residual Habitat Impact Score.
Biodiversity Financial Contribution	The contribution due by the developer for a specific Biodiversity Accounting Scheme.
Biodiversity Impact Assessment (BIA)	The process of evaluating the habitat biodiversity impact of a development.
Baseline Value	Biodiversity value of the current habitat on the offset site in Biodiversity Units.
Biodiversity Loss	A negative Biodiversity Unit score.
Biodiversity offset broker	These intermediary players can support the biodiversity offset system by registering potential offset sites and matching them to the needs of the developers and local planning authorities. They can also facilitate the development of offset arrangements on new land.
Biodiversity Units	A measure of the biodiversity loss or gain calculated as the product of the area, condition and distinctiveness of the habitat lost.
Condition	The state of habitat, which includes their physical, chemical, and biological characteristics.
Construction and Environmental Management Plan (CEMP)	A condition placed on an approved planning application to secure nature conservation during the construction phase of the development.
Contingency Payment (CP)	The element of a financial contribution that will be used to secure additional biodiversity enhancements should any Biodiversity Accounting Schemes not fulfil their ecological objectives.
Current Habitat Value	Is the Distinctiveness x Condition x Area (x Spatial Factor).

Distinctiveness	A collective measure of biodiversity and includes parameters such as species richness, diversity, rarity and the degree to which a habitat supports species rarely found in other habitats.
Ecosystem Services	Our health and wellbeing depend upon the services provided by ecosystems and their components: water, soil, nutrients and organisms. Ecosystem services are processes by which the environment produces resources utilised by humans, such as clean air, water, food, and materials.
Habitat Mitigation Score (HMS)	∑[Future Habitat Value] + Trading Down Correction Value.
Landscape and Ecology Management Plan (LEMP)	A condition placed on an approved planning application to secure nature conservation after the construction phase of the development has finished
Management and monitoring Payment (MP)	The element of a financial contribution that and will be used to cover the costs associated with collecting data, managing, monitoring, reporting and regulating the progress of Biodiversity Accounting Schemes.
Priority Habitats and Species	Species and habitats published in the UK Biodiversity Action Plan as conservation priorities which are under threat because of their rarity and rate of decline. Those found in England continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework as habitats and species of principal importance.
Receptor Site	The land where the Biodiversity Accounting Scheme will be delivered.
Residual Habitat Impact Score	The total number of biodiversity units necessary to account for the biodiversity impacts from the development.
Risk Factors	Include delivery risk, spatial risk and temporal risk. These are multipliers within the metric calculation that help manage ecological risks associated with offset delivery.
Target Habitat	The habitat to be created or enhanced by the proposed offset.
Trading Down	Lower Distinctiveness habitat cannot compensate for Higher Distinctiveness habitat, were this to happen it would be termed as ‘trading down’.

Acronyms

BAMMP	Biodiversity Accounting Management and Monitoring Plan
BAP	Biodiversity Accounting Payment
BIA	Biodiversity Impact Assessment
B&MK BAT	Buckinghamshire and Milton Keynes Biodiversity Accounting Tool
BNG	Biodiversity Net Gain
BNGTS	Biodiversity Net Gain Target Score
CBD	Convention on Biological Diversity
CEMP	Construction and Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CP	Contingency Payment
HMS	Habitat Mitigation Score
HIS	Habitat Impact Score
IEMA	Institute of Environmental Management and Assessment
LEMP	Landscape and Ecology Management Plan
MP	Management Payment
NEP	Buckinghamshire and Milton Keynes Natural Environment Partnership
NPPF	National Policy Planning Framework
SPD	Supplementary Planning Document

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Biodiversity Net Gain and Local Nature Recovery Strategies - Impact Assessment https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/839610/net-gain-ia.pdf

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Buckinghamshire Green Infrastructure Delivery Plan, (NEP,2013) Available at: http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwiO5snN2ZTnAhWyVBUIHZlVAcYQFjAAegQIBRAB&url=http%3A%2F%2Fwww.chiltern.gov.uk%2Fmedia%2F5014%2FBuckinghamshire-Green-Infrastructure-Delivery-Plan-Buckinghamshire-and-Milton-Keynes-Natural-Environment-Partnership-August-2013-%2Fpdf%2F5326-Bucks-GI-Delivery-Plan-FINAL-ISSUE_2013_08_07_low_res.pdf%3Fm%3D635877761809270000&usg=AOvVaw3TDdtzsFEze-oBtn_Kz07c

The Business and Biodiversity Offsets Program (BBOP) is a partnership between companies, governments and conservation experts to explore biodiversity offsets. http://bbop.forest-trends.org/

Defra Guidance for Developers 2012 http://www.defra.gov.uk/publications/files/pb13743-bio-guide-developers.pdf

Defra Guidance for Offset Providers http://www.defra.gov.uk/publications/files/pb13742-bio-guide-offset-providers.pdf

Guidance for Developer and Guidance for Offset Providers - Appendix 1 http://archive.defra.gov.uk/environment/biodiversity/offsetting/documents/1204-bio-offset-pilot-appendix.pdf

Hedgerow Regulations http://www.legislation.gov.uk/uksi/1997/1160/contents/made

Information for Local Authorities http://www.defra.gov.uk/publications/files/pb13744-bio-local-authority-info-note.pdf

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Making Space for Nature, John Lawton, 2010 http://www.official-documents.gov.uk/document/cm80/8082/8082.asp

Vision and Principles for the Improvement of Green Infrastructure in Buckinghamshire and Milton Keynes, (Buckinghamshire and Milton Keynes Natural Environment Partnership, 2016) Available here: https://bucksmknep.co.uk/projects/vision-and-principles-for-the-improvement-of-green-infrastructure/

Warwickshire County Council Biodiversity Impact Assessment calculator (latest version available here: https://www.warwickshire.gov.uk/biodiversityoffsetting)

APPENDIX A – Biodiversity Accounting and the Community Infrastructure Levy – Legal Position

The Council believes that the obligation can satisfy the tests in Regulation 122 because, there is agreement that it is necessary to have in place measures to ensure that the development should not result in a net biodiversity loss. Because the developer has the freedom to achieve this through on-site and/or off-site measures at its election, with resort to a contribution only if it so chooses or other measures have failed, it does not exceed what is necessary. The measures are directly related to the development because they concern the mitigation or offsetting of its impacts on biodiversity and they are reasonably and fairly related because they use a recognised methodology based on objective evidence to calculate those impacts and compare them with the proposed response to achieve equivalence.

We consider Regulation 123 to be irrelevant because biodiversity offsetting measures do not involve the provision of "infrastructure" within the meaning of section 216 of the Planning Act 2008. Defra have stated that "*biodiversity offsets should not be classed as infrastructure because they do not enable the development to function, nor do they provide any facility for those living within or using the new development.* ***There are also practical reasons which make funding biodiversity offsets through CIL inappropriate compared to case-by-case Section 106 agreements.*** *However, the Department for Communities and Local Government lead on the CIL policy and they advise: "that it is difficult to be definitive about what does and doesn't fall into the definition of infrastructure. Section 216 (2) of the Planning Act 2008 sets out what infrastructure includes but is not a definitive or exhaustive list. In the past when this has been raised by other authorities in respect of other types of infrastructure, we have advised the authority to seek their own legal advice on how something should be funded through developer contributions. The advice would be the same here*". (Defra, pers. comm. to Warwickshire County Council, 2015).

An example of an offsetting project would be the creation of a woodland, typically not open to the public, to provide a habitat for flora and fauna. Such projects are not within or ejusdem generis with the types of infrastructure listed in section 216 and reference to the dictionary indicates that defining characteristic of "infrastructure" is that it supports human (rather than animal or plant) activity.

It is not necessary to take a purposive approach to defend this interpretation but, if a purposive approach were taken, **it would reinforce the case that biodiversity offsetting projects are not infrastructure.** This is because biodiversity offsetting is practically impossible to include in infrastructure delivery plans as the amount, type and cost likely to be required in an area cannot be determined until the detail of specific development proposals have been supplied and assessed. Similarly, there are considerable practical difficulties in identifying at the time of preparing a planning obligation the specific offsetting project that would be implemented**. In consequence, the community infrastructure levy is not a funding mechanism that is appropriate, or even capable, of providing satisfactorily for such projects and so an interpretation of "infrastructure" which avoids its application is consistent with the purposes of that regime.**

Appendix 5263/AB12:

Milton Keynes Council Ecologist Consultation Response

(05 February 2020)

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PublicAccessEDRMS

From: Buckley, David
Sent: 13 March 2020 09:01
To: Buckley, David
Subject: 19/01818/OUT South Caldecotte- Ecology- Update

From: Evans, Diane
Sent: 05 February 2020 19:37
To: Buckley, David
Cc: Palmer, Jonathan; Hine, Sarah
Subject: RE: 19/01818/OUT South Caldecotte- Ecology- Update

These comments relate specifically to the Lowland Meadow habitat and inappropriate use of the submitted BIA metric which renders it unacceptable.

- The agent twice states that the proposal complies with the mitigation hierarchy. However, I am unable to find evidence of this in their submission. It is the developer's responsibility to furnish the LPA with proof that the mitigation hierarchy process has been fully engaged with before opting for off-site biodiversity offsetting.
- The BIA metric submitted in support of the proposal is unacceptable. Although the BIA metric contains a Lowland Meadow classification, the developer's ecologist has chosen to classify the area of Lowland Meadow as "Grassland – Other Neutral Grassland" which is incorrect. The submitted BIA also states that this area of priority habitat is of low strategic significance, which I believe is incorrect as priority habitats are covered in Plan:MK policy NE2:b, NPPF 174:b and Natural Environment Guidance: paragraph 024.
- However, if the correct habitat classification of poor condition Lowland Meadow is entered into the metric, the calculator states **"Any Loss is Unacceptable".** It is not the prerogative of the developer to down-grade a habitat classified as a priority habitat and manipulate the BIA metric in order to generate the result they desire.

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Appendix 5263/AB13:

DEFRA Biodiversity Impact Assessment Calculator V2.0

AB13(a) Technical Supplement

AB13(b) User Guide

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AB13(a) Technical Supplement

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Natural England Joint Publication JP029

The Biodiversity Metric 2.0

auditing and accounting for biodiversity

TECHNICAL SUPPLEMENT

Beta Edition

First published 29th July 2019

NATURAL ENGLAND

www.gov.uk/natural-england

Contents

Introduction

0.1 The **biodiversity metric 2.0 technical supplement** provides technical resources to support data collection, condition assessment and further detail about the metric.

0.2 We recognise that not all users of biodiversity metric 2.0 will want or need this level of technical detail for everyday use. But for those that that need to apply the metric in detail the technical supplement will be a key resource.

0.3 This document provides the detailed data tables used in the calculation tool; methodological reference sheets for assessing area habitat condition; a digest of the considerations that have informed the values presented in these sections, and additional relevant information on topics such as connectivity.

Part 1a - Habitat Condition

Scope

1.1 This section explains how to assess the 'condition' of Area Habitats.

1.2 The detailed methodology for assessing condition of habitats within the supplementary modules to the metric (currently hedgerows and lines of trees and rivers and ditches) are provided separately in chapter 7 of the User Guide, but are largely repeated here in parts 1 b and c for convenience

Introduction

1.3 Biodiversity metric 2.0, like the original Defra biodiversity metric, uses the term habitat 'condition' as one of its measures of the quality of a habitat. The 'condition' component of quality measures the biological 'working-order' of a habitat type judged against the perceived ecological optimum state for that particular habitat. It is – therefore – a means of measuring variation in quality of patches of the same habitat type (i.e. an 'intra-habitat' quality measure) rather than a measure of quality between habitat types (i.e. an 'inter-habitat' quality measure) – which is assessed through the 'distinctiveness' of habitats.

1.4 So, for example, you might have a high distinctiveness grassland habitat that is lacking in important structural components of the sward and may have become dominated by tussock forming grass species. Because this patch of habitat is not in the optimum 'working order' for this particular grassland type it will be classified as being in 'Moderate' or 'Poor' condition, depending on how far from optimum it is judged to be.

1.5 The process of assessing habitat condition considers how many of the key physical characteristics and typical species of a particular habitat type are present in a habitat patch. For example, if a grassland has some of the grass species typically found in a sward but few of the flowering plants, its condition is poor relative to a patch of grassland that has all the expected species richness of grasses and flowering plants.

1.6 To support the use of biodiversity metric 2.0 'Condition Sheets' are provided for each area habitat type. These list positive indicators for each habitat, and indicate how many of these indicators need to be present to meet certain thresholds of condition.

Choosing the right area habitat condition sheet

1.7 Table TS1-1 lists the habitat condition sheets that are available and indicates which sheet should be used for each Area Habitat type.

Format of area habitat condition sheets

1.8 Condition sheets are either specific to a particular habitat type or cover a wider range of habitat types within a broad habitat category[1]. More detailed ecological input will be required when using a condition sheet for a broader habitat category to

[1] We have used an adapted version of the Broad Habitat Categories defined by the JNCC at: http://jncc.defra.gov.uk/page-4261

judge the state of a habitat patch relative to the optimum ecological state that is potentially possible for a habitat in this category.

1.9 The condition sheets have been split into a number of sections.

- **Habitat Description**: a description of the habitat type and contextual information to aid the assessment.
- **Condition Assessment Criteria:** the criteria describe what components need to be present for the habitat to be judged to be of good quality. These features may be specific to a particular habitat but in most cases are general to all habitats within the broad groupings. The condition assessment describes the scores that a high, medium or low quality habitat will need to achieve to fit in this category.

1.10 Condition sheets list commonly encountered undesirable species that are relevant to the condition assessment. The lists are not exhaustive and expert judgement by the ecological surveyor will be needed to assess whether other undesirable species are present.

1.11 For certain habitats a condition assessment is not required and a condition score is pre-assigned in the metric. These tend to be habitats that are intensively managed i.e. croplands or artificial e.g. green roof, and have a narrow biodiversity niche.

TABLE TS1-1: Choosing the appropriate condition sheet

How to use: Locate the relevant habitat in column 1 of the table and then refer to column 2 to find out which habitat Condition Sheet should be used for data collection. The Condition Sheets are provided in the next section of this document. Please note the following important points:

- Certain habitats are allocated a fixed condition score and do not need their condition assessed. These are marked '*No assessment required*'.
- The condition assessment of habitats covered by Supplementary modules are explained in the relevant sections of the User Guidance and parts 1b and c..
- Habitats Descriptions in **bold** are Priority Habitats (including Annex 1)

Habitat Description	Condition Sheet to use	Notes
Cropland - Arable field margins cultivated annually	No assessment required	Allocated a score of 1
Cropland - Arable field margins game bird mix	No assessment required	Allocated a score of 1
Cropland - Arable field margins pollen & nectar	No assessment required	Allocated a score of 1
Cropland - Arable field margins tussocky	No assessment required	Allocated a score of 1
Cropland - Cereal crops	No assessment required	Allocated a score of 1
Cropland - Cereal crops other	No assessment required	Allocated a score of 1
Cropland - Cereal crops winter stubble	No assessment required	Allocated a score of 1
Cropland - Horticulture	No assessment required	Allocated a score of 1
Cropland - Intensive orchards	No assessment required	Allocated a score of 1
Cropland - Non-cereal crops	No assessment required	Allocated a score of 1
Cropland - Temporary grass and clover leys	No assessment required	Allocated a score of 1
Cropland - Traditional orchards	Orchard	
Grassland - Bracken	Scrub	
Grassland – Floodplain Wetland Mosaic (previously Coastal floodplain Grazing Marsh)	Wetland, unless associated with a species rich grassland sward	See *Additional Information* on individual habitats section
Grassland - Lowland calcareous grassland	Grassland	
Grassland - Lowland dry acid grassland	Grassland	
Grassland - Lowland meadows	Grassland	
Grassland - Modified grassland	Grassland	

Grassland - Other lowland acid grassland	Grassland	
Grassland - Other neutral grassland	Grassland	
Grassland - Tall herb communities	Grassland	
Grassland - Upland acid grassland	Grassland	
Grassland - Upland calcareous grassland	Grassland	
Grassland - Upland hay meadows	Grassland	
Heathland and shrub - Blackthorn scrub	Scrub	
Heathland and shrub - Bramble scrub	Scrub	
Heathland and shrub - Gorse scrub	Scrub	
Heathland and shrub - Hawthorn scrub	Scrub	
Heathland and shrub - Hazel scrub	Scrub	
Heathland and shrub - Lowland Heathland	Heathland	
Heathland and shrub - Mixed scrub	Scrub	
Heathland and shrub - Mountain heaths and willow scrub	Heathland	
Heathland and shrub - Rhododendron scrub	No assessment required	Allocated a score of 1
Heathland and shrub - Sea buckthorn scrub	Scrub	
Heathland and shrub - Sea buckthorn scrub (non- priority habitat)	Scrub	
Heathland and shrub - Upland Heathland	Heathland	
Lakes - Aquifer fed naturally fluctuating water bodies	Lakes	Refer to Lakes Types section
Lakes - High alkalinity lakes	Lakes	Refer to Lakes Types section
Lakes - Moderate alkalinity lakes	Lakes	Refer to Lakes Types section

Condition Table Grassland Habitat Types

Habitat Description

- Includes both agricultural, recreational, amenity, road verges and semi-natural grassland types including Priority Habitat Grasslands on all soil types.
- Will be dominated by grassland species with very little (if any) dwarf shrub, wetland or wooded species within the sward.
- Will exist above and below the level of enclosure at all altitudes.

Condition Assessment Criteria

1. The area is clearly and easily recognisable as a good example of this type of habitat and there is little difference between what is described in the relevant habitat classifications and what is visible on site.
2. The appearance and composition of the vegetation on site should very closely match the characteristics for the specific Priority Habitat [i.e as described by either the Phase 1 Habitat Classification or the UK Habitat Classification], with species typical of the habitat representing a significant majority of the vegetation.
3. Wildflowers, sedges and indicator species for the specific Priority grassland habitat are very clearly and easily visible throughout the sward and occur at high densities in high frequency. See relevant Habitat Classification for details of indicator species for specific habitat.
4. Undesirable species and physical damage is below 5% cover.
5. Cover of bare ground greater than 10% (including localised areas, for example, rabbit warrens).
6. Cover of bracken less than 20% and cover of scrub and bramble less than 5%.

Condition	Assessment Criteria	Score
Good	• Species-rich Grassland of all Priority Habitat Types. Of high to moderate quality. • Wildflower and sedges above 30% excluding white clover *Trifolium repens*, creeping buttercup *Ranunculus repens* and injurious weeds. • Meets all the condition criteria with only minor variation. • None of the indicators of poor condition are present (4, 5 & 6).	3
Moderate	• Semi-improved grassland occurs on a wide range of soils and may be derived from higher quality Priority Habitat grassland habitats in poor condition. Often as they deteriorate following nutrient inputs. Typical grasses include: cock's-foot, common bent, creeping bent, crested dog's-tail, false oat-grass, meadow fescue, meadow foxtail, red fescue, sweet vernal grass, Timothy, tufted hair-grass and Yorkshire-fog. • Total cover of wildflowers and sedges less than 30%, excluding white clover, creeping buttercup and injurious weeds. • Rye-grass cover is less than 25% including amenity grasslands. • OR clearly fails at least 1 of the condition criteria. • OR The grassland type has some differences between what is described in the relevant habitat classifications and what is visible on site. It is a Lower Quality Priority Habitat, but clearly recognisable as such.	2

	• Potentially restorable to grassland Priority Habitat with improved management. • Cover of undesirable species at 5- 15%.	
Poor	• Agricultural grasslands is characterised by vegetation dominated by a few fast-growing grasses on fertile, neutral soils. It is frequently characterised by an abundance of rye-grass *Lolium* spp. (above 25% cover) and white clover *Trifolium repens*. These grasslands are typically either managed as pasture or mown regularly for silage production or in non-agricultural contexts for recreation and amenity purposes; they are often periodically re-sown and are maintained by fertiliser treatment and weed control. They may also be temporary and sown as part of the rotation of arable crops but they are only included in this broad habitat type if they are more than one year old. • Amenity and Road verge grasslands with similar species to description for agriculture grasslands. • OR Most of the condition criteria are being failed. • Cover of undesirable species above 15%, usually resulting in a dense scrub or tree cover, or high cover of exotic species.	1
	Undesirable species: • creeping thistle *Cirsium arvense*, spear thistle *Cirsium vulgare*, curled dock *Rumex crispus*, broad-leaved dock *Rumex otusifolius*, common ragwort *Senecio jacobea*, common nettle *Urtica dioica*, creeping buttercup *Ranunculus repens*, white clover *Trifolium repens*, cow parsley *Anthriscus sylvestris*, marsh thistle *Cirsium palustre* and marsh ragwort *Senecio aquaticus*.	
	Notes • Physical damage to the vegetation from: excessive poaching, damage from machinery use or storage, or any other damaging management activities.	

	• Relict Heathland, generally in a mosaic with acid grassland. • Potentially restorable to heathland with improved management. • The heathland type has major differences between what is described in the relevant habitat classifications and what is visible on site, but is still clearly been heathland vegetation for considerable time and is now severely degraded. • Cover of undesirable species is above 20%.	

Undesirable species:

Dry heaths:

- *Rhododendron ponticum, Gaultheria shallon, Fallopia japonica* (exotic species <1%); *Cirsium arvense*, *Digitalis purpurea, Epilobium* spp. (excl. *E. palustre*), *Chameriun angustifolium, Juncus effusus, J. squarrosus, Ranunculus* spp*., Senecio* spp., *Rumex obtusifolius, Urtica dioica*, "coarse grasses" (< 1% *Senecio* spp., *Urtica dioica, Cirsium* spp. and other herbaceous, in clumps); *Betula* spp., *Prunus spinosa*, *Pinus* spp., *Rubus* spp., *Cytisus scoparius, Quercus* spp., *Hippophae rhamnoides* (< 15% trees, tree seedlings or other species of scrub. <1% *Rubus* spp); *Pteridium aquilinum* (< 10% P. a. in dense canopy); *Ulex europaeus* (<25%); Dense mats of acrocarpous mosses (*Campylopus introflexus*, Acr. mosses <occasional).

Wet Heaths:

- *Rhododendron ponticum* (exotic species <1%); *Apium nodiflorum, Cirsium arvense, Digitalis purpurea, Epilobium* spp. (excl. *E. palustre*), *Glyceria fluitans, Juncus effusus, J. squarrosus, Oenanthe crocata, Phragmites* spp., *Ranunculus repens, Fallopia japonica, Senecio jacobaea, Rumex obtusifolius, Typha* spp., *Urtica* spp (<1% undesirable herbaceous/forb spp); *Alnus glutinosa, Betula* spp., *Pinus* spp., *Prunus spinosa, Quercus* spp., *Rubus* spp., *Salix* spp. (< 10% trees, tree seedlings or other species of scrub); *Pteridium aquilinum* (< 5% *P. aquilinum*); *Ulex europaeus* (<10% *U. europaeus*); Dense mats of acrocarpous mosses (*Campylopus introflexus*, Acr. mosses <occasional).

Condition Table Orchards Habitat Type

Habitat Description

Includes: Intensive Orchards: Traditional Orchards: Urban Orchards

Traditional orchards are defined as five or more trees, where the distance between the crown edges is 20 m or less.

- They are characterised by the presence of either standard or half-standard fruit trees, grown on vigorous rootstocks and planted at low densities (usually less than 150 trees per hectare) on permanent grassland.
- Mature trees should have 90% of their foliage above 1.5 m, with trunks that are either at least 1 m in circumference at the base or form their first major fork at least 1.5 m above ground level.

Intensive Orchards

- Where planting is relatively recent and in full agricultural production usually with planting above 150 trees per hectare.

Urban Orchards

- Can have similar attributes but generally much smaller or much more recently planted within a built up (Urban) area. Can get traditional orchards in an urban environment if they match the description. They may well fall below the age (and varieties) of traditional orchards but still be of an older age than an intensive productive orchard.

Condition Assessment Criteria

1. There should be between 50 and 150 fruit or nut trees per hectare.
2. There should be an absence of scrub growing between or up the trees.
3. At least 80% of the trees should be free from damage caused by browsing, bark stripping or rubbing on non-adjusted ties.
4. The average height of the grass sward should be between 5 cm and 30 cm.
5. There should be less than 5% cover of bare ground, injurious weeds or scrub.

Condition	Assessment Criteria	Score
Good	• Meets the majority of the criteria with only minor variation. • None of the indicators of poor condition are present.	3
Moderate	• A poorer quality Traditional Orchard, missing a number of defining features or Urban Orchard. • Some of the condition criteria are being failed. • The Orchard type has minor differences between what is described in the relevant habitat classifications and what is visible on site. • Cover of undesirable species at 5% or above.	2
Poor	• An Intensive Orchard in full agricultural production. • Poor Quality Urban Orchard with little biodiversity value.	1

	• Potentially restorable to higher biodiverse state with improved management. • Most of the condition criteria are being failed. • The Orchard type has major differences between what is described in the relevant habitat classifications and what is visible on site. • Cover of undesirable species above 20%, usually resulting in a dense scrub or tree cover, or high cover of exotic and invasive species, lack of bare ground and lack of structural diversity.	

Undesirable species:

- Which become overly dominate (above 10% cover) below the canopy, such as; creeping thistle, spear thistle, curled dock, broad-leaved dock, common ragwort, common nettle, creeping buttercup and cow parsley etc..

Notes

The following can be recorded:

- Density – spacing between rows and within rows.
- Tree form – for example, standard or half-standard and the height of the trees.
- Grassland management regime – if the orchard is grazed, include the type of animal being used, the density and timing of grazing and the source of water for stock. If the sward is cut, include the timing and number of cuts, whether there is any aftermath grazing and whether cuttings are removed.
- The number of surviving trees and their approximate age, and the number of young trees.
- Condition – the general state of health of the trees, i.e. whether they are upright, the amount of dead wood, whether they have been under- or over-pruned in the recent past, any disease present and the likelihood of long-term survival.
- Species/varieties of trees – details on varieties may be obtained either from the owner, local experts or previous planting records or through identification.
- Threats – damage by pests, invasion of undesirable species, overgrazing or the presence of non-native species.
- Conservation value – the presence of any BAP species or mistletoe.
- Invasive Species – any invasive and non-native invasive species.
- Undesirable species – type and how much in % cover.

Condition Table Pond Habitat Type

Habitat Description

- This covers all water bodies up to 1 ha in area. Expert judgement should be used to decide if a water body between 1 and 2 ha area is assessed as a pond or as a lake.
- It includes sunny or shaded and temporary or permanent ponds at any stage of succession, from newly created ponds to ones that are completely overgrown.
- It also includes scrapes, and other temporary ponds which may be dry certain times of the year.

Condition Assessment Criteria

1. Are of good water quality, with clear water (substrate can be seen) and no obvious sign of pollution in the water body.
2. The water body should have semi natural riparian land for at least 10 m from the pond edge.
3. Non-woodland ponds should be dominated by plants, be they submerged or floating (note dominance of duckweed is a sign of eutrophication).
4. Non-woodland ponds [i.e. that have always been open] should not be shaded more than 50%
5. Many ponds will be fishless, those which naturally contain fish should not be stocked and should contain a native fish assemblage.
6. Ponds should not be artificially connected to other water bodies, e.g. ditches.
7. Pond water levels should be able to fluctuate naturally throughout the year.
8. Non-native species should be absent.
9. Less than 10% of the pond should be covered with duckweed or filamentous algae.

Condition	Assessment Criteria	Score
Good	• Meets the majority of the criteria with only minor variation. • Few of the indicators of poor condition are present.	3
Moderate	• Fails a number of the criteria above. • Where non-native species comprise more than 10% of the vegetation. • There is only moderate water quality. • There is insufficient extent of semi natural riparian land. • Water levels are subject to some control. • There are some artificial connections to other water bodies, but they are not delivering water of poor water quality or preventing water level fluctuations. • Fish have been stocked at a low density, but they are native species and there is sufficient aquatic plants and habitat heterogeneity to reduce the effects of predation. • Moderate shading of non-woodland ponds. • Submerged and floating plants are limited but still presence.	2
Poor	• Ponds in poor health. • Fails the majority of criteria. • Poor water quality present.	1

	• Extensive filamentous algae or duckweed. • Absence of semi-natural riparian land. • No natural fluctuations in water levels. • Extensive non-native species. • High density of stocked fish. • Absence of submerged and floating plants (unless naturally a shaded woodland pond). • Non-woodland ponds completely over-grown with trees and scrub.	

Undesirable species:

- Any non-native species.
- Frequently observed non-native plant species include water fern, Australian swamp stonecrop, parrot's feather, floating pennywort and Japanese knotweed and giant hogweed (on the banks).
- Frequently occurring non-native animals include signal crayfish, zebra mussels, killer and demon shrimp and carp.
- Cover of more than 10% of duckweeds or filamentous algae are signs of eutrophication.

Factsheets of these invasive non-native plant species can be found on the GB non-native species secretariat website.
http://www.nonnativespecies.org/home/index.cfm

Notes

- Make a record of key features, including water quality, undesirable and non-native species all non- natives

Additional information relevant to data collection

Aquatic Marginal Vegetation

Aquatic Marginal Vegetation is a habitat type listed within UK Habitat classification. When applying the biodiversity metric please always record as the component of the river, lake or pond Priority Habitat that it sits adjacent to. With field notes about its location, structure and species composition.

Condition Table Scrub Habitat Types

Habitat Description

This covers Biodiversity Metric scrub categories including;

- Bracken, Blackthorn, Bramble, Gorse, Hawthorn, Hazel, Mixed scrub, Sea blackthorn and Rhododendron, *Rhododendron ponticum*.

For hedgerows see User Guide chapter 7.

Scrub of high (distinctiveness) environmental value such as:

- Common juniper or box scrub.
- Scrub on calcareous soils with three or more of wayfaring-tree.
- Wild privet, dogwood, buckthorn, hawthorn and spindle.
- Native sea buckthorn scrub (on the east coast).
- Hazel.
- Scrub on peat soils with two or more of alder buckthorn, eared willow, goat willow, grey willow, bay willow, purple willow and osier.
- It excludes montane scrub (above 600 m altitude) which is covered under Heathland.
- South facing bracken stands with violets, when associated with UK priority butterfly species; high brown fritillary, pearl-bordered fritillary and small pearl-bordered fritillary.

Scrub of lower (distinctiveness) environmental value such as:

- The majority of bracken stands.
- Bramble.
- Blackthorn, Hawthorn.
- Gorse (unless as a low growing component of heathland habitat).
- Mixed scrub.

Condition Assessment Criteria

1. Condition assessment criteria for Scrub Habitats.
2. There are at least three woody species, with no one species comprising more than 75% of the cover (except common juniper, sea buckthorn or box, which can be 100% cover).
3. There is a good age range – a mixture of seedlings, saplings, young shrubs and mature shrubs.
4. Pernicious weeds and invasive species make up less than 5% of the ground cover.
5. The scrub has a well-developed edge with un-grazed tall herbs.
6. There are many clearings and glades within the scrub.

Condition	Assessment Criteria	Score
Good	• Meets all of the 5 criteria with only minor variation. • Scrub type of high biodiversity value in good condition. • None of the indicators of poor condition are present.	3
Moderate	• The single woody species cover is greater than 75%. • The age range is missing some size classes. • Scrub type of high biodiversity value in poor condition.	2

	• The scrub type has minor differences between what is described in the relevant habitat classifications and what is visible on site. • Cover of undesirable and invasive species at 5-20%.	
Poor	• The single woody species cover is greater than 75%. • The age range is missing some size classes. • Scrub type of high biodiversity value in poor condition. • The scrub type has minor differences between what is described in the relevant habitat classifications and what is visible on site. • Cover of undesirable and invasive species at 5-20%. • Single-age scrub present. • Potentially restorable to improved scrub habitat with improved management. • All of the condition criteria are being failed. • The scrub type has major differences between what is described in the relevant habitat classifications and what is visible on site. • Cover of undesirable and invasive species above 20% [see below]. • All Rhododendron stands will be in this condition.	1
	Undesirable species: • *Cirsium arvense* • *Urtica dioica* • Himalayan balsam *Impatiens glandulifera* • Japanese knotweed *Fallopia japonica* • Cherry Laurel *Prunus laurocerasus* • Rhododendron *Rhododendron ponticum* Factsheets of these invasive non-native plant species can be found on the GB non-native species secretariat website. http://www.nonnativespecies.org/home/index.cfm	

Condition Table Urban Habitat Type

Habitat Description

This includes the Priority Habitat Open Mosaic Habitats on Previously Developed Land.

Along with other urban habitats, that have high biodiversity value or the potential to deliver for multiple species such as extensive green roof and walls designed for maximum wildlife benefits.

- Open mosaic habitat on Previously Developed Land [inc. brownfield sites] can be extremely diverse, supporting a wide range of terrestrial and aquatic habitats. This diversity has made them increasingly important within ecological networks for rare and scarce invertebrates as well as lichens, plants, birds, reptiles and amphibians of conservation concern. However, this same diversity can make them challenging to define, identify and assess appropriately. Without being properly identified, wildlife-rich brownfields supporting open mosaic habitat are vulnerable to being poorly assessed, increasing the likelihood of loss to development or inappropriate restoration.
- Open mosaic habitats can be located on wide range of sites such as railway sidings, quarries, former industrial works, slag heap, bings and brick pits. Brownfields with open mosaic habitats show evidence of previous disturbance, either through soil being removed or severely modified by previous use, or the addition of materials such as industrial spoil, with spatial variation developing across the site. The resultant variation allows for a mosaic of different habitats to be supported in close proximity. This habitat diversity can support rich assemblages of invertebrates.
- Artificially created & planted areas that mimic semi-natural habitats such as species rich grassland would also be in scope. Where quality features & high native species richness are created to imitate desirable natural ecosystem attributes, such as pollen, nectar and nesting locations within the area.
- They can be created and incorporated during the development process as a way of increasing and supporting wildlife in an urban setting.
- For more information see:
    - Identifying Open Mosaic Habitats: https://www.buglife.org.uk/sites/default/files/Identifying%20open%20mosaic%20habitat.pdf
    - Open Mosaic Habitat Survey Handbook both by BugLife; https://www.buglife.org.uk/sites/default/files/omhsurveyhandbookfinal.pdf

Condition Assessment Criteria

1. Known history of disturbance at the site or evidence that soil has been removed or severely modified by previous use(s) of the site. Extraneous materials/substrates such as industrial spoil may have been added which in turn has led to a low nutrient environment.
2. The site contains some vegetation. This will comprise of early successional communities consisting mainly of stress-tolerant species (e.g. indicative of low nutrient status or drought). Early successional communities are composed of (a) annuals, or (b) mosses/liverworts, or (c) lichens, or (d) ruderals, or (e) inundation species, or (f) open grassland, or (g) flower-rich grassland, or (h) heathland.
3. The site contains unvegetated, loose bare substrate and pools may be present and desirable.

4. The site shows spatial variation, forming a mosaic of one or more of the early successional communities (a)–(h) above plus bare substrate or pools.		
Condition	**Assessment Criteria**	**Score**
Good	• Vegetation provides multiple opportunities for a high number of species to live and breed (complete their life cycles). • Bare open ground is common throughout the area. • Plant species are flowering extensively and so providing ready nectar sources for insects. • Insects and butterflies are common and using the site extensively. • None of the indicators of poor condition are present. • The invasive none-native species are low or absent from the site, or in the process of being eradicated if beneficial to wildlife to do so.	3
Moderate	• Cover of undesirable and invasive species at 10-20%. • OR Some of the condition criteria are being failed. • The areas of bare ground with little species colonisation are large, with a high potential for improvement with better wildlife management.	2
Poor	• Most of the condition criteria are being failed. • Cover of undesirable species high above 20%	1

Undesirable species:

- American skunk cabbage *Lysichiton americanus*
- Himalayan balsam *Impatiens glandulifera*
- Japanese knotweed *Fallopia japonica*
- Cherry Laurel *Prunus laurocerasus*
- Shallon *Gaultheria shallon*
- Snowberry *Symphoricarpos albus*
- Variegated yellow archangel *Lamiastrum galeobdolon* subsp. *argentatum*
- Rhododendron *Rhododendron ponticum*

Factsheets of these invasive non-native plant species can be found on the GB non-native species secretariat website.
http://www.nonnativespecies.org/home/index.cfm

Condition Table Woodland Broad Habitat Type

Habitat Description

Woodland is defined as vegetation dominated by trees more than 5 m high when mature, which forms a distinct, although sometimes open, canopy [areas of trees with a canopy greater than 20%]. This includes felled, young or newly planted woodland.

- There is no minimum size for areas of trees that have the definite characteristics and feel of a woodland and are managed as woodland.
- Two broad woodland types are considered here:
    - Broadleaved, mixed and yew woodland.
    - Coniferous woodland.
- It **does not** include scrub (see separate scrub condition assessment).
- In England, native woodland is defined as woodland that is composed of at least 80% native tree species including 'naturalised species'.
- It is based on the **England Woodland Biodiversity Group** condition assessment for none SSSI woodlands. See https://woodlandwildlifetoolkit.sylva.org.uk/assess for more background and detailed information.

Wood Pasture and Parkland (see notes below on how to record)

Wood pasture is a vegetation structure rather than a particular plant community. Typically, this structure consists of large, open-grown or high forest trees (often pollards) at various densities, in a matrix of grazed grassland, heathland and/or woodland floras.

This feature includes:

- Wood pasture and parkland derived from medieval forests and embankments, wooded commons, parks and pastures with trees; and where the land use has been converted to arable, forestry or amenity, but where ancient trees are still present.
- For wood pasture and parkland assessment established by PTES see https://ptes.org/campaigns/wood-pasture-parkland/wood-pasture-parkland-survey/.

Condition Assessment Criteria

1. This should be an area of trees with complete canopy cover.
2. Native species are dominant. Non-native and invasive species account for less than 10% of the vegetation cover.
3. A diverse age and height structure of the trees.
4. Free from damage [Bark stripping; Browse line; Damage shoot tips] (in the last five years) from stock or wild mammals with less than 20% of vegetation being browsed.
5. There should be evidence of successful (i.e. not browsed off before it gets well established) tree regeneration such as seedlings, saplings and young trees.
6. Standing and fallen dead wood of over 20 cm diameter are present including fallen large dead branches/stems and stumps.
7. Wetland habitat if they exist within the wood has little sign of drainage or channel straightening.
8. The area is protected from damage by agricultural and other adjacent operations.
9. There should be no evidence of inappropriate management (e.g. deep ruts, animal poaching or compaction).
10. Invasive non-native plants are below 5% (see list below).
11. No signs of significant nutrient enrichment present.

12. More than 3 different native trees and 3 shrub species in an average 10 m radius.

Condition	Assessment Criteria	Score
Good	• Meets at least 10 of the criteria with only minor variation. • No more than 1 of the indicators of poor condition are present: • Stands of native trees that do not obviously originate from planting should be classified as native semi-natural woodland.	3
Moderate	• Clearly fails at least 2 of the criteria above. • OR invasive non-native plants are 5-20%. • OR where non-native species comprise more than 20% of the canopy, the woodland should be recorded as either non-native plantation or mixed woodland. • A mixed woodland is woodland with native and non-native species. (This includes woodlands established by planting and by natural regeneration.) • Trees of similar age and height structure throughout the woodland. • Little standing or fallen deadwood present.	2
Poor	The following characteristics can help to identify plantations: (note: BAP woodlands can be plantation woodlands) • Non-native trees often of a single species or the same age are the dominant component; • OR invasive non-native plants are greater than 20%. • Mixed species show a consistent planting pattern across the site. • Original planting lines, or remains of planting lines, can be seen. • Drainage features and channel straightening of watercourses.	1

Undesirable species:

- American skunk cabbage *Lysichiton americanus*
- Himalayan balsam *Impatiens glandulifera*
- Japanese knotweed *Fallopia japonica*
- Cherry Laurel *Prunus laurocerasus*
- Shallon *Gaultheria shallon*
- Snowberry *Symphoricarpos albus*
- Variegated yellow archangel *Lamiastrum galeobdolon* subsp. *argentatum*
- Rhododendron *Rhododendron ponticum*

Factsheets of these invasive non-native plant species can be found on the GB non-native species secretariat website.
http://www.nonnativespecies.org/home/index.cfm

Notes

The following information should be recorded:

- Dominant tree species.

- Regenerating tree or shrub species.
- Ground flora species – any specialist woodland plants present.
- The average age class throughout the wood – establishment (E), semi-mature (S/M), mature (M) or ancient (A).
- Whether the woodland is accessed by livestock and amount of deer pressure.
- Past management – whether any trees are coppiced or pollarded;
- Threats – damage by pests, invasion by undesirable species, overgrazing or the presence of non-native species.

Additional information relevant to data collection

Woodland - Felled woodland

The condition assessment of this habitat type needs to be based – so far as possible - on the trees that stood on the site prior to felling. It should be possible to determine what these were from the stumps, bark and leaf litter. It should then be recorded as the original woodland type, the age of the trees and note that it has been felled. Condition assessment will be harder in these situation, but should be considered good unless good ecological justification can be given preferably with accompanying photographic evidence.

If it is not possible to record the woodland type, record any tree recovery or seedlings present between the stumps. Where felling occurred a considerable time previously (4-5 year +) with no obvious replanting progressing it may be appropriate in some circumstances to classify as the predominant habitat that is now replacing the felled trees (with stumps still present), particularly when they have high biodiversity value such as heathland or grassland development. Notes of what other species are present on the site will need to be recorded, such as ground flora; felled brash predominates; heather present; grass species; scrub and tree species regenerating etc.

Woodland - Planted young trees

This is recently planted trees (often in tree tubes) within grassland. Where the tree species planted match another woodland description they should be recorded under this description (with a note to state the tree age and that recently planted). If none match then they can be recorded under this catch all category. The grassland sward species and herbs present should also be recorded and described in field notes. Particular note should be made of habitat enhancement practices, such as where native flowers and herbs are created surrounding the planting, to give a wildlife boost until full tree canopy has developed.

Woodland and forest - Wood-pasture and parkland

These are mosaic habitats valued for their trees, especially veteran and ancient trees, with a grazed grassland below. They have open grown trees, sometimes in clumps, but with space between them. They may contain patches of scrub in some circumstances. If it is clearly this habitat then it needs to be recorded under this habitat type for all the area being surveyed. But for condition it may well be preferable to condition assess and map different components separately using different sheets. Please record how this was done, along with recording area amounts for each split section. So below the tree canopy use the woodland condition table; in open grassland use the grassland condition; on mappable areas of scrub use the scrub condition etc. This is relatively complex on the different components of the mosaic, but will be useful for large areas of parkland being surveyed. To make an accurate assessment

of the biodiversity value we need to know if the grassland is made of poor or good quality species composition, is the scrub of high quality, the age of the trees and key feature etc. This is likely to involve quite extensive field notes and ecological report to capture this information accurately.

Wood pasture and parkland that has been converted to other land uses such as arable fields, forestry and amenity land but where veteran trees survive are still of high nature conservation interest. They offer great opportunities for restoration to increase biodiversity habitat and should still be recorded under this category with the potential to provide wildlife gain highlighted.

Part 1b - Condition assessment of hedgerows and lines of trees

1.13 A series of eight 'attributes', representing key physical characteristics, are used for this assessment. The attributes, and the minimum criteria for achieving a 'favourable condition' in each, are set out in Table TS1-2. The attributes use similar favourable condition criteria to the 'Hedgerow Survey Handbook' and the handbook is the recommended source of reference for assessing hedgerow attributes.

TABLE TS1-2: Hedgerow attributes and criteria for meeting 'favourable condition'

Hedgerow favourable condition attributes		
Attributes and functional groupings (A, B, C & D)	**Criteria (the minimum requirements for 'favourable condition'**	**Description**
A1. Height	>1.5 m average along length	The average height of woody growth estimated from base of stem to the top of shoots, excluding any bank beneath the hedgerow, any gaps or isolated trees. Newly laid or coppiced hedgerows are indicative of good management and pass this criterion for up to a maximum of four years (if undertaken according to good practice) A newly planted hedgerow does not pass this criterion (unless it is > 1.5 m height)
A2. Width	>1.5 m average along length	The average width of woody growth estimated at the widest point of the canopy, excluding gaps and isolated trees. Outgrowths (e.g. blackthorn suckers) are only included in the width estimate when they >0.5 m in height. Laid, coppiced, cut and newly planted hedgerows are indicative of good management and pass this criterion for up to a maximum of four years (if undertaken according to good practice[4])
B1. Gap – hedge base	Gap between ground and base of canopy <0.5 m for >90% of length (unless 'line of trees')	This is the vertical gappiness of the woody component of the hedgerow, and its distance from the ground to the lowest leafy growth. Certain exceptions to this criterion are acceptable (see page 65 of the Hedgerow Survey Handbook)

[4] HedgeLink (http://hedgelink.org.uk/index.php) provides a resource of management advice for hedgerows.

B2.	Gap - hedge canopy continuity	• Gaps make up <10% of total length and • No canopy gaps >5 m	This is the horizontal gappiness of the woody component of the hedgerow. Gaps are complete breaks in the woody canopy (no matter how small). Access points and gates contribute to the overall gappiness, but are not subject to the >5 m criterion (as this is the typical size of a gate)
C1.	Undisturbed ground and perennial vegetation	>1 m width of undisturbed ground with perennial herbaceous vegetation for >90% of length ○ measured from outer edge of hedgerow, and is present on one side of the hedge (at least)	This is the horizontal gappiness of the woody component of the hedgerow. Gaps are complete breaks in the woody canopy (no matter how small). Access points and gates contribute to the overall gappiness, but are not subject to the >5 m criterion (as this is the typical size of a gate)
C2.	Undesirable perennial vegetation	Plant species indicative of nutrient enrichment of soils dominate <20% cover of the area of undisturbed ground	The indicator species used are nettles (*Urtica* spp.), cleavers (*Galium aparine*) and docks (*Rumex* spp.). Their presence, either singly or together, should not exceed the 20% cover threshold.
D1.	Invasive and neophyte species	>90% of the hedgerow and undisturbed ground is free of invasive non-native and neophyte species	Neophytes are plants that have naturalised in the UK since AD 1500. For information on neophytes see the JNCC website and for information on invasive non-native species see the GB Non-Native Secretariat website.
D2.	Current damage	>90% of the hedgerow or undisturbed ground is free of damage caused by human activities	This criterion addresses damaging activities that may have led to or lead to deterioration in other attributes. This could include evidence of pollution, piles of manure or rubble, or inappropriate management practices (e.g. excessive hedge cutting)

1.14 Each attribute is assigned to one of four functional groups (A – D), as indicated in Table TS1-2 and the condition of a hedgerow is assessed according to the number of attributes from these functional groups which pass or fail the 'favourable condition' criteria according to the approach set out in Table TS1-3.

1.15 Hedgerow and line of trees condition assessment generates a weighting (score) ranging from 1-3, which is used within the biodiversity metric 2.0. The scores for each are set out in tables TS1-3 and TS1-4 below.

TABLE TS1-3: Hedgerow condition assessment and weighting

Condition categories for hedgerows		
Category	**Maximum number of attributes that can fail to meet 'favourable condition' criteria in Table TS1-.2**	**Weighting (score)**
Good	No more than 2 failures in total and no more than 1 in any functional group.	3
Moderate	No more than 4 failures in total and fails both attributes in a maximum of one functional group e.g. fails attribute 1 & 2, 5 &7 = Moderate condition.	2
Poor	Fails a total of more than 4 attributes or both attributes in more than one functional group.	1

Condition assessment of a line of trees

1.16 Condition assessment for a line of trees is based on continuity of the canopy only, as set out in Table TS1-4.

TABLE TS1-4: Line of tree condition assessment and weighting

Condition categories for lines of trees		
Category	**Continuity of tree canopy**	**Weighting (score)**
Good	Mature trees with continuous canopy Definition: • a 'mature tree' in this context is one that is at least 1/3 expected fully mature height • gaps make up <10% of total length and there are no canopy gaps >5 m	3
Moderate	Continuous canopy Definition: • trees < 1/3 expected fully mature height • gaps make up <10% of total length and there are no canopy gaps >5 m	2
Poor	Broken canopy Definition: • gaps make up >10% and / or gaps are >5 m in length.	1

Part 1c - The Rivers and Streams Condition Assessment

1.17 The rivers and streams condition assessment is based on the extent and diversity of observed physical features in the river channel and riparian zone (including the physical structure of vegetation) as well as the extent and types of any human modifications. The physical state of a river reach is a useful proxy for determining overall riverine ecological quality but it needs to be attuned to the type of river under consideration.

1.18 The rivers and streams condition assessment is based on geomorphic principles that are an extension of established citizen science surveys[5]. The assessment, called the River Metric Survey, is implemented in two parts[6]. A largely desk-based reach-scale assessment indicates the current river type. A subreach scale assessment based entirely on field survey captures physical features / habitats, vegetation structural features, and human interventions to assess the condition of the river at the development site, taking into account the type of river.

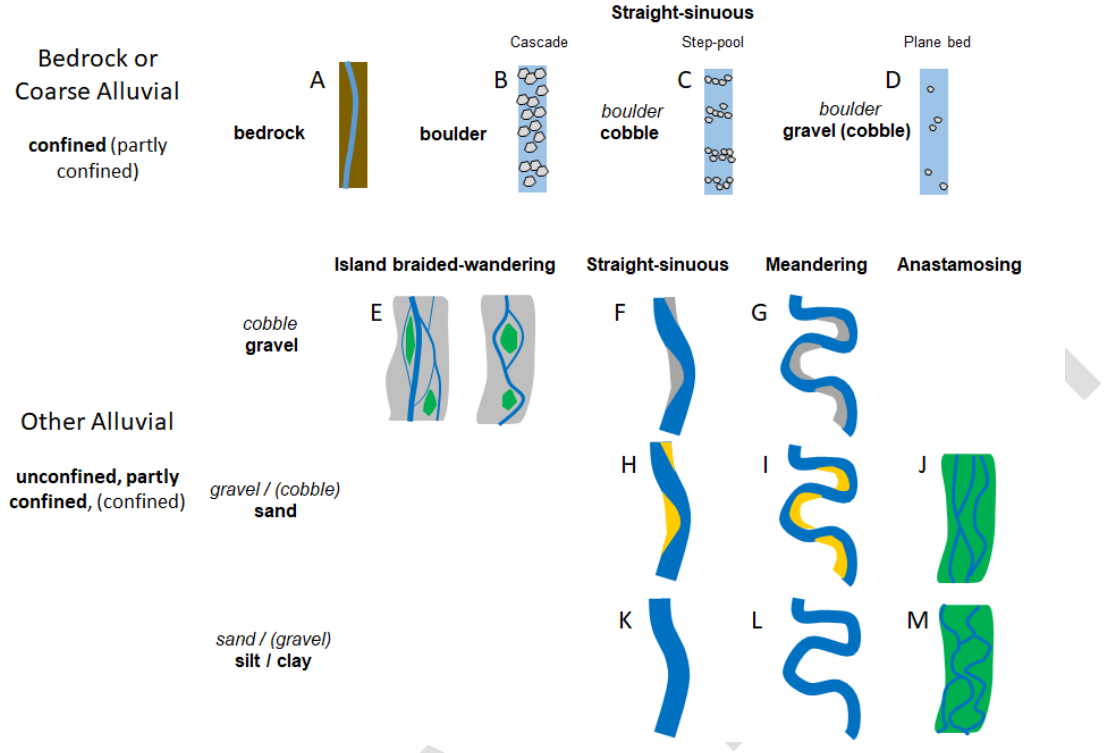
Part 1 - Reach scale desk-based assessment

1.19 The river is assigned to one of 13 river types that are likely to be encountered in England (Figure 8-2). These are a subgroup of 22 broad types of river that have been identified for Europe[7,8], including the United Kingdom[9]. The river type is determined firstly by identifying a homogenous reach that contains the proposed intervention site. This reach is identified using the latest Ordnance Survey (1:10,000 scale) maps or air photographs (e.g. Google Earth) and searching upstream and downstream from the proposed intervention site. To delimit the start and end point, a homogeneous river reach will show a reasonably consistent planform with no major tributary streams, on-line large lakes or reservoirs, as these could cause a marked change in the flow regime and sediment load.

1.20 Once the reach is determined, its gradient and 4 properties of its planform are measured to support an initial assessment of the river type. This is further refined using 4 properties of the river bed sediments observed in field surveys of sub-reaches (see below). The assignment of this indicative river type is automatically carried out within the River Metric Survey information system.

[5] See: https://modularriversurvey.org/river-metric
[6] For further information on the method please visit (https://modularriversurvey.org/river-metric).
[7] GURNELL ET AL., 2016. A multi-scale hierarchical framework for developing understanding of river behaviour to support river management. Aquatic Sciences, 78(1): 1-16.
[8] RINALDI, M., GURNELL, A.M., GONZÁLEZ DEL TÁNAGO, M., BUSSETTINI, M. & HENDRIKS, D., 2016. Classification of river morphology and hydrology to support management and restoration. Aquatic Sciences, 78(1): 17-33.
[9] ENGLAND AND GURNELL, 2016. England, J. and Gurnell, A.M. (2016) Incorporating Catchment to Reach Scale Processes into Hydromorphology Assessment in the UK. Water and Environment Journal, 30: 22–30.

FIGURE TS1-1: 13 river types found in Britain based on valley confinement, planform and bed material size (Gurnell et al., 2016, Rinaldi et al., 2016)



Part 2 - Sub-reach scale field assessment

1.21 The field element employs the Monitoring of River Phyisical habitat (MoRPh) survey[10,11], which is applied to short lengths of river. For the River Metric Survey, 5 MoRPh field surveys are conducted on contiguous lengths (modules) of river. Each MoRPh module covers a river length that is approximately twice the river width (typically 10, 20, 30 or 40 m in length). Completing 5 contiguous modules provides information for a 50 to 200 m long sub-reach. Depending on the size of the development, the sub-reach survey of 5 modules is repeated to capture at least 20% of the total river length under consideration (i.e. 1 sub-reach survey every 250 to 1000 m). The River Metric Survey captures information on sediments, vegetation, morphological and water-related features; and the extent and severity of physical modification within the channel, channel margins, banks and riparian zone (to 10 m from the bank tops).

1.22 Once each set of observations for 5 contiguous modules is entered into the River Metric Survey information system, indicators of the condition of the sub-reach are automatically provided as well as an overall condition score (Table TS1-5). The condition score is scaled to a range that is achievable by the particular river type. In addition, guidance is given on which specific geomorphic features are expected, or highly likely, to be observed in the field surveys if the river is functioning according to river type.

[10] SHUKER, L.J., GURNELL, A.M., WHARTON, G., GURNELL, D.J., ENGLAND, J., FINN LEEMING, B. & BEACH, E., 2017. MoRPh: a citizen science tool for monitoring and appraising physical habitat changes in rivers. Water and Environment Journal, 31(3): 418-424.
[11] GURNELL, A.M., ENGLAND, J., SHUKER, L., WHARTON, G. (in review). The contribution of citizen science volunteers to river monitoring and management: International and national perspectives and the example of the MoRPh survey.

- The extent of the River Metric Survey is only required within the red line boundary of the intervention site (on-site and off-site).
- Surveyors are required to be accredited to use the River Metric Survey and be suitably qualified / experienced to identify the sources of modifications on the site and their potential solutions.
- A low risk condition assessment can be used in situations where the impact on the river reach is considered low, see below in section, Riparian Zone.

TABLE TS1-5: Condition weightings for rivers and streams

Classification	Weighting
Good	5
Fairly Good	4
Moderate	3
Fairly Poor	2
Poor	1

AB13(b) User Guide

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Natural England Joint Publication JP029

The Biodiversity Metric 2.0

auditing and accounting for biodiversity

USER GUIDE

Beta Version

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Contents

Foreword

Biodiversity is the variety of life on earth, it includes all living things and the places in which they live. It is vital for our health, well-being and economy. But biodiversity is declining, both in the UK and internationally. Species are becoming extinct and the habitats needed for wildlife to live and thrive are under increased pressure from development and land management practices. However, we know that development and land management are not incompatible with nature. Both can and do provide spaces for wildlife to thrive in. The challenge is to understand how to design developments and manage land in such a way that supports biodiversity.

Biodiversity metric 2.0 provides developers, planners, land managers and others with a tool to help limit damage to nature in the first place and to help it thrive. The metric uses habitat features as a proxy measure for capturing the value and importance of nature. It uses a simple calculation that takes into account the importance of these features for nature: their size, ecological condition, location and proximity to nearby 'connecting' features. The metric enables assessments to be made of the present and forecast future biodiversity value of a site. This can be applied to an individual field or an entire river catchment.

The biodiversity metric 2.0 enables developers and land managers to better understand and quantify the current value of a place for nature and how proposed changes to that site, either from development or land management practice, will impact on that value. In short, it provides a way of calculating biodiversity gains and losses. The metric enables developers and land managers to see how they might be able to design a site or implement a land management change in a way that increases its value to nature over time.

The biodiversity metric 2.0 is the successor to the biodiversity metric published by Defra in 2012 and commonly referred to as the 'Defra biodiversity metric'. Biodiversity metric 2.0 builds upon that original metric. Co-developed with the help of industry, environmental NGOs, planners and land managers biodiversity metric 2.0 represents a significant advance in our ability to account for and measure biodiversity losses and gains. This new metric can be used in all terrestrial development and land management scenarios. It can measure the value of habitats ranging in scale from individual street trees and green roofs through to very important priority habitats. The biodiversity metric 2.0 includes all terrestrial habitats including linear habitats (hedgerows, lines of trees, rivers and streams) whose biodiversity value is calculated separately to the main metric calculation. Biodiversity metric 2.0 is being published as a beta test version to gather wider feedback.

Chapter 1 of this user guide sets out the importance and value of using a metric to measure and account for impacts upon biodiversity. Chapter 2 goes onto to set out how biodiversity metric 2.0 has been developed and the underpinning calculations that sit at its heart. Chapter 3 describes how the information and data needed to run the metric calculations can be gathered.

In order to simplify the whole process of calculating biodiversity losses and gains a separate Calculation Tool has been developed. It is designed solely for use with the biodiversity

metric 2.0. Chapter 4 contains detailed guidance on how to use this tool. Shorter, summary user guidance for the tool is also available.

Chapters 5 – 8 provide detailed information about the approach and calculations that inform the biodiversity metric 2.0, including those for the supplementary linear metrics. Chapter 9 provides an introduction to work that is currently underway to extend the biodiversity metric to include inter-tidal habitats. These habitats will be included in an update scheduled for late 2019.

The biodiversity metric 2.0 is designed to provide developers, planners and land managers with a robust yet simple way to account for the value of nature and better understand how development and land management change will impact on its' value over time. It is being initially released as a beta version because we are seeking feedback on its real world application, whether that be the calculation tool or documentation, in order that improvements can be made and bugs fixed. Also, further enhancements such as coastal and intertidal habitat module should be added by the end of 2019. Please provide feedback via the biodiversity metric 2.0 survey

1: Introduction

The rationale for using a metric

1.1. Biodiversity is the term that is used to describe the variety of all life on earth. It includes all species of animals and plants – and everything else that is alive on our planet. Habitats are the places in which species live. These species and their habitats contribute to the ecosystems services that provide substantial benefits to people and the economy. For example, woodlands and saltmarsh can help prevent flooding whilst parks and greenspaces make our towns and cities healthier and more attractive places in which to live and work. However, biodiversity is under threat, globally and at home. Habitats are being damaged or disappearing and species are declining. This is not just bad news for nature but also for our own health and well-being and that of future generations. Biodiversity and healthy habitats are vital for a well-functioning planet but their value is often not taken into account in decision-making.

1.2. In this user guide we introduce and explain how to use the **biodiversity metric 2.0**. This metric provides a way to measure biodiversity and the impact that developments or land management practices may have upon it. Biodiversity metric 2.0 can help developers, ecologists, planners, communities, land managers and many others take biodiversity into account. The metric provides a way to measure biodiversity loss and gain in a consistent and robust way. It can also predict the likely effectiveness of creating new or enhancing existing habitats. Used in combination with appropriate professional advice the metric can help to reduce biodiversity losses and increase gains resulting from development or land management.

Introducing the biodiversity metric 2.0

1.3. Biodiversity metric 2.0 is an updated version of the original Defra biodiversity metric[1]. This version builds upon the knowledge and experience gained across a variety of different sectors since the original Defra biodiversity metric was first launched as part of Defra's biodiversity offsetting pilots.

1.4. Biodiversity metric 2.0 balances robustness with simplicity. The metric uses habitat as a proxy for wider biodiversity with different habitat types scored according to their relative biodiversity value. This value is then adjusted depending on the condition and location of the habitat, to calculate '**biodiversity units**' for that specific project or development. Biodiversity metric 2.0 incorporates similar but separate calculations for habitats that require a different method of measurement such as hedgerows, lines of trees, rivers and streams and street trees.

1.5. The metric can be used to measure both on-site and off-site biodiversity changes for a project or development. The metric also accounts within it for some of the risks associated whenever new habitat is created or existing habitat is enhanced. In calculation terms, the change in biodiversity units is determined by subtracting the number of **pre-intervention** biodiversity units (i.e. those originally existing on-site and off-site) from the number of **post-intervention** units (i.e. those projected to be provided). It is important to note that achieving gains in biodiversity from the

[1] DEFRA. 2012. Biodiversity offsetting pilots. Technical paper: the metric for the biodiversity offsetting pilot in England. Defra. March 2012. https://www.gov.uk/government/collections/biodiversity-offsetting (Accessed 20-06-2019)

calculation does not necessarily mean a development meets any wider requirements of planning policy or law relating to nature conservation or biodiversity.

1.6. All biodiversity unit calculations come with some 'health warnings'. The outputs of the metric are not absolute values but provide a proxy for the relative biodiversity worth of a site pre- and post-intervention. The quality and reliability of outputs will depend on the quality of the inputs. This user guide provides advice on how to use the biodiversity unit approach and where and when it is appropriate for use. The metric is not a substitute for expert ecological advice. The metric does not override or undermine any existing planning policy or legislation, including the mitigation hierarchy (see section 1.11 below), which should always be considered as the metric is applied.

1.7. Biodiversity metric 2.0 does not include species explicitly. Instead, biodiversity metric 2.0 uses broad habitat categories as a proxy for the biodiversity 'value' of the species communities that make up different habitats. The metric does not change existing levels of species protection and the processes linked to protection regimes are outside the scope of the metric.

1.8. To simplify and streamline the calculation process, the biodiversity metric 2.0 comes with a free tool to calculate biodiversity units. A shortened user guide for the calculation tool is also available.

The mitigation hierarchy and the metric

1.9. Planning policy[2][3] supports the application of the **mitigation hierarchy** (see Figure 1-1). When using the metric application of the mitigation hierarchy might mean looking to retain habitats in situ or avoiding habitat damage. In the metric biodiversity gains are easier to achieve where habitat impacts are avoided due to the way that habitat creation or enhancement risks are accounted for.

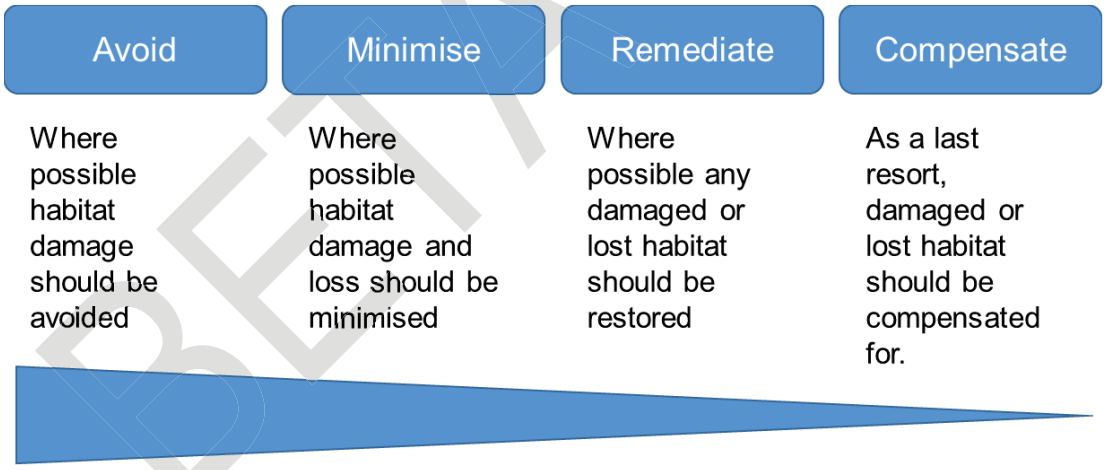


FIGURE 1-1: The Mitigation Hierarchy[4]

[2] Planning policy explained: https://www.gov.uk/guidance/national-planning-policy-framework
[3] NPPF implementation explained https://www.gov.uk/guidance/natural-environment
[4] Source: adapted from DEFRA, 2018, Net Gain Consultation Proposals. Defra, December 2018. https://consult.defra.gov.uk/land-use/net-gain/supporting_documents/netgainconsultationdocument.pdf (Accessed 20-06-2019)

2: How to use biodiversity metric 2.0

Who is this guidance for?

2.1. This guidance is for anyone planning to use the biodiversity metric 2.0 and anyone who wants to understand the outputs of the metric. This includes developers who have commissioned a biodiversity assessment using the metric, communities wanting to understand the impacts of a local development, and planning authority decision-makers interpreting metric outputs included in a planning application or land owners wishing to provide biodiversity units from their sites to others.

2.2. This guidance therefore starts by explaining the basic principles and rules underpinning the metric.

Why use this metric?

2.3. Using this metric will help you to take better account of biodiversity in designing plans and making land management decisions. It will allow you to demonstrate biodiversity net gains or losses in a robust and consistent manner. Different plan and project proposals for a site can be compared using the same metric, allowing more objective assessments of alternative approaches to be made. The metric can be used option assessment through to detailed design stages.

When can biodiversity metric 2.0 be used?

2.4. Biodiversity metric 2.0 is designed to quantify biodiversity to inform and improve planning, design, land management and decision-making. It can be used to both:

- assess or audit **the biodiversity unit value** of an area of land and
- to **calculate the losses and gains** in biodiversity unit value from changes or actions which affect biodiversity, such as a building houses or changing the conservation management of a land holding.

How the biodiversity metric 2.0 works

What the metric measures

2.5. Biodiversity metric 2.0 uses **habitat**, the places in which species live**,** as a proxy to describe biodiversity. These habitats are converted into measurable '**biodiversity units**'. These biodiversity units are the 'currency' of the metric.

2.6. Biodiversity units are calculated using the **size** of a parcel of habitat and its **quality**. The metric uses **habitat area** as its core measurement, except for linear habitats where habitat length is used (see supplementary modules section 2.8). To assess the quality of a habitat the metric scores habitats of different types, such as woodland or grassland, according to their relative biodiversity value. Habitats that are scarce or declining typically score highly relative to habitats that are more common and widespread. The metric also takes account of the condition of a habitat. The metric accounts for the location of the habitat relative to other similar habitats to measure its connectedness in the landscape. Being 'better' and 'more joined-up' are important facets of habitats that can contribute to halting and reversing biodiversity declines[5]. Last, the metric also accounts for whether or not the habitat is sited in an area identified locally, typically in a relevant policy of plan, as being of significance for nature.

2.7. Where new habitat is created or existing habitat is enhanced the difficulty and associated risks of doing so are taken into account by the metric. If habitat is created to compensate for losses elsewhere, then the metric also takes account of its proximity to the impact site. The metric incentivises delivery that is on or close to the impact site.

Supplementary modules of the metric

2.8. Biodiversity metric 2.0 includes additional supplementary modules for habitats that are not well described by their area. These are linear habitats, for which habitat length is often a more meaningful measure of their extent than area.

2.9. There are two broad categories of linear habitats :

- hedgerows and lines of trees
- rivers and streams

2.10. These supplementary modules of the metric are calculated differently and have their own discrete biodiversity unit types. It is an important rule of the metric that the biodiversity units calculated through the core habitat area-based metric and each of the linear units are unique and cannot be summed or converted. When reporting biodiversity gains or losses with the metric, the different biodiversity unit types must be reported separately and not summed to give an overall biodiversity unit value. For example, a scheme should report a gain of 3 area-based units, a loss of 1 hedgerow unit and a loss of 1 river unit rather than an overall total gain of 1 unit. The separate

[5] LAWTON J.H., BROTHERTON P.N.M., BROWN V.K., ELPHICK C., FITTER A.H., FORSHAW J., HADDOW R.W., HILBORNE S., LEAFE R.N., MACE G.M., SOUTHGATE M.P., SUTHERLAND W.J., TEW T.E., VARLEY J. & WYNEE G.R. 2010. Making Space for Nature: a review of England's wildlife sites and ecological network. Report to Defra

Calculation Tool provides an easy and simple to use way of undertaking both area and/or linear biodiversity unit calculations.

How area habitat biodiversity units are calculated

2.11. To measure the biodiversity value of habitats it is first necessary to define the site boundaries and then divide it into appropriate parcels as needed. Parcels are simply distinct portions of each habitat type present. The habitat type and size of these parcels, and the condition of the habitat it contains, should then be recorded. The metric uses standard methodologies for categorising habitats so this can be done alongside routine ecological surveying. The biodiversity unit value of each habitat parcel is then calculated. To determine the unit value of a habitat parcel we assess its 'quality'. The assessment of quality comprises four components.

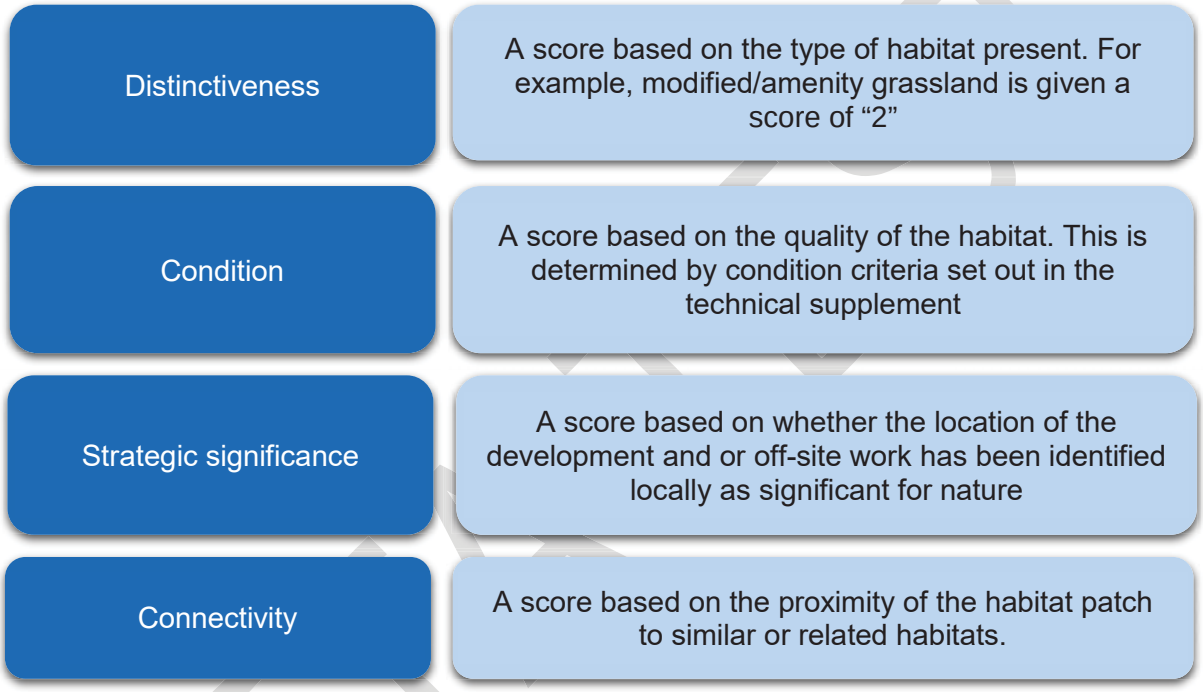


FIGURE 2-1: Quality components in biodiversity metric 2.0

2.12. The metric operates by applying a score to each of these elements. It then multiplies the size of each habitat parcel using with each of these 'quality' scores (see BOX 2-2) to produce a number that represents the **biodiversity unit** value of each habitat parcel.

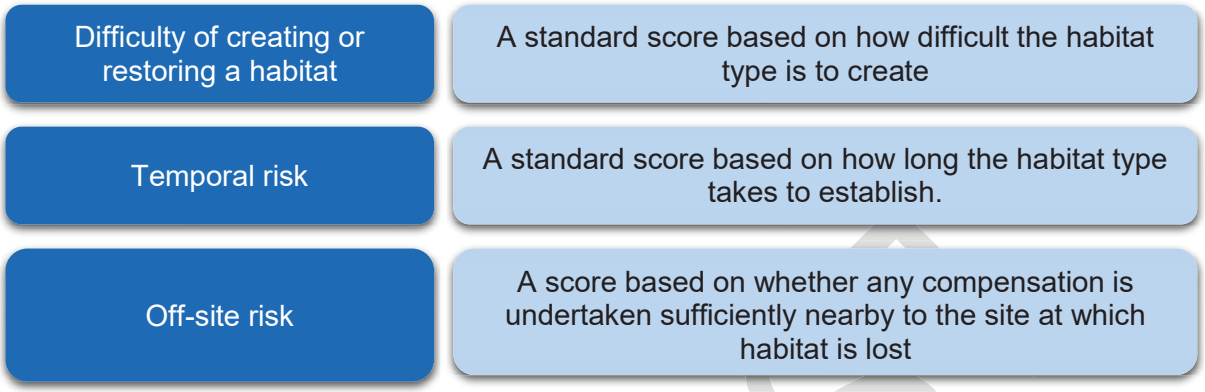
2.13. The next update to the metric and calculation tool will come with a tool for calculating connectivity. There will also be a simplified approach for calculating connectivity for smaller sites. In the meantime in the absence of any local data to the contrary, the metric (and the calculation tool) should be populated with 'medium' score for high and very high distinctiveness habitats and low score for all other habitats.

2.14. The initial calculation represents the '**baseline**' or '**pre-intervention'** value in biodiversity units.

2.15. The calculation is then repeated for the post-intervention (either development or land management change) scenario. This calculation should include any measures to retain existing habitats and create or enhance habitats to generate additional biodiversity units. This gives the user a '**post-intervention'** biodiversity unit score. At

this point, because the metric is measuring predicted changes rather than existing habitats, additional factors to account for the risk associated with creating, restoring or enhancing habitats are also considered. Figure 2-2 sets out the three risks incorporated into the metric.

FIGURE 2-2: Risk components of biodiversity metric 2.0



2.16. The predicted value of the habitats in biodiversity units 'post-intervention' is then deducted from the 'baseline' pre-intervention unit score to give a net change unit value. If your project has explicit biodiversity unit requirements the metric can be used to calculate the numbers of units your design is predicted to deliver. The design can be revised to improve the number of biodiversity units obtained.

2.17. The metric can be used to measure off-site compensation where this is required. The processes for measuring on-site and off-site changes and compensation are very similar. The biodiversity unit value of the off-site habitats are calculated for the 'pre-intervention' and 'post-intervention' stages. The 'pre-intervention' units are then subtracted from the 'post-intervention' units to work out how many biodiversity units will result from that habitat change.

2.18. The example in BOX 2-2 illustrates the general approach used to calculate the biodiversity unit value for habitats described above. A more detailed explanation of this process is given in chapter 5.

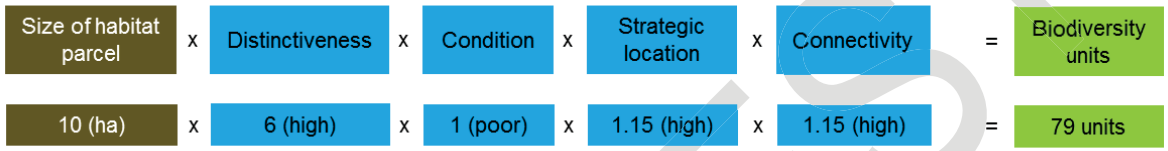
BOX 2-2: Calculating the biodiversity unit value of a habitat

How we calculate biodiversity value for habitats is illustrated in the scenario below:

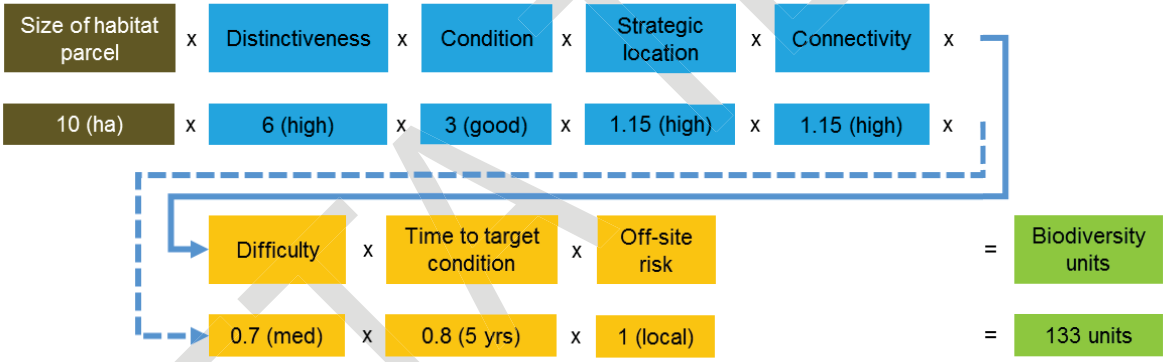
- The pre-intervention calculation that establishes the baseline biodiversity unit value of a habitat. In essence, that multiplies the size of a habitat parcel by its 'quality' scores, and
- The post-intervention calculation that gives you the biodiversity unit value of a habitat after it has been changed. This calculation also takes account of the difficulty and time it takes to create the new habitat.

How these calculations are used in an example scenario is illustrated in BOX 2-3. *N.B. In this example the 'high' connectivity score has been derived from local data.*

PRE-intervention biodiversity calculation (the baseline)

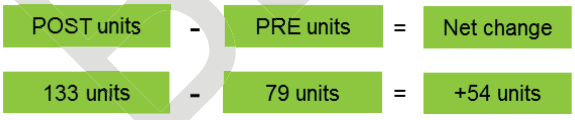


POST-intervention biodiversity calculation (for newly created habitat)



Calculation of gains or losses

The net effect of an intervention (or a series of interventions) on biodiversity is calculated as follows:



Key process steps

2.19. The key steps you need to follow to make practical use of the metric are outlined in Figure 2-1.

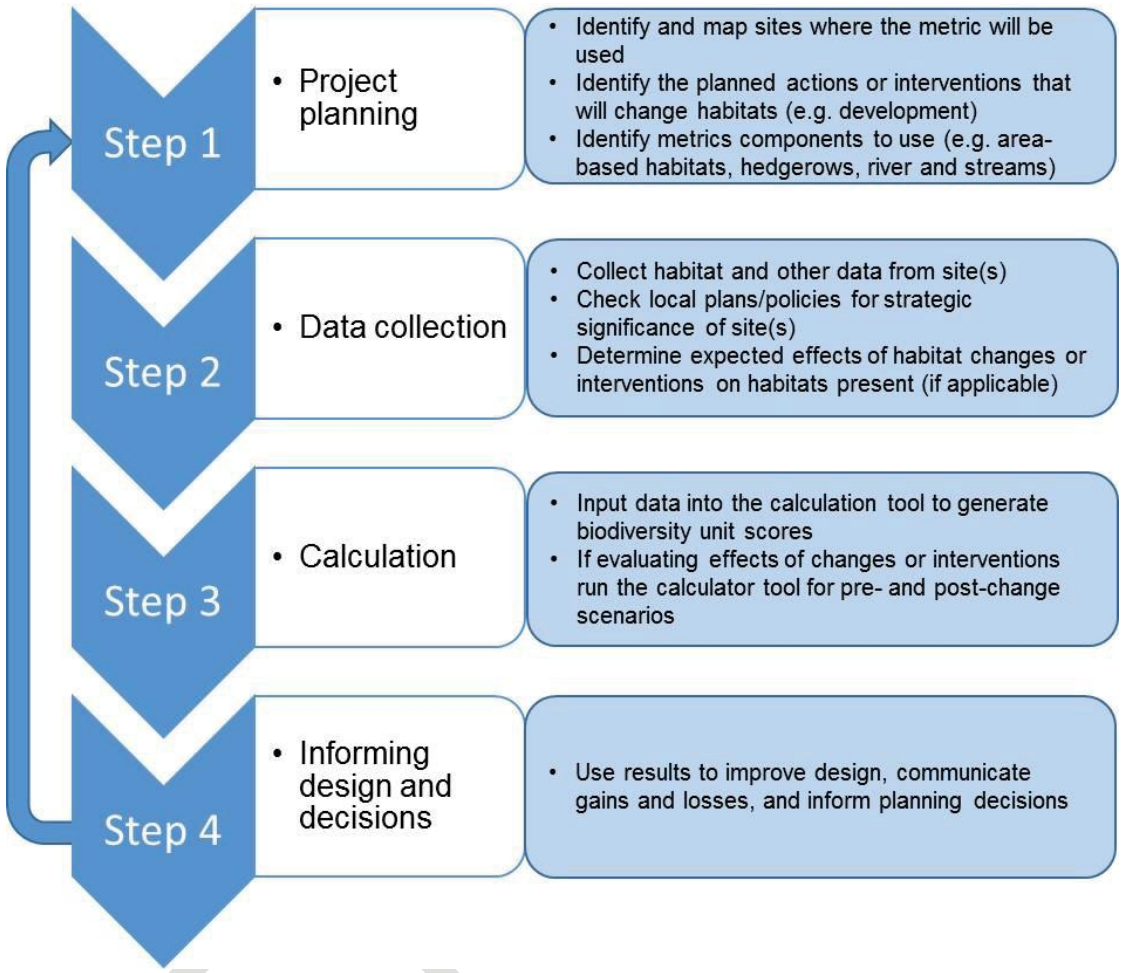


FIGURE 2-1: The 4 key steps to using biodiversity 2.0

Principles and rules for using the metric

2.20. The metric is a tool that can be used to help inform plans and decisions. Used properly, it incentivises actions that are expected to benefit biodiversity and discourages actions that harm biodiversity. It is important, however, to be aware of its limitations and to follow some important principles.

2.21. The metric uses habitat categories as a proxy for biodiversity. Although this is rational, it is an oversimplification of the real world. Furthermore, while the scoring of habitats is informed by ecological reasoning and the available evidence, the outputs of biodiversity unit calculations are not scientifically precise or absolute values. The generated biodiversity unit scores are proxies for the relative biodiversity worth for the state of a place.

2.22. The metric and its outputs should therefore be interpreted, alongside ecological expertise and common sense, as an element of the evidence that informs plans and

decisions. The metric is not a total solution to biodiversity decisions. The metric, for example, helps you work out how much new or restored habitat is needed to compensate for a loss of habitat, but it does not tell you the appropriate composition of plant species to use.

2.23. Users wanting to apply the metric properly should conduct their assessments with regard to a set of **key principles and rules** for its use. These are set out below:

- **Principle 1: The metric does not change the protection afforded to biodiversity.** Existing levels of protection afforded to protected species and to habitats are not changed by use of this or any other metric. Statutory obligations will still need to be satisfied.

- **Principle 2: Biodiversity metric calculations can inform decision-making where application of the mitigation hierarchy and good practice principles[6] conclude that compensation for habitat losses is justified.**

- **Principle 3: The metric's biodiversity units are only a proxy for biodiversity.** While it is underpinned by ecological evidence the metric is only a proxy for biodiversity and to be of practical use has been kept deliberately simple. The numerical values generated by the metric represent relative, not absolute, values.

- **Principle 4: The metric focuses on widespread species and typical habitats.** Area based habitats are considered a suitable proxy for widespread species found in typical examples of different habitat types.
    - Protected and locally important species needs are not considered through the metric,
    - Impacts on protected (e.g. SSSIs) and irreplaceable habitats are not adequately measured by this metric, and will likely require separate consideration.

- **Principle 5: The metric design aims to encourage enhancement, not transformation, of the natural environment.** Where possible, habitat created to compensate for loss of a natural or semi-natural habitat should be of the same broad type (e.g. new woodland to replace lost woodland) unless there is a good ecological reason to do otherwise (e.g. to restore a heathland habitat that was converted to woodland for timber in the past).

- **Principle 6: The metric is designed to inform decisions**. Decisions and management interventions need to take account of available expert ecological advice and not just the biodiversity unit outputs of the metric.

- **Principle 7: Compensation habitats should seek, where practical, to be local to the impact.** They should aim to replicate the characteristics of the habitats that have been lost, taking account of the structure and species composition that give habitats their local distinctiveness. Where possible

[6] CIEEM, CIRIA, IEMA. 2016 Biodiversity Net Gain – Good Practice Principles for Development. https://www.cieem.net/data/files/Publications/Biodiversity_Net_Gain_Principles.pdf

compensation habitats should contribute to England's ecological network by creating more, bigger, better and joined areas for biodiversity

- **Principle 8: The metric does not enforce a mandatory minimum 1:1 habitat size ratio for losses and compensation.** A difference can occur because of a difference in quality between the site impacted and the compensation provided. For example, if a habitat of low distinctiveness is impacted and is compensated for by the creation of habitat of high distinctiveness, the area needed to compensate for losses can potentially be less than the area impacted. Consideration should be given to whether reducing the size of compensation is an appropriate outcome.

Rules	
Rule 1	Where the metric is used to measure change biodiversity unit values need to be calculated prior to the intervention and post-intervention for all parcels of land / linear features affected.
Rule 2	Compensation for habitat losses can be provided by creating new habitat, by restoring or enhancing existing habitats, or by accelerating successional processes. Measures to improve existing habitats must provide a significant and demonstrable uplift in distinctiveness and/or condition to record additional biodiversity units.
Rule 3	'Trading down' must be avoided. Losses of habitat are to be compensated for on a "like for like" or "like for better" basis. Ideally, new or restored habitats should aim to achieve a higher distinctiveness and / or condition than habitats lost.
Rule 4	Biodiversity unit values generated by biodiversity metric 2.0 are unique to this metric and cannot be compared to unit outputs from the original Defra metric or any other biodiversity metric. Furthermore, the units generated by the each module of biodiversity metric 2.0 (for area, hedgerow and river habitats) are unique and cannot be summed.
Rule 5	It is not the area of habitat created that determines whether ecological equivalence or better has been achieved but the net change in biodiversity units. Risks associated with enhancing or creating habitats mean that it may be necessary to enhance or create a larger area of habitat than lost to fully compensate for impacts on biodiversity.
Rule 6	Deviations from the published methodology of biodiversity metric 2.0 need to be ecologically justified. While the methodology is expected to be suitable in the majority of circumstances it is recognised that there may be exceptions. Any local or project-specific adaptations of the metric must be transparent and fully justified.

3: Data Collection & Fieldwork

Introduction

3.1. This section sets out how to collect the data required for the biodiversity metric 2.0 calculation. This includes information that can be collected through 'desktop surveys' (i.e. remotely) and information that requires site visits or surveys. The section focusses on the data required for the core (area) calculation of biodiversity metric 2.0. Section 8 details the data needed to undertake the supplementary (linear) calculations.

3.2. To complete biodiversity metric 2.0 the following data needs to be obtained for existing and proposed habitats:

- Habitat types present (including sealed surfaces and man-made land cover);
- Area of each parcel of habitat of a particular type (hectares);
- Condition of each parcel of habitat (High, Medium, Low).
- Connectivity (high, medium and low) – *N.B. in the beta version of the biodiversity metric 2.0 these scores should be set at 'low' for low and moderate distinctiveness habitats and 'medium' for high or very high distinctiveness habitats in the absence of local data.*
- Strategic significance

Data Collection Approach

3.3. The best approach to take for data collection will depend on wider survey and data requirements for the development and the site being affected. However, the steps below set out some useful stages to consider.

Step 1: Pre site-visit background checks

a. Online data searches (such as using MAGIC) can help to identify any relevant Habitat Inventory data and SSSI boundary information. This can help to identify whether highly distinctive habitat is likely to be present or whether the site is within a SSSI or other statutory designation and whether there are known to be irreplaceable habitats on site. Designated sites and irreplaceable habitat impacts need to be addressed separately in accordance with existing mechanisms. The biodiversity metric 2.0 is not designed for use determining compensation for impacts on such sites and habitats.

b. Searching for species records (such as those held within the NBN Atlas) can give an indication of how biodiversity rich the site and its surroundings might be. This will help determine any constraints or aspects of the site's biodiversity that may need more detailed consideration outside of the scope of biodiversity net gain. Local Environmental Record Centres (LERCs) can also be good sources of biodiversity information.

c. It is also advisable to check that recent maps or aerial images of the habitats on the site are consistent with those from recent years. They can highlight if any potential baseline degradation (i.e. the removal of habitat before development to reduce net gain costs) has occurred.

Step 2: Initial walkover on the site

a. A walkover will give an impression on how the site might be split up and surveyed most effectively. During the walkover consider different land uses across the site and identify any hot spots of biodiversity with higher quality features (i.e. areas with Priority Habitats or Species) that may need more survey time and consideration.
b. The site should be divided into habitat parcels (contiguous areas of habitats with the same type and condition) as appropriate. Site mapping will usually be the most straightforward way of doing this.

Step 3: Identifying habitat types present on site

a. This is best completed through the use of UK Habitat Classification System[7] (see Box 3-1). This means that habitats are recorded as types that will be widely recognised and that can be put directly into the biodiversity metric 2.0 calculation tool. If a Phase 1 habitat survey is undertaken the results can be translated into UK Habitat Classification System types (see Box 3-1 below). A translation table between Phase 1 and UKHab types is also contained within the calculation tool provided for biodiversity metric 2.0.
b. Habitat type identification might require a separate survey visit, or might be achievable on the site walkover, depending on the habitats present. For example, a site comprising hardstanding and amenity grassland might not require a detailed habitat survey, but a site with different grassland types and a rich mosaic of habitats would be likely to.

BOX 3-1: The UK Habitat Classification ("UKHab")

Biodiversity metric 2.0 is based on the UK Habitat Classification system, a free-to-use (open access), unified and comprehensive approach to classifying habitats that is fully compatible with other major existing classifications. It is designed to be suitable for digital or manual use in habitat metrics, impact assessment and sharing data between organisations.

The UK Habitat Classification system was chosen for use in the metric as it translates easily into Priority Habitat types and Habitats Directive Annex 1 types; does have scope to incorporate assessments of condition, origin or management regime; and is much easier to use in electronic mapping systems because of its architecture.

Minor adjustments to the habitat list within the UK Habitat Classification system have been made within the metric. The adjustments include the addition of habitats (all based on a EUNIS code or Annex 1 habitat type) that cut across a number of Priority Habitat types and so work better in the metric as a separate category. Some habitats have been omitted from the list because they are better recorded in the metric as the actual habitat type as represented on the site (e.g. a railway corridor is better split into its individual grassland & scrub types).

If your project uses Phase 1 habitat typologies the biodiversity metric 2.0 calculation tool can convert between Phase 1 and UKHab classifications. A conversion table can be found via the 'Technical Data' button in the calculation tool.

[7] UK Habitat Classification: http://ecountability.co.uk/ukhabworkinggroup-ukhab/ (Accessed 20/06/2019)

Step 4: Recording size (ha) and mapping the habitat polygon/ parcel.

a. The size of each habitat parcel should be recorded in hectares (with the exception of the habitats covered by the supplementary modules – see Chapter 8). Whilst there is no firm minimum or maximum size of recorded parcels, it is recommended that a proportionate approach is taken to avoid the recording of habitat types that cover a total area of less than one square meter (0.0001 ha), or recording extremely large areas that are likely to vary in their condition, as one habitat parcel.
b. Mapping is not always required, but is usually helpful to visualise the inputs and to help decision-makers to make sense of the habitats included in metric calculations. Where practical, it is advisable to use digital mapping as this will typically allow more accurate recording of boundaries and make the process of revising maps easier. If you record reference numbers for each habitat parcel, it can be helpful for reviewers to label any habitat map with these references.

Step 5: Recording condition scores to describe the quality of the habitat present.

a. Habitat condition is divided into one of 3 categories: High, Medium and Low in the metric. These 3 main categories will be used but the metric and calculation tool does allow for half scores, if for example it is not possible to separate High and Medium condition. Using the appropriate habitat condition sheet (see the Technical Supplement for details) the surveyor will need to assess the quality of each parcel of habitat for wildlife. Some parcels may need to be split, if quality varies across an area, into separate parcels. Each parcel needs to be recorded on the map and calculated separately using the metric. If using the calculation tool each parcel needs to be entered as a separate line in the tool. Identifying habitat condition will require some ecological knowledge in most circumstances. The detailed habitat condition assessment sheets can be found in the technical supplement published alongside this document.

Step 6: Supplementary habitat modules

If the site contains any of the following habitat types then an assessment using the relevant supplementary module of the metric is required:

Linear Habitats (see Chapter 8)

- hedgerow and lines of trees – this module uses length (kilometres), height and condition
- rivers or streams – this module uses length (kilometres), type and nearby habitat type

Urban Street Trees (see Chapter 7)

- urban street trees – this module uses stem diameter at breast height (centimetres) and the number of trees involved.

Step 7: Opportunities for onsite Habitat Creation & Enhancement.

It is generally advisable to use any site visits and surveys to also identify opportunities where existing habitats could be enhanced or new habitats created.

Trading summary tab

4.43. The trading summary tab provides details of trading between habitat types and an indication of whether the development has abided by the trading rules (See Rule 3). It is designed to set out the available data in a way that allows assessors and reviewers to determine whether or not trading principles described in rule 3 (see chapter 2) have been adhered to.

Error checking

4.44. The tool contains a number of inbuilt error messages which are designed to identify errors in data entry. Typically they can be resolved by checking the input data and common causes of errors include:

- inappropriate condition ratings
- habitat areas that do not match
- aiming to create a habitat or condition type that is not considered ecologically feasible

STEP 6 (optional): Understanding and checking supporting data in the tool

4.45. All the technical data and multipliers underpinning the calculation can be accessed through the main menu in tabs G-1 to G-9 of the calculation tool. This is not required for normal operation of the tool but regular users of the tool might want to look at the underlying data to better understand the tool's outputs.

Connectivity scoring

4.46. In the beta version of the metric, low distinctiveness habitats should be afforded a connectivity score of 'low' and high and very high distinctiveness habitats afforded a connectivity score of 'medium'. A connectivity tool is being developed and will be available in future updates.

5: Detailed description of the biodiversity metric 2.0

5.1. This chapter provides explanations of the different components of biodiversity metric 2.0. The aim is to give a sense of the values used for different multipliers, why those multipliers are being used, and the assumptions and limitations around them. This chapter also outlines some the considerations that might be taken into account when designing a project underpinned by the metric.

5.2. This chapter focuses on the core components of the metric. Specific area habitat and urban tree components are detailed in chapters 6 and 7 respectively. Chapter 8 provides similar details and explanations for the additional supplementary metric modules covering hedgerows, lines of trees and rivers and streams.

Components of biodiversity quality

Distinctiveness

5.3. Habitats are assigned to distinctiveness bands. These are based on an assessment of the distinguishing features of a habitat or linear feature, including the consideration of species richness, rarity (at local, regional, national and international scales), and the degree to which a habitat supports species rarely found in other habitats.

5.4. The distinctiveness band of each habitat is preassigned in biodiversity metric 2.0. The bands are based upon the UK habitat classification system. A combination of simple rules and expert judgement have been used to assign each habitat type to the appropriate distinctiveness band. The distinctiveness categories used are tailored to habitat type and are explained later in this chapter for Area Habitats and in chapter 8 for habitats with supplementary modules.

Condition

5.5. Parcels of habitat will be in different ecological conditions In addition, interventions to improve habitats will not always involve taking a habitat in poor condition and improving it to good condition. The metric therefore takes account of variants in habitat condition.

5.6. The approach to condition assessment is tailored to habitat type and is explained later in this chapter for Area Habitats and in chapter 8 for habitats with supplementary modules.

Strategic significance and connectivity

5.7. ‘The spatial location of a habitat is treated as a component of the quality of a habitat parcel in the same way as distinctiveness or condition. Two distinct spatial components are used strategic significance and connectivity. These are explained in more detail in section 5.29.

Dealing with risk

5.8. There are uncertainties and a risk of failure in any endeavour to create or improve the biodiversity unit value of a habitat. One way to deal with these risks is to complete the habitat improvements works in advance of the habitat losses occurring.

5.9. Where this is not possible risks can be mitigated by reducing the number of units generated by a unit of compensation habitat. This is done by using a **multiplier** in the metric to correct for disparity or risk. The use of multipliers to account for the risks associated with habitat restoration or creation has several benefits:

- it **provides flexibility** by allowing activities impacting habitats to proceed in advance of compensation being either provided or attaining its target quality in exchange for an increase in the magnitude of compensation provided;
- it **incentivises** the creation of compensation habitat in advance of loss. If the habitat is established before the impact then there is no need to apply risk multipliers to manage delivery risks or to take account of time differences. More units will therefore be available from a specific parcel of land, and
- it **creates a disincentive** for damaging habitats that are difficult or take a long time to recreate or restore (the case for many habitats in the Very High and High distinctiveness band), by increasing the area of habitat needed to compensate for the loss.

5.10. A typical consequence of applying risk multipliers is to increase the size (e.g. area or length for linear features) of habitat required as compensation such that it exceeds the size of habitat lost or damaged. This is necessary:

- to preserve the incentives and disincentives referred to above;
- to compensate for temporal losses of biodiversity (e.g. where there is a period of diminished biodiversity between the point in time when a habitat is impacted and it is replaced by habitat of equivalent biodiversity value);
- to protect against situations where habitats that are created, enhanced or restored fail to adequately compensate for the lost biodiversity. This is necessary because there is no requirement to provide additional compensation if interventions ultimately fail to deliver the predicted biodiversity outcome.

5.11. The following three risks are recognised in this metric.

Difficulty of creation and restoration

5.12. This risk associated with delivery of biodiversity creation or enhancement due to uncertainty in the effectiveness of management techniques used to restore or create habitat.

5.13. The level of risk differs between habitat types because of ecological factors (e.g. the different challenges posed by creating different habitat types) and due to the availability of techniques or know-how to create habitats in a realistic time-frame. Uncertainty in achieving the target outcome for each habitat is addressed by a habitat-specific 'difficulty' multiplier based on available science and expert opinion.

5.14. There is a growing body of experience and expertise associated with habitat creation and enhancement[11]. Nevertheless, it is important to recognise that it is impossible to exactly replicate habitat losses because of the unique physical and ecological features of every place. This point is of particular relevance to impacts on well-established semi-natural habitats and emphasises why it is so important that the mitigation hierarchy is adhered to so that impacts on such habitats occur only when there is no alternative.

5.15. The difficulty and uncertainty of successfully creating, restoring or enhancing a habitat is recognised in this multiplier.

[11] As the evidence base on the effectiveness of creation and restoration techniques grows and is reviewed the risk multipliers may be modified. A timetable for future updates/revision to the metric will be published.

TABLE 5-1: Difficulty categories and multipliers

Difficulty categories	
Category	**Multiplier**
Very High	0.1
High	0.33
Medium	0.67
Low	1

Temporal risk

5.16. In delivering compensation there may be a mismatch in the timing of the impact and compensation, i.e. the difference in time between the negative impact on biodiversity and the compensation reaching the required quality. This results in lower levels of biodiversity for that period of time.

5.17. This issue can be managed by the creation of compensation habitat ahead of the impact taking place: e.g. by starting the offset work well ahead of the development for projects with a long lead in or through the creation of a bank of habitat units.

5.18. However, this is not always possible and even where the management to create compensation habitat starts in advance, the time taken for habitats to mature means that there will almost inevitably be a time lag. Where a time lag does occur, a risk multiplier is applied. This is referred to as the '**Time to target condition'** multiplier.

5.19. The time period to use in applying the Time to Target Condition multiplier to a metric calculation is the length of time (in years) between the intervention and the point in time the habitat reaches the pre-agreed target quality (i.e. distinctiveness, condition, area). This time will vary between habitat types, between change scenarios (e.g. creation typically takes longer than enhancement) and due to way the habitat is managed. Time to target condition values – based on based on good practice and typical conditions are provided for all habitats used in biodiversity metric 2.0. These values are set out in detail in the Technical Supplement.

5.20. These time to target condition values then need to be discounted. Discounting over time is an economic technique used to compare costs and benefits that occur in different time periods based around the principle that, generally, people prefer to receive goods and services now rather than later. Where time discounting is used in compensation schemes a standard discount rate is typically used. The biodiversity metric 2.0 uses 3.5%, which is the value recommended in the Treasury Green Book[12](Table 5-2 shows the multipliers for a number of time periods using a discount rate of 3.5 %. It is important to use precise figures (at least to 3 decimal places).

5.21. To be practical, the metric:

- **assumes that there is a quality 'jump' from the baseline condition to the target condition** once the relevant number of years has elapsed. Metric

[12] more details on discounting can be found in the Treasury Green Book Guidance, HM Treasury, 2011).

calculations do not take into account incremental increases in quality of the habitat and do not need to be re-done annually, and

- **sets a limit on the discount rate used for temporal risk**. The metric sets a multiplier limit of x0.320 to take account of temporal risk. This equates to approximately 32 years, which is about the maximum time frame that most projects and plans can realistically plan ahead.

Monitoring is, however, recommended to confirm the actual number of biodiversity units delivered matches what was predicted.

TABLE 5-2: Time to target condition: multipliers for different time periods using a 3.5% discount rate.

Time to target condition			
Time (years)	**Multiplier**	**Time (years)**	**Multiplier**
0	1.000	17	0.546
1	0.965	18	0.527
2	0.931	19	0.508
3	0.899	20	0.490
4	0.867	21	0.473
5	0.837	22	0.457
6	0.808	23	0.441
7	0.779	24	0.425
8	0.752	25	0.410
9	0.726	26	0.396
10	0.700	27	0.382
11	0.676	28	0.369
12	0.652	29	0.356
13	0.629	30	0.343
14	0.607	31	0.331
15	0.586	>32	0.320
16	0.566		

Off-site risk multiplier

5.22. There are both ecological and social drivers for compensation habitat to be provided local to where losses occur: e.g. the cultural ecosystem services provided by an area of land to a community. When off site compensation is within the local planning authority area (LPA) or the same National Character Area (NCA)[13] it is considered

[13] Further information on NCAs can be found at: http://publications.naturalengland.org.uk/category/587130

that those drivers have been addressed. However there is a risk of compensation being delivered at distance from the impact site. Where this is the case the off-site risk multiplier is applied to those compensation parcels outside of the relevant LPA or NCA. This risk is applied to area habitat, hedgerow and river elements of biodiversity metric 2.0. Note – for rivers and streams different off-site risk multipliers called riparian loss. See Chapter 8 for more details.

TABLE 5-3: Off-site risk categories

Off-site risk categories			
Category	**Score**	**Point applied to calculation**	
		Pre-impact	**Post-impact**
Compensation inside LPA or NCA of impact site	1.0	No	**Yes**
Compensation outside LPA or NCA of impact site but in neighbouring LPA or NCA	0.75	No	**Yes**
Compensation outside LPA or NCA of impact site and beyond neighbouring LPA or NCA	0.5	No	**Yes**

Biodiversity change scenarios

5.23. Different biodiversity change scenarios carry different levels of risk and the multipliers are applied differently to reflect this. Three distinct biodiversity habitat change scenarios (illustrated in Figure 3.1) are recognised in the biodiversity metric 2.0:

- **Habitat creation or recreation.** Where one habitat type is replaced by another or the habitat is destroyed (e.g. by development works) and the same habitat is recreated.
- **Habitat restoration or enhancement** of an existing habitat to improve its distinctiveness and / or condition. An example of restoration would be the transformation of a derelict chalk grassland dominated by scrub and coarse grasses to a continuous area of chalk grassland with isolated woody species and an abundance of fine-leaved grasses.
- **Accelerated habitat succession**. This recognises that certain interventions are comparable with ecological succession processes which result in a more distinctive habitat type (for example, grassland changing into scrub and ultimately woodland).The biodiversity value of the original habitat is not abruptly lost, but gradually changes as the new habitat type emerges. Accelerated succession interventions are subject to 'trading down' principles. Accelerated succession is a purposeful sustained intervention and it is envisaged that there are a limited number of situations where this would apply. For example, the planting of an existing grassland with thorny shrubs to facilitate natural tree regeneration to establish a woodland without removing the grassland.

5.24. Under the above scenarios different portions of the biodiversity value of a habitat may have different risk multipliers applied to it. So, as illustrated in Figure 5-1, in the

case of a straightforward habitat creation, you lose all the original habitat, so the risks apply to the whole value of the habitat being created. Whilst in the case of restoration or enhancement the habitat starts with and retains a certain biodiversity value that interventions increase. The risk multipliers are applied to this uplift (improvement) of the habitat. In accelerated succession the situation is more complex. Recognising that the original habitat retains a biodiversity value while the new habitat emerges the metric applies risk only to the uplift in value resulting from succession.

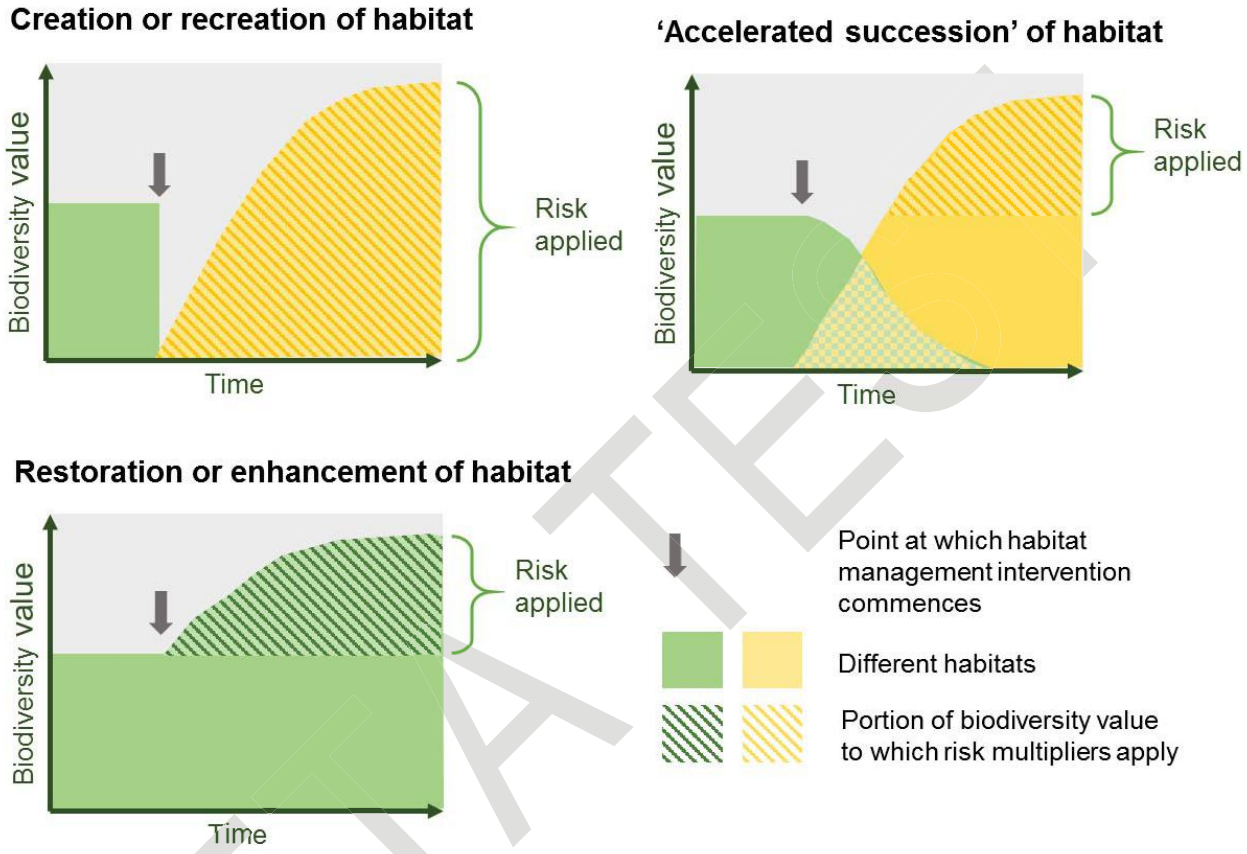


FIGURE 5.1: The biodiversity habitat change scenarios recognised in the metric

5.25. This leads to three different equations being used to generate biodiversity unit values pre and post intervention.

5.26. It is important to select the appropriate change scenario for each management intervention. This choice is an ecological judgement and is determined by the ecological consequences of the change, not where the habitat is located.

5.27. Compensation habitats can be created, restored or enhanced, or subject to accelerated succession on-site as well as off-site. Measures taken to generate biodiversity units by improving existing habitats must provide a significant and demonstrable uplift in distinctiveness or condition.

5.28. Good management practice does not, by itself, constitute restoration or enhancement, or accelerated succession.

The spatial component

5.29. In biodiversity metric 2.0 there are two core spatial components. First, the **strategic significance** of a place for biodiversity, its geography. Second, ecological **connectivity**, the relationship of a habitat in a defined place to its immediate surroundings in respect of biological and ecosystem flows. While these concepts are not completely independent of each other they do represent different qualities of a habitat.

Strategic significance

5.30. The idea of strategic significance works at a landscape scale. It gives additional unit value to habitats that are located in preferred locations for biodiversity and other environmental objectives. Ideally these aspirations will have been summarised in a local strategic planning document which articulates where biodiversity is of high priority and the places where it is less so. Strategic significance utilises published local plans and objectives to identify local priorities for targeting biodiversity and nature improvement, such Nature Recovery Areas, local biodiversity plans, National Character Area[14] objectives and green infrastructure strategies. Table 5-5 shows the multiplier scores for both impact and compensation sites based on its place in a strategic plan.

5.31. In the absence of a locally or nationally relevant strategic documentation indicating areas of significance for biodiversity, the value of **1** should be used in pre and post development calculations. Use of a score of 1 does not penalise a proposal.

TABLE 5-5: Strategic significance categories and scores

Strategic Significance categories			
Category	**Score**	**Point applied to calculation**	
		Pre-impact	**Post-impact**
High strategic significance High potential & within area formally identified in local policy	1.15	**Yes**	**Yes**
Medium strategic significance Good potential but not in area defined in local policy	1.1	**Yes**	**Yes**
Low Strategic Significance Low potential and not in area defined in local policy	1	**Yes**	**Yes**

Connectivity

5.32. The focus of connectivity in biodiversity metric 2.0 is the relationship of a particular habitat patch to other surrounding **similar** or **related** semi-natural habitats. These help facilitate flows of species and ecosystem services increases habitat resilience.

[14] For more details of National Character Areas see: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles

By **similar** habitats we mean, for example, multiple patches of calcareous grassland. By **related** habitats we mean habitats often found in association as part of a dynamic complex, for example lowland heath and scrub. The same approach is applied to impact and compensation sites.

5.33. In the beta version of biodiversity metric 2.0 all High and Very High distinctiveness habitats should be assigned a Medium connectivity multiplier, other habitats a Low connectivity multiplier (see Table 5-5).

5.34. A connectivity tool will be published in an updated version of biodiversity metric 2.0. which will use an approach based upon the habitat fragmentation or 'structural connectivity' model with the National Biodiversity Climate Change Vulnerability Model (NBCCVM)[15] to assess connectivity and will generate connectivity categories from highly connected to low connectivity. It encompasses the ideas of:

- Larger habitat patches being less susceptible to extreme events;
- Accommodation of a wider range of soil types, topography and microclimate affords greater niche variation;
- Potential for species dispersal and local re-colonisation to be facilitated; and
- Patch size and permeability of surrounding landscape being important for persistence of biodiversity.

TABLE 5-5: Beta version Connectivity multipliers assigned by habitat distinctiveness.

Connectivity Multipliers		
Habitat distinctiveness	**Connectivity**	**Multiplier**
Very high distinctiveness	Medium	1.1
High distinctiveness	Medium	1.1
Medium and low distinctiveness	Low	1

Moderating the influence of spatial components

5.35. So that strategic significance and connectivity elements do not have a disproportionate effect on the calculation outputs the specific scores are restricted in range in the beta version of biodiversity metric 2.0 to: strategic significance 1 – 1.15, and connectivity 1 – 1.1.

6: Area Habitat biodiversity unit calculations

6.1. Areas habitats are perhaps the most familiar ecological currency in the UK, they are the woodlands, grasslands, wetlands and other types that are widely recognised by ecologists and the public alike. The habitats we recognise comprise a community of different species populations living in a place. There is usually a sub-group of those

[15] For more information about the NBCCVM see: TAYLOR, S., KNIGHT, M. & HARFOOT, A. 2014. National biodiversity climate change vulnerability model. Natural England Research Report NERR054. Natural England. ISBN 978-1-78354-084-6.

Appendix 5263/AB14:

Greensand Ridge Biodiversity Opportunity Area Map

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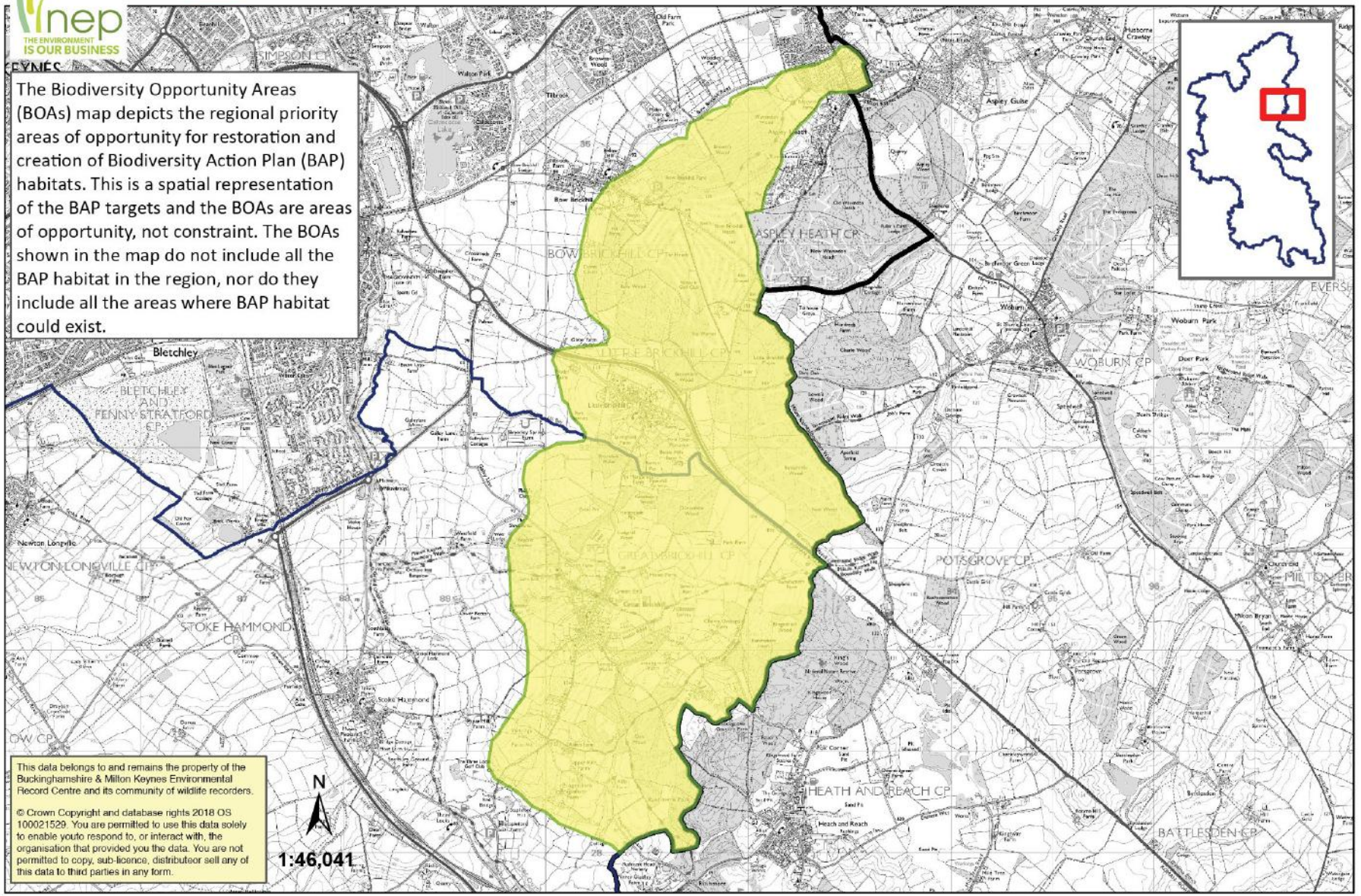
Greensand Ridge

Buckinghamshire & Milton Keynes
Biodiversity Opportunity Areas



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Appendix 5263/AB15:

AB15(a): Buckinghamshire & Milton Keynes BAP: Lowland Meadows Habitat Action Plan

AB15(b): Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan

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AB15(a): Buckinghamshire & Milton Keynes BAP: Lowland Meadows Habitat Action Plan

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Lowland Meadows

Key associated species

Adder's- tongue Fern	Marsh Fritillary
Barn Owl	Meadow Pipit
Brown Hare	Meadow Saxifrage
Cowslip	Moss Weissia squarrosa
Curlew	Narrow-leaved Water-dropwort
Forester Moth	Redshank
Fritillary	Short-eared Owl
Green-winged Orchid	Skylark
Lapwing	Snipe

The vast majority of grassland currently present on farms in the UK is species-poor grassland which has been 'improved' through the application of fertiliser and/or ploughed and reseeded. Unimproved neutral grassland supporting a species-rich sward is now rare and subject to further threat as pressure increases to maintain or increase profitability. Lowland meadows are a priority habitat within the UK Biodiversity Action Plan. This plan also covers another UK Priority Habitat – Coastal & Floodplain Grazing Marshes.

1 Current status in the UK

Biological status

1.1 There are currently less than 10,000 ha of unimproved neutral grassland remaining in England and less than 2,000 ha in Wales. These grasslands are managed mainly as traditional hay meadows or pastures. They contain a high proportion of broad-leaved herbaceous species such as Greater Burnet and Common Knapweed. As the habitat has been lost so these species have become rarer.

1.2 Semi-natural lowland grassland decreased in England and Wales by an estimated 97% between 1930 and 1984. Most neutral meadows now remain in a landscape of hedges and small woods, or in the distinctive upland areas characterised by the stone walls and moorland of northern England.

2 Current status in Buckinghamshire

Cover and distribution

2.1 Unimproved, species-rich neutral grasslands are rare and threatened. The majority of neutral grasslands within Buckinghamshire are mainly located in the north, managed as traditional hay meadows or pastures. Neutral meadows are often characterised by ridge and furrow, and

combined with hedgerows and small woodlands form an intricate patchwork of habitats contributing to the biological diversity and richness of these areas. Those notified as SSSIs are often confined to small, isolated fields. There are, however, a number of non-statutory neutral and marshy grassland Wildlife Sites. The nationally important NVC type MG4 (Alopecurus pratensis-Sanguisorba officinalis flood meadow) is found at a number of sites in the Marsh Gibbon-Ludgershall area eg Long Herdon Meadow SSSI and in Milton Keynes at Oxley Mead SSSI.

2.2 The majority of lowland meadow Local Wildlife Sites are found north of the Chiltern Escarpment (164 ha, 86%) with just 25.5 ha within Chiltern, South Bucks and Wycombe Districts.

2.3 In the late 1990s surveys of neutral grasslands in North Buckinghamshire established their extent, distribution and quality. Only 37.9 ha of grassland and flush communities are regarded as exhibiting high conservation interest. This species-rich sward usually possesses a high proportion of wildflowers to grasses. Many of these fields are subject to seasonal flooding which attracts wintering and breeding waders and wildfowl. Management is generally through hay cropping and aftermath grazing. The area around Ludgershall-Marsh Gibbon exhibits outstanding interest with a large area of MG4 flood meadow grassland. Nationally rare, this area of interest fell within the Upper Thames Tributaries ESA.

2.4 Along the Thame valley near Notley Abbey and along the river between Eythrope and Lower Winchendon sites support some botanical interest. Sites at Bledlow tend to be small fields at the heart of the village, larger fields outside the settlement are arable or have been improved.

2.5 Stoke Hammond/Bragenham/ Soulbury is an area of note for the number of unimproved/semi-improved grasslands still in existence.

Trends

2.6 Aerial photographic survey of Buckinghamshire revealed a loss of 95% of unimproved flower-rich meadows between 1947 and 1985. This mirrors the decline seen at a national level.

2.7 A number of birds associated with neutral grasslands are suffering a national decline. Amongst those included in the UK Steering Group list of species that breed in the County and rely on the typical grasslands of north Buckinghamshire are skylark, grey partridge and corn bunting.

2.8 Key negative species associated with deterioration in this type of habitat are coarse grasses such as tufted hair-grass and scrub species.

2.9 For the MG4 grassland in the ESA area the presence of Greater Burnet and Saw-wort provide evidence of high conservation interest.

3 Current factors affecting the habitat

Agricultural intensification

3.1 Losses have resulted through agricultural improvements and changes in management practice. These include ploughing and re-seeding, drainage of marshy grasslands, conversion to arable use.

Addition of chemicals and fertilisers

3.2 There has been an increased use of slurry, fertilisers and herbicides. This leads to greater soil fertility with a subsequent decrease in floristic diversity.

Change from traditional practices

3.3 There is a current preference for silage production rather than haymaking.

Changes in the rural economy

3.4 Changes include financial pressures which lead to over-grazing, diversification, and increased horse grazing.

Lack of perceived value

3.5 This can lead to neglect or to alternative land-use such as tree-planting and development.

4 Current Action

Legal status

4.1 Some of Buckinghamshire's neutral grasslands are protected as SSSIs. Additionally a number are designated as Wildlife Sites which confers some protection from development.

4.2 Neutral grasslands which are managed under ESA and Environmental Stewardship schemes have short-term protection from agricultural improvements.

Management, research and guidance

4.3 Many of the important grasslands on the Upper Ray are in a Natural England Priority Area for the targeting of Environmental Stewardship, having previously been within the Upper Thames Tributaries ESA. The aim of both schemes in this area is the maintenance of the landscape and extensive management of the permanent grassland. Objectives include the raising of water levels in ditches and arable reversion to permanent and wet grassland.

4.5 'North Buckinghamshire Grasslands - A Summary Report' (Jennings 1997) provides a focus and strategy for the work of the funding organisations - Bucks County Council, Natural England and Aylesbury Vale District Council. The report identifies areas of botanical and bird interest and discusses future priorities.

4.6 Species-rich neutral grasslands have been identified as part of the Bucks Wildlife Sites Project. Sites that possess carefully selected criteria are eligible as Local Wildlife Sites, with the objective of targeting grant aid to assist in sympathetic management of the land.

5 Objectives

5.1 It is important that Habitat Action Plan objectives and actions are considered in conjunction with those in Generic Issues (see Generic Issues). All Generic objectives and actions apply to each individual Habitat Action Plan.

5.2 The Lowland Meadows HAP will contribute to the following UK BAP Targets

-

T1 Maintain the current extent of Lowland Meadows in the UK. (Target represents no loss of BAP habitat).

T2 Maintain at least the current condition of Lowland Meadows.

T3 Achieve favourable or recovering condition for 7,088ha of Lowland Meadow by 2010

T4 Restore 1,736 ha of Lowland Meadow from semi-improved or neglected grassland, which no longer meets the priority habitat definition by 2010

T5 Re-establish 345 ha of grassland of wildlife value from arable or improved grassland, by 2010.

T6 260 ha (75%) of re-established area to be adjacent to existing Lowland Meadows or other semi-natural habitat by 2010. (Refer to T5)

T7 170 ha (50%) of re-established area to contribute to resultant habitat patches of 2 ha or more of Lowland Meadow by 2010. (Refer to T5)

And also the following targets in the Coastal & Flood Plain Grazing Marsh HAP

T1 Maintain the extent of the existing resource of Coastal & Flood Plain Grazing Marsh habitat with no net loss.

T2 Maintain the condition of Coastal & Flood Plain Grazing Marsh habitat where already favourable and establish by 2010, management to secure favourable condition for all areas of grazing marsh currently judged as unfavourable. The target condition for all such areas should be favourable or unfavourable recovering by 2020.

T3 Restore and improve 25,000 ha of relict habitat that does not qualify as Coastal & Flood Plain Grazing Marsh habitat by 2020. (e.g. dry Coastal & Flood Plain Grazing Marsh with inappropriate hydrological regime, agriculturally improved sites etc by implementing appropriate management at all sites).

T4 Re-establish 3,200 ha of Coastal & Flood Plain Grazing Marsh of wildlife value from appropriate land sources (e.g. arable land) by 2020 (which is capable of supporting a diverse range of invertebrates, mammals and breeding waders).

T5 Establish 8 new landscape scale wetland complexes by 2020, at least 1 in each country in which Coastal & Flood Plain Grazing Marsh is a major component along other wetland types. This cross-refers to targets in the uplands, lowland raised bog, wet woodlands, fens and reedbed HAPs.

6. Biodiversity Opportunity Areas

Lowland Meadows may be a priority habitat in the following Biodiversity Opportunity Areas

- Bernwood
- Chess Valley
- Colne Valley
- Greensand Ridge
- Medmenham
- Ouse Valley
- Ouzel Valley
- South Bucks Heaths & Parklands
- South Western Commons
- Thame Valley
- Thames Valley
- Tingewick Meadows and Woodlands
- Upper Ray
- Whaddon Chase
- Whittlewood Ridge
- Yardley Chase

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National Target	Code	Target	Action	Start	End	Action location	Lead	Other Orgs	Target total	Baseline
T1 - Maintain the current extent of lowland meadows in the UK	M1	Maintain extent of lowland meadows		2007	2010					
	M1/1		Promote the management of roadside verges and designate as Roadside Verge Nature Reserves where appropriate	2007	2010	Bucks & MK	BMKBP	BCC AVDC CDC MKC SBDC WDC Parish Councils	X ha	x
	M1/2		Ensure all floodplain Lowland Meadows and target areas are taken into account in Thames River Basin Management Plan and flood risk strategies	2007	2009	Bucks	EA	RSPB/BBOWT		
	M1/3		Target lowland meadow sites in Local Wildlife Site prioritisation and selection process	2007	2010	Bucks & MK	BMKBP AVDC	BCC CDC MKC SBDC WDC	X sites	
	M1/4		Maintain current extent of lowland meadows in Aylesbury Vale	2007	2010	Aylesbury Vale	TBA	AVDC NE BBOWT	143 ha	143 ha
	M1/5		Maintain current extent of lowland meadows in Chiltern	2007	2010	Chiltern	TBA	CDC	14 ha	14 ha
	M1/6		Maintain current extent of lowland meadows in Milton Keynes	2007	2010	Milton Keynes	TBA	MKC NE	4 ha	4 ha
	M1/7		Maintain current extent of lowland meadows in South Bucks	2007	2010	South Bucks	TBA	SBDC NE	6 ha	6 ha
	M1/8		Maintain current extent of lowland meadows in Wycombe	2007	2010	Wycombe	TBA	WDC NE BBOWT	4 ha	4 ha
T2 - Maintain at least the current condition of lowland meadows T3 - Achieve favourable or recovering condition of lowland meadow	M2	Achieve condition of lowland meadows								
	M2/1		Increase no of sites in Environmental Stewardship to ensure long term management security	2007	2010	Bucks & MK	NE	FWAG/BBOWT/AVDC?	X sites	
	M2/2		Disseminate best practice to landowners for habitat management / creation	2007	2010	Bucks & MK	FWAG/BBOWT/RSPB/DEFRA			
	M2/3		Monitor and maintain condition of sites in Aylesbury Vale	2007	2010	Aylesbury Vale	TBA	AVDC NE BBOWT	143 ha	x
	M2/4		Monitor and maintain condition of sites in Chiltern	2007	2010	Chiltern	TBA	CDC	14 ha	x
	M2/5		Monitor and maintain condition of sites	2007	2010	Milton Keynes	TBA	MKC NE	4 ha	x

			in Milton Keynes							
	M2/6		Monitor and maintain condition of sites in South Bucks	2007	2010	South Bucks	TBA	SBDC NE	6 ha	x
	M2/7		Monitor and maintain condition of sites in Wycombe	2007	2010	Wycombe	TBA	WDC NE BBOWT	4 ha	x
T4 – Restore 1,736ha of lowland meadows from semi-improved or neglected grassland, which no longer meets priority habitat definition by 2010.	M3	Restore lowland meadows from semi-improved or neglected grassland								
	M3/1		Restore lowland meadows from semi-improved or neglected grassland in Aylesbury Vale	2007	2010	Aylesbury Vale	TBA	AVDC NE	14 ha	x
	M3/2		Restore lowland meadows from semi-improved or neglected grassland in Chiltern	2007	2010	Chiltern	TBA	CDC	1.4 ha	x
	M3/3		Restore lowland meadows from semi-improved or neglected grassland in Milton Keynes	2007	2010	Milton Keynes	TBA	MKC NE	0.4 ha	x
	M3/4		Restore lowland meadows from semi-improved or neglected grassland in South Bucks	2007	2010	South Bucks	TBA	SBDC NE	0.6 ha	x
	M3/5		Restore lowland meadows from semi-improved or neglected grassland in Wycombe	2007	2010	Wycombe	TBA	WDC NE	0.4 ha	x
T5 - Re-establish 345 ha of grassland of wildlife value from arable or improved grassland by 2010 T6 - 75% of re-established area to be adjacent to existing lowland meadows or other semi natural habitat by 2010 T7 - 50% of re-established area to contribute to resultant habitat patches of 2ha or more of lowland meadow by 2010	M4	Restore lowland meadows from semi-improved or neglected grassland		2007	2010					
	M4/2		Restore lowland meadows in floodplains in Aylesbury Vale	2007	2010	Aylesbury Vale	TBA	AVDC NE BBOWT RSPB	X ha	x
	M4/3		Restore lowland meadows in floodplains in Chiltern	2007	2010	Chiltern	TBA	CDC	X ha	x
	M4/4		Restore lowland meadows in floodplains in Milton Keynes	2007	2010	Milton Keynes	TBA	MKC NE	X ha	x

	M4/5		Restore lowland meadows in floodplains in Wycombe	2007	2010	South Bucks	TBA	SBDC NE	X ha	x
	M4/6		Restore lowland meadows in floodplains in South Bucks	2007	2010	Wycombe	TBA	WDC NE	X ha	x

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AB15(b): Forward to 2020: Buckinghamshire and Milton Keynes Biodiversity Action Plan

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Forward to 2020

Buckinghamshire and Milton Keynes Biodiversity Action Plan

Acknowledgements

This plan has been a full year in the making. Whilst it has taken longer than expected to produce, as the momentum for this endeavour grew, it brought together a wider cross-section of the local conservation community. During our sessions, we have enjoyed some robust debates and faced difficult choices about the direction of travel and the targets we set ourselves. We have always sought to embrace the wider agenda of the Natural Environmental Partnership (NEP) whilst also being clear about our focus on the state of biodiversity in Buckinghamshire and Milton Keynes.

Many people are owed thanks for their contribution towards this plan. Firstly, it must be recognised that this is a re-draft of an earlier plan, so those involved in the production of the previous version should be acknowledged. Thanks go to members of the BAP Task and Finish group (listed below) who have collectively spent many hours compiling the content of this plan.

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Sarah Wright (Natural England)

Note:

Hereafter, the terms *Buckinghamshire*, *Bucks* or *county* are deemed to mean jointly, the county of Buckinghamshire and the Unitary Authority of Milton Keynes

*Photo credit front cover: Chalkhill blue (*Polyommatus coridon)* Jim Higham

Contents

Foreword

This Biodiversity Action Plan has been put together by partners representing a range of organisations from Buckinghamshire, Milton Keynes and beyond. On behalf of the Natural Environmental Partnership (NEP), I would like to express my sincere thanks to everyone who has contributed to the process.

The NEP has agreed 4 priority themes which provide a framework for our remit.

The NEP's priority themes:

1. *Partnership development – collective voice & coordinated working*

2. *Promoting the environment as an economic asset and driver of environmental growth*

3. *Developing frameworks to support Landscape scale projects*

4. *Connecting people & Nature – highlighting the health and wellbeing benefits of the natural environment*

While this Plan is mostly concerned with the third priority theme, *Developing frameworks to support Landscape scale projects*, in reality it cuts across all the themes identified.

We know that the only way to secure our natural capital, is to make our network of sites bigger, better and more joined up (Natural Environment White Paper 2011). Our ambition is to restore and connect habitats across the whole county, making our wildlife populations more resilient and allowing wildlife to adapt to climate change and other pressures.

To achieve this ambition will require a response from beyond the local nature conservation sector. Our economy and society depends on us having a healthy environment and naturally-functioning ecosystems. Organisations from all sectors, businesses and farmers, families and individuals all have so much to gain from our natural heritage, but they also have much to contribute. This Plan provides a summary of the current state of biodiversity in the county. Importantly, it identifies how everyone can play their part.

I urge everyone in Buckinghamshire and Milton Keynes to consider how they can help achieve our shared goals outlined within this Plan.

Sir Henry Aubrey Fletcher

Natural Environment Partnership Chairman

1 Introduction

1. Biodiversity is all around us; in our woodlands and hedgerows, our fields and rivers, and our gardens. Countless varieties of birds, plants, insects and other animals live out their lives in a complex interconnected natural system. This is biodiversity – the rich variety of life on earth.

Yoesden Bank
John Morris

2. We have a unique responsibility as a species, because we have the power to affect entire ecosystems and the populations they support through our own actions. All living things and the physical environment (the geology, soil, air and water etc.) which support them, are part of the stock of natural capital. This natural capital underpins essential ecosystem services such as crop pollination, flood defence and water and air quality upon which our civilization's health and prosperity depends. There is a clear moral, social and economic imperative to ensure that we protect, look after and where possible enhance the prospects for biodiversity now and in the future, for its sake and ours.

3. We have many species of plants and animals in Buckinghamshire which are amongst the rarest and most important in the country. They may be important because they are nationally uncommon, but relatively abundant locally, such as the Chiltern Gentian. They may have a small population in Buckinghamshire, which is sensitive to changes in the way their habitat is managed, such as Water Vole.

4. There are also many species in the county which, though once common, are now in steep local and national decline, for example the Skylark. We have a responsibility to ensure that these species have a sustainable future in Buckinghamshire. This Biodiversity Action Plan describes how we can meet that responsibility in Buckinghamshire and Milton Keynes.

2 The Biodiversity of Buckinghamshire

5. The varied geology and topography of Buckinghamshire gives rise to a countryside rich in landscape and wildlife value. Many of the habitats and associated species in Buckinghamshire are of national or even international importance.

6. In the very north of the county, wide, meandering alluvial floodplains lie interspersed with harder limestone outcrops. The remains of historic hunting forests, networks of hedgerows, flood meadows and wet pastures along river corridors and the enigmatic patterns of ancient ridge and furrow, combine to provide a variety of important and wildlife-rich natural habitats. Brown and black hairstreak butterflies, barn owls and green-winged orchids may be found where suitable conditions persist.

7. In the Brickhills area on the Bedfordshire border, the acidic soils of the greensands, with its many springs, relics of heathland vegetation and pockets of marshy ground, support unusual species such as marsh fern and bog bush cricket.

8. The clay vales immediately to the north of the Chilterns are characterised by pasture, the damper grasslands being occasionally carpeted with great burnet, meadow sweet and ragged robin. Slow flowing brooks are lined with willow pollards and black poplars, the latter being found in greater numbers in Buckinghamshire than anywhere else in the UK. Regular winter flooding provides good feeding grounds for wetland birds such as snipe and curlew.

9. Rising from the vale is the chalky backbone of Buckinghamshire, the Chiltern Hills. Here, the now familiar red kites soar above the steep scarp and valleys. In many areas, the scarp is cloaked by species-rich grassland where Chalkhill blue butterflies, glow worms and Roman snails are found amongst aromatic swards of thyme and marjoram. Luxuriant stands of orchids and other specialities such as the Chiltern gentian are a vital component of the distinctiveness of this part of the county.

10. Scrub also plays its part in the biodiversity of the Chilterns. Three valleys in the hills at Ellesborough are covered in rare box woodland. Elsewhere along the

escarpment, stands of juniper still remain. Cathedral-like beech hangers, heathy wooded commons and the more elusive chalk heaths are a feature of the clay-capped hills with fast flowing chalk streams running through the valleys below.

11. To the south, the chalky dip slope gives way to the acid drift gravels, where the largest extent of heathlands in the county are found. These heathlands frequently include pockets of acid grassland, bare ground and birch woodland, which offer valuable niches to invertebrates and reptiles. Notable bird species of our heathlands include nightjar, woodlark and hobby. The wetter areas are home to some of our more unusual plants, like the insectivorous bladderwort and sundews, whilst in tiny bog pools and ditches, patches of sphagnum mosses are found. These bodies of standing water are also readily utilised by resident populations of darting bejewelled dragonflies and beetles. Scattered clumps of hilltop and valleyside woodland may host wild service tree, early purple orchid and white admiral butterfly.

12. Burnham Beeches, a tract of ancient wood-pasture, is found in the south of the county, where majestic pollards stand and support a wide variety of fungi and insects. They are found within a diverse area of habitats and species, including woodland, grassland, heath, bog, ponds and ditches. Notable species include marsh violet and the black darter dragonfly. Over 60 Red Data Book species have been recorded for Burnham Beeches, most of which are rare flies and beetles.

Curlew (*Numenius arquata)*
Steve Mendham

2.1 Protection and designation

13. A sample of the best sites for biodiversity or geology, are protected under the Countryside and Rights of Way Act 2000 and are classified as Sites of Special Scientific Interest (SSSIs). In some instances, sites are designated for their international importance, such as Burnham Beeches which is a Special Area of Conservation (SAC). Such sites are protected under the European Habitats Directive.

14. It is important to recognise that there are hundreds of other sites which can be equally important as our SSSIs or SACs, but which do not have the same level of protection. Many of these sites have been identified in Buckinghamshire and are classified as Local Wildlife Sites (LWS). Other potentially important sites have also been listed as Biological Notification Sites (BNS).

15. Rivers, lakes and groundwater in Buckinghamshire and Milton Keynes are protected under the Water Framework Directive (WFD). WFD requires that all EU member states work to have their waterbodies in 'good ecological status' (or 'good ecological potential' for heavily modified waterbodies) by 2015. In addition to improving the status, there must be no deterioration.

2.2 How does Buckinghamshire compare with other counties?

16. Much of Buckinghamshire may look green and pleasant, but compared with other English counties it is not well served in terms of its biodiversity resources. Buckinghamshire in fact has a very low percentage area of land designated as SSSI. SSSIs only account for 1.4% of Buckinghamshire, compared to a national figure of 7.7% (England). Even Greater London has a higher proportion of land designated as SSSI at 2.4%.

17. Buckinghamshire also has significantly less priority habitat than the average English county. Natural England's national habitat inventory maps show 13% of England as BAP priority habitat, but only 9.7% of Buckinghamshire is designated as priority habitat.

18. A recent national report by Plantlife entitled "Our Vanishing Flora" ranked Buckinghamshire and Milton Keynes 39th out of 52 counties in terms of the rate of plant extinctions. Buckinghamshire and Milton Keynes are losing plant species at a rate of 0.59 species per year. If that rate continues then by 2020 there will be 4 less plant species living in Buckinghamshire and Milton Keynes.

19. There are 73 Water Framework Directive watercourses and waterbodies in Buckinghamshire and Milton Keynes; 65 rivers, 6 canals and 2 lakes. As of the last assessment in 2009, 14 of these are in 'good ecological status', 38 are 'moderate', 19 are 'poor', 1 is 'bad' and one of the lakes has not been

assessed. When compared to the national figures, Buckinghamshire and Milton Keynes are achieving a slightly higher percentage of waterbodies in good status and fewer which are 'poor' or 'bad'. Although the figures compare favourably to the national figures, Buckinghamshire and Milton Keynes have 80% of waterbodies failing to achieve good status.

3 Significant biodiversity issues in Buckinghamshire

3.1 Ecosystems under pressure

20. In common with other parts of the country and particularly the developed South East, Buckinghamshire has severely damaged ecosystems.

21. Our rivers have been straightened, and thereby shortened so that they no longer flow and flood naturally. Rivers have also been deepened, through dredging and re-profiling, in order to get water off the land as quickly as possible with much of the removed material being deposited on the banks. As a result, many rivers are disconnected from their floodplains and we have lost natural areas of wetland and reedbed as well as significantly reducing the area of lowland wet meadows (nationally) by 97% since the 1930s.

22. Our woodlands have lost the larger animals; wolves, bears, beavers, wild cattle and boar which historically would have controlled deer or created open spaces, dams and shallow scrapes and influenced rivers and wetland habitats. A decline in woodland management along with many introduced species such as grey squirrel and tree diseases have put excessive pressure on the functioning ecology of our native woods.

23. Our grassland and heathlands have suffered declines from developmental pressure or change of use (e.g. from cattle to horse/pony grazing). Many important grassland sites have been under-grazed leading them to scrub over, reducing the overall biological value.

24. Changes in farming practice since 1945 has seen a decline in a number of groups including farmland birds and arable weed species. Many kilometres of hedgerows have been removed to enlarge fields or left unmanaged leading to their gradual loss or reduced value through poorer structure or connectivity.

3.2 Habitat fragmentation

25. The division of a single habitat parcel into multiple smaller fragments creates more isolated ecological communities that are increasingly disconnected from each other. Major, as well as minor, developments and infrastructure projects threaten to compound habitat fragmentation within Buckinghamshire by

causing habitat loss and becoming obstacles to successful species dispersal. As a consequence of habitat fragmentation, ecological communities are less resilient to deterministic processes like climate change and stochastic events such as pollution.

3.3 Pollinators

26. The transfer of pollen from one flower to another is essential for plant sexual reproduction. Honey, social and solitary bees are key pollinators. However, the process is also carried out by hoverflies, beetles, butterflies and moths during their feeding activities. A number of crop species e.g. oilseed rape, rely on insect pollination (some are wind-pollinated) as do many wild plants, which in turn support a complex network of animal and plant life. However, pollinating insects face a multitude of threats. These include pests, disease, invasive species, land-use intensification, habitat loss and fragmentation and climate change. In the last 40 years we have seen a significant decline in honeybee abundance (most estimates are above 50%). The National Pollinator Strategy (DEFRA 2014) recognises the critical importance of the enhancement of urban biodiversity in supporting pollinators and sets out a strategy to address pollinator declines.

3.4 Pollution

27. Pollution of waterbodies from isolated incidents, agricultural run-off, poor water treatment or direct source from industry directly impacts the watercourses themselves and connected habitats. On flood meadows, for example, this has the effect of giving competitive advantage to coarse grasses and other plants which displace less competitive flora. The effects can be wide ranging from catastrophic fish kills, sedimentation of gravels and an increase in nutrients which can cause eutrophication. The flow of water means that the impact of pollution can sometimes be seen for kilometres downstream.

28. In Buckinghamshire and Milton Keynes, the main reason for waterbodies not reaching 'good ecological status' under WFD has been identified as high phosphate levels. Along some reaches this is seen in algae blooms and loss of in-channel plant species diversity.

3.5 Disconnection of rivers and floodplains

29. Creating land drains, dredging channels and raising bank height have meant that in time of high flow, river water is constrained to the channel rather than flowing into the floodplain. This has led to the drying out of some habitats and a change in water regimes for others. Traditional floodplain meadows rely on seasonal water inundation to maintain conditions for characteristic plants and

animals. When the water is prevented from flowing onto the land, the site conditions can become unfavourable resulting in a complete change in species composition. The drying out of floodplain habitats in some areas has led to a decline in wading birds.

30. In addition, the increase in volume of water within a river channel can result in an increase in erosion power causing banks to become undermined and collapse. The collapse of the bank will increase the amount of sediment in the river and can lead landowners to 'protect' their banks by installing hard revetment which fragments natural marginal and bank habitat.

3.6 Alien species

31. There are now believed to be over 1,500 species of non-native plants and animals established in the wild in Britain and many of these pose a substantial threat to our native species. For example, introduced Signal Crayfish carry a plague which is fatal to our native White-clawed Crayfish and has caused a massive decline in this species, as well as having a major impact on freshwater invertebrates and fish populations. In our area, American Mink are also widely established and have decimated our water vole population whereas other mammalian aliens such as Grey Squirrel and Muntjac deer are long established.

32. Among the invasive plant species are New Zealand pygmyweed – a serious pest in freshwater habitats, Japanese knotweed, Himalayan balsam and Giant Hogweed. In many cases, the long term effects of these species on our native flora and fauna are as yet unknown but clearly the ever increasing number of alien species is of great concern as so many of them directly impact on natives. And some species, such as Oak Processionary Moth, can damage not only other species but also change whole landscapes.

3.7 Climate change

33. As well as direct local impacts, increased stress on our priority habitats and ecosystems has come, and is likely to come, from climate change. The UK has lower levels of projected climate change than many parts of the world, yet if greenhouse gas emissions are not dramatically reduced, almost half of our land area is expected, by the 2050s, to have a bioclimate unlike any currently found here.

34. While there is uncertainty around the predicted impacts, it is important to aid the ability for habitats and species to cope with climate change, which is likely to bring profound changes to wildlife. While there are likely to be some positives, with new species arriving from continental Europe, most of the

impacts are thought likely to be negative, particularly given the speed of climate change which leaves little time for natural adaptation.

35. In addition, it is thought that our weather will be more erratic, with an increased number of extreme weather events, such as excessive rainfall, drought and storms. Seasonal timings are likely to alter, the composition of ecological communities is likely to change, and invasive species and disease are likely to increase. Species which cannot adapt quickly, or which cannot disperse are likely to suffer significant and increasing declines or even local or complete extinction.

36. To aid the ability for habitats and species to cope with climate change, sites need to achieve the Lawton principles of better, bigger and more connected. Further adaptation plans should be developed to tackle the risks climate change brings (see Natural England and RSPB, 2014. Climate Change Adaptation Manual).

3.8 Ways to respond to these challenges

Wider Land management

37. Our society and economy needs the land resource of Buckinghamshire to provide a diverse range of utility including food production, space for recreation as well as our entire private, commercial and public infrastructure.

38. A sustainable Buckinghamshire economy will require our land resource to be more ecologically robust on a landscape-scale and be one which can provide the fullest spectrum of ecosystem services. Our ecosystems not only provide the needs of all life, they underpin economic and social necessities such as clean water, productive soil, pollination, flood defence, control of diseases, clean air etc.

39. Biodiversity can benefit from a change in approach in our thinking and application. For example, recreating areas of permanent woodland and grassland provide important re-connected habitats for a range of specialist species and they can also provide natural buffers to flood events which erode soils, lower water quality, flood our homes and damage our economy.

40. For biodiversity in Buckinghamshire to be supported sustainably, its needs must be meaningfully integrated into land management beyond protected sites and sites managed for wildlife. It is no longer sufficient to rely upon small, fragmented and disconnected wildlife-rich sites such as protected sites and nature reserves.

41. Bio-diverse areas are often rich in landscape features such as ponds, woods and textural pasturelands. House values are directly affected by the perceived quality of the surrounding green spaces. It is therefore in the interest of developers to factor-in features which will support a wider range of wildlife. New initiative such as biodiversity off-setting, could also provide opportunities for habitat creation on the back of development. The Natural Environment Partnership (NEP) can help create and broker a positive and informed dialogue between the respective parties which could make a significant difference for the prospects of our biodiversity.

42. We need Buckinghamshire's farmers and land managers to engage positively with the biodiversity agenda and take up effective options through agri-environment schemes. The conservation community will have a key role to play in helping to achieve positive gain for wildlife through such initiatives, by providing advice to farmers and land managers.

43. To be most effective, effort should be focused on, but not exclusive to Biodiversity Opportunity Areas (BOAs) and priority water catchments.

Built environments

44. Open Mosaic Habitats can be found mainly in urban and formerly industrial areas and can have high biodiversity value. This value includes rare plants, mosses, lichens and a large number of rare invertebrates, especially bees, wasps and beetles. This habitat was identified as a UK BAP Priority Habitat in 2007. Such sites can be threatened by redevelopment (due to their common status as brownfield sites), inappropriate 'restoration', inappropriate management or natural succession.

45. Around 20% of Buckinghamshire is classified as urban. Urban environments have a disproportionately important role in providing benefits for physical health and mental wellbeing.

46. Public land (e.g. road verges, school grounds, parks, cemeteries etc.) and corporate estates etc. all have the potential to provide for wildlife if managed sensitively. Simply changing grass and hedgerow cutting regimes can have significant positive effects for a range of species. On an individual level, even small gardens can support wildlife–rich habitats such as ponds. New research shows that gardens could be more significant for pollinating insects than we have realised.

47. The NEP should do its best to encourage and facilitate actions which will maximise biodiversity and ecosystems services benefits. For example, local

friends of groups and parish councils can be encouraged to take more ownership of green spaces by learning more about site management plans.

48. Corporate actions could include the NEP helping to channel corporate responsibility programmes into helping community groups, environmental sustainable start-up businesses or sponsoring targeted land management that would help a specific habitat or species, such as creating orchards which could help a bespoke business and or public amenity space.

49. The National Planning Policy Framework (NPPF) provides a lead for local planning authorities to recognise the wider benefits of ecosystems services, provide net gains for biodiversity and to establish coherent ecological networks. Local planning authorities have the opportunity therefore to embrace a range of actions, from whole-area wildlife corridor protection and enhancements to simple gains in built development aimed at a single or family of species such as the provision of swift and bat boxes. Local guidance is available in the form of the Biodiversity and Planning in Buckinghamshire document produced by several NEP partner organisations. Worryingly, local government is currently experiencing a substantial restructuring and in this process is losing ecological expertise regarding its land management and planning functions.

Data resource and advice

50. In Buckinghamshire, we rely upon the Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC) to hold up to date records of our biological resource. These records not only provide vital data to help inform decisions such as development proposals, they provide a historic thread enabling us to identify trends and thereby inform decision making about management of sites.

51. There is considerable work to be done in Buckinghamshire regarding its Local Wildlife Sites (LWSs) and Biological Notification Sites (BNSs). Other counties have active habitat and species monitoring and management advice is given to landowners of LWSs. It would be preferable for all local planning Authorities and developers if the BNSs in the county were assessed so that they could then each be, as appropriate, either classified as LWSs or dropped from the system.

52. Since the loss of the Farming and Wildlife Advisory Group (FWAG) and the reduction in the staffing resource available from Natural England, there is a lack of direct advice and support available for farmers and landowners. The NEP could provide a sign-posting service through its website to encourage and enable those in search of advice to find it where it is available (e.g. where there are active landscape schemes and projects).

Championing change

53. The NEP can act as a reference point to help anyone achieve effective and sustainable results within the context of Biodiversity Opportunity Areas and our BAP targets. The NEP could reward the positive actions by individuals, groups and organisations through celebrations and awards.

54. Many impacts upon our biodiversity are caused by mechanisms and collective decisions which are far removed from the effect.

55. For example, changes in demand from consumers towards organic produce, will have a direct positive impact on water quality by reducing the phosphate levels in our water courses. The NEP can champion positive behaviours which will help support, or at least reduce harm, to the prospects of our biodiversity.

56. Public perceptions about key biodiversity issues (e.g. the need to control deer) can be positively challenged by the NEP through its communication channels and its champions on the NEP Board and Delivery groups.

Partnership at local level

57. To achieve our aspirations within this Plan, we will need involvement and support from a wider range of sectors than are traditionally engaged with the biodiversity agenda. These are described in section 7 of this plan.

Bechstein's bat (*Myotis bechsteinii)*
Susan Makepeace

4 Biodiversity Action Plans

58. In 1992 the UK Government signed the Convention on Biodiversity at the Earth Summit in Rio. This was an agreement between countries about how to protect the diversity of species and habitats in the world. Virtually all the world leaders signed up to this Convention which required the drawing up of a National Action Plan. The UK's first Action Plan was published in January 1994, with the expectation that regional and local Biodiversity Action Plans (BAPs) would be produced.

59. In December 1993, Buckinghamshire County Council, in consultation with 60 organisations produced a Nature Conservation Strategy for Buckinghamshire.

60. One of the policies within the Strategy was to deliver effective communication and collaboration between all organisations involved in nature conservation. One of the main ways of delivering this was the formation of the Buckinghamshire Nature Conservation Forum (BNCF) which was established in 1994.

61. In 1997 a BAP Working Group was set up under the BNCF to further the production of the county BAP.

62. In 2006 the Buckinghamshire & Milton Keynes Biodiversity Partnership was formed. This enabled the creation of the post of Biodiversity Project Officer to take forward the delivery of the BAP. In 2006/7 the Habitat Action Plan (HAP) targets were reviewed and revised in consultation with the organisations that had been involved in the BNCF along with other relevant partner organisations.

63. In 2013, the NEP was formed for Buckinghamshire and Milton Keynes as the county's version of a Local Nature Partnership (LNP). The NEP took on the brief of the Buckinghamshire & Milton Keynes Biodiversity Partnership.

64. In December 2013, a BAP Task and Finish group was established under the authority of the NEP, to revisit BAP work in the county and produce a way forward in line with local aspirations and national targets.

4.1 Wider benefits of the BAP

65. This BAP focuses on work that is needed to safeguard and enhance the biodiversity of Buckinghamshire. Wildlife has its own intrinsic value, irrespective of humans, however the benefits to people of a healthy environment with rich biodiversity are immense and just a few are mentioned below:
    i. contributing to a beautiful and inspiring countryside that encourages people and businesses to locate in/visit Buckinghamshire, thus boosting the county's economy;

ii. providing spaces in both rural and urban areas where people can exercise and be inspired by nature, gaining mental and physical refreshment with positive benefits for health and well-being.
iii. holding up the flow of water so as to reduce the risk of flooding, and buffering waterways so as to reduce the inflow of nutrients, pesticides and silt into rivers, thus reducing the economic costs of water purification;
iv. providing a habitat for insects that pollinate crops;
v. long-term storage of carbon in soil and vegetation for climate change mitigation;
vi. green spaces and trees within urban areas help to reduce temperatures on hot days and nights, and reduce levels of air pollution;
vii. good woodland management for wildlife is also often good economically, with tree felling and replanting where appropriate contributing to the wood fuel and wood products economy;
viii. the work needed to maintain and enhance biodiversity will support employment, and also encourage people to volunteer and gain exercise, for example with Green Gyms.

Greater burnet (*Sanguisorba officinalis*)
Colin Williams

66. This value that we draw from the natural environment is often taken for granted, and is not always well recognised in decision making, despite the fact it underpins our economy. We need to work to develop new ways of assessing our impact on natural resources that include what are currently considered to be "intangible" benefits. Recent work on ecosystem services and natural capital at scales from international to local level are helping to quantify the value of biodiversity, over and above its intrinsic value.

5 BAP targets 2010 – 2020

5.1 National BAP Targets

67. In 2011, the Department for Environment, Food and Rural Affairs (Defra) published Biodiversity 2020: A Strategy for England's wildlife and ecosystem services. Outcome 1b states: '*More, bigger and less fragmented areas for wildlife, with no net loss of priority habitat and an increase in overall extent of priority habitats by at least 200,000 ha.*'

68. Habitats and species identified as requiring action in the UK Biodiversity Action Plan continue to be regarded as conservation priorities in the UK Post-2010 Biodiversity Framework. In total, 56 habitats and 943 species are now listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

5.2 Buckinghamshire Priority Habitat creation targets

69. In order to turn into reality, the Biodiversity 2020 aspiration of '*an increase in overall extent of priority habitats by at least 200,000 ha.*', it is valuable to split the figure down at a local level, in our case for Buckinghamshire. The targets described in Table 1 show the area of land in Buckinghamshire and Milton Keynes identified for the creation of each priority habitat between the years 2010 and 2020. Creation in this case includes restoration, which is bringing habitat that no longer meets the standards for priority habitat back into a system of management such that it does meet those standards.

70. The targets differ for each habitat. The figures have been informed by the national targets for each priority habitat determined as part of the Biodiversity 2020 Strategy. Partner organisations in Buckinghamshire have determined the targets as a challenging but realistic contribution that the county can make towards the national targets, the perceived relative importance of those habitats within the county and achievability given local conditions (e.g. dependent geology etc.) and likely resources available. Their achievement is

vitally important in order to safeguard and enhance the wildlife of the county, and the many benefits that wildlife and the environment provide to people.

71. The overall headline figure is 20%. We aim to promote this figure to organisations, landowners, businesses, community groups and the general public so that people can all "do their bit" whether at a garden scale or field scale to making Buckinghamshire a better place for wildlife and people.

72. A simple headline figure of 20% can inspire people to set 20% of their garden or business premises aside for wildlife, and say *"I've done my 20% for wildlife, have you?"*

Table 1. Priority habitat creation and restoration targets for Buckinghamshire and Milton Keynes from 2010 – 2020

			Target for priority habitat creation and restoration (hectares) (percentage increase on existing habitat in brackets)	
No.	**Priority habitat**	**Current area (hectares)**	**2010 - 2020**	**Per year**
1	Lowland Wood Pastures and parkland	536	100 (19%)	10
2	Traditional Orchards	365	50 (14%)	5
3	Hedgerows (2 m wide)	unknown	100 km	10 km
4	Ponds (assumes average size of 0.05 ha)	unknown	500 ponds	50 ponds
5	Lowland Heathland	77	20 (26%)	2
6	Lowland Dry Acid Grassland	317	50 (16%)	5
7	Lowland Meadows	382	125 (33%)	12.5
8	Lowland Calcareous Grassland	344	100 (29%)	10
9	Purple Moorgrass & Rush pastures	18	5 (28%)	0.5
10	Lowland Fens	67	5 (7%)	0.5
11	Reedbed	25	15 (60%)	1.5
12	Coastal & Floodplain Grazing Marsh	337	200 (59%)	20
13	Native Woodland	2,906 ++	400 (14%)	40
14	Water Framework Directive (WFD) watercourses			
Total	All habitats (excluding hedgerows and ponds)	5, 374	1,070 (20%)	107

Notes:

+ Current habitat area from BMERC 2012 Core and Local Output Indicators for Biodiversity report

++ Native woodland comprises Lowland mixed deciduous woodland (1,682 ha), lowland beech and yew woodland (1,191 ha) and Wet woodland (33 ha).

6 A spatial approach

73. As a rule, we will take a spatial approach to achieving our targets in the county and as often as possible, adopt a landscape-scale approach to our work. We will therefore target our efforts in the areas of the county already identified as being of high value for biodiversity.

74. Such a spatial, or landscape-scale, approach is widely accepted across the UK and supported by government policy. The "Lawton Report" or "Making Space for Nature" provided clear support for such an approach and was subsequently quoted in the Natural Environment White Paper:

> *'2.12 Making Space for Nature set out a practical vision for addressing the fragmentation of our natural environment by restoring ecological networks across the country. The approach is based on five components, to be implemented at a landscape scale working with existing land uses and economic activities: core areas of high nature conservation value…; corridors and 'stepping stones'….; restoration areas…; buffer zones….; and sustainable use areas.'*

75. In Buckinghamshire, the Biodiversity Opportunity Areas (BOAs - see below) are the key focus areas for the creation of such ecological networks. The creation of Nature Improvement Areas, as proposed by the Natural Environment White Paper, is also a potential way of taking forward ecological networks, working alongside BOAs. Areas suggested as potential NIAs in the county include the Bernwood Forest/Ray Valley area, and the Chilterns.

6.1 Biodiversity Opportunity Areas

76. Biodiversity Opportunity Areas (BOAs) are the most important areas for biodiversity in the county. BOAs represent a targeted landscape-scale approach to conserving biodiversity and the basis for an ecological network.

77. The identification of Buckinghamshire's BOAs was a detailed assessment process. It took into account existing concentrations of UK BAP habitat, important areas for UK BAP and other rare species, land with potential for habitat restoration and several other factors (including geology, topography and hydrology). Many of the areas identified are well known in the county for their nature conservation importance and they all contain BAP habitat. BOAs have been identified throughout the South East of England.

78. BOAs therefore identify where the greatest opportunities for habitat creation lie, enabling the efficient focusing of resources to where they will have the greatest positive conservation impact.

79. The map also highlights local BOAs which have importance at the county scale but which have not been mapped to the same criteria as those for the regional scale BOAs.

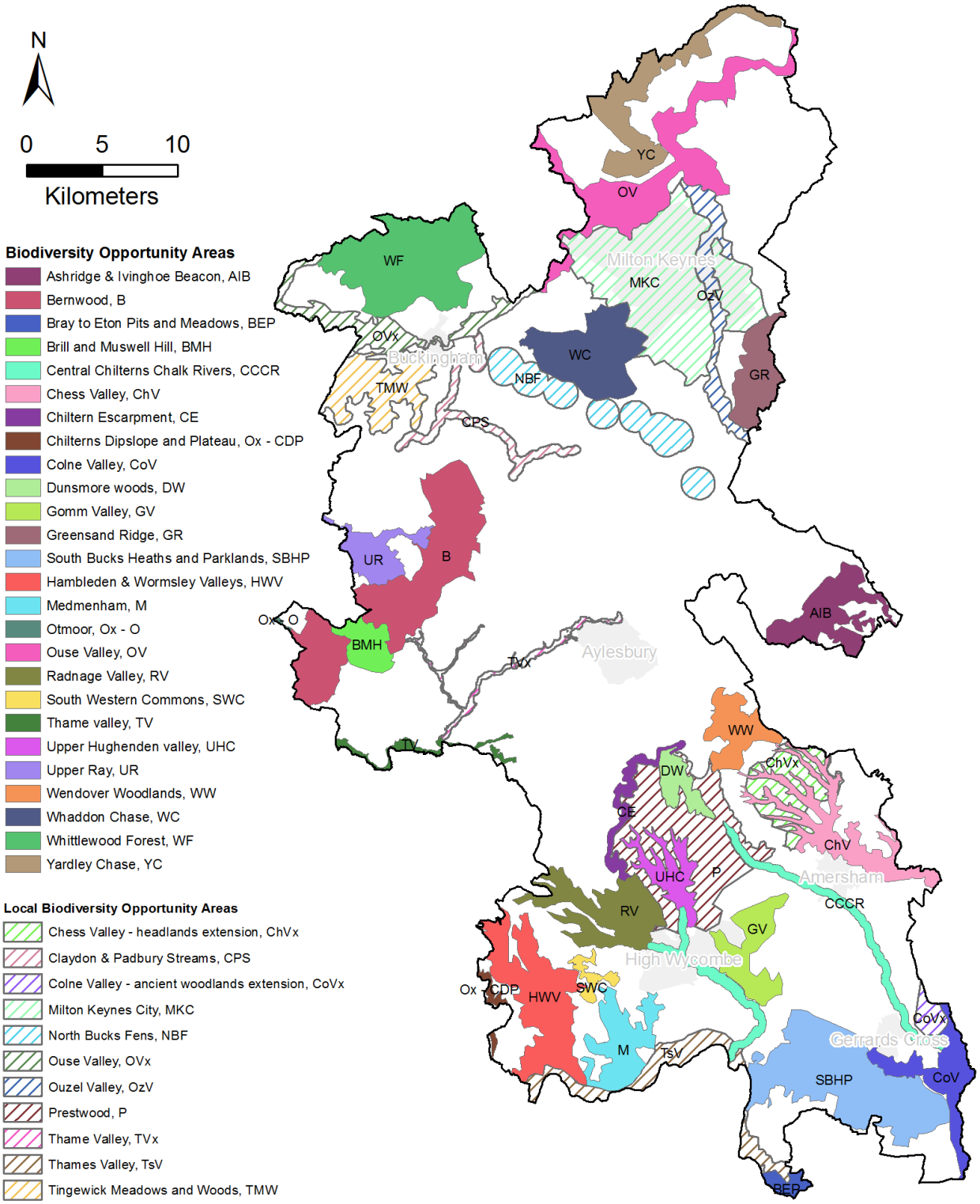
80. Priority habitat creation work in Buckinghamshire and Milton Keynes will be focused in the BOAs:

1. Ashridge & Ivinghoe Beacon
2. Bernwood
3. Brill & Muswell Hill
4. Central Chiltern Chalk Rivers
5. Chess Valley
6. Chiltern Escarpment
7. Colne Valley
8. Dunsmore Woodlands
9. Gomm Valley
10. Greensand Ridge
11. Hambleden & Wormsley Valleys
12. Medmenham
13. Ouse Valley
14. Radnage Valley
15. South Bucks Heaths & Parklands
16. South Western Commons
17. Thame Valley
18. Upper Hughenden Valley
19. Upper Ray
20. Wendover Woods
21. Whaddon Chase
22. Whittlewood Forest
23. Yardley Chase

Local BOAs:

1. Chess Valley – headlands extension
2. Claydon & Padbury Streams
3. Colne Valley - ancient woodlands extension
4. Milton Keynes City
5. North Bucks Fens
6. Ouse Valley
7. Ouzel Valley
8. Prestwood
9. Thame Valley
10. Thames Valley
11. Tingewick Meadows and Woods

Figure 2 Biodiversity Opportuntiy Areas in Buckinghamshire



Map produced by the Buckinghamshire and Milton Keynes Evironmental Records Centre (BMERC, 2014)

n.b. This map is only an example - for up to date information contact BMERC:
(http://www.buckinghamshirepartnership.gov.uk/environmental-records/)

6.2 Habitat creation outside of BOAs

81. There will be opportunities to create priority habitat in areas which fall outside of the BOAs. These will largely occur through agri-environment schemes, the planning process e.g. on-site mitigation or off-site compensation for habitat lost to development, and through using legislation to drive specific projects e.g. WFD objectives.

82. Local planning authorities will need to work towards adopting at least current 'best in the county practice' regarding planning and habitat creation, including local planning policy realising the opportunities for biodiversity enhancement and wildlife corridor development as set out in the National Planning Policy Framework.

83. Significant opportunities could also accrue from large-scale developments such as High Speed Two and from increasing the habitat quality of sustainable drainage schemes, highway verges and public open spaces including parks and recreation areas that will need to be managed appropriately.

84. Many landowners, managers and communities wish to enhance their land for wildlife as part of a farming system, or as an end in its self. Good quality advice and guidance will need to be available so that individual actions will be able to contribute to wider landscape habitat and wildlife corridor creation in the most beneficial way.

85. Habitat creation should also include small-scale actions that can be specific to a single species, such as the placement of swift boxes on buildings, thereby giving a BAP species greater nesting opportunities.

6.3 Local Wildlife Sites and Biological Notification Sites

86. Local Sites (Wildlife and Geological) are non-statutory areas of local importance for nature conservation that complement nationally and internationally designated geological and wildlife sites.

87. Local Wildlife Sites (LWS) within Buckinghamshire have been selected by the local authorities, BBOWT and other local wildlife conservation groups. They support both locally and nationally threatened wildlife, and many sites will contain habitats and species that are priorities under the UK or Buckinghamshire and Milton Keynes BAP. Biological Notification Sites (BNS) are sites with the potential to meet the criteria to be designated as an LWS.

88. The identification of LWSs is an ongoing process including monitoring and review. Both LWS and BNS are considered with equal weight during the planning process.

6.4 Species-specific work

89. We believe taking a spatial and habitat approach to nature conservation will bring the best results over time. There are species which occur in Buckinghamshire which deserve special attention due to their protected status or rarity (locally, nationally or internationally).

90. Appendix 1 lists BAP priority and protected species in Buckinghamshire.

7 Implementation of the BAP

Buttercups *(Ranunculus spp.)*
Colin Williams

91. Table 2 summarises the key activities and the individuals, groups or organisations and their role in the implementation of this Plan.

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Table 2. Key activities, responsibilities and roles for BAP implementation

Major project activity	Accountable	Responsible	Consult	Inform	Notes / Deadline
Implementation of NEP business plan	NEP board	NEP Partnership Manager	NEP Delivery group		
Co-ordination of NEP Biodiversity Group activity	NEP Delivery group	NEP Partnership Manager	NEP Biodiversity Group	Orgs. listed in section 7.2	Reporting of success / delivery against BAP is reported back to orgs. listed in section 7.2
Management of NEP Biodiversity Group meetings	Chair of NEP Biodiversity Group	Chair of NEP Biodiversity Group	NEP Partnership Manager NEP Delivery group	NEP board	
Establish appropriate individuals as effective BOA leads	Chair of NEP Biodiversity Group	Chair of NEP Biodiversity Group	NEP Biodiversity Group	NEP board	
Delivery of individual BOA plans	Chair of NEP Biodiversity Group	BOA leads	Orgs. listed in section 7.2, as appropriate to BOA	NEP board	Orgs. listed in section 7.2 These report to the BOA lead as requested.
Compile progress table from results provided by BOA leads. Prepare Annual report Report results into BARS 2	NEP Partnership Manager	NEP Partnership Manager	Chair of NEP Biodiversity Group / BOA leads	NEP board NEP Delivery group	Work outside BOAs collated by Bucks CC
BAP input into NEP Conference	NEP Partnership Manager	NEP Partnership Manager	NEP Delivery group NEP Biodiversity Group	NEP board	
Manage Bucks Biodiversity and Planning Forum	Bucks CC	Bucks CC	NEP Biodiversity Group		
Prepare Terms of Reference for NEP Biodiversity Group	Chair of NEP Biodiversity Group	Chair of NEP Biodiversity Group	NEP Delivery group	NEP board	

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7.1 The Natural Environment Partnership (NEP)

92. The NEP brings together and provides a forum for collaboration and partnership between organisations involved in biodiversity work in Buckinghamshire and Milton Keynes. Most member organisations have some current commitment to and interest in BAP work in the county. The role of the NEP Board is to, where it can, help remove barriers to progress and help provide the resources needed to fulfil this plan. The reporting relationship is described in section 7. Monitoring and reporting.

NEP Partnership Manager

93. The NEP Partnership Manager has a key role to play supporting BAP work in the county:
    i. Signposting advice, support and funding for BAP work at local level
    ii. Manage NEP website including BAP information
    iii. E-bulletin including BAP issues
    iv. Organise annual event for the wider NEP Forum to celebrate achievements and stimulate further action for biodiversity
    v. Enable work with other sectors (e.g. business, health, schools etc.)

BAP Task and Finish group / NEP Biodiversity Group

94. This group was convened in December 2013 to consider how BAP work could be re-focused and rejuvenated in the county. Its work is completed with the publication of this plan. The BAP Task and Finish group have recognised the need for an on-going partnership to manage the implementation of the BAP. A new NEP Biodiversity Group will be formed from the Task and Finish group and others involved in BAP work (e.g. BOA leads).

BOA leads and BOA Delivery groups

95. The formation and activation of BOA leads and BOA Delivery groups is a key new development for the county which will drive much of the work described in this Plan. The BOAs leads will play a key role in helping to co-ordinate BAP activity within BOAs and to act as a contact point within the county.

96. We must recognise that some BOAs will have more project activity and resource than others. In some cases, there may be dedicated project staff whilst others will have little or no identified human or capital resource. We should therefore expect there to be a significant difference in the level of pro-active delivery across each of the BOAs over any given period.

    Some suggested ways for BOA leads to operate include the following:

i. Act as contact point for a BOA.
ii. Attend NEP Biodiversity Group meetings to report known activity within the BOA.
iii. Establish a Vision for the BOA, using the BOA statement and maps of the BOA to assist this. The Vision could include both habitat and species work but the restoration and creation of BAP habitat where possible should be a key element.
iv. Identify organisations, community groups, landowners/farmers and individuals who are particularly interested in biodiversity work in the BOA and keep abreast of activity through informal channels such as an e-mail list.
v. Invite the above interested parties to form a local BOA Delivery Group which meets once or twice a year to co-ordinate activity or promote local action.
vi. Encourage biodiversity delivery within BOAs: delivery of wildlife habitat by farmers and landowners, local authorities including Parish Councils, conservation organisations, community groups and businesses.
vii. Provide brief 6 monthly written updates to the NEP Biodiversity Group as to biodiversity action in the BOA, particularly in relation to progress towards the BAP habitat creation targets.
viii. Maintain a simple quantitative record of progress towards BAP targets e.g. area, location and habitat for creation of priority habitats.
ix. Identify potential biodiversity work that could happen in the BOA but needs funding or support. Provide this information to the BOA Leads Group so that if and when funding or support arises then potential recipients are already known about.

97. Membership of each BOA Delivery Group is flexible, but could include:

i. Statutory Agencies - Natural England, Environment Agency, Forestry Commission
ii. Local Authorities – County, District and Unitary
iii. NGOs - Wildlife Trust, RSPB, Woodland Trust, National Trust, Parks Trust etc.
iv. Local Organisations - Conservation groups, Natural History societies, Parishes
v. Landowners and businesses

98. It is important to recognise that some of the above may wish to be involved but may not have the capacity to attend meetings. For example with statutory agencies it is useful to have a contact who can keep the BOA Lead updated with respect to their work in the BOA but they may only have limited time to input.

Black hairstreak (*Satyrium pruni*)
Tim Read

Bucks Biodiversity and Planning Forum

99. Paragraph 9 of the National Planning Policy Framework states that for development to be sustainable it 'includes seeking positive improvements in quality of the built, natural and historic environment...Moving from a net loss of biodiversity to achieving net gains for nature.'

100. In achieving biodiversity net gain through the planning system there is a clear opportunity for local authorities to make a significant contribution towards the targets set out in this document. Conversely, an ill-informed decision-making process can have a marked and often irreversible impact upon our biodiversity resources.

101. The Bucks Biodiversity and Planning Forum is a new initiative which will bring together biodiversity officers from Local Authorities and Non-Governmental Organisations with a statutory or advisory role in development control. In so doing, the sharing and discussion of knowledge and ideas, successes and failures, will promote best practice throughout the county and result in more coherent and consistent decision making and ultimately, the enhancement of our natural environment.

7.2 The role of the different sectors and organisations

Non-Governmental Organisations (NGOs)

102. NGOs, including large local and national conservation charities, often own, or manage areas of high biodiversity value. In recent decades, these organisations have grown to become the key driving force for conservation action at a time when Local Authorities and Statutory Agencies have tended to reduce their commitment in line with more restricted budgets.

103. Importantly, the NGOs can influence large numbers of local people through their membership, educational outreach work and volunteering opportunities. They can also have significant political influence and will often actively lobby government on issues relevant to BAP work, e.g. Common Agricultural Policy settlement or Planning legislation.

Local Conservation groups

104. Local conservation groups, sometimes part of or affiliated to one of the Conservation Charities, can have a key role in the implementation of the Plan, and can have an influence on the decisions taken by those in positions of authority.

Local Authorities and Parish Councils

105. Local authorities have a key role to play in conserving the biodiversity of the county and many are already engaged in a range of activities in their area. All levels of local authorities, whether county councils, district councils or parish councils have a statutory duty to consider biodiversity while undertaking all of their functions. This duty is set out in Section 40 of the Natural Environment and Rural Communities Act (NERC) 2006 and states:

> *'Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, in the purpose of conserving biodiversity'.*

106. Through the statutory planning process, the framework provided by international and national legislation and government, biodiversity conservation is given high priority in land-use planning. They will also promote nature conservation within the wider countryside and urban areas.

107. Local Authorities should seek to manage their land in a sustainable way, with biodiversity given priority where appropriate. They will continue to support initiatives which conserve, or raise awareness of biodiversity through their own projects and support for the Buckinghamshire and Milton Keynes Environmental Records Centre (BMERC). They also have a major role to play in integrating

biodiversity issues into formal education. Parish and Neighbourhood councils have a role in promoting awareness and encouraging local people to participate in local community initiatives.

Statutory Agencies

108. Statutory Agencies have national responsibilities regarding biodiversity, including advising on national policies, designating and managing land which is of national importance for its biodiversity, research, regulatory work and protecting species and habitats, as well as being involved locally. They will continue to support biodiversity initiatives through specific projects and partnerships, and through their day to day functions. Statutory Agencies are also important sources of agri-environmental schemes which can provide funding to ensure many habitats and species are protected and managed appropriately.

Farmers, Landowners and land managers

109. Farmers, landowners and land managers, both public and private, have a vital part to play in the implementation of the Plan. The land they own or manage may support important habitats and species. The stewardship such people provide to biodiversity benefits us all. Farmers and landowners can apply for funding through agri-environment schemes such as Countryside Stewardship.

110. Easy access to information, advice and support is essential in order to encourage sensitive stewardship. Landowners can be encouraged to consider the impacts of their activities upon wildlife and habitats.

Business and industry

111. As well as strengthening existing partnerships, the Plan seeks to forge new ones. Business and industry can play a major part in the Plan, through sponsorship of a habitat or species, funding a project, creating and managing wildlife areas on their land, or taking part at grass roots level, through voluntary conservation work. Every business should be encouraged to consider the effects of its activities on biodiversity, perhaps by undertaking an environmental audit, seeking to reduce any harmful impacts and encourage sustainable practices. Simple activities like recycling all the office paper, using recycled products where possible, efficient energy use and wise-use of water will make a difference by reducing pressure on the environment and could save a business money.

Health sector

112. Various studies show that access to wildlife-rich green space can have a positive effect on the physical and mental wellbeing of local communities.

Engaging directly in conservation management can also help individuals gain exercise and connection with nature which may be beneficial to their health. Health professionals therefore have a direct role to play to support the objectives of this Plan and to shape its implementation within their sphere of influence. Hospitals and Health Care centres also manage large areas of land which if managed well, can provide a natural health recovery resource and support a wide range of plants and animals.

Education sector

113. Nurseries, Schools, Colleges and Universities can help people of all ages gain a greater appreciation and understanding of our natural world which will be increasingly vital if biodiversity is to prosper in decades to come. Educational establishments also manage large areas of land which if managed well, can provide a great learning resource (e.g. a pond for dipping) and support a wide range of plants and animals.

Individuals

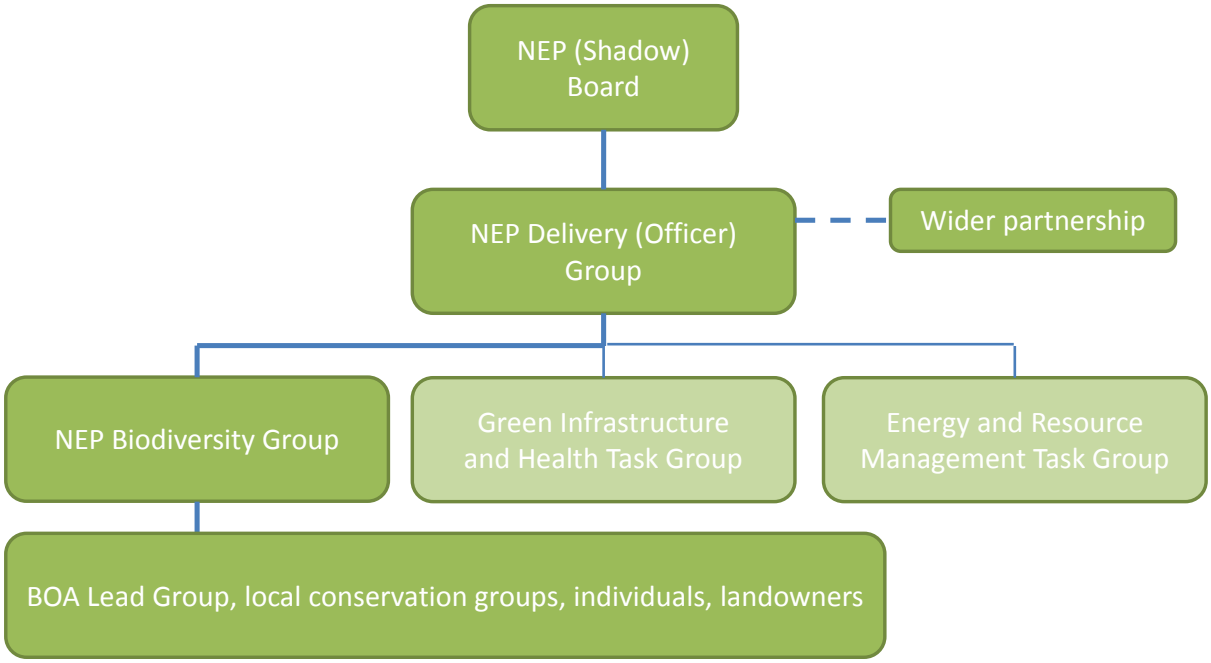
114. Whether biodiversity continues to decline, depends largely on the actions and commitment of each individual within our community. Decisions taken by those in positions of authority are key to the future of biodiversity, but the community is a powerful force in influencing these decisions.

Great crested newt (*Triturus cristatus*)
Debbie Lewis

8 Monitoring and reporting

The BOA Lead Group will manage the monitoring and reporting of work towards fulfilment of this plan and will report through the existing NEP structure (Figure 1):

Figure 1 Reporting structure of the NEP



8.1 Reporting process

115. BOA leads will be responsible for collecting information on projects, progress and opportunities within each BOA and will submit reports of progress for the BOA leads' meetings. The BOA leads' reports will detail the size (hectares) of creation and of restoration for each of the relevant BAP habitats.

116. The information from the BOA leads will be compiled into a simple table to show progress for all of Buckinghamshire's BAP habitats and BOAs. This table will be colour coded (as indicated in the table below) to allow easy assessment of progress across the habitats and across the BOAs.

117. The tables compiled for each BOA leads' meeting, will be used as part of a simple report which will be compiled annually by the NEP partnership manager. In addition to work inside BOAs, work outside BOAs will also be compiled.

118. In addition to the above reporting, the NEP partnership manager, working with the BOA leads, will enter the information into BARS2.

9 Conclusion

119. This Biodiversity Action Plan has been put together by partners representing a range of organisations from Buckinghamshire, Milton Keynes and beyond. It reflects the significant challenges ahead to arrest and reverse the declines we have experienced in our biological resource in recent decades.

120. Targets have been set and a clear direction of travel described which will involve a much wider spectrum of organisations and people hitherto involved in the nature conservation field.

121. This plan is a call to action for the community of Buckinghamshire to come together for a common cause which will bring wide-reaching benefits across virtually the whole remit of the NEP

122. The ambition is to restore and connect habitats across the whole county, thereby making wildlife populations more resilient and able to adapt to climate change and other pressures.

Wood pasture at Burnham Beeches
Ian Thornhill

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Appendix 1: List of Priority Species in Buckinghamshire

To be confirmed