

Biodiversity Net Gain Calculator (January 2023)

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Executive summary

The Oxford Flood Alleviation Scheme (FAS) ('hereafter referred to as the 'proposed Scheme') is critical in reducing the long-term risk of flooding to residential and commercial properties on the floodplain in the Oxford area. The principal component of the FAS is a new channel to the west of the city centre, accompanied by modifications to the Seacourt, Hinksey and Bulstake streams, designed to reduce water levels in the river during flood events without increasing levels further downstream. A planning application was submitted for the proposed Scheme in March 2022 (Planning Application Reference MW.0027/22 Flood Alleviation Scheme). During the consultation period for the planning application, a Regulation 25 request for additional information was issued and comments were received from both statutory and non-statutory consultees. A number of these comments related to the categorisation and condition assessment of some grassland areas within the planning application boundary. As a result, an update of the botanical survey report was completed and these changes required a revision of the site habitat baseline scores for the proposed Scheme using the Natural England Biodiversity Metric. Several additional minor revisions were also made to the Metric assessment at this time as detailed within this report.

This assessment uses the Biodiversity Metric 3.0 (the Metric) calculation tool (Panks *et al.*, 2021a and Panks *et al.*, 2021b) to ensure that it is directly comparable with the previous revision of the Metric for the proposed Scheme (Jacobs, February 2022). It should be noted that this revision of the Metric considers changes to the 'area-based habitats' assessment only. The values for both 'hedgerows' and 'rivers and streams' units remain unchanged since the last revision.

In the absence of mitigation, the highest forecast biodiversity unit loss is predicted for Other Neutral Grassland (medium distinctiveness). This accounts for 512.73 units. To mitigate for this loss, 504.27 units (59.08 ha) will be reinstated or created within the red line boundary resulting in a net change of -8.46 units. Wet Woodland (high distinctiveness) habitat is also predicted to be subject to a loss assessed at 76.01 units. Approximately 10 ha (53.79 units) of wet woodland will be created within the red line boundary (RLB) to mitigate for these losses, resulting in a net change of -22.22 units. Most of the remaining notable habitat losses (62.03 units) are predicted for high distinctiveness (priority ponds, reedbeds) and medium distinctiveness (scrub, ponds, other woodland; broadleaved) habitats. Overall, there are forecast on-site gains for Ponds (priority habitat – high distinctiveness); Mixed Scrub (medium distinctiveness) and Allotments (low distinctiveness) (See below for off-site delivery).

Changes in the assessment since the last revision of the Metric have resulted in a significant increase to the value of the on-site baseline units (increase of 136.64 units) due to changes to grassland categories and condition resulting from the botanical survey update. Despite an increase in on-site post intervention units (+90.67 units), which was mainly due to the creation of other neutral grassland in temporary working areas and permanent vehicle access tracks, this was not sufficient to offset the baseline increase. The forecast on-site net change post-intervention is now -1.04% for area-based habitats (this was previously a positive value of +15.88%).

Additional off-site provision will therefore be required to balance the trading deficit for habitats lost and to ensure a 10% net gain for the project. With a baseline unit value of 773 units, a total of 850 units must be achieved to provide a 10% net gain. Currently the on-site post intervention score is 766 and therefore approximately 86 units are required off-site to achieve the 10% target. As an example of how this could be achieved, off-site habitat creation is currently illustrated to comprise Wet Woodland (4.5ha/23.32 units) and Reedbed (11.26ha/97.41 units) on 15.76ha of existing low distinctiveness modified grassland. The current revision of the calculator now forecasts an overall net biodiversity gain of +11.24% through the proposed inclusion of off-site habitat creation (currently under discussion with final details to be agreed with relevant landowners). This reflects the 10% net gain as agreed with the Local Authority allowing the project to be future proofed in advance of the Environment Act (2021) becoming a mandatory requirement.

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1. Introduction

1.1 Project Description and Background

The Oxford Flood Alleviation Scheme (FAS) ('hereafter referred to as the 'proposed Scheme') is critical in reducing the long-term risk of flooding to residential and commercial properties on the floodplain in the Oxford area. The principal component of the FAS is a new channel to the west of the city centre, accompanied by modifications to the Seacourt, Hinksey and Bulstake streams, designed to reduce water levels in the river during flood events without increasing levels further downstream.

A planning application was submitted for the proposed Scheme in March 2022 (Planning Application Reference MW.0027/22 Flood Alleviation Scheme). This was supported by an Environmental Statement (ES) describing the baseline ecological status which included:

- **ES Appendix C-3 the Habitat and Botanical Survey Report** Document Number IMSE500177-CH2-XX-00-SU-EN-0734 (Jacobs, October 2021). Surveys to support this report were undertaken in 2020. Full results of the 2020 survey, including lists of plants recorded and photographs, are available to view online via an interactive map at the following web address: <https://jacobs.maps.arcgis.com/apps/instant/attachmentviewer/index.html?appid=3e0155afbbbf4e4d814c316894e7f6fd> and,
- **ES Appendix S Biodiversity Metric**, Document Number IMSE500177-CH2-00-00-DT-EN-0020 (Jacobs, February 2022). The initial Biodiversity Metric Report for the proposed Scheme was submitted as part of the planning application in February 2022 (Jacobs, February 2022)¹. It assessed net gains and losses for the proposed Scheme using revision 3.0 of the calculator (Panks *et al* 2021a and 2021b). Overall, the Metric recorded an overall net gain of 16.73% for area-based habitat units (including all on-site and off-site habitat creation and enhancement).

1.2 Purpose of Document

During the consultation period for the planning application, a Regulation 25 request for additional information was issued and comments were received from both statutory and non-statutory consultees. A number of these comments related to the categorisation and condition assessment of some grassland areas within the planning application boundary. As a result, an update of the botanical survey report was completed (Oxford Flood Alleviation Scheme Botanical Survey Report Addendum, Document Number IMSE500177-CH2-XX-SU-EN-0739 (Jacobs, November 2022). These changes required a revision of the site habitat baseline scores for the proposed Scheme using the Natural England Biodiversity Metric.

In addition, a number of further changes were also made to the Metric assessment at this time. These included changes to the RLB (inclusion of Eastwyke diversion route), removal of habitat erroneously included in the February 2022 baseline, re-categorisation of some hedgerow polygons and a number of minor revisions to the habitats retained and created in the post intervention assessment (Refer to Tables 1 and 2 for more detailed information).

¹ **ES Appendix S Biodiversity Metric**, Document Number IMSE500177-CH2-00-00-DT-EN-0020 (Jacobs, February 2022).

This report details all updates that have been applied to the Biodiversity Metric calculator for the proposed Scheme since February 2022, noting these changes relate to area-based habitat units only.

1.3 Policy and Legislative Context

The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government (MHCLG), 2021) sets out the government's planning policies for England and how these are expected to be applied. Chapter 15 of the NPPF details core policy principles with respect to conserving and enhancing the natural environment. Paragraph 174 states that planning decisions are required to contribute to and enhance the natural and local environment by '*minimising impacts on and providing net gains for biodiversity*', and Paragraph 179 states that plans should, '*identify and pursue opportunities for securing measurable net gains for biodiversity*'.

Following a transition period, the Environment Act (2021) will mandate developments and projects in England consented through the Town and Country Planning Act (1990) to deliver an anticipated 10% Biodiversity Net Gain (BNG). This will be measured using a version of Natural England's Biodiversity Metric which will be consulted on by the Secretary of State prior to adoption as the Metric required to demonstrate mandatory BNG. The Environment Act will be underpinned by secondary legislation, which is currently being consulted on in respect of mandatory BNG.

Whilst there is no current legal requirement for the proposed Scheme to provide BNG, the design has been developed to maximise biodiversity delivery and the proposed Scheme has been proactive in applying the Biodiversity Metric to assess measurable changes in biodiversity. Ongoing discussion with Oxfordshire County Council has taken place throughout the design and planning process and agreement has been made that a 10% net gain will be achieved.

2. Methodology

2.1 The Biodiversity Metric 3.0

This assessment uses the Biodiversity Metric 3.0 (the Metric) calculation tool (Panks et al., 2021a and Panks et al., 2021b) to ensure that it is directly comparable with the previous revision of the Metric for this proposed Scheme (Jacobs, February 2022)².

The Biodiversity 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'* (Panks et al., 2021a and Panks et al., 2021b). Thus, the Metric can be a useful tool to determine whether a scheme could result in a net gain in biodiversity and therefore be compliant with both the current planning policy and emerging legislation (refer to Section 1.3 Policy and Legislative Context). However, it is important to note that achieving gains in biodiversity in accordance with the Metric, does not necessarily mean a development meets the wider requirements of planning policy or law relating to nature conservation or biodiversity.

There are a number of key points to note about use of the Biodiversity Metric 3.0 as follows:

- The Metric incorporates separate calculations for linear habitats that require a different method of measurement. These include hedgerows and lines of trees, rivers and streams and urban trees.
- The Metric only accounts for direct impacts on habitats within the footprint of a development or project and not any indirect impacts that may result in habitat degradation.
- The Metric is not a substitute for expert ecological advice. It does not override or undermine any existing planning policy or legislation.
- The Metric does not include species explicitly. Instead, it uses habitat types as a proxy for biodiversity 'value'.
- 'Trading down' in habitat type and value must be avoided. Losses of habitat are to be compensated for on a 'like for like' or 'like for better' basis.
- Losses of irreplaceable or very high distinctiveness habitat cannot adequately be accounted for through the Metric.

² Panks et al 2021a: 'Rule 4 – Biodiversity unit values generated by biodiversity metric 3.0 are unique to this metric and cannot be compared to unit outputs from version 2.0, the original Defra metric or any other biodiversity metric.'

2.2 Scope of the Assessment and Changes since Last Revision

The scope of the assessment presented here includes consideration of all direct habitat loss, creation and enhancement within all areas of the Red Line Boundary (RLB).

Three figures have been prepared to illustrate more clearly the results of the Metric assessment as follows (Refer to Appendix A):

- Figure 1 shows the revised UK Habitat Classification (UKHab) types with the RLB superimposed. Habitat areas outside the RLB are not considered in the calculation.
- Figure 2 shows the habitat condition score for each polygon.
- Figure 3 shows the Habitat Creation Proposals within the RLB.

There has been one very minor change to the RLB since the last submission in February 2022. This relates to the 'Eastwyke Lane diversion route' (Refer to Tables 1 and 2 below for more information). This adjustment has reduced the temporary working area in one location and increased it slightly in another to help accommodate easier continuous access for the landowner and users of the boathouse at the end of Eastwyke Lane during the construction process (Refer to Figure 6.3b of the Environmental Statement).

It should be noted that this revision of the Metric assessment relates to biodiversity unit change for 'area-based habitats' only. The values for both 'hedgerows' and 'rivers and streams' remain unchanged since the last revision.

As per the Metric User Guide, areas of the very high distinctiveness habitat MG4 meadow grassland which would be lost as a result of the proposed Scheme are excluded from the Metric assessment, as is the associated bespoke mitigation/compensation (both areas are excluded from both the baseline and creation parts of the Metric calculation tool). This accounts for 1.71ha of MG4 which would be lost and 17.11ha that would be created within the RLB. The bespoke mitigation areas are shown on Figure 3 (Appendix A) as 'Lowland Meadows (bespoke mitigation – excluded from calculator) and considered further in Section 2.3.3 A-2 Site Habitat Creation and Section 2.3.5 Assumptions and Exclusions.

Where assumptions have had to be made or limitations exist, these are detailed in Section 2.3.5 below.

2.2.1 Changes to the baseline and site habitat creation proposals since last Metric revision

In relation to the scope of the assessment, Tables 1 and 2 below detail all the changes made to the Site Habitat Baseline (Tab A-1 in the calculator tool) and Site Habitat Creation (Tab A-2 in the calculator tool) since the last revision (Jacobs, February 2022) that are included within this revision of the Metric.

There has been no change to the data in Tab A-3, Site Habitat Enhancement in the Metric calculation tool since the last revision.

2.2.2 Changes to the off-site habitat creation proposals since last revision

The February 2022 revision of the Metric had proposed to create 9.2ha of 'Wet Woodland' (good condition) and 0.5ha of 'Reedbed' habitat (good condition) on poor condition 'Modified Grassland'. This habitat provision was an arbitrary value which was proposed to ensure compliance with trading rules. Locations and providers for the land required had not been identified at that stage.

Since the previous revision, the off-site habitat provision required has been re-calculated. The changes to the value of the on-site baseline have increased the requirements for off-site provision, so that in addition to satisfying the trading rules for wet woodland and reedbed, further habitat will need to be created to ensure a minimum of 10% net gain for biodiversity.

The February revision had assumed that off-site planting may not take place within the Local Planning Authority (LPA) of Oxfordshire. A precautionary approach was therefore taken at that time and the 'spatial risk category' was categorised as 'Compensation outside LPA or NCA of impact site but in neighbouring LPA or NCA'.

Since February 2022, positive engagement with local landowners has enabled the identification of a number of suitable sites for off-site habitat and hedgerow creation and enhancement. These sites range in location from those adjacent to the Scheme, up to a maximum of 15km away. All are within Oxfordshire LPA and next to the Thame to Evenlode Water Framework Directive (WFD) Waterbody. The precise location of these sites is currently commercially sensitive so they are not referred to by name or identified on a plan within this report. Further details about Off-Site Habitat Baseline, Creation and Enhancement are provided in Section 2.3.6 Assumptions and Exclusions.

As the off-site habitat can be delivered within the same LPA as the proposed scheme, this results in less woodland (i.e., ha) being required to generate the units required to off-set the woodland trading deficit.

Table 1: Changes to Tab A-1 Site Habitat Baseline since last Metric revision

Requirement for change	Description of change	Original Habitat Type Affected (UK Hab code)
<p>Modified grassland (UKHabs g4) condition re-assessed using Defra Metric 3.0 guidance</p>	<p>Modified grassland (habitat g4 of the UK Habitats Classification) had been assessed as being of 'poor' condition in 2020 using the Metric 2.0 guidance (Natural England, July 2019). Using Metric 2.0 condition criteria, modified grassland could only be assessed as being of 'poor' condition and this condition score was initially transferred into the Metric 3.0 assessment. However, the Metric 3.0 guidance includes three condition categories, 'good', 'moderate' and 'poor'. Additional field-work and re-evaluation of these grasslands was therefore undertaken to update the Metric to 3.0 categorisation of these grasslands. As referenced in the Botanical Survey Report Addendum (Jacobs, November 2022).</p>	<p>g4</p>
<p>Verification of condition and distinctiveness of grassland areas</p>	<p>Verification of the habitat classification and condition assessment of grassland areas that had been subject to a hay cut prior to 2020 surveys and/or where distinctiveness had been challenged during consultation. As referenced in the Botanical Survey Report Addendum (Jacobs, November 2022)</p>	<p>g3c, g3c6, g4,</p>
<p>Re-survey for areas of grassland where no condition assessment had been undertaken in 2020.</p>	<p>As referenced in the Botanical Survey Report Addendum (Jacobs, November 2022). For the previous revision of the Metric, a precautionary condition assessment was applied, and these habitats were assumed to be in 'good' condition for g3c habitats and/or 'poor' condition for g4 habitats. The updated survey information has been used to refine the assessment in this revision.</p>	<p>g3c, g3c6, g4</p>
<p>Other miscellaneous polygons identified for additional field survey</p>	<p>As referenced in the Botanical Survey Report Addendum (Jacobs, November 2022). For the previous revision of the Metric, a precautionary condition assessment was applied, and these habitats were assumed to be in 'good' condition for g3c habitats. The updated survey information has been used to refine the assessment in this revision.</p>	<p>g3c6</p>
<p>Removal of hedgerow polygons where hedgerows <5m wide.</p>	<p>All hedgerows have been included within the Metric under the B-1 Site Hedge Baseline and B-2 Site Hedge Creation tabs and there are no changes in the Metric assessment for hedgerow units.</p> <p>However, it was noted that the Feb 2022 Site Habitat Baseline Figure (Figure 1, Appendix A) still showed some hedgerows as GIS polygons, whereas these should be shown as lines according to the Metric Guidance. This revision has addressed this issue for hedgerows under 5m in width by representing the area occupied by these hedgerows as the habitat type within the same field, or else split between the two habitat types where the hedge forms a field boundary between two different habitats. This has the effect of increasing the extent of area-based habitats in the assessment as compared to the previous assessment.</p>	<p>Various grassland types, mainly g3c subtypes with a limited amount of g4.</p>

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Requirement for change	Description of change	Original Habitat Type Affected (UK Hab code)
	For the approach applied to hedgerows >5m wide please refer to Section 2.3.5 Assumptions and Exclusions.	
Eastwyke Lane diversion route	There has been one very minor change to the RLB since last submission in February 2022. This relates to the 'Eastwyke Lane diversion route'. This adjustment has reduced the temporary working area in one location and increased it slightly in another to help accommodate easier continuous access for the landowner and users of the boathouse at the end of Eastwyke Lane during the construction process (Refer to Figure 6.3b of the Environmental Statement). This area had received botanical survey in 2020.	g3c, h3, w1d5, f2a/f2f
'Unknown' habitat	It was noted that following further review of the Site Habitat Baseline, some polygons in the Feb 2022 revision had been allocated to "unknown" habitat. These were generally small areas where the RLB included habitat such as hard standing and mown road verges (i.e., habitats of low or no biodiversity unit value) and most of this land was 'retained' in the post-intervention scenario. This land has now been allocated to specific habitat types and marked as retained where appropriate.	g4, u1, u1b, w1d5
Removal of two fields incorrectly included in RLB	An area between the second stage channel and the Electric Road, within two fields (OS Grid Reference SP 50679 04981 and OS Grid Reference SP 50838 04861), was incorrectly included within the initial submission. In fact, this area is outside the RLB and has therefore now been excluded from the Metric assessment.	g4

Table 2: Changes to Tab A-2 Site Habitat Creation since last Metric revision

Change Applied	Description of Change	Habitat Type Affected
Increase in Years' delay.	In the February 2022 submission, an assumption was made that the delay in starting habitat creation would be '0 years' because it would take place immediately after the start of construction. However, it was subsequently noted that some areas of the proposed Scheme will be under construction for more than one year. The Metric has therefore been adjusted to allow for this, with each polygon of created habitat now allocated a number of years' delay, from zero up to three. Adding the delay to created habitats reduces the unit outputs for these habitats.	All
Reduction in reedbed habitat	The February 2022 submission assumed that some of the priority pond habitat would be allowed to develop into reedbeds via natural succession. i.e., this habitat type had been allocated to reedbeds rather than pond habitat. Some reedbed may develop on site but in order to ensure that there is no net loss in this priority habitat, the amount of reedbed required to satisfy the habitat trading rules will now be included in the offsite habitat creation. Hence there has been a reduction in proposed on site reedbed habitat creation and a corresponding increase in priority pond habitat creation.	Pond (priority habitat); Reedbeds
Temporary Working Areas	An assumption was made in the Feb 2022 Metric that following construction, areas allocated to contractor's temporary working areas would be the same habitat type but reduced to 'poor' condition. However, it was subsequently identified that much of this land will actually be seeded and returned to the current landowner(s) post-construction and is now therefore assumed to return to the current land use. There are two scenarios for this habitat: 1. Areas that will be managed by the Environment Agency, such as the field immediately north of South Hinksey. These will be sown with seed mixes with a high proportion of wildflowers and managed to reach 'good' condition; 2. land which will be managed by existing landowners. These will also be seeded and assumed to be managed to 'moderate' or 'poor' condition as per existing baseline.	Other Neutral Grassland, Cereal Crops
Permanent vehicle access tracks	Tracks which will provide permanent vehicle access for operational maintenance purposes were represented as hard standing in the Feb 2022 submission. However, it was noted that all of the tracks will be sown with the same meadow grass seed mix as the land on either side in order to blend the into the landscape. These areas have therefore been amended to represent creation of 'Other Neutral Grassland' of 'Moderate' condition.	Built Linear Feature
Allotments	Temporary working areas within existing allotments were shown as being subject to grassland habitat creation in the Feb 2022 Metric. However, it was subsequently noted that some of these areas would actually be reinstated to allotment. An additional small area of retained habitat has also now been re-categorised to Allotment post-construction.	Other Neutral Grassland
Cereal crops	A single field which was categorised as cropland in the Site Habitat Baseline was previously shown as being subject to Other Neutral Grassland creation post-construction (OS Grid Reference SP 48967 06493). It was subsequently identified that part of this field will now support permanent vehicle access, whilst part of the field that will be a temporary working area will be restored to use for crops.	Cereal Crops
Retained trees within woodland	Cross-review of the arboricultural reports showed some existing trees along the edges of woodland polygons as being retained where the previous Metric had shown small woodland losses. The Metric has therefore been updated to show retained habitat for these woodland habitats.	Wet Woodland, Other Woodland; Broadleaved

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Change Applied	Description of Change	Habitat Type Affected
Eastwyke Lane diversion route	As per the baseline, a small change has been made to the RLB to allow for a diversion route to keep access open to the boathouse.	Other Neutral Grassland
Removal of two fields incorrectly included in RLB	An area between the second stage channel and Electric Road, within two fields (OS Grid Reference SP 50679 04981 and OS Grid Reference SP 50838 04861), was incorrectly shown as retained habitat in the initial submission. In fact, this area is outside the RLB and has therefore now been excluded from the Metric.	Modified Grassland
Retention of areas of grassland	An area of Wet Woodland habitat creation was proposed near North Hinksey (OS Grid Reference SP 49884 05390). This had been shown within the Metric as being completely cleared and then replanted. However, an opportunity was subsequently identified to retain some existing grassland in the areas that will form the glades.	Wet Woodland
Allotments and vegetated gardens	Category u1 (built up areas and gardens) covers both residential gardens and allotments. In the Metric calculator these are entered separately although both have the same points score. A correction has been made to the proportion of how much of the u1 habitat is allotment.	Allotments, Vegetated Garden
Small area of land re-categorised from artificial unvegetated unsealed land to allotments	Small change of category from Artificial Unvegetated Unsealed Land to Allotments due to a minor GIS error in previous revision	Allotments

2.3 Calculating Biodiversity Units

2.3.1 Project Boundary

The extent of this assessment is defined by the RLB as presented in Figures 1-3, Appendix A. There has been one very minor change to the RLB since last submission in February 2022. This relates to the 'Eastwyke Lane diversion route'.

2.3.2 A-1 Site Habitat Baseline

2.3.2.1 General Approach

To create the biodiversity baseline for the proposed Scheme, the baseline habitat data for this assessment was drawn from the following sources:

- **Habitat and Botanical Survey Report 2021.** ES Appendix C-3 Document Number IMSE500177-CH2-XX-00-SU-EN-0734 (Jacobs, October 2021). Surveys to support this report were undertaken in 2020. Full results are available to view online via an interactive map as follows: <https://jacobs.maps.arcgis.com/apps/instant/attachmentviewer/index.html?appid=3e0155afbbb4e4d814c316894e7f6fd>
- **Botanical Survey Report Addendum 2022,** Document Number IMSE500177-CH2-xx-SU-EN-0739 (Jacobs, November 2022): Additional surveys undertaken in 2022 to some of the grassland areas in response to a Regulation 25 request during the consultation period for the planning application. Full results are available to view online via an interactive map as follows: <https://jacobs.maps.arcgis.com/apps/instant/sidebar/index.html?appid=2727f926785144708a5932da64fc4b80>
- **Hinksey Meadows NVC survey.** Environmental Statement Appendix C-4 (Floodplain Meadows Partnership, 2020)

The following data was entered into the Metric 3.0 calculator tool for area-based habitats (Refer to Appendix B):

- a. Habitat type and extent (ha) for area-based habitat: at which point each habitat is automatically assigned a distinctiveness rating (Very Low-Very High, 0-8);
- b. Habitat condition multiplier: poor (1), moderate (2), or good (3) (or an intermediate value where appropriate) based on condition criteria assessment; and,
- c. Strategic significance multiplier: based on proximity to local strategies and how ecologically desirable the habitat is (further information on how this has been assigned is provided below).

This combination of data produces a total number of units for each area-based habitat, and subsequently the total overall habitat units of biodiversity baseline for the entire proposed Scheme. This is then used to investigate the total units retained and lost.

Where habitat parcels presented identical attributes (e.g., habitat type, condition, or strategic significance), these were combined prior to entry into the Metric calculation tool. This reduced the complexity of the data due to limitations of the tool, e.g. limited row allowance.

For ease of reference, the UKHab Category and codes established through the baseline surveys are provided in the Metric within the 'Assessor comments' column.

2.3.2.2 Strategic Significance

All area-based habitat polygons included in the assessment must be assigned a strategic significance score, both in the baseline and post-intervention parts of the assessment. *'Being 'better' and 'more joined-up' are important facets of habitats that can contribute to halting and reversing biodiversity declines, so the metric also accounts for whether or not the habitat is sited in an area identified, typically in a relevant local strategy or plan, as being of strategic significance for nature'* (Panks *et al*, 2021a). Recognising strategic significance gives extra value to habitats that are located in optimal locations for biodiversity or are of a type that meets local objectives for biodiversity.

For the purposes of this assessment, the following criteria were used to assign a strategic significance category to each habitat polygon:

- **High** i.e., within area formally identified in local strategy or plan i.e., located with Oxfordshire Conservation Target Areas (Thames and Cherwell, Oxford Heights West, Oxford Meadows and Farmoor);
- **Medium** (location ecologically desirable but not in local strategy); these areas were informed by professional judgment and are generally areas of semi-natural habitat in close proximity to existing Conservation Target Areas / areas of 'high' strategic significance; and
- **Low** (Area/compensation not in local strategy / no local strategy) – all other areas which were not assigned 'Medium' or 'High' strategic significance and/or of negligible ecological value e.g., areas of 'hard-standing'.

2.3.3 A-2: Site Habitat Creation

To create an onsite post-intervention unit score, similar habitat data is required to that input into the 'Site-Creation' tab of the Metric calculation tool as for the baseline (Refer to Section 2.3.2: A-1 Site Habitat Baseline), with the addition of information relating to the timing of habitat creation proposed. This combination of data produces a total number of units for each habitat and subsequently quantifies total habitat units in the biodiversity post-intervention scenario. Further information as to how this data was generated is provided below.

The area within the RLB is split into polygons, based on the future "action" allocated to each area, the existing baseline habitat and, where relevant, the future planting proposals. Polygons are shown on Figure 3 (Appendix A), which also shows the proposed planting where relevant.

The primary division of the polygons is by action, as follows:

- "Retained": these polygons are shown on Figure 3 (Appendix A), coloured magenta. They are not altered by the Scheme and appear in the A-1 Site Habitat Baseline tab of the calculator as retained habitat. The area of these polygons appears both in the total area and the retained area on the relevant line of the Baseline tab.
- "MG4 Mitigation": these polygons are shown on Figure 3 (Appendix A) as 'Lowland Meadows (bespoke-mitigation – excluded from calculator). All MG4 creation areas are excluded from the calculator as they form part of the bespoke mitigation plan for MG4 meadow grassland (see Section 2.3.5 Assumptions and Exclusions below).
- "First Stage Channel": these polygons are where the new first stage stream will be constructed. They can be identified by comparing polygons shown on Figure 3 as habitat type "Rivers and streams" with those shown on Figure 1. Within the calculator, these polygons appear in the A-1 Site Habitat Baseline but are not within the A-2 Site Habitat Creation tab. This accounts for approximately 6.39ha of habitat (excluding 0.40ha of pre-existing river channel) which is lost from the area-based habitat assessment because the corresponding post-intervention habitat is included in the Rivers & Streams Metric.
- "Create": these polygons / areas of habitat will be lost and then re-instated/created when works are completed. The habitat in the A-2 Site Habitat Creation tab of the calculator is shown on

Figure 3 and is based on the species-mix on the proposed Scheme's landscape drawings. Each polygon with the action of "create" is also allocated a strategic significance score, which is the same as the strategic significance in the baseline situation.

Habitat types and condition scores for future habitats derive from the planting and management proposals (Refer to revised Landscape Planting Plan (Jacobs, 2023)). Professional judgement has been used to predict the type of habitat resulting from the planting mixes, ground conditions and proposed management. Figure 3 shows the future habitat creation proposals and also shows those areas where existing habitat is to be retained.

2.3.4 D-1 Off Site Habitat Baseline

As detailed in Section 2.2.2, the habitat type and extent of off-site habitat provision is the product of a calculation to ensure a minimum of 10% net gain for biodiversity and compliance with trading rules.

To create the off-site biodiversity baseline, preliminary surveys of the existing habitats have been undertaken at all potential sites. Furthermore, detailed UK Hab baseline surveys will be undertaken at selected sites in early Summer 2023 to refine the baseline and ensure that sufficient uplift is provided for the metric.

2.3.5 D-2 and D-3 Off Site Habitat Creation and Enhancement

The types and condition scores for future habitats will derive from the detailed proposals for habitat creation, which will be set out and detailed once further site assessments and landowner agreements have been secured (see sections 2.3.6.4 and 2.3.6.5 below). The long-term management, monitoring and reporting is set out in a specification for off-site BNG delivery in Appendix C. This specification will be updated and refined as and when guidance on BNG monitoring and reporting is provided by Natural England.

2.3.6 Assumptions and Exclusions

2.3.6.1 General

As per the Metric User Guide (Panks *et al.*, 2021a), the Metric assessment does not include any consideration of a reduction in biodiversity unit value for retained habitats as a result of potential indirect habitat degradation either inside or outside the RLB.

Many of the assumptions and exclusions described here have been taken from the original Metric report where they are still applicable (Jacobs, February 2022).

2.3.6.2 Site Habitat Baseline

Some of the habitat within the RLB is categorised as g3a5 lowland meadow habitat. This is a 'Very High Distinctiveness' habitat, which requires bespoke compensation as stated within the Metric calculation tool and User Guide. A mitigation strategy was therefore developed for this habitat which was referred to as its NVC community type of MG4: *Aleopecurus pratensis-Sanguisorba officinalis* grassland (Refer to MG4 Grassland: Mitigation Strategy, Jacobs January 2022). This accounts for 1.71ha of MG4 which will be lost and 17.11ha that will be reinstated or created which has been excluded from the calculator. An additional small area of this habitat (0.66ha, OS Grid Reference SP 49374 05982, refer to Figure 3, Appendix A) was treated as retained habitat in the Metric (Rows 3-5 of lowland meadow in A-1 Site Habitat Baseline). This is because it has been categorised as potential exchange land and will be retained with its current management regime.

All habitats classified as hedgerows have been included as polyline measurements within the Metric under the B-1 Site Hedge Baseline tab. However, it was noted that the Feb 2022 Site Habitat Baseline Figure 1 also showed some hedgerows as GIS polygons. Whilst polygons for hedgerows >5m are still shown on Figure 1, all hedgerow polygons have been excluded from the Metric area-based habitats assessment to ensure that hedgerow habitat is not double counted. For hedgerows <5m, the area occupied by these hedgerows is now allocated to the habitat type within the same field or else split between the two habitat types where the hedge forms a field boundary between two different habitats. This has increased the total habitat area included within the A-1 Site Habitat Baseline assessment as it was previously excluded from the Metric.

All lowland calcareous grassland habitat (UK Hab category g2a5: Lowland calcareous grassland) is located at Egrove Park, which is excluded from any works. It is potential exchange land and will be retained with its current management regime whether or not it is required for public access. It is therefore shown as retained within the Metric.

All ponds (priority and non-priority) are shown on Figure 1: UK Hab Classification Plan as a single habitat type (r1; standing open water and canals). It is noted that there is only a single non-priority pond: Hinksey Ponds which is at the foot of a rail embankment (OS Grid Reference: SP50865 05287 to SP 51489 04123, Refer to Figure 1, Appendix A).

It is noted that UKHabs Category h3; dense scrub has no directly comparable habitat category within the Metric. Therefore, any areas mapped as dense scrub were allocated to either a specific species scrub type (e.g., hawthorn, blackthorn etc) where sufficient information was available, or else allocated to mixed scrub. Relevant condition assessment information was available for each scrub category.

2.3.6.3 Site Habitat Creation

Lowland Meadow habitat creation is excluded from the calculator as it is part of the bespoke MG4 mitigation plan. For further information on these habitat proposals, refer to the MG4 mitigation strategy (Jacobs, January 2022).

All areas planted with mixed shrubs are scored as 'moderate' condition and treated as Mixed Scrub, except for the woodland edge planting which is treated as part of the associated woodland rather than as Mixed Scrub *per se*.

All woodland, whether Wet Woodland or otherwise, is scored as moderate in recognition of the difficulty of achieving high-quality woodland from plantation other than over very long time periods.

Wet Woodland is defined as woodland where the species mix is determined by the ground being regularly wet; it is not essential that it be regularly flooded, as long as the ground is saturated for enough of the year. This will apply to most of the areas of woodland planting in the proposed Scheme area, which has driven the choice of tree-planting species mix for these areas. The exception is the woodland planting at Kendall Copse, where the soil is drier in part due to being above a former landfill. A different species mix is proposed here, and it is treated as Other Woodland; Broadleaved in the Metric calculator.

There are a number of wetland habitat types within the RLB, mostly small areas of swamp, i.e., UKHab categories of f2a (lowland fens) and f2f (other swamps). As per the last revision of the Metric (Jacobs, February 2022), these areas have been classified as Reedbed habitat for the purposes of the Metric.

In the February 2022 submission, an assumption was made that the delay in starting habitat creation would be '0 years' because it would take place immediately after the start of construction. However, it was subsequently noted that some areas of the proposed Scheme will be under construction for more than one year. The Metric has therefore been adjusted to allow for this, with each polygon of created habitat now having a number of years' delay applied, from zero up to three. Adding the delay to created habitats reduces the unit outputs for these habitats.

The February 2022 submission assumed that some of the priority pond habitat would be allowed to develop into reedbeds via natural succession. i.e., this habitat type had been allocated to reedbeds rather than pond habitat in the Metric calculator. Some reedbed may develop on site but to ensure that there is no net loss in this priority habitat, the amount of reedbed required to satisfy the habitat trading rules will now be included in the offsite habitat creation. Hence there has been a reduction in proposed reedbed habitat creation onsite with a corresponding increase in priority pond habitat creation.

An assumption was made in the February 2022 Metric that following construction, areas allocated to contractor's temporary working areas would be left in a 'poor' condition. However, it was subsequently identified that much of this land will be seeded and returned to the current landowner(s) post-construction and is now therefore assumed to return to the current land use (i.e., same habitat type as the Site Habitat Baseline). There are two scenarios for this habitat: 1. Areas that will be managed by the Environment Agency, such as the field immediately north of South Hinksey. These will be sown with seed mixes with a high proportion of wildflowers and managed to reach 'good' condition; 2. Land which will be managed by existing landowners. These will also be seeded and assumed to be managed to 'moderate' or 'poor' condition as per the existing baseline.

Tracks which will provide permanent vehicle access for operational maintenance purposes were represented as hard standing in the original submission. However, it was noted that all of the tracks will be sown within the same meadow grass seed mix as the land on either side to blend them into the landscape. These areas have therefore been amended to show creation of 'Other Neutral Grassland' of 'moderate' condition for this revision.

It is noted that, as per last revision, the Metric shows an error message which states 'Check Areas – Area of development footprint and habitat creation exceeds the area of habitats lost'. It is noted that there is 3.62ha less habitat area in the post-development scheme compared with the baseline. This discrepancy is largely due to approximately 6.39ha of 'First Stage River Channel' (excluding 0.4ha of pre-existing river channel) which is lost from the area-based habitat assessment because the corresponding post-intervention habitat is included within the Rivers & Streams Metric. These new areas of river channel are shown in the river tabs on the Metric (C-1 to C-3). There is also a small adjustment for hedgerow polygons >5m which increases creation by 1.7ha. This leaves a very small area (approximately 1ha) of habitat which has been unaccounted for in the metric due to data mismatches.

2.3.6.4 Off Site Habitat Baseline

The area or length of each habitat that will need to be provided to deliver the required biodiversity units is dependent on the baseline conditions of the site, the type and quality of the habitat that is going to be created, whether or not it is in a location that is of strategic importance for biodiversity, how soon the work is going to be carried out and how close the site is to the scheme area.

Site Selection Criteria

Our site selection criteria for off-site BNG are as follows:

1. Proximity of the proposed site to the development site;
2. Strategic significance of the proposed site;
3. Ecological baseline;
4. Landscape and heritage baseline;
5. Existing land management philosophy and long-term ambition; and,
6. Accessibility and visibility for the public.

These criteria are set out in more detail in Appendix D.

A number of suitable sites have been identified for off-site habitat creation and enhancement. These sites range in location, from adjacent to the Scheme, up to a maximum of 15km away.

The sites under detailed consideration are all within Conservation Target Areas and areas highlighted for recovery on the Draft Oxfordshire Nature Recovery Network.

Preliminary surveys of the baseline habitats have been undertaken at all sites. Detailed UK Hab baseline surveys will be undertaken at the preferred sites in early Summer 2023 to refine the baseline and ensure that sufficient uplift is provided for the metric.

Preliminary landscape and heritage baseline surveys have been undertaken to identify risks and opportunities, particularly on sites where ground lowering may be required to create ditches and reedbeds. More detailed surveys will be undertaken at the preferred sites and measures taken to protect and enhance landscape and heritage as required.

The landowners of the sites have all worked with the Environment Agency in the past on environmental improvement and habitat creation schemes and have a proven track record of environmental project delivery.

A number of the sites are already accessible and visible to the public either via public rights of way and/or roads and the railway. There may be opportunities to increase access to some of those sites which are currently less accessible, although any impact that this might have on existing and proposed wildlife will need to be considered.

2.3.6.5 Off Site Habitat Creation

Discussions with landowners are very positive and progressing well. The required site or combination of sites for off-site habitat creation and enhancement will be secured by one or more of the following means:

- a) entering into a conservation covenant with the existing landowner under which they will create, monitor and manage the habitats for a period of 30+ years to meet the specification and condition criteria set out in the Defra 3.1 Metric Technical Supplement and in the Specifications for Off-Site BNG Delivery (Refer to Appendix C);
- b) entering into a long-term lease for the land that will allow us to create, monitor and manage the habitat ourselves;
- c) purchasing the land so that we can create, monitor and manage the habitats ourselves (as per the main Scheme); or,
- d) purchasing biodiversity units from a trusted provider.

All necessary agreements will be in place before construction of the Scheme begins and the Environment Agency would agree to a pre-commencement condition relating to their commitment to delivery to be imposed on any planning permission granted.

In all cases, the Environment Agency will maintain an overview of the creation, management, monitoring and reporting for each habitat to ensure that the BNG is delivered.

3. Results

3.1 Summary of Results for Latest Revision

Table 3 provides a summary of the revised expected biodiversity unit change for the proposed Scheme for area-based habitat only (Refer to Metric in Appendix B). For area-based habitats, there is a forecast loss of 1.04% on the development site.

Table 3 Summary of the Metric 3.0 Assessment, on-site only

Unit Type	Assessment Stage	Total (Units / %)
Area-based Units	Baseline Units	773.65
	On-site Post-Intervention Units	765.58
	On-site Net Change Units	-8.07
	On-site Net Change %	-1.04%
Trading rules satisfied (Yes/No)?	No	
Irreplaceable habitat loss (Yes/No)?	No	

The most notable on-site losses in units per habitat type are summarised in Table 4 below (all habitats >5 units which are shown in descending order of units lost). This table also summarises the on-site units to be created and net unit change, as well as extents (ha) of areas lost, created and area net change by habitat type. This table excludes consideration of off-site habitat creation.

Table 4 Summary of notable on-site unit losses and gains by habitat type and area (descending order of units lost, excludes off-site habitat creation)

Habitat Type	Distinctiveness	Units lost	Units to be Created	Units Net Change	Area Lost (ha)	Area to be reinstated/ created (ha)	Area Net Change (ha)
Other neutral grassland	Medium	512.73	504.27	-8.46	65.52	59.08	-6.44
Wet woodland	High	76.01	53.79	-22.22	4.15	10.06	+5.91
Scrub (All types)	Medium	15.54	16.96	+1.44	3.25	2.28	-0.96
Ponds (Priority/ Non-priority)	Medium/High	12.79	54.73	+41.94	0.81	4.83	+4.02
Reedbeds	High	12.27	3.17	-9.1	1.14	0.36	-0.78

Habitat Type	Distinctiveness	Units lost	Units to be Created	Units Net Change	Area Lost (ha)	Area to be reinstated/ created (ha)	Area Net Change (ha)
Other woodland, broadleaved	Medium	11.53	6.40	-5.13	2.32	1.28	-1.04
Modified grassland	Low	9.94	7.13	-2.81	4.42	1.87	-2.55

The highest forecast habitat loss by units is predicted for Other Neutral Grassland (UK Hab categories g3, g3C5, g3C6, g3C7 and g3C8) which is a medium distinctiveness habitat. This accounts for 512.73 units or 65.52ha i.e., 78% of total habitat units lost within the RLB and 77% by area. Approximately 504.27 units (59.08ha) of Other Neutral Grassland will be reinstated/or created within the RLB (42.49ha in 'good' condition, 13.05ha in 'moderate' condition and 3.54ha in 'poor' condition). This will result in a net change on-site of -8.46 units.

Wet Woodland, a high distinctiveness habitat (UK Hab category w1d5 Alder Woodland floodplains) is predicted to be subject to a loss of 76.01 units or 4.15ha or i.e., 11.6% of the total habitat units lost within the RLB and 4.9% by area. Approximately 53.79 units (10 ha) of Wet Woodland will be created within the RLB, resulting in a net change of -22.22 units.

With the exception of 9.94 units (4.42ha) of Modified Grassland, the remaining notable habitat losses calculated within the metric are predicted to take place for high distinctiveness (priority ponds, reedbeds) and medium distinctiveness (scrub, ponds, other woodland; broadleaved) habitats.

In terms of highest forecast habitat gains by units, the largest on-site net gain of 41.94 units (4.02ha) is forecast for Ponds (priority/non-priority habitat) which are high and medium distinctiveness habitats respectively. Scrub (all types), a medium distinctiveness habitat, is also forecast for a minimal net gain of +1.44 units. However, by area this results in a net loss of -0.96ha.

It is noted that off-site provision will be required to balance the trading deficit for habitats lost and to ensure a minimum of 10% net gain for the project. Considering the on-site provision, a minimum of 84 area-based units are required through off-site provision. Our preferred developing option for off-site provision follows positive discussions with landowners and comprises: Wet Woodland (4.25ha/13.25 units) and Reedbed (1.25ha/8.43) which are both required to meet trading rules. Additionally, the creation of Other Neutral Grassland (8ha/43.20 units) and the enhancement of existing grassland to Floodplain Wetland Mosaic (5ha/30.15 units) are also proposed.

3.2 Comparison with last revision (February 2022)

As per the changes noted since the last revision described in Tables 1 and 2, Table 5 below provides a summary of the notable unit losses and habitat creation by habitat type as a comparison with the previous revision of the Metric (February 2022).

As expected, the most significant change in the assessment was as a result of the re-categorisation of some of the grassland habitats in the baseline. This was specifically due to an increase to 'Other Neutral Grassland' (g3c and sub-categories) in the baseline and a corresponding decrease in 'Modified Grassland' (g4), as a result of the revised botanical survey results. Smaller differences were also noted to a number of other habitats as a result of other changes described in Tables 1 and 2. However, these were relatively minor <5 units per habitat type. This includes a very small increase in unit losses for Scrub (3.52 units), Other Woodland, Broadleaved (3.33 units) and Reedbeds (0.94 units). Fewer units are lost for Ponds (priority/non-priority habitat, 1.50 units) and Wet Woodland (1.24 units) in the latest assessment.

There were also on-site increases in the units of habitat creation proposed for all habitat types with the exception of reedbed habitats and ponds (priority/non-priority ponds). The decrease in reedbed habitat is due to the exclusion of the uncertain natural succession of this habitat within ponds on-site and a shift to reedbed creation offsite (Refer to Table 2 for full description).

In respect to the small difference in the units created of pond habitat (0.11ha/2.58 units), this is due to a small change in the planting of aquatic pond edge vegetation at one large pond (North of the A420); in February 2022 this was counted as pond habitat in the metric, whilst in the latest revision, this has been counted as terrestrial habitat since it is a better fit for the habitat type here. Overall, there has been no change in the proposed size and/or design of new ponds since the last revision and it is noted that overall, there is still a significant gain in this habitat type post-intervention (+41.94 units).

The increases in on-site habitat creation i.e., +90.67 unit increase between revisions, are mainly due to the increase in units created for Other Neutral Grassland in temporary working areas and permanent vehicle access tracks (+83.32 units) (Refer to Table 2 for full description of these changes). Other small increases were noted for Modified Grassland (+3.3 units), Scrub (+7.0 units), Other Woodland; Broadleaved (+2.06 units) and Wet Woodland (+5.79 units) which are due to minor changes to the RLB with resulting additions/subtractions of habitats (e.g., retained trees within woodland, Eastwyke Lane diversion route and retention of areas of grassland in wet woodland near North Hinksey).

Table 5: Comparison of notable on-site unit losses and creation by habitat type between revisions of the metric (descending order of units difference since last revision)

Habitat Type	Distinctiveness	Units lost previous (Feb 2022)	Units lost latest (Jan 2023)	Difference (units lost)	Units Created Feb 2022	Units Created Jan 2023	Difference (units created)
Other neutral grassland	Medium	243.36	512.73	+269.37	420.95	504.27	+83.32
Modified grassland	Low	87.80	9.94	-77.86	3.83	7.13	+3.3
Scrub (All types)	Medium	12.02	15.54	+3.52	9.96	16.96	+7.0
Other woodland, broadleaved	Medium	8.17	11.53	+3.33	4.34	6.40	+2.06
Ponds (Priority/ Non-priority)	Medium / High	14.29	12.79	-1.50	57.31	54.73	-2.58
Wet woodland	High	77.25	76.01	-1.24	48.00	53.79	+5.79
Reedbeds	High	11.33	12.27	+0.94	11.71	3.17	-8.54

Overall, it is noted that there has been a slight change in the area within the RLB for the habitat baseline since the last revision of the metric. This change is a reduction in area from 120.42ha to 103.55ha in the latest revision. The reduction in extent is due to the change in RLB (Eastwyke Lane diversion) and removal of two fields that were previously included in the RLB.

4. Conclusion

There have been some significant changes in the area-based habitat part of the Metric calculator since the last revision (February 2022), both in relation to A-1 Site Habitat Baseline, A-2 Site Habitat Creation, D-1 Off-Site Habitat Baseline and D-2 Off-Site Habitat Creation. The majority of these changes resulted from updates to the botanical survey data, alongside a number of other scheme changes and assumptions as described within Tables 1 and 2.

These changes have resulted in a significant increase to the on-site baseline units (increase of 136.64 units). Despite an increase in on-site post intervention units (27.41) as compared to the previous assessment, this was not sufficient to offset the baseline increase, and the forecast on-site net change post-intervention is now -1.04% (this was previously a positive value of +15.88%). Thus, it has been necessary to considerably increase the proposed off-site habitat provision needed to ensure a net gain can be achieved through the Metric calculator.

The current revision of the calculator now forecasts an overall net biodiversity gain of +11.24% where proposed off-site habitat creation areas have been identified and are in the process of being agreed with the relevant landowners. This reflects the requirement to secure a minimum of 86 units off-site. These off-site units will be secured to achieve the 10% net gain as agreed with the Local Authority allowing the project to be future proofed in advance of the Environment Act (2021) becoming a mandatory requirement.

Table 6 – Overall Changes in Headline Results since last revision of the metric

Metric Calculation	Last revision (February 2022)	Current revision (January 2023)
On-site baseline units	637.01	773.65
On-site post-intervention units	738.17	765.58
On-site net % change	15.88%	-1.04%
Off-site post-intervention net units (required)	5.44	86.06
Total net unit change	106.60	86.95
Total on-site net % change plus off-site surplus	16.73%	11.24%

5. References

Floodplain Meadows Partnership (2020). ES Appendix C-4. Hinksey Meadows NVC survey.

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Jacobs (October 2021). ES Appendix C-3 the Habitat and Botanical Survey Report. Document Number IMSE500177-CH2-XX-00-SU-EN-0734.

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Appendix A. Figures

- Figure 1 UK Habitat Classification (UKHab) Plan
- Figure 2 Habitat Condition Scores
- Figure 3 Habitat Creation Proposals

Appendix B. Biodiversity Metric 3.0 Rev 2

Appendix C. Specification for Off-site BNG Delivery (Environment Agency, February 2023)

Oxford Flood Alleviation Scheme – Off-site Biodiversity Net Gain Specifications (Environment Agency, February 2023)

OFF-SITE WORK

- Wet Woodland Creation and Management
- Reedbed Creation and Management
- Ditch Enhancement
- Hedgerow Creation and Management
- Other Neutral Grassland Creation and Management
- Floodplain Wetland Mosaic Creation and Management

AIMS

We are creating or enhancing the habitats so that they meet the definition set out in the Defra 3.1 Technical Supplement and are in 'good' condition by the target date set out in the Biodiversity Metric 3.1 Technical Supplement. Therefore, the works and maintenance specifications are written with this in mind.

PERMISSIONS

It will be the responsibility of the person undertaking habitat creation, enhancement and maintenance to get all the necessary permissions before carrying out the works. Permissions may be required from Natural England, Environment Agency, Local Lead Flood Authority, Forestry Commission or Historic England.

WET WOODLAND CREATION, MANAGEMENT, MONITORING AND REPORTING

Definition (taken from the Woodland Wildlife Toolkit but also refer to UK Habitat Classification)

Wet woodland occurs on waterlogged or seasonally wet soils, and is usually characterised by the presence of alder, birch and willow; tree species adapted to wetter conditions. Wet woodland can develop in a wide range of situations: on floodplains, as successional habitat within fens, mires and bogs, along streams, hill-side flushes, and in peaty hollows, and hence occurs on a broad spectrum of soil types; nutrient rich or poor, mineral or organic, acidic or base-rich. Wet woodland within or adjacent to other woodland types adds to the diversity of the habitat and offers greater diversity of niches for species. It is also an important habitat in its own right, supporting a huge range of invertebrates, fungi and other wildlife.

Wet Woodland Creation (list compiled with reference to the Woodland Wildlife Toolkit and Gov.uk guidance on planting trees to extend existing woodland)

- Provide connecting habitat between established woodland or extend existing woodland if possible.
- Use a combination of planting (80%) and natural regeneration (20%)
- The species mix will be determined by looking at existing, mature wet woodlands that are local to the site and using this as a guide to the range of species and percentage of each species that will be appropriate.
- When planting, consider the topography of the site and plant the species that thrive in very wet ground in the lower areas.
- Carry out the planting between 1 November and 28 February
- Notch plant trees between 2 - 3m apart (approx. 1600 plants/ha). Spacing does not need to be regular.
- Notch plant small tree species and shrubs between 1-1.5m apart (approx..2400 plants/ha) Spacing does not need to be regular.
- Do not plant in straight lines, but try to emulate a natural structure
- Use bare root or cell grown trees and shrubs 40-60cm in height
- Include scrubby or understorey species. Plant these along edges as well as within the main mix
- Plant mixes of species rather than single species blocks
- Protect young plants with tree shelters or fencing as appropriate to prevent any herbivore damage.

On the basis of the specification above, for a 10ha site, assume that 8ha will be planted and a mosaic of 2 ha within the planted areas will be left for natural regeneration. Of the planted 8ha, assume 2ha of small trees and shrubs ($2 \times 2400 = 4800$ small trees and shrubs) and 6ha of larger trees ($6 \times 1600 = 9600$ larger trees).

Wet Woodland Management

This is an outline management plan only. Management activities and the management plan will need to be developed and adapted in response to the selected site and monitoring results.

Duration	Wet Woodland Management Activity	Timing
Years 1-5	Keep an area 75cm diameter around each tree free of tall, competing vegetation by cutting it back. Check integrity of tree protection (fencing/guards) and repair as required to prevent damage by herbivores. Check for, remove and legally dispose of all invasive and injurious weeds.	Allow 6 visits per year carried out from May – October (30 visits in total)
	Undertake annual plant inspection and replacement survey	August/September (5 surveys in total)
	Replace losses >5%* each year	November/December
Years 6-10	Check for, remove and legally dispose of all invasive and injurious weeds. Ensure all dead and decaying wood is left in place. Remove guards/fencing if or when no longer serving a purpose.	As required throughout this period to eliminate all invasive plants.
Years 10-15	Check for, remove and legally dispose of all invasive and injurious weeds.	As required throughout this period to eliminate all invasive plants.
	Ensure all dead and decaying wood is left in place. Allow for some thinning, in the event that natural losses (years 5-10) and natural regeneration are not creating a diverse structure. Thinnings should be left on site.	November/December (not required every year but as required throughout this period to meet target condition)
Years 15-30	Allow for some thinning, in the event that natural losses (years 5-10) and natural regeneration are not creating a diverse structure. Thinnings should be left on site. Ensure all dead and decaying wood is left in place.	November/December
Years 30+	Minimal intervention is most likely to be beneficial in areas of established / mature woodland with existing variety of structure and relatively intact natural processes in operation. These conditions are most often found in wet woodlands, where a high-water table accelerates decay processes and structural change. Wetter areas can be set aside for minimal intervention, while other sections of the woodland receive more active management, if required.	

Monitoring

The Defra Metric Technical Supplement sets out the expected time to good condition for different habitats and also the time by which those habitats are expected to transition from poor to moderate and then on to good. For woodland, this is as follows:

Biodiversity Net Gain Calculator (January 2023)

Habitat Description	Distinctiveness	Difficulty of		Time (years) to target condition for habitat creation						
		Creation	Enhancement	Good	Fairly Good	Moderate	Fairly Poor	Poor	N/A - Agricultural	N/A - Other
Woodland and forest - Wet woodland	High	Medium	Medium	30+	30	15	10	5	-	-

The wet woodland will be monitored with the aim of working out whether it is on track to meet the target conditions as set out above and if it is not, what management work needs to be undertaken to ensure that the targets are met.

Monitoring will involve undertaking a [Woodland Wildlife Toolkit Woodland Condition Assessment](#) using the [BNG Woodland Condition Assessment Criteria](#) survey forms. In each survey year, the condition assessment must be carried out twice. This should be in:

- early spring before ground vegetation covers up features like dead wood
- summer when trees are in leaf and ground vegetation is present so you can see features like evidence of wild animals browsing.

Monitoring will be undertaken in Years 3, 5, 7, 10, 12, 15, 20, 25 and 30.

At Appendix A Condition Assessment Scores, the 'Wet Woodland' tab allows the input of scores for each condition indicator in each monitoring year as follows:

Biodiversity Net Gain Calculator (January 2023)

Indicator	Good (3 points)	Moderate (2 points)	Poor (1 point)	Scores for Each Monitoring Year								
				Year 3	Year 5	Year 7	Year 10	Year 12	Year 15	Year 30	Year 30+	
Age distribution of trees	Three age classes present	Two age classes present	One age class present									
Herbivore damage	No significant browsing damage evident	Evidence of significant browsing pressure in 40% or less of whole woodland	Evidence of significant browsing pressure in 40% or more of whole woodland									
Invasive plant species	None present	Rhododendron or laurel not present, other invasive species <10% cover	Rhododendron or laurel not present, other invasive species >10% cover									
Number of native tree or shrub species	Five or more	Three to four	None to two									
Cover of native tree and shrub species	>80% of canopy trees and >80% of understorey shrubs are native	50-80% of canopy trees and 50-80% of understorey shrubs are native	<50% of canopy trees and <50% of understorey shrubs are native									
Open space within woodland	10-20% of woodland area has temporary open space unless woodland is <10ha.	21-40% of woodland has temporary open space.	More than 40% of woodland has areas of temporary open space									

Biodiversity Net Gain Calculator (January 2023)

Woodland regeneration	All three classes present in woodland; trees 4-7cm dbh, saplings and seedlings or advanced coppice regrowth	One or two classes only present in woodland	No classes or coppice regrowth present in woodland								
Tree health	Tree mortality less than 10%, no pests or diseases and no crown dieback	11% to 25% mortality and/or crown dieback or low risk pest or disease present	Greater than 25% tree mortality and or any high risk pest or disease present								
Vegetation and ground flora	Ancient woodland flora indicators present	Recognisable NVC plant community present	No recognisable NVC community								
Woodland vertical structure	Three or more storeys across all survey plots or a complex woodland	Two storeys across all survey plots	One or less storey across all survey plots								
Veteran trees	Two or more veteran trees per hectare	One veteran tree per hectare	No veteran trees present in woodland								
Amount of deadwood	50% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps	Between 25% and 50% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps	Less than 25% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps								

Biodiversity Net Gain Calculator (January 2023)

Woodland disturbance	No nutrient enrichment or damaged ground evident	Less than 1 hectare in total of nutrient enrichment across woodland area and/or less than 20% of woodland area has damaged ground	More than 1 hectare of nutrient enrichment and/or more than 20% of woodland area has damaged ground								
Project Scores											
Defra Metric Target Score				24	<26	25	25	28	26-32	32	>32
Condition Assessment Result (Defra Metric Target Result)				N/A	Poor	N/A	Fairly Poor	N/A	Moderate	Fairly Good	Good

Footnote 1 - See EWBG method INDICATOR 1 for more information. If tree species is not a birch, cherry or Sorbus: 0 – 20 years (Young); 21 - 150 years (Intermediate); and >150 years (Old). A recognisable age class should be a consistent recognisable layer across the woodland or stand being assessed. Presence of a few saplings would not indicate that the woodland has an 'age class' of young trees.

Footnote 2 - See EWBG method INDICATOR 2 for more information. Browsing pressure is considered to be significant where >20% of vegetation visible within each survey plot shows damage from any type of browsing pressure listed.

Footnote 3 - See EWBG method INDICATOR 3 for more information. Check for presence of the following invasive non-native species: American skunk cabbage *Lysichiton americanus*; Himalayan balsam *Impatiens glandulifera*; Japanese knotweed *Fallopia japonica*; Cherry Laurel *Prunus laurocerasus*; Shalton *Gaultheria shallon*; Snowberry *Symphoricarpos albus*; Variegated yellow archangel *Lamiastrum galeobdolon* subsp. *argentatum*; and Rhododendron *Rhododendron ponticum*.

Footnote 4 - See EWBG method INDICATOR 6 for more information. Open space within woodland in this context is temporary open space in which trees can be expected to regenerate (e.g. glades, rides, footpaths, areas of clear-fell). This differs from permanent open space where tree regeneration is not possible or desirable (e.g. tarmac, buildings, rivers). Area is at least 10m wide with less than 20% covered by shrubs or trees.

Footnote 5 - See EWBG method INDICATOR 8 for more information. This indicator measures regeneration potential of the woodland by considering three classes: seedlings; saplings; and young trees of 4-7 cm DBH. All three classes would fall in the 'young' category of the 'age distribution of trees' indicator, the regeneration indicator is gathers additional information by considering regeneration potential i.e. if seedlings, saplings and young trees are all present that means natural regeneration processes are happening.

Footnote 6 - This indicator is looking at structural diversity and is useful to understand in conjunction with the age of trees in a woodland. Vertical structure is defined as the number of canopy storeys present. Possible storey values are: 1) Upper; 2) Complex: recorded when the stand is composed of multiple tree heights that cannot easily be stratified into broad height bands (such as upper, middle or lower); 3) Middle; 4) Lower; and 5) Shrub layer.

Footnote 7- See EWBG method INDICATOR 12 for more information. All ancient trees are veteran trees, but not all veteran trees are ancient. A veteran tree may not be very old, but it has decay features, such as branch death and hollowing. These features contribute to its biodiversity, cultural and heritage value. Veteran trees can be classified if they have four out of the five following features: 1. Rot sites associated with wounds which are decaying >400 cm² ; 2. Holes and water pockets in the trunk and mature crown >5 cm diameter; 3. Dead branches or stems >15 cm diameter; 4. Any hollowing in the trunk or major limbs; 5. Fruit bodies of fungi known to cause wood decay. **Footnote 8** - See EWBG method INDICATOR 15 for more information. Examples of disturbance are: significant nutrient enrichment; soil compaction from trampling, machinery or animal poaching; litter

Reporting

Reports will be submitted to the Environment Agency and Local Planning Authority in each of the monitoring years set out above or as otherwise required by the LPA in their determination of the planning application.

Monitoring and Management Reports will include:

- completed condition survey assessment sheets and photographs
- a brief narrative explaining how the woodland is developing in relation to the target condition
- details of any proposed adaptations that might be required to the woodland management plan in order to meet the target condition

Response to Recommendations

Upon receipt of the Monitoring and Management Reports, the Environment Agency and/or the Local Planning Authority may provide feedback and make recommendations for additional or alternative management activities that they deem necessary for the habitat to develop as required under the Defra Metric 3.1. These will be discussed and agreed with the landowner/land manager before being incorporated into the management plan.

REEDBED CREATION, MANAGEMENT, MONITORING AND REPORTING

Definition (see UK Hab)

Reedbeds are wetlands dominated by stands of the Common Reed *Phragmites australis*, with the water table at or above ground level for most of the year. Reedbeds tend to incorporate areas of open water and ditches, and small areas of wet grassland and carr woodland may be associated with them. Reedbeds may be differentiated from aquatic marginal vegetation by the presence of a wider range of species in the latter.

Reedbed Creation (list compiled with reference '[How to Create and Manage Reedbeds](#)' Sussex Wildlife Trust)

An adequate water supply at key times of year is essential for a reedbed. Reeds can cope with water levels which vary through the year. Dry periods allow for management and maintenance if required, and encourage the oxidation of plant litter, making nutrients available and prolonging the life of the reedbed. The reedbed should ideally be created so that once established, it is 60-80% reeds and includes 10-15% open water to optimise its value for a range of fauna.

The site will have:

- A reliable natural water supply with up to 300+ mm of water depth in spring
- Sufficient low-level ground or ground with very shallow gradients
- Access as required for management such as harvesting, cutting, stock grazing and land forming

On many naturally wet sites there will be a minimal need for land forming. Reeds will naturally recolonise the lowest areas of floodplain or wetlands. However:

- where land levels are too uniform/ flat or they are naturally too high, allow for the reprofiling of land levels to create the desired shape, micro topography and open water networks. NOTE: If land forming within 8m of a main river, you may require consent from the Environment Agency. Land forming must not compromise flood movement or storage.

Options for establishing reeds:

- **Natural expansion** is the simplest and cheapest option for establishing reed — a naturally developing reedbed is often more beneficial to wildlife. Reed will automatically establish once water levels are suitable and / or grazing and mowing management is ceased. Shallow flooding of low-lying land with an existing reed resource, e.g., ditches, provides an ideal source from which reed can spread naturally. Expansion rates vary and are affected by temperature, soil type, grazing, birds, landform and water depth.
- **Planting** should be used to establish reeds if there is no local source from which reed is likely to spread naturally. Use one or a combination of the following planting options:

Pot Grown Seedlings

- 110cc plug plants
- Plants to be of local provenance and free of invasive species
- 4 plants/m²
- Notch planting
- Plant when water levels are between 1 and 5cm above ground level.
- Plant in June
- Focus the planting in areas with relatively stable water levels, from which the reed can naturally spread out

On the basis of the specification above, for a 0.5ha site, assume that 0.15ha will be planted (6,000 plugs) and a mosaic of 0.35ha within the planted areas will be left as a combination of open water and an area for the reeds to expand.

Pre-planted Coir Fibre Pallets

- 2m x 1m pre-established coir pallets, 40-50mm depth
- 18 plants/m²
- Plants to be of local provenance and pallets free of invasive species
- Pallets shall be established for at least one growing season (March – Oct)
- All pallets should be unloaded and laid out within 24 hours of delivery and kept wet at all times.
- Plant when water levels are between 1 and 5cm above ground level.
- Plant in June
- Peg as per supplier's instructions.

On the basis of the specification above, for a 0.5ha site, assume that 0.15ha will be planted (750 pallets) and a mosaic of 0.35ha within the planted areas will be left as a combination of open water and an area for the reeds to expand.

Protection

Wildfowl/livestock fencing should be considered where there is a risk of grazing or trampling during the initial vegetation establishment period. Fencing should be appropriately designed to account for any water flow, with a mesh aperture that is specific to the type of waterfowl or livestock that is being excluded.

Management

Once established, the reedbed may benefit from rotational cutting, grazing or management each year or periodically, to:

- maintain a mosaic of vegetation at different stages of growth
- prevent too much decomposition, litter build-up and nutrient enrichment
- increase structure and diversity
- prevent the invasion of too much scrub and eventual natural succession to carr/wet woodland.

The reeds may be managed by seasonal grazing, through machine cutting or by hand cutting and removing different areas of reeds on a 4–7-year rotation, but this will depend on the habitat context and the ability to manipulate water levels, which will vary from site to site. Cutting should take place in the winter (December–February) and water draw down to ground level or below may be required if possible, to enable access.

Managing the water table, where feasible, to allow seasonal flooding of vegetation can help control growth of specific plants. Seasonal drying (preferably natural) also helps reed litter to break down and keep the reedbed wetter in the long term.

Some natural succession should be allowed to occur (<2%), with patches of scrub and wet wood in drier areas providing niche habitats for more species.

It may be necessary to use heavy plant every 4-7 years to create and maintain areas of open water.

If clearing reeds, be aware that storing cut reeds on site can cause localised nutrient enrichment and decreased plant diversity/water quality. Where possible, reeds should be composted off-site or, if suitable, cut and used for thatching

This is an outline management plan only. Management activities and the management plan will need to be developed and adapted in response to the selected site and monitoring results.

Duration	Reedbed Management Activity	Timing
Years 1-5	Check integrity of fencing and repair as required to prevent damage by wildfowl and livestock. Check for, remove and legally dispose of all invasive and injurious weeds. Undertake scrub control through root removal of saplings.	Allow 6 visits per year carried out from May – October (30 visits in total)
	Undertake annual plant inspection and replacement survey	Early June (5 surveys in total)
	Replace losses >5% each year	June
Years 6-10	Check for, remove and legally dispose of all invasive and injurious weeds.	As required throughout this period to eliminate all invasive plants.
	Undertake scrub control through coppicing or root removal.	Allow a maximum of 2% scrub to develop
	Remove fencing if or when no longer serving a purpose.	As required
	Check that water levels are within the range of tolerance for reed survival and growth and take steps to adjust water levels if possible, as necessary.	As required throughout this period to ensure that the reedbed thrives
Years 10-15	Check for, remove and legally dispose of all invasive and injurious weeds.	As required throughout this period to eliminate all invasive plants.
	Undertake scrub control through coppicing or root removal of scrub.	Allow a maximum of 2% scrub to develop
	Allow for cutting or grazing different sections of the reedbed each year, rotating the areas that are cut on a 4-7 year basis. Remove arisings off site. Draw-down water levels as necessary in order to gain access.	December - February
Years 15-30+	Check for, remove and legally dispose of all invasive and injurious weeds.	As required throughout this period to eliminate all invasive plants.
	Undertake scrub control through coppicing or root removal of scrub.	Allow a maximum of 2% scrub to develop
	Allow for cutting or grazing different sections of the reedbed each year, rotating the areas that are cut on a 4–7-year basis. Remove arisings off site. Draw-down water levels as necessary to gain access.	December - February

Monitoring

The Defra Metric Technical Supplement sets out the expected time to good condition for different habitats and the time by which those habitats are expected to transition from poor to moderate and then on to good. For reedbed, this is as follows:

Biodiversity Net Gain Calculator (January 2023)

Habitat Description	Distinctiveness	Difficulty of		Time (years) to target condition for habitat creation						
		Creation	Enhancement	Good	Fairly Good	Moderate	Fairly Poor	Poor	Condition Assessment	N/A - Other
Wetland - Reedbeds	High	Medium	Medium	12	10	7	5	3	-	-

The reedbed will be monitored with the aim of working out whether it is on track to meet the target conditions as set out above and if it is not, what management work needs to be undertaken to ensure that the targets are met.

Monitoring will involve undertaking a Reedbed Condition Assessment using the Defra 3.1 criteria and Annex 2 Condition Assessment Proforma. In each survey year, the condition assessment must be carried out once during the summer.

Monitoring will be undertaken in Years 3, 5, 7, 10, 12, 15, 20, 25 and 30.

At Appendix A Condition Assessment Scores, the 'Reedbed' tab allows the input of scores for each condition indicator in each monitoring year.

Condition Assessment Criteria		Year				
		3	5	7	10	12
Core Criteria- Applicable to all wetland habitats						
1	The water table is at or near the surface throughout the year, this could be open water or saturation of soil at the surface. There is no artificial drainage, unless specifically to maintain water levels as specified above. NB - this criterion is essential for achieving good condition.					
2	The appearance and composition of the vegetation closely matches characteristics of the specific wetland habitat type (see UKHab definition linked above). Indicator species for the specific wetland habitat type ¹ are very clearly and easily visible.					
3	The water supplies (groundwater, surface water and/or rainwater) to the wetland are of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution					
4	Cover of scrub and scattered trees less than 10%.					
5	Cover of bare ground less than 5%.					
6	There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981) and species indicative of sub-optimal condition ¹ make up less than 5% of ground cover					
Additional criterion for Reedbed						
7c	The reedbed has a diverse structure with between 60 and 80% reeds. Other areas may include open water (at least 10%), species-rich fen and/or wet woodland.					

Project Scores					
Defra Metric Target Score	0 to 3	3 to 4	4 to 6*	5 to 6	6 to 7
Defra Metric Target Condition	Poor	Fairly Poor	Moderate	Fairly Good	Good
If 7 criteria assessed:				Good (6/7)	
<ul style="list-style-type: none"> • Passes 5 or 6 of 6 core criteria, INCLUDING essential core criterion 1; AND • Passes additional criterion 7a, 7b, 7c OR 7d where applicable 					

Biodiversity Net Gain Calculator (January 2023)

<ul style="list-style-type: none">• Passes 4 or 5 of 7 criteria; OR• *Passes 6 of 7 criteria EXCLUDING either essential core criterion 1 or additional criterion 7a, 7b, 7c OR 7d		Moderate
<ul style="list-style-type: none">• Passes 0, 1, 2 or 3 of 7 criteria		Poor

Reporting

Reports will be submitted to the Environment Agency and Local Planning Authority in each of the monitoring years set out above or as otherwise required by the LPA in their determination of the planning application.

Monitoring and Management Reports will include:

- completed condition survey assessment sheets and photographs
- a brief narrative explaining how the reedbed is developing in relation to the target condition
- details of any proposed adaptations that might be required to the woodland management plan in order to meet the target condition

Response to Recommendations

Upon receipt of the Monitoring and Management Reports, the Environment Agency and/or the Local Planning Authority may provide feedback and make recommendations for additional or alternative management activities that they deem necessary for the habitat to develop as required under the Defra Metric 3.1. These will be discussed and agreed with the landowner/land manager before being incorporated into the management plan.

SPECIES-RICH HEDGEROW WITH TREES: CREATION, MANAGEMENT, MONITORING AND REPORTING

Definition (taken from Defra 3.1 Technical Supplement)

A line of woody hedgerow plants that have some or all of their leafy canopies less than 2m in height from the ground. The shrubby component must be less than 5m wide at the base. The hedgerow must be more than 20m of continuous vegetation and have a distinct Line of trees extending above it, the tree canopies being closer than 20m, so that the woody linear feature as a whole appears as a 'shrubby layer plus lollipops'. Where the structural species making up the 30m section of hedgerow include at least five (or at least four in northern and eastern England, upland Wales and Scotland) woody species that are either native to the UK, or which are archaeophytes (see Appendix 11 of the Hedgerow Survey Handbook), the hedgerow is defined as species-rich. Climbers and bramble do not count towards the total except for roses.

Hedgerow Creation

- Provide connecting hedges between existing hedgerows and/or woodland areas if possible.
- Look at the species mix in existing, mature or ancient native hedgerows that are local to the site and use this as a guide to the range of native species and percentage of each species that will be appropriate.
- Prepare the ground along a 1.5m wide strip to provide good soil conditions and as little competition from other vegetation as possible
- Apply herbicide to the 1.5m strip in the August or September prior to planting only
- Use 2-year-old transplants at least 40-60cm in height for hedgerow stock
- Use 180cm to 220cm feathered trees for tree stock
- Use a mix of native hedgerow species, with no one species making up more than 70% of the total
- Plant in a staggered double row 40 centimetres (cm) apart with a minimum of 6 plants per metre
- Plant trees within the double-staggered row at varying intervals within a range of 5-30m
- Carry out planting between 1 November and 28 February
- Protect young plants with tree shelters or fencing as appropriate to prevent any herbivore damage.
- Keep the plants clear of weeds until they are established

Hedgerow Management

This is an outline management plan only. Management activities and the management plan will need to be developed and adapted in response to the selected site and monitoring results.

Duration	Hedgerow Management Activity	Timing
Years 1-5	Keep the hedgerow plants clear of tall, competing vegetation by weeding and cutting back. Check the integrity of tree protection (fencing/guards) and repair as required to prevent damage by herbivores. Check for, remove and legally dispose of all neophyte, invasive and injurious weeds.	Allow 6 visits per year carried out from May – October (30 visits in total)
	Undertake annual plant inspection and replacement survey	August/September (5 surveys in total)
	Replace losses each year	November/December

Years 6-10	Check for, remove and legally dispose of all neophyte, invasive and injurious weeds.	As required throughout this period to eliminate all invasive plants.
	Trim the hedge in Year 6 to encourage bushy growth. At each subsequent cut, increase the height and width of each cut until 1/5m high. Take care not to damage hedgerow trees.	Annual cut in late winter
	Once the hedge has reached at least 1.5m in height, cut one year in three to maintain at the preferred height >1.5m and width >1.5m.	One year in three in late winter.
	Remove guards/fencing and tree stakes and ties if or when no longer serving a purpose.	As required.
Years 10-30+	Check for, remove and legally dispose of all neophyte, invasive and injurious weeds.	As required throughout this period to eliminate all invasive plants.
	Cut one year in three to maintain at the preferred height >1.5m and width >1.5m.	One year in three in late winter.

Monitoring

The Defra Metric Technical Supplement sets out the expected time to good condition for different habitats and also the time by which those habitats are expected to transition from poor to moderate and then on to good. For native species-rich hedgerow with trees, this is as follows:

Hedgerow type	Distinctiveness	Creation - Years to Target Condition		
		Poor	Moderate	Good
Native species rich hedgerow with trees with trees	High	1	10	20

The hedgerow will be monitored with the aim of working out whether it is on track to meet the target conditions as set out above and if it is not, what management work needs to be undertaken to ensure that the targets are met.

Monitoring will involve undertaking a Hedgerow Condition Assessment using the Defra 3.1 criteria and Annex 2 Condition Assessment Proforma. Reference should also be made to the [Hedgerow Survey Handbook](#).

Monitoring will be undertaken in Years 3, 5, 7, 10, 12, 15, 20, 25 and 30.

At Appendix A Condition Assessment Scores, the 'Hedgerow' tab allows the input of scores for each condition indicator in each monitoring year as follows.

Condition Assessment Criteria			Year								
Core Criteria- Applicable to all hedgerow types			3	5	7	10	12	15	20	25	30
A1. Height	>1.5m 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	>1.5m 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 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)									
C1. Undisturbed ground and perennial vegetation	>1 m width of undisturbed ground with perennial herbaceous vegetation for >90% of length: · measured from outer edge of hedgerow, and · is present on one side of the hedge (at least)	This is the level of disturbance (excluding wildlife disturbance) at the base of the hedge. Undisturbed ground should be present for at least 90% of the hedgerow length, greater than 1m in width and must be present along at least one side of the hedge. This criterion recognises the value of the hedge base as a boundary habitat with the capacity to support a wide range of species. Cultivation, heavily trodden footpaths, poached ground etc. can limit available habitat niches.									

C2. Nutrient-enriched perennial vegetation	Plant species indicative of nutrient enrichment of soils dominate	The indicator species used are nettles (<i>Urtica</i> spp.), cleavers (<i>Galium aparine</i>) and docks (<i>Rumex</i> spp.). Their presence, either singly or together, 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).									
E1. Tree age	At least one mature tree per 30m stretch of hedgerow. A mature tree is one that is at least 2/3 expected fully mature height for the species.	This criterion addresses if there are sufficient mature trees (within the scope of planning timescales) which are of higher value to biodiversity.									

E2. Tree health	At least 95% of hedgerow trees are in a healthy condition (excluding veteran features valuable for wildlife). There is little or no evidence of an adverse impact on tree health by damage from livestock or wild animals, pests or diseases, or human activity.	This criterion identifies if the trees are subject to damage which compromises the survival and health of the individual specimens.										
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Project Scores							
Defra Metric Target Score	0 to 4			4 to 6			7 to 9
Defra Metric Target Condition	Poor			Moderate			Good

No more than 2 failures in total; AND No more than 1 failure in any functional group.	Good
No more than 5 failures in total; AND Does not fail both attributes in more than one functional group.	Moderate
Fails a total of more than 5 attributes; OR Fails both attributes in more than one functional group.	Poor

Reporting

Reports will be submitted to the Environment Agency and Local Planning Authority in each of the monitoring years set out above.

Monitoring and Management Reports will include:

- completed condition survey assessment sheets and photographs
- a brief narrative explaining how the hedgerow is developing in relation to the target condition
- details of any proposed adaptations that might be required to the hedgerow management plan in order to meet the target condition

Response to Recommendations

Upon receipt of the Monitoring and Management Reports, the Environment Agency and/or the Local Planning Authority may provide feedback and make recommendations for additional or alternative management activities that they deem necessary for the habitat to develop as required under the Defra Metric 3.1. These will be discussed and agreed with the landowner/land manager before being incorporated into the management plan.

DITCH ENHANCEMENT, MANAGEMENT, MONITORING AND REPORTING

Definition (taken from Defra 3.1 Technical Supplement)

Artificially created, linear water conveyancing features that are less than 5 m wide and likely to retain water for more than 4 months of the year. Their hydraulic function is primarily for land drainage, and although partially or fully connected to a river system, they would not have been present without human intervention' [Note: some heavily engineered ditches may be part of the river system (usually part of the headwater system). If there is uncertainty, consult historic maps, LIDAR data and riverine specialists]

Ditch Enhancement (with reference to Gov.uk Create and Manage Ditches for Wildlife)

We are aiming to enhance a ditch so that it changes from being in poor/moderate condition to being in good condition. The initial work that may be required:

- Clear scrub from the banks or cut back overhanging vegetation so that no more than 10% is heavily shaded. Leave occasional trees/bushes along the banks to provide some shade.
- If required, re-profile the ditch banks to create shallow sloping ditch sides. This will provide a range of water depths for different plants and animals.
- Dig out silt on rotation as required between 1 September and 1 April, to maintain the movement and depth of water, but do not deepen the ditch as this can change water levels in surrounding wetlands depending on soil permeability and avoid working on more than a third of the ditch system at any one time to conserve conditions for a range of fauna and flora.
- Deposit the silt in a strip a few metres wide alongside the ditch bank. Spread thinly to allow the existing vegetation to grow back through, or spread spoil from ditches on agricultural land where soil improvement is required (not in areas with wildflowers).
- Mow a percentage of the ditch banks to prevent the establishment of scrub on a rotational basis; undertake any mowing between 1 September and 1 April to avoid disturbing nesting wildlife. Cut no shorter than 10cm.
- Check for, remove and legally dispose of all invasive and injurious weeds. If Japanese Knotweed is present, then prepare a management plan if required.
- Undertake any work required to improve water quality in the ditch such as steps to prevent manure, fertiliser or soil getting into the water. This may involve creating and managing grass strips between the ditch and arable land or reducing livestock density/fencing-off livestock to prevent excessive bank poaching.
- If natural regeneration of native marginal vegetation is unlikely to occur because seed/vegetative sources are in short supply, then allow for installing pre-planted coir rolls in areas of bank reprofiling or in areas where scrub has been removed.
- 200mm x 3m coir rolls pre-planted with native marginal species
 - Plants to be of local provenance and pallets free of invasive species
 - Rolls shall come established for at least one growing season (March – Oct)
 - All rolls should be unloaded and laid out within 24 hours of delivery and kept wet at all times.
 - Plant in areas where water levels are between 1 and 5cm above ground level.
 - Plant in June
 - Peg as per supplier's instructions

Ditch Management

This is an outline management plan only. Management activities and the management plan will need to be developed and adapted in response to the selected site and monitoring results.

Duration	Ditch Management Activity	Timing
Years 1-5	Check for, remove and legally dispose of all invasive and injurious weeds.	Allow 6 visits per year carried out from May – October (30 visits in total)
	Mow a percentage of the ditch banks on rotation each year	1 September – 1 April (5 visits in total)
	Check coir rolls and re-peg if required. Replace any plant failures >2%.	May/June (5 visits in total)
	Remove silt as required from sections of the ditch on different rotations. Leave each cleared section for at least 3 years before managing again.	1 Sept-1 April As required to provide conditions for a range of wildlife.
	Check water levels and undertake works to maintain them if necessary.	As required to ensure that sufficient water levels are maintained.
	Check water quality and undertake works to improve water quality if necessary.	As required to ensure sufficient water quality.
Years 6-30+	Check for, remove and legally dispose of all invasive and injurious weeds.	As required throughout this period to eliminate all invasive plants.
	Remove silt from sections of the ditch on different rotations. Leave each cleared section for at least 3 years before managing again.	1 Sept-1 April As required to provide conditions for a range of wildlife.
	Check water levels and undertake works to maintain them as required.	As required to ensure that sufficient water levels are maintained.
	Check water quality and undertake works to improve water quality if necessary.	As required to ensure sufficient water quality.
	Mow a percentage of the ditch banks on rotation each year	1 September – 1 April (25 visits in total)
	Clear scrub from the banks or cut back overhanging vegetation.	As required to ensure that no more than 10% of the ditch is heavily shaded.

Monitoring

The Defra Metric Technical Supplement sets out the expected time to good condition for different habitats when they are created or enhanced and also the time by which those habitats are expected to transition from poor to moderate and then on to good. For ditches that are starting with a baseline of Fairly Poor/Moderate, they are expected to reach Moderate condition in Year 1, Fairly Good Condition in Year 2, and Good Condition in Year 4.

The ditch/ditches will be monitored with the aim of working out whether they are on track to meet the target conditions as set out above and if not, what management work needs to be undertaken to ensure that the targets are met.

Biodiversity Net Gain Calculator (January 2023)

Monitoring will involve undertaking a Ditch Condition Assessment using the Defra 3.1 criteria and Annex 2 Condition Assessment Proforma.

Monitoring will be undertaken in Years 1, 2, 3, 4, 5, 10, 15, 20, 25 and 30 or as otherwise required by the LPA in their determination of the planning application.

At Appendix A Condition Assessment Scores, the 'Ditch tab allows the input of scores for each condition indicator in each monitoring year as follows.

Biodiversity Net Gain Calculator (January 2023)

Condition Assessment Criteria		Year									
		1	2	3	4	5	10	15	20	25	30
1	The ditch is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution.										
2	A range of emergent, submerged and floating leaved plants are present. As a guide >10 species of emergent, floating or submerged plants in a 20 m ditch length.										
3	There is less than 10% cover of filamentous algae and/or duckweed (these are signs of eutrophication).										
4	A fringe of marginal vegetation is present along more than 75% of the ditch.										
5	Physical damage evident along less than 5% of the ditch, such as excessive poaching, damage from machinery use or storage, or any other damaging management activities.										
6	Sufficient water levels are maintained; as a guide a minimum summer depth of approximately 50 cm in minor ditches and 1 m in main drains										
7	Less than 10% of the ditch is heavily shaded.										
8	There is an absence of non-native plant and animal species.										
Project Scores											
Defra Metric Target Score		6 or 7	7	7	8	8	8	8	8	8	8
Defra Metric Target Condition		Poor	Fairly Good	Fairly Good	Good	Good	Good	Good	Good	Good	Good

Passes 8 of 8 criteria	Good
Passes 6, or 7 of 8 criteria	Moderate
Passes 0,1,2,3,4 or 5 of 8 criteria	Poor

Reporting

Reports will be submitted to the Environment Agency and Local Planning Authority in each of the monitoring years set out above.

Monitoring and Management Reports will include:

- completed condition survey assessment sheets and photographs
- a brief narrative explaining how the ditches are developing in relation to the target condition
- details of any proposed adaptations that might be required to the ditch management plan in order to meet the target condition

Response to Recommendations

Upon receipt of the Monitoring and Management Reports, the Environment Agency and/or the Local Planning Authority may provide feedback and make recommendations for additional or alternative management activities that they deem necessary for the habitat to develop as required under the Defra Metric 3.1. These will be discussed and agreed with the landowner/land manager before being incorporated into the management plan.

OTHER NEUTRAL GRASSLAND CREATION, MANAGEMENT, MONITORING AND REPORTING

Definition (see UK Hab)

Neutral grassland that does not meet the definition of either g3a or g3b. Perennial Rye-grass *Lolium perenne* is likely to be present at <30% with between 9 and 15 further species (m²) also present. Many of the more species rich swards that were previously described as 'semi-improved neutral grassland' will fall here, together with rank and unmanaged swards on neutral soils.

Other Neutral Grassland Creation

- Investigate soil fertility, structure and water levels.
- Check the existing seedbank to see which, if any, grassland species are already present.
- Using the site investigation results, choose an appropriate meadow seed mixture to sow. The seed mix should be locally harvested if possible.
- Ensure existing fences are stock-proof or if the field is unfenced, erect fence and gates as per fencing specification.
- Sow seed in March/April in accordance with the seed merchants' recommendations.

Other Neutral Grassland Management

This is an outline management plan only. Management activities and the management plan will need to be developed and adapted in response to the selected site and monitoring results.

Duration	Grassland Management Activity	Timing
Years 1-30+	Check for, remove and legally dispose of all invasive and injurious weeds.	As required throughout this period to eliminate all invasive plants.
	Cut the grassland for hay in early July. Turn and dry over 3-5 days, bale and remove from site.	July (5 visits in total)
	Graze with sheep or cattle from July to October (and into the winter if the ground is not too wet). Graze the sward to no less than 3cm.	July-October (annual grazing)
	Check and repair fencing to ensure that it remains stockproof.	As required throughout.

Monitoring

The Defra Metric Technical Supplement sets out the expected time to good condition for different habitats when they are created or enhanced and also the time by which those habitats are expected to transition from poor to moderate and then on to good. For newly created Other Neutral Grassland, it is expected to reach Moderate condition in Year 5, Fairly Good Condition in Year 7, and Good Condition in Year 10.

The grassland will be monitored with the aim of working out whether it is on track to meet the target conditions as set out above and if not, what management work needs to be undertaken to ensure that the targets are met.

Monitoring will involve undertaking a Grassland (Medium, High and Very High Distinctiveness) Condition Assessment using the Defra 3.1 criteria and Annex 2 Condition Assessment Proforma.

Biodiversity Net Gain Calculator (January 2023)

Monitoring will be undertaken in Years 1, 2, 3, 4, 5, 10, 15, 20, 25 and 30 or as otherwise required by the LPA in their determination of the planning application.

At Appendix A Condition Assessment Scores, the 'ONG' tab allows the input of scores for each condition indicator in each monitoring year as follows.

Biodiversity Net Gain Calculator (January 2023)

Condition Assessment Criteria		Year									
		1	2	3	4	5	10	15	20	25	30
1	The appearance and composition of the vegetation closely matches characteristics of the specific grassland habitat type (see UKHab definition). Wildflowers, sedges and indicator species for the specific grassland habitat type are very clearly and easily visible throughout the sward. NB - This criterion is essential for achieving moderate condition for nonacid grassland types only..										
2	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.										
3	Cover of bare ground is between 1% and 5%, including localised areas, for example, rabbit warrens.										
4	Cover of bracken is less than 20% and cover of scrub (including bramble) is less than 5%.										
5	There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981). Combined cover of species indicative of sub-optimal condition ¹ and physical damage (such as excessive poaching, damage from machinery use or storage, damaging levels of access, or any other damaging management activities) accounts for less than 5% of total area.										

Biodiversity Net Gain Calculator (January 2023)

6	There are greater than 9 species per metre squared. NB - This criterion is essential for achieving good condition (non-acid grassland types only).										
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Project Scores										
Defra Metric Target Score	0 to 4	0 to 4	2 to 4	2 to 4	3 or 4	5+	5+	5+	5+	5+
Defra Metric Target Condition	Poor	Poor	Fairly Poor	Fairly Poor	Moderate	Good	Good	Good	Good	Good

Passes 5 of 6 criteria, including essential criterion 1 and 6		Good
Passes 3 or 4 of 6 criteria, including essential criterion 1.		Moderate
Passes 0, 1, 2 criteria of 6 criteria; OR Passes 3 or 4 criteria excluding criterion 1 and 6		Poor

Reporting

Reports will be submitted to the Environment Agency and Local Planning Authority in each of the monitoring years set out above.

Monitoring and Management Reports will include:

- completed condition survey assessment sheets and photographs
- a brief narrative explaining how the grassland is developing in relation to the target condition
- details of any proposed adaptations that might be required to the grassland management plan in order to meet the target condition

Response to Recommendations

Upon receipt of the Monitoring and Management Reports, the Environment Agency and/or the Local Planning Authority may provide feedback and make recommendations for additional or alternative management activities that they deem necessary for the habitat to develop as required under the Defra Metric 3.1. These will be discussed and agreed with the landowner/land manager before being incorporated into the management plan.

FLOODPLAIN GRAZING MARSH CREATION, MANAGEMENT, MONITORING AND REPORTING

Definition (see UK Hab)

Grazing marsh is defined as periodically inundated pasture, or meadow with ditches which maintain the water levels, containing brackish or fresh water. Sites may contain seasonal water-filled hollows and permanent ponds with emergent swamp communities.

Floodplain Grazing Marsh Creation

- Investigate soil fertility, structure and water levels of the existing grassland.
- Undertake an NVC botanical survey of the existing grassland.
- Use existing sources of freshwater adjacent to the site to allow seasonal flooding at key times of the year.
- Check existing fences are stock-proof or if the field is unfenced, erect fence and gates as per fencing specification.

Floodplain Grazing Marsh Management

This is an outline management plan only. Management activities and the management plan will need to be developed and adapted in response to the selected site and monitoring results.

Duration	Grassland Management Activity	Timing
Years 1-30+	Check for, remove and legally dispose of all invasive and injurious weeds.	As required throughout this period to eliminate all invasive plants.
	Low level grazing with cattle typically from May to October (this will vary depending on the wetness of the season/year).	May-October (annual grazing)
	Check and repair fencing to ensure that it remains stockproof.	As required throughout.
	Manage water source and any associated ditches as per the ditch management plan.	As required to allow seasonal inundation.

Monitoring

The Defra Metric Technical Supplement sets out the expected time to good condition for different habitats when they are created or enhanced and also the time by which those habitats are expected to transition from poor to moderate and then on to good. For existing Modified Grassland that has been converted to Floodplain Grazing Marsh, it is expected to reach Moderate condition in Year 20, Fairly Good Condition in Year 25, and Good Condition in Year 30.

The floodplain grazing marsh will be monitored with the aim of working out whether it is on track to meet the target conditions as set out above and if not, what management work needs to be undertaken to ensure that the targets are met.

Monitoring will involve undertaking a Wetland Habitat Type Condition Assessment using the Defra 3.1 criteria and Annex 2 Condition Assessment Proforma.

Biodiversity Net Gain Calculator (January 2023)

Monitoring will be undertaken in Years 1, 2, 3, 4, 5, 10, 15, 20, 25 and 30 or as otherwise required by the LPA in their determination of the planning application.

At Appendix A Condition Assessment Scores, the 'Grazing Marsh' tab allows the input of scores for each condition indicator in each monitoring year as follows.

Biodiversity Net Gain Calculator (January 2023)

Condition Assessment Criteria		Year									
		1	2	3	4	5	10	15	20	25	30
1	The water table is at or near the surface throughout the year, this could be open water or saturation of soil at the surface. There is no artificial drainage, unless specifically to maintain water levels as specified above. NB - this criterion is essential for achieving good condition.										
2	The appearance and composition of the vegetation closely matches characteristics of the specific wetland habitat type (see UKHab definition linked above). Indicator species for the specific wetland habitat type1 are very clearly and easily visible.										
3	The water supplies (groundwater, surface water and/or rainwater) to the wetland are of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution										
4	Cover of scrub and scattered trees less than 10%.										
5	Cover of bare ground less than 5%.										
6	There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981) and species indicative of sub-optimal condition1 make up less than 5% of ground cover.										
7d	All ditches recorded within the habitat achieve Good condition as assessed using the Ditch condition sheet.										

Project Scores										
Defra Metric Target Score	0 to 3	0 to 3	0 to 3	0 to 3	0 to 3	3 to 4	3 to 4	4 to 5	5 or 6	6 or 7
Defra Metric Target Condition	Poor	Poor	Poor	Poor	Poor	Fairly Poor	Fairy Poor	Moderate	Fairly Good	Good

Biodiversity Net Gain Calculator (January 2023)

Passes 5 or 6 of 6 core criteria, INCLUDING essential core criterion 1; AND Passes additional criterion 7a, 7b, 7c OR 7d where applicable	Good
Passes 4 or 5 of 7 criteria; OR Passes 6 of 7 criteria EXCLUDING either essential core criterion 1 or additional criterion 7a, 7b, 7c OR 7d	Moderate
Passes 0, 1, 2 or 3 of 7 criteria	Poor

Reporting

Reports will be submitted to the Environment Agency and Local Planning Authority in each of the monitoring years set out above.

Monitoring and Management Reports will include:

- completed condition survey assessment sheets and photographs
- a brief narrative explaining how the grassland is developing in relation to the target condition
- details of any proposed adaptations that might be required to the grassland management plan in order to meet the target condition

Response to Recommendations

Upon receipt of the Monitoring and Management Reports, the Environment Agency and/or the Local Planning Authority may provide feedback and make recommendations for additional or alternative management activities that they deem necessary for the habitat to develop as required under the Defra Metric 3.1. These will be discussed and agreed with the landowner/land manager before being incorporated into the management plan.

Appendix D. Site Selection Criteria (Environment Agency, February 2023)

Oxford Flood Alleviation Scheme - Off-site Biodiversity Net Gain - Site Selection Criteria (Environment Agency, February 2023)

1. Proximity of the proposed site to the development site
2. Strategic significance of the proposed site
3. Ecological baseline
4. Landscape and heritage baseline
5. Existing land management philosophy and long-term ambition
6. Accessibility and visibility for the public

1. Proximity to the development site

There are both ecological and social drivers for off-site habitat to be provided close to where losses occur. For this reason, the Defra Biodiversity Metric penalises proposals where the off-site habitat is located at distance from the site of impact.

If the off-site habitat is delivered inside the same Local Planning Authority Area (LPA) or National Character Area (NCA) as the impact site, then there are no penalties. Off-site river or ditch works that are carried out within the same Water Framework Directive (WFD) waterbody do not incur a spatial penalty either. BNG will be provided as close to the site of impact as possible.



Figure 1. Local Planning Authority Boundary

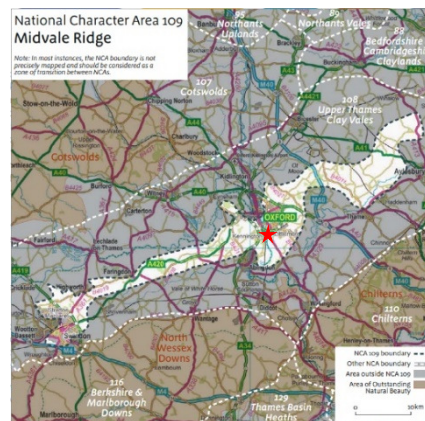


Figure 2. National Character Areas

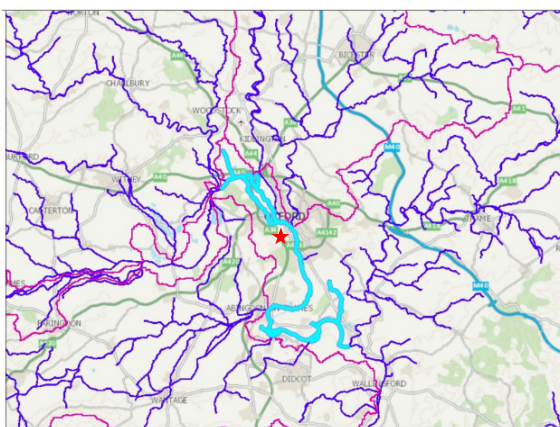


Figure 3. WFD Waterbody: Thames (Thame to Evenlode)

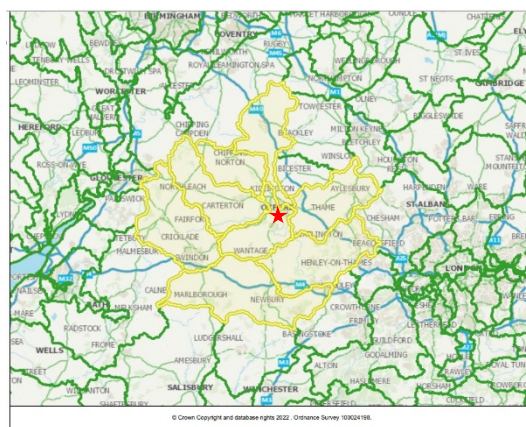


Figure 4. WFD Catchments

2. Strategic significance of the proposed site

Strategic significance utilises published local strategies and objectives to identify local priorities for targeting biodiversity and nature improvement, such as Local Nature Recovery Strategies, local biodiversity plans, National Character Areas objectives, Local Ecological Networks etc.

Figures 5 and 6 below illustrate the strategies that are relevant to the delivery of BNG for the Oxford FAS.

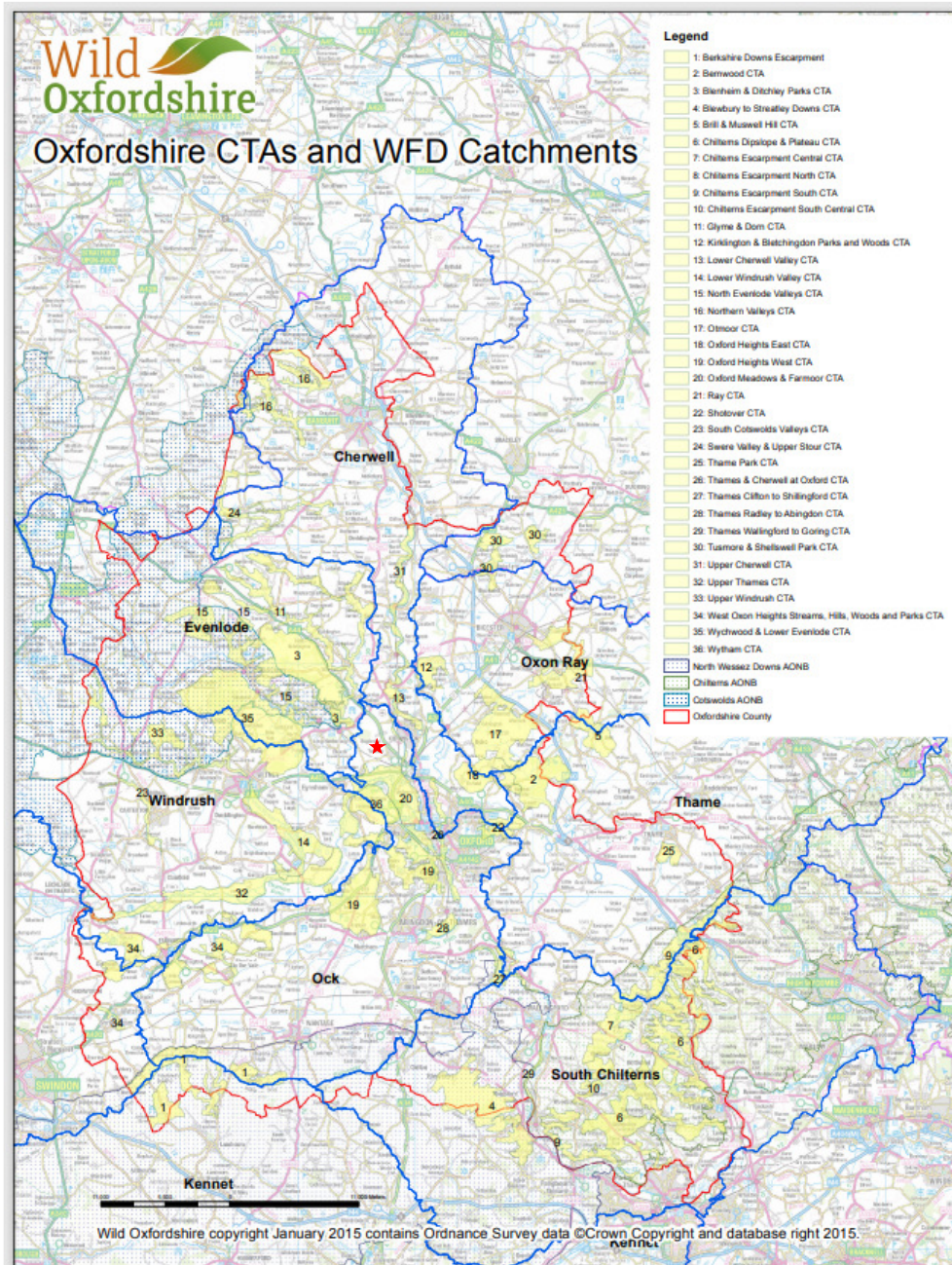
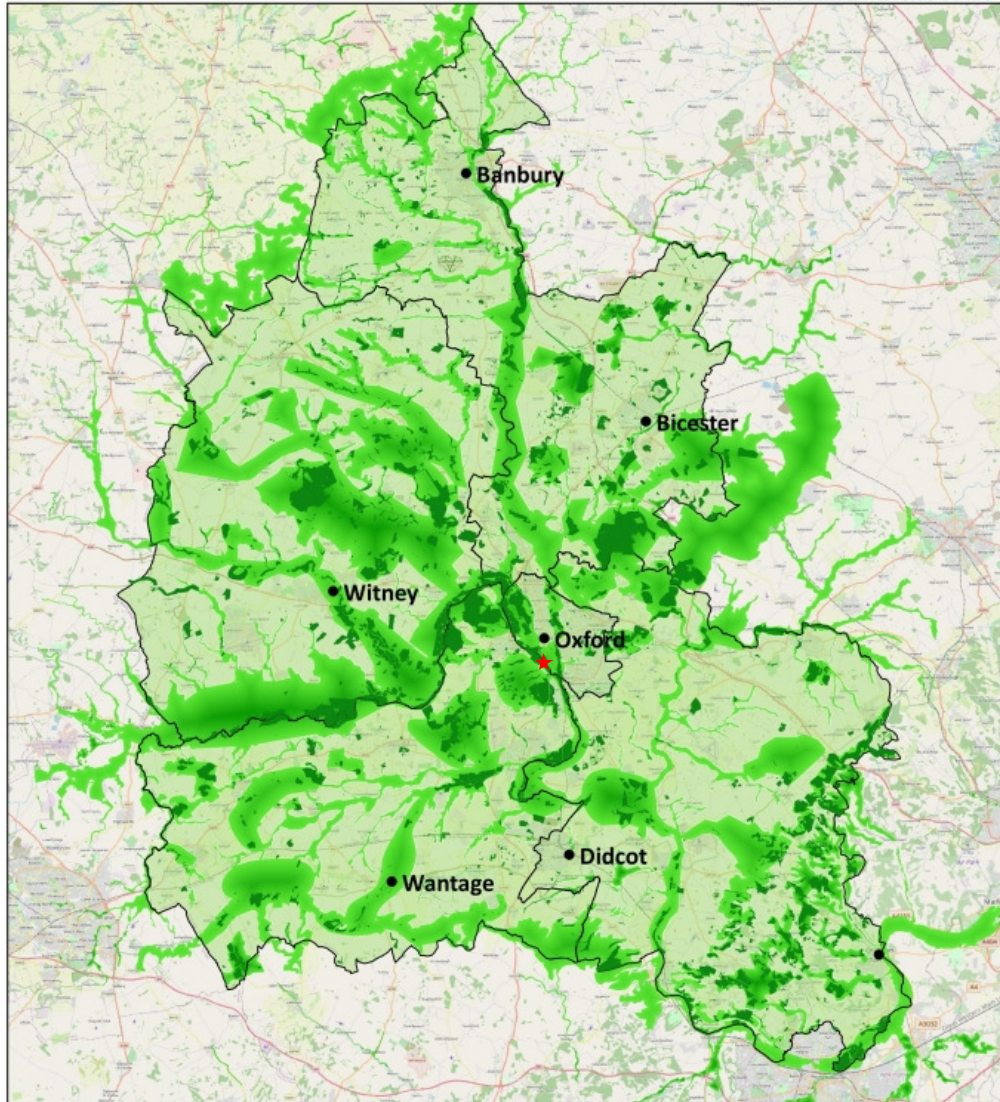


Figure 5. Conservation Target Areas

Draft Oxfordshire Nature Recovery Network



Key

- Nature Recovery Network**
- Core Zone
 - Recovery Zone
 - Wider Landscape Zone

- Boundaries**
- District Boundaries

Map produced by Thames Valley Environmental Records Centre in 2020
 Contains TVERC data
 Contains OS data (c) Licence number 100023343
 Contains OpenStreetMap data
 Contains Environment Agency information (c) Environment Agency and/or database right

The NRN consists of 3 zones:

1. **Core zone** – the most important sites for biodiversity in Oxfordshire – including all nationally and locally designated sites, nature reserves, priority habitats and ancient woodland.
2. **Recovery zone** – comprising the **Conservation Target Areas**, **Important Freshwater Areas** and additional areas added to provide better habitat connectivity.
3. **Wider Landscape zone** – covering the rest of the county, recognising the important contribution that agricultural and urban landscapes beyond the Recovery zone can make to nature’s recovery

Figure 6. Draft Nature Recovery Network

The Strategic Environmental Opportunities (SEOs) for National Character Area's 108 and 109, which are most relevant to the delivery of offsite BNG for the Oxford FAS are:

108 Upper Thames Clay Vales

SEO 2: Manage farmland across the Upper Thames Clay Vales to produce food sustainably and maintain sense of place. Taking a catchment approach, improve filtration of pollutants and regulation of water flow by realising a farmland habitat mosaic that incorporates strategic areas of wet grassland, reedbed, wet woodland and ponds as well as ditches and hedgerows.

109 Midvale Ridge

SEO 2: Manage, enhance and expand the valuable semi-natural habitats of the Midvale Ridge such as fens, grassland and calcareous heathland to benefit biodiversity, prevent soil erosion, improve water regulation and quality, support pollinators and protect and enhance wildlife corridors

SEO 3: Manage and enhance the woodland cover and expand areas of native broadleaved woodland to benefit landscape character and biodiversity, for carbon sequestration, to prevent soil erosion, improve water quality, supply renewable fuel and to provide access and recreation opportunities.

3. Ecological suitability

Site conditions

In the case of wet woodland, reedbed and ditches the hydrology of the site is critical. Hedgerows can be created in a much wider range of conditions.

Wet woodland occurs on waterlogged or seasonally wet soils. It can develop on floodplains, as successional habitat within fens, mires and bogs, along streams, hill-side flushes, and in peaty hollows, and hence occurs on a broad spectrum of soil types; nutrient rich or poor, mineral or organic, acidic or base-rich. We are mitigating for the loss of wet woodland that is growing on a floodplain in neutral, mineral soils that are not nutrient-rich, so will ideally be looking for sites with similar characteristics.

Reedbed occurs on land where the water table is at or near the surface throughout the year. This could be open water or saturation of soil at the surface.

Ditches are described in the Defra Metric as being 'Artificially created, linear water-conveyancing features that are less than 5m wide and likely to retain water for more than 4 months of the year. Their hydraulic function is predominantly for land drainage, and although partially or fully connected to a river system, they would not have been present without human intervention.' We are looking for ditches that are in poor condition with the aim of improving them so that they are in good ecological condition. Therefore, we require ditches that are currently perhaps heavily shaded, support invasive non-natives (which can be feasibly eradicated), have less than 75% marginal vegetation, support only a small range of plants, are heavily poached, have poor water quality and lots of filamentous algae or duckweed – i.e., are capable of significant improvement.

Hedgerows occur in a wide range of site conditions and therefore finding a suitable site for hedgerow creation should be more straightforward than for the wetland habitats.

Where there is flexibility in the type of habitat that might be created to achieve net gain, the existing ecological baseline conditions and opportunities will determine the type of habitat that is proposed.

Site context and connectivity

Sites surrounded by high-intensity agriculture would not enable us to deliver the quality of habitat required. If the new habitat can be set within an area which is already managed with biodiversity in mind, then the benefits will be amplified.

Although ecological connectivity is not measured in the Metric, it is nevertheless an important consideration. If the new habitat can be created in a location that will connect two or more separate, existing areas of similar habitat then the benefits will be much greater than creating the habitat in isolation.

4. Landscape and Heritage Suitability

Historic Landscape Characterisation (HLC) uses a combination of historic data including historic map regressions to map past and present landscape character types. The proposed site(s) will be assessed against the Oxfordshire County Council HLC maps for opportunities to reinstate lost habitats where appropriate. It is important that heritage assets are not negatively impacted by any habitat creation work and appropriate consultation will be undertaken during the planning and design process to ensure that this is the case, particularly if any land lowering is required to create habitats such as reedbeds.

5. Existing land management philosophy and long-term ambition

Selecting a site that belongs to a landowner who has already demonstrated a long-term commitment to nature recovery is important. To maximise the chances of successful BNG delivery, the creation and management of the habitats will need to be undertaken by a landowner/manager who understands the ecological principles behind the work.

6. Accessibility and visibility for the public

Sites that are already accessible to the public or visible from public rights of way, roads or railways will generally be favoured over those which are isolated. Where there are opportunities to increase access to nature, these will be taken. It should be noted though that there may be occasions where there are greater benefits to wildlife (and ultimately humans) in creating/enhancing habitat which is inaccessible to the public.