PUDLICOTE FARM

MANAGEMENT PLAN

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CONTENTS

INTRODUCTION

Aims and Objectives

Ecosulis were commissioned by Bradley Wickens to undertake a biodiversity gain assessment of land at Pudlicote Farm, hereafter referred to as 'the Site'. The Site, which is located at OS central grid reference: SP 31694 20107 and has an area of 34.47 ha (OS data), will be used as a receptor site for habitat creation and enhancement to offset the habitat losses associated with development sites in Oxfordshire.

The management plan has been prepared to detail the methods of establishing, enhancing, and managing the proposed habitat types and target conditions set out in the biodiversity gain assessment, which has been developed in line with the overall ambition for the Site to restore a natural floodplain ecosystem of the River Evenlode with ponds, floodplain wetland mosaic and CFGM, lowland meadow, neutral grassland, mixed scrub, and woodland buffers.

The management plan incorporates rewilding principles (Figure 1) within the long-term management measures to deliver the optimal outcome for biodiversity gain as well as delivering enhancements for protected and notable species / species groups.

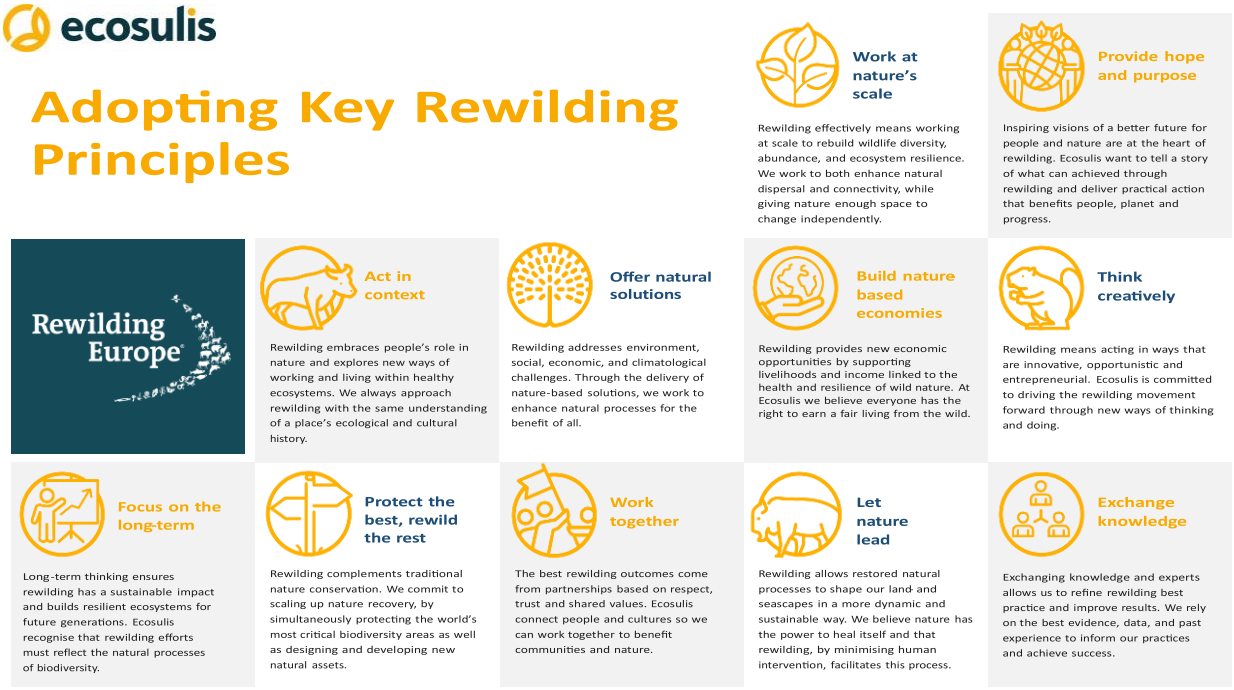

Figure 1 – Ecosulis rewilding principles

Background

Previous surveys have been undertaken of this Site to record an ecological baseline and inform the habitat types that could be established, based on the site location, historical land use, soils, and hydrology. The following survey reports were reviewed to inform the biodiversity gain assessment and management plan:

- Atkins, March 2020 – Pudlicote Design Book, Pudlicote Farm, nr Chipping Norton, Oxfordshire, on behalf of the Environment Agency.
- Thames Valley Environmental Records Centre, September 2021 – Pudlicote Farm, Baseline Site Assessments for Biodiversity Net Gain.
- Environment Bank, February 2022 – Initial Site Review, WOX06 – Pudlicote Farm.
- Devon Wildlife Consultants, July 2022 – Pudlicote, West Oxfordshire, Biodiversity Offset Management Plan, on behalf of the Environment Bank.

Proposal

The proposed habitat creation and enhancement works are being undertaken to restore the current arable land to a natural floodplain ecosystem comprising permanent ponds, temporarily inundated areas, floodplain wetland mosaic and CFGM, lowland meadow, neutral grassland, woodland buffers, and a scrub regeneration zone.

Site Location

The Site (approximately 34.47 ha) is located within arable land associated with Pudlicote Farm, Pudlicote, Oxfordshire, to the south of Chipping Norton (Figure 2). The Site is set in a rural landscape and is adjacent to the southern bank of the River Evenlode.

The Site consists of three large arable fields containing grassland field margins that have hedgerows present at some of their boundaries (see Appendix I). The southern part of the Site supports mixed plantation woodland, which acts as a buffer along the adjacent railway line. The northern Site boundary supports grassland buffers between the arable fields and the River Evenlode. The westernmost arable field has patches of dense bramble scrub with mature and veteran trees. The Site is bisected by Pudlicote Lane.

Within the wider landscape, the Site is surrounded by arable and pasture farmland, hedgerows, woodland, waterbodies, and nearby villages.

Figure 2: Site Boundary

Biodiversity Gain Assessment

The Defra Biodiversity Metric 4.0 was used to calculate the baseline biodiversity value of the Site, using the habitat information obtained during the site visit undertaken in December 2022 and the habitat condition information provided in the 2021 TVERC survey report. The baseline information has been used to inform habitat enhancement and creation measures that will be undertaken on Site to achieve a biodiversity gain that is within the habitat creation objectives for the Site, i.e., the restoration of a floodplain wetland mosaic and CFGM. Professional judgement has been applied to provide realistic habitat enhancement and creation measures, what condition the habitats can achieve and how they will be managed in the long-term.

The baseline biodiversity value, given by the number of biodiversity units, is determined by multiplying the area or length of a certain habitat by its 'quality', which encompasses habitat distinctiveness, condition, and strategic significance. All habitat types are inputted into the metric, with each area or length of habitat displaying different biodiversity units based on their calculated value. The total baseline biodiversity units are determined through the sum of all the habitats on site.

The post-intervention biodiversity units are determined in the same way as the baseline biodiversity units; however, certain risk factors are also taken into account, including the difficulty and time taken to achieve the desired habitat enhancement and creation measures.

A baseline map is provided in Appendix I, a condition justification for the baseline habitats is provided in Appendix II, a plan showing the proposed habitats is provided in Appendix III and the biodiversity gain assessment headline results are provided in Appendix IV. A separate excel spreadsheet has been provided with the full Defra Biodiversity Metric 4.0 calculation, updated in June 2024.

HABITAT ENHANCEMENT, CREATION AND MANAGEMENT MEASURES

This section of the report details the habitat enhancement and creation measures that will be undertaken to achieve the biodiversity gain targets and deliver additional gains for biodiversity by adopting rewilding principles and incorporating added value measures for species and species groups.

Please refer to Appendix III for a visual display of the proposed habitats and the location of species enhancement features. A summary of the habitat enhancement and creation measures are provided in Table 1 below.

Table 1: Summary of habitat enhancement and creation measures

HABITAT	ENHANCEMENT / CREATION MEASURES
Lowland meadow	Enhancement of existing modified grassland to lowland meadow.
Floodplain wetland mosaic and CFGM	Creation of floodplain wetland mosaic and CFGM surrounding the open and seasonal ponds and scrapes, adjacent to the river Evenlode, Enhancement of the existing neutral grassland fields.
Neutral grassland	Creation of neutral grassland and marshy grassland in the existing arable fields. Enhancement of the existing neutral grassland field margins and buffers between the arable fields and River Evenlode.
Mixed scrub	Creation of a mixed scrub regeneration zone along the woodland edge in the southern part of each arable field.
Ponds	Creation of ponds in the central and north-western parts of the Site, adjacent to the River Evenlode, within the existing arable fields.
Temporary ponds	Creation of temporary ponds in the north-eastern part of the Site, adjacent to the River Evenlode, within the existing arable fields.
Broadleaved woodland	Enhancement of existing recently planted broadleaved woodland in the north-eastern corner of the western arable field.
Mixed woodland	Enhancement of existing recently planted mixed woodland along the southern boundary of the Site adjacent to the railway line.
Hedgerows	Planting of native hedgerow and enhancement of existing hedgerows.
Log/brash piles	Any timber/brash created from management of the woodlands and hedgerows will be used to create log/brash piles across the site. Opportunities for amphibians, reptiles, and small mammals including hedgehog. Logs to be left intact as far as possible to prevent drying out from the ends which slows decomposition and colonisation.
Invertebrate banks	The spoil created from excavating the ponds will be kept on Site and used to create invertebrate banks, also known as butterfly banks. These will vary in design, size, and orientation. Opportunities for rare invertebrates that depend on bare ground and sparsely vegetated land.
Compost piles	Created using the arisings from long-term management of the grassland. Opportunities for reptiles, small mammals, and invertebrates.
Deadwood (standing / fallen)	Standing deadwood will be retained wherever possible and fallen deadwood will be left in situ. Some of the timber from woodland management activities can be placed on the woodland floor to become a future deadwood resource, which will provide opportunities for invertebrates and fungi.

Soils and Hydrology

As detailed in the Atkins report (2020), the dominant soil type for the Site is:

"fine loamy over clayey soils with slowly permeable subsoils leading to seasonal waterlogging…The national soil map show that these soils cover the entire extent of all three fields. However, field evidence suggests soils become brashier/stonier up the valley sides and have a higher clay content at lower elevations, on the valley floor/in the floodplain."

The northern part of the Site is within Flood Zone 2 and Flood Zone 3 (Figure 3: Environment Agency flood risk map) and the low-lying areas are regularly inundated during the winter months. Drainage ditches cross the Site carrying water from the wider catchment area, have been installed to aid with farming practices.

This soil type and hydrology information will help to inform the plant lists and seed mixes prescribed in this management plan, whilst using the existing vegetation present as a guide to the soil type and hydrology combined with information from other site design drawings.

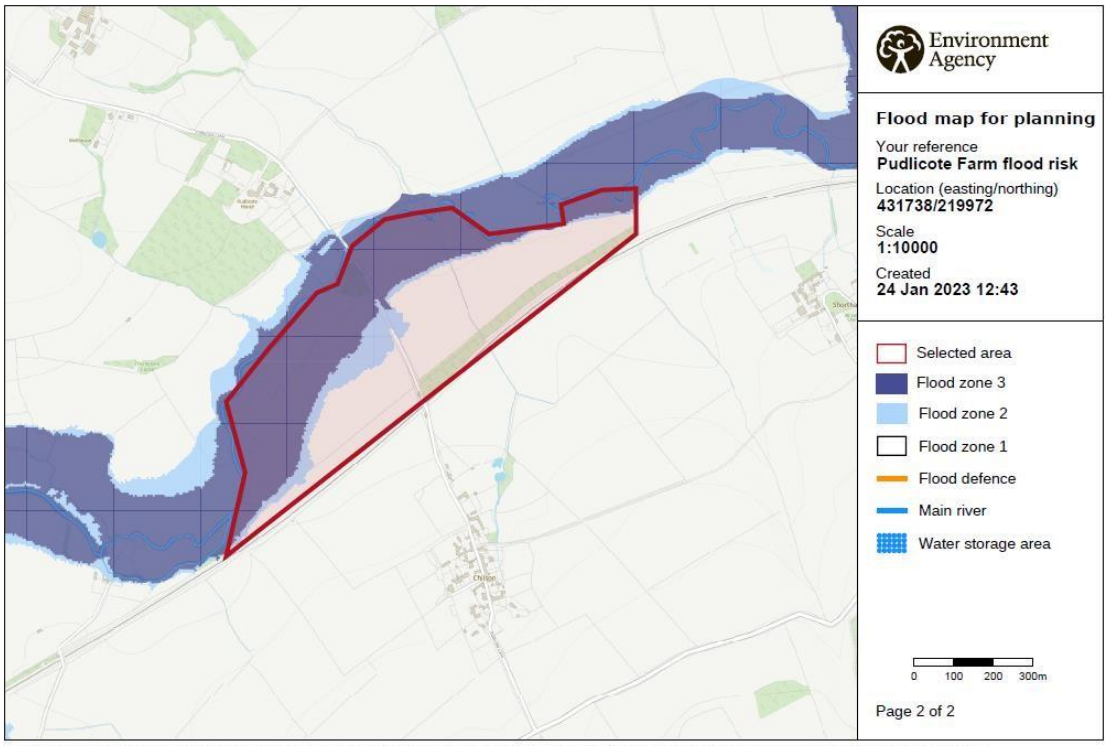

Figure 3: Environment Agency flood risk map for Pudlicote Farm

Habitats

A plan showing the proposed habitats is provided in Appendix III. Natural regeneration will be the adopted approach when creating some of the habitats below, for example the mixed scrub, however traditional planting, management and maintenance techniques will also be utilised to accelerate natural processes. Details of the habitat establishment and management measures for each proposed habitat, taking into account their target condition for biodiversity gain, is provided in the relevant section below.

Floodplain Wetland Mosaic and CFGM

Habitat establishment

The area proposed for floodplain wetland mosaic and Coastal Floodplain and Grazing Marsh (CFGM) (referred to as 'Floodplain Wetland Mosaic and CFGM' in the UKHab classification) currently supports neutral grasslands, which generally maintains a balanced nutrient level and a diverse plant composition. This condition provides a naturally favourable starting point for developing a floodplain wetland mosaic and CFGM. Now the floodplain has been reconnected to the river, the natural process of periodic and seasonal inundation with water will continue to support the establishment of the complex habitat, however some additional interventions are required.

The first phase of floodplain wetland mosaic and CFGM establishment requires adjustment to the soil conditions to favour wetland-specific species by slightly reducing the nutrient levels, which may still be moderately high for typical wetland plants. The nutrient reduction strategy occurs over a three-year period, and involves mowing the site twice per year, in spring and late summer, to approximately 100-150mm. This regime helps to stress nutrient-competitive grasses and prevent them from seeding. All mowed material will be removed from site promptly to prevent nutrients from re-entering the soil through decomposition.

Following the final year of nutrient reduction, preparation of the site will be carried out in early autumn to allow for seeding. Allow the soil to rest for a few weeks after initial preparation to clear any germinating weeds or unwanted roots. The following stages will be undertaken:

- Cut the existing grassland to 50mm, to suppress dominant species and expose bare soil patches.
- Use light harrowing to create open soil areas, which will constitute approximately 30-40% of the total neutral grassland area, to enhance seed-soil contact for new sowing.
- Optimal seeding periods are early autumn or spring. Adjust seed mix proportions to include about 1.5g of wildflower and 3.5g of grass seed per square meter. Seek local donor material for green hay or brush harvesting (see Lowland Meadow Habitat Establishment) or seed from Chimney Meadows National Nature Reserve (Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust).
- Lightly rake and roll to firm the soil after sowing to ensure good seed-to-soil contact without burying the seeds too deeply (3-6mm optimal depth).

To effectively seed a floodplain wetland mosaic and CFGM, source seeds from a local donor site or apply a specifically formulated seed mix that includes a variety of native wetland species. Choose a mix like the British Flora BFS5(F) Wildflower 100% wetland and pond edge seed mix and British Flora BFS3(F) Floodplain 100% meadow grassland seed mix, which contains both flowering plants and grasses typical of local wetland ecosystems. See species list in Table 2 and 4 below. This ensures ecological compatibility and resilience. The BFS5 seed mix is designed for areas like pond edges and wet margins of streams or lakes. Sow the seeds at a rate of 1-2 grams per square meter to achieve optimal coverage and diversity. This approach supports a robust establishment of wetland flora.

Table 2: British Flora BFS 5 Wetland & Pond Edge Wildflower seed mix

WETLAND WILDFLOWER SPECIES
Achillea ptarmica – (Sneezewort)
Caltha palustris – (Marsh Marigold)
Carex acutiformis – (Lesser Pond Sedge)
Eupatorium cannabinium – (Hemp Agrimony)
Filipendul ulmaria – (Meadow Sweet)
Hypericum tetrapterum – (Square Stemmed St John's Wort)
Iris pseudacorus – (Yellow Flag Iris)
Juncus effusus – (Soft Rush)
Leucanthemum vulgare – (Oxeye Daisy)
Lotus pedunculatus – (Greater Bird's-foot Trefoil)
Lychnis flos-cuculi –– (Ragged Robin)
Lythrum salicaria – (Purple Loosestrife)
Lycopus europaeus – (Gypsywort)
Plantago lanceolata –– (Ribwort Plantain)
Prunella vulgaris – (Selfheal)
Pulicaria dysenterica – (Fleabane)

Ranunculus acris – (Meadow Buttercup)
Ranunculus flammula – (Lesser Spearwort)
Rhinanthus minor – (Yellow Rattle)
Scrophularia auriculata – (Water Figwort)
Succisa pratensis – (Devil's Bit Scabious)

Habitat management

Managing an established floodplain wetland mosaic and CFGM involves several key practices aimed at maintaining biodiversity, controlling invasive species, and ensuring the health of both the plant and animal communities that inhabit these areas.

Managing the mowing and cutting of established wetland meadows is timed to balance vegetation control with the protection of wildlife, especially during sensitive periods like breeding seasons. The specific timing can vary depending on the species of birds. Typically, the best time for mowing these habitats is late summer or early autumn (August to September). This timing is strategic as it avoids disturbance during the sensitive breeding season, allowing birds and other wildlife to raise their young. It also ensures that plants have completed their growth cycles and seed dispersal, crucial for maintaining the diversity and resilience of the plant community.

Generally, wetland meadows require only one cut per year. This annual mowing helps prevent the encroachment of woody vegetation, maintaining the open character of the meadow which is vital for many species of birds, insects, and other wildlife. When mowing, leave the cuttings on the ground for a few days to allow seeds to fall back into the soil, supporting the next year's growth. This practice also provides a temporary habitat for insects. After a few days, these cuttings will be removed to prevent them from smothering the ground and negatively affecting new plant growth.

Pudlicote is in a region where specific conservation-sensitive species are present, such as ground-nesting birds, the timing of mowing will need further adjustment to ensure that young birds have fledged before the area is disturbed. Consult an ecologist to highlight or identify any areas of concern and confirm timings of the work as there can be fluctuation from year to year.

The proposed habitat creation and management measures incorporate rewilding principles to achieve the optimal outcome for biodiversity and reflect the Defra Metric 4.0 Habitat Condition Assessment Sheets criteria for high distinctiveness wetland habitat types, as detailed in Table 3 below.

Table 3: Measures to achieve good condition floodplain wetland mosaic and CFGM mosaic.

CONDITION ASSESSMENT CRITERIA	MEASURE TO MEET CONDITION CRITERIA
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.	Ensure consistent hydrological management to maintain natural water levels without artificial drainage. Use water level control structures only as necessary to mimic natural hydroperiods and prevent drying out or oversaturation.
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.	Implement planting and seeding of native wetland species adapted to local conditions. Regularly remove competitive invasive species and monitor plant community structure to ensure that the desired vegetation composition is achieved and maintained.
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.	Monitor water quality regularly to detect pollutants. Implement buffer zones and sediment control measures to reduce input of pollutants and sediments into the wetland area.
Cover of scrub and scattered trees less than 10%.	Periodic cutting or mowing to control woody vegetation growth and maintain open wetland conditions. Scrub and tree cover should be managed to prevent overgrowth while allowing for some habitat complexity.
Cover of bare ground less than 5%.	Implement soil stabilisation techniques such as mulching or temporary cover crops where necessary. Adjust hydrological management to prevent erosion and excessive exposure of soil.

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.	Establish a regular monitoring and rapid response system for detecting and removing invasive species. Use manual removal techniques and appropriate herbicides as per conservation guidelines.
All ditches recorded within the habitat achieve good condition as assessed using the Ditch condition sheet.	Maintain and restore ditches to ensure good water flow and ecological function. Avoid over-cleaning and maintain vegetative buffers around ditches to enhance habitat quality and filter runoff.

Lowland Meadow

Habitat establishment

The area proposed for lowland meadow creation currently supports modified grassland, which is indicative of high nutrient levels within the soil. Therefore, the first stage of lowland meadow establishment is to gradually reduce the soil nutrient levels over a period of five years to create suitable conditions for lowland meadow seed to germinate successfully. The nutrient levels will be reduced by undertaking two cuts to approx. 150mm (or less) per year: one in April and the second between July and September. All arisings will be removed from Site during this initial cutting phase.

Following completion of the initial cutting phase, the existing grassland will need to be seeded in September or April with a species mix typical of lowland meadows. The following stages will be undertaken:

- Cut the existing grassland to 50mm.
- Use a spring tine harrow to break up the sward and create areas of bare ground (equating to approximately 40-50% of the total grassland area).
- Seed the area using either green hay* from a local lowland floodplain meadow donor site if available
    - e.g., within the River Evenlode Catchment Partnership, which is recommended as the seeds will be adapted to local conditions, or by sourcing a suitable seed mix such as British Flora BFS3(F) Floodplain 100% meadow grassland seed mix. A species list is provided in Table 4 below. A combination of green hay and overseeding can be used if necessary. The seed should be sown at a rate of 1-2g/m2.

*If green hay is used this is likely to take place around July once the seed in the donor site has formed but not yet started to drop. Work on a ratio of 1:2 e.g., each 1 hectare of donor material to 2 hectares of receptor site. Ensure the donor site has 2 years of rest in between each green hay collection to allow seed bank to remain resilient. You may want to adjust the timing of green hay collection to target different species in the sward.

Table 4: British Flora BFS 3 Floodplain meadow grassland seed mix

WILDFLOWER SPECIES
Achillea millefolium – (Yarrow)
Centaurea nigra – (Black knapweed)
Filipendula ulmaria – (Meadowsweet)
Galium palustre – (Marsh bedstraw)
Hypericum tetrapterum – (Square stemmed st john's-wort)
Hypochaeris radicata – (Common cat's-ear)
Lathyrus pratensis – (Meadow vetchling)
Leontodon autumnalis – (Autumn hawkbit)
Leucanthemum vulgare – (Ox-eye daisy)
Lotus corniculatus – (Common bird's-foot trefoil)
Lotus pendunculatus – (Greater bird's-foot trefoil)
Lychnis flos-cuculi – (Ragged robin)
Plantago lanceolata – (Ribwort plantain)
Primula veris – (Cowslip)
Prunella vulgaris – (Selfheal)
Ranunculus acris – (Meadow buttercup)
Rhinanthus minor – (Yellow rattle)
Rumex acetosa – (Common sorrel)

Sanguisorba officianlis – (Great burnet)
Silaum silaus – (Pepper saxifrage)
Stachys officianlis – (Betony)
Succisa pratensis – (Devil's-bit scabious)
Trifolium pratense – (Red clover)
Vicia cracca – (Tufted vetch)

Habitat management

Once the lowland meadow has established it will be managed as a hay meadow, which would include an annual cut to 50-150 mm between late June and early July. Arisings are to be left for around a week, giving time for the cut material to dry and drop seeds, turned at least once, before being raked up and used to create bails or compost piles elsewhere on Site.

Light grazing of approximately 0.5 livestock units per hectare for large breads, will be undertaken between the hay cut and March the following year, removing the livestock when the ground becomes too waterlogged. This stocking density is recommended as a starting point, but it can be adapted throughout the management period depending on the results of the monitoring surveys. For example, if the grazing is causing excessive poaching, i.e., more than 20% of the areas are showing impact, then the stocking density can be reduced, or if the grazing is not controlling vegetation growth effectively then the stocking density can be increased to fine tune for the Site.

It is recommended that a mixed herd of native rare breed grazing species are considered for autumn and winter grazing as many of them are hardier than our more common livestock species and will be able to withstand winter conditions. Additionally, many native rare breed grazing species are included in Defra's Native Breeds at Risk (NBAR) list and as such potentially qualify for payment per hectare under the Higher Tier of the Countryside Stewardship (CS) scheme under Supplement SP8. Refer to the Rare Breeds Survival Trust (Rare Breeds Survival Trust (rbst.org.uk)) for further details.

The proposed habitat creation and management measures incorporate rewilding principles to achieve the optimal outcome for biodiversity and reflect the Defra Metric 4.0 Habitat Condition Assessment Sheets criteria for medium distinctiveness grassland habitat types, as detailed in Table 5 below.

Table 5: Measures to achieve good condition lowland meadow.

CONDITION ASSESSMENT CRITERIA	MEASURE TO MEET CONDITION CRITERIA
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 (non-acid grassland types only).	Using a local lowland meadow as a donor site and/or a suitable seed mix will ensure that the specific grassland type (UKHab lowland meadow g3a) has the potential to be established. Annual monitoring will include undertaking botanical surveys to record the species present, specifically the indicator species: crested dogstail, red fescue, common knapweed, autumn hawkbit, great burnet, and meadowsweet.
Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20 per cent is more than 7 cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.	A 5 m wide buffer strip of uncut lowland meadow will be retained along the bank of the River Evenlode. Additionally, uncut areas will be left around the existing pond and along the margins of the newly planted hedgerow. The rest of the meadow will be managed as a hay meadow. Having a combination of cut and uncut areas will achieve variation in sward height and this will be assessed during annual monitoring.
Cover of bare ground between 1% and 5%, including localised areas, for example, rabbit warrens.	Areas of bare ground, due to light poaching, will be created through autumn and winter grazing. It is considered likely that mammals such as rabbits, deer, and badger would use the Site and create bare ground through foraging, mammal paths and warren/sett creation. Annual monitoring will measure the percentage cover of bare ground.
Cover of bracken less than 20% and cover of scrub (including bramble) less than 5%.	Cutting the meadow annually will prevent the encroachment of scrub and bracken. Annual monitoring will measure the percentage cover of scrub and bracken.

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 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.	Cutting the meadow annually will reduce the likelihood of undesirable species becoming dominant. Autumn and winter grazing will be low-level (0.5 livestock units per hectare) to ensure that excessive poaching is not a problem. Animals should be removed when 20% or more of the site shows poaching damage. Annual monitoring will record the presence of any Schedule 9 species and measure the percentage cover of undesirable species/physical damage.
There are greater than 9 species per metre squared. NB - This criterion is essential for achieving good condition (non-acid grassland types only).	Using a local lowland meadow as a donor site and/or a suitable seed mix will ensure that the target species diversity is more than 9 species per metre squared. Annual botanical monitoring surveys will record the species diversity.

Other Neutral Grassland

Habitat establishment

The area proposed for other neutral grassland currently supports three fields formerly managed as arable land. In the westernmost field a depression will be created, in an area that regularly floods during the winter, and marshy grassland will be established. Marshy grassland is included within the other neutral grassland UKHab category.

To prepare the arable fields for seeding, a subsoiler will be used to break through any cultivation pan. A power harrow will then be used to break up and smooth the soil surface, which will create suitable conditions for seeding.

After soil preparation the seed will be sown and, similarly to lowland meadow creation, it is recommended that green hay is sourced from local species-rich neutral grassland and marshy grassland donor sites e.g., within the River Evenlode Catchment Partnership, so that the seeds will be adapted to local conditions. Alternatively, a wildflower grassland seed mix can be used such as the Emorsgate Clattinger Meadows Mixture EM31 for the species-rich neutral grassland and Emorsgate EM8 meadow mixture for wetlands for the marshy grassland area. Species lists are provided in Tables 6 and 7 below. A combination of green hay and overseeding can be used if necessary. The seed is to be sown at a rate of 4-5g/m2 and sown in September or March.

In the first year of establishment, the grasslands will be first cut in mid-summer to 75-150mm. There will be a flush of annual weeds before this first cut; however, it is important to allow slower growing species, including yellow rattle, to establish before cutting. All arisings will be removed from Site during this initial cutting phase.

As detailed in the lowland meadow section above, light grazing of approximately 0.5 livestock units per hectare will be undertaken between the first cut and March the following year, removing the livestock when the ground becomes too waterlogged or poaching impacts more than >20% of the area. This stocking density is recommended as a starting point, but it can be adapted throughout the management period depending on the results of the monitoring surveys.

Pioneer broadleaf species or farm weeds may need managing during the establishment phase. If and where possible, these will be removed by hand or cut before going to seed. It can take several years to get these under control. Invasive non-native species (INNS) may need different or specific interventions if these are discovered, but chemical interventions will be kept to a minimum, carefully timed, and undertaken sympathetically to avoid negative impact on the surrounding habitats.

Table 6: Emorsgate Clattinger Meadows Mixture EM31

WILDFLOWER SPECIES	% COVER
Centaurea nigra – (Common knapweed)	0.8%
Leontodon hispidus – (Rough Hawkbit)	0.8%
Lecanthemum vulgare – (Oxeye Daisy)	2.3%
Lotus corniculatus – (Bird's-foot Trefoil)	0.8%
Medicago lupulina – (Black Medick)	0.8%
Plantago lanceolata – (Ribwort Plantain)	7.8%
Ranunculus acris – (Meadow Buttercup)	3.3%

Rhinanthus minor – (Yellow Rattle)	19.2%
Rumex acetosa – (Common Sorrel)	0.8%
Sanguisorba officinalis – (Great Burnet)	0.8%
Scorzoneroides autumnalis – Leontodon autumnalis – (Autumn Hawkbit)	3.1%
Succisa pratensis – (Devil's-bit Scabious)	0.8%
Trifolium pratense – (Wild Red Clover)	2.3%

GRASS SPECIES	% COVER
Agrostis castellana – (Common Bent)	4.7%
Anthoxanthum odoratum – (Sweet Vernal-grass)	0.8%
Briza media – (Quaking Grass)	4.7%
Bromopsis erecta – (Upright Brome)	3.9%
Cynosurus cristatus – (Crested Dog's-tail)	14.5%
Dactylis glomerata – (Cocksfoot)	7.8%
Festuca rubra – (Red Fescue)	18.4%

Table 7: Emorsgate EM8 meadow mixture for wetlands seed mix.

WILDFLOWER SPECIES	% COVER
Achillea millefolium – (Yarrow)	2.4%
Betonica officinalis – (Betony)	0.1%
Centaurea nigra – (Common Knapweed)	4%
Daucus carota – (Wild Carrot)	0.1%
Filipendula ularia – (Meadowsweet)	0.4%
Galium album – (Hedge Bedstraw)	0.6%
Galium verum – (Lady's Bedstraw)	2%
Lathyrus pratensis – (Meadow Vetchling)	0.4%
Leucanthemum vulgare – (Oxeye Daisy)	0.3%
Lotus corniculatus – (Birdsfoot Trefoil)	0.2%
Lotus pedunculatus – (Greater Birdsfoot Trefoil)	0.4%
Medicago lupulina – (Black Medick)	0.2%
Plantago lancelata – (Ribwort Plantain)	4.0%
Primula veris – (Cowslip)	0.1%
Ranunculus acris – (Meadow Buttercup)	1.4%
Rhinanthus minor – (Yellow Rattle)	1.5%
Rumex acetosa – (Common Sorrel)	0.1%
Silaum silaus – (Pepper Saxifrage)	0.1%
Silene flos-cuculi – (Ragged Robin)	1.6%
Succisa pratensis – (Devil's-bit Scabious)	0.1%

GRASS SPECIES	% COVER
Agrostis capillaris – (Common Bent (w))	2%
Anthoxanthum odoratum – (Sweet Vernal-grass (w))	2%
Briza media – (Quaking Grass (w))	4%
Cynosurus cristatus – (Crested Dogs-tail)	48%
Deschampsia cespitosa – (Tufted Hair-grass (w))	2%
Festuca rubra – (Red Fescue)	22%

Once the other neutral grassland has established it will also be managed as a hay meadow, which would include an annual cut to 150mm between late June and early July. Arisings will be left for around a week, giving time for the cut material to dry and drop seeds, before being raked up and used to create compost piles elsewhere on Site. Light grazing of 0.5 livestock units per hectare will be undertaken after the hay cut until March the following year.

The existing field margins will be excluded from the annual hay cut, to retain some areas of longer sward, but cut on a rotational basis. It is recommended that 2/3 of the field margins are left uncut each year to provide structural variation to the grassland.

The proposed habitat creation and management measures incorporate rewilding principles to achieve the optimal outcome for biodiversity and reflect the Defra Metric 4.0 Habitat Condition Assessment Sheets criteria for medium distinctiveness grassland habitat types, as detailed in Table 8 below.

Table 8: Measures to achieve good condition other neutral grassland.

CONDITION ASSESSMENT CRITERIA	MEASURE TO MEET CONDITION CRITERIA
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 (non-acid grassland types only).	Using local species-rich wildflower grassland and marshy grassland as donor sites and/or a suitable seed mix will ensure that the specific grassland type (UKHab other neutral grassland – g3c) has the potential to be established. Annual monitoring will include undertaking botanical surveys to record the species present.
Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20 per cent is more than 7 cm) creating microclimates which provide opportunities for insects, birds and small mammals to live and breed.	The combination of grazing, a hay meadow cutting regime, and leaving 2/3 field margins uncut per year will achieve variation in sward height. The sward height will be assessed during annual monitoring.
Cover of bare ground between 1% and 5%, including localised areas, for example, rabbit warrens.	Areas of bare ground, due to light poaching, will be created through autumn and winter grazing. It is considered likely that mammals such as rabbits, deer, and badger would use the Site and create bare ground through foraging, mammal paths and warren/sett creation. Annual monitoring will measure the percentage cover of bare ground.
Cover of bracken less than 20% and cover of scrub (including bramble) less than 5%.	Cutting the meadow annually will prevent the encroachment of scrub and bracken. Annual monitoring will measure the percentage cover of scrub and bracken.
There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981). Combined cover of species indicative of sub-optimal condition1 and physical damage (such as excessive poaching, damage from machinery use or storage, damaging levels of access, or any other damaging management activities) accounts for less than 5% of total area.	Cutting the meadow annually will reduce the likelihood of undesirable species becoming dominant. Autumn and winter grazing will be low-level (0.5 livestock units per hectare) to ensure that excessive poaching is not a problem. Animals should be removed when 20% or more of the site shows poaching damage. Annual monitoring will record the presence of any Schedule 9 species and measure the percentage cover of undesirable species/physical damage.
There are greater than 9 species per metre squared. NB - This criterion is essential for achieving good condition (non-acid grassland types only).	Using a local species-rich wildflower grassland and marshy grassland as donor sites and/or a suitable seed mix will ensure that the target species diversity is more than 9 species per metre squared. Annual botanical monitoring surveys will record the species diversity.

Mixed Scrub

Habitat establishment

A mixed scrub natural regeneration zone will be established at the southern boundary of the Site, which is currently arable land, along the woodland edge and incorporating sections of two existing hedgerows. Natural regeneration of the woodland species will be encouraged as well as allowing the sections of hedge to outgrow. Suckering from the hedgerows is expected especially for blackthorn scrub, which is present in all the hedgerows on Site. It is important that the other neutral grassland soil preparation and seeding is undertaken prior to any scrub planting.

To accelerate scrub establishment, whips from a local supplier will be planted in a natural pattern to encourage bushy growth and clearings between patches of scrub, in addition to, and to complement, the natural regeneration approach. As there is hawthorn and blackthorn in the nearby hedgerows and mixed woodland, it is likely that these species will encroach naturally into the mixed scrub areas. Therefore, hawthorn and blackthorn whips should not be included within the scrub planting scheme.

The scrub planting schedule will adhere to on British Standards on Tree and Shrub Planting BS: 4428:1989. Whips will be planted between November and February in clumps of similar species at 0.3m to 1m spacing with 3-5m gaps between clusters. Planted stock

will be bare root 40-60cm whips, planted approx. 6/m^2 in holes dug to the depth to accommodate all of the roots (approx. 400mm). It is recommended that plastic guards are avoided and, instead, the clusters of whips are protected by scattering brash cuttings over them. Brash can be used from other management tasks on Site, e.g., hedgerow cutting. Over the first five years of establishment any failed specimens will be replaced like for like.

Pioneer broadleaf species or farm weeds will need managing during the establishment phase. If and where possible, these will be removed by hand or cut before going to seed. It can take several years to get these under control. Invasive non-native species (INNS) may need different or specific interventions if these are discovered, but chemical interventions will be kept to a minimum, carefully timed, and undertaken sympathetically to avoid negative impact on the surrounding habitats.

The following native scrub species are recommended:

Table 9: Mixed scrub target species mix

SCRUB SPECIES (WHIPS)	% COVER
Corylus avellana - (Hazel)	15%
Cornus sanguinea – (Dogwood)	5%
Euonymus europaeus – (Spindle)	5%
Acer campestre – (Field Maple)	10%
Sorbus aucuparia – (Rowan)	10%
Viburnum opulus – (Guelder Rose)	10%
Lonicera periclymenum – (Honeysuckle)	5%
Alnus glutinosa – (Alder)	10%

SCRUB SPECIES (NATURAL REGENERATION)	% COVER
Prunus spinosa – (Blackthorn)	15%
Crataegus monogyna – (Hawthorn)	15%

Habitat management

The natural scrub regeneration area is within the other neutral grassland field, which will be subject to grazing. It is recommended that the livestock species chosen to graze the Site also have tendencies to browse scrub, as this will help with long-term scrub management and allow a mosaic of dense scrub, scattered scrub, and open glades to develop. The stocking density of 0.5 livestock units per hectare recommended above can be used as a starting point and adapted as necessary following monitoring visits. It may be necessary to manually cut back areas of scrub, in addition to grazing and browsing, so that a natural mosaic structure is maintained. However, it will be important for the scrub to have established and be well rooted before being exposed to grazing, or the plants could be easily uprooted by grazers.

Habitat piles, using brash, logs or grass cuttings from ongoing management activities, will be created within and around the edge of the scrub mosaic to provide opportunities for mammals, reptiles, amphibians, and invertebrates. This will also ensure that management costs are reduced by keeping the cut vegetation on Site.

The proposed habitat creation and management measures incorporate rewilding principles to achieve the optimal outcome for biodiversity and reflect the Defra Metric 4.0 Habitat Condition Assessment Sheets criteria for mixed scrub habitat type, as detailed in Table 10 below.

Table 10: Measures to achieve good condition mixed scrub.

CONDITION ASSESSMENT CRITERIA	MEASURE TO MEET CONDITION CRITERIA
Habitat is representative of UKHab description (where in its natural range). There are at least three woody species, with no one species comprising more than 75% of the cover (except common juniper, sea buckthorn or box, which can be up to 100% cover).	The range and percentage cover of native species recommended in Table 9 will ensure that this criterion is met. Annual monitoring will record the species abundance and remedial action will be undertaken should one species become dominant.

There is a good age range – all of the following are present: seedlings, young shrubs and mature shrubs.	The combination of whip planting and natural regeneration will enable a good age range to establish. Annual monitoring will record the age ranges present. Cutting back of some scrub areas can be applied if necessary.
There is an absence of invasive non-native species (as listed on Schedule 9 of WCA, 1981) and species indicative of sub-optimal condition make up less than 5% of ground cover.	Annual monitoring will record the presence of any Schedule 9 species and measure the percentage cover of undesirable species. Removal of these species will be undertaken as necessary.
The scrub has a well-developed edge with scattered scrub and tall grassland and/or herbs present between the scrub and adjacent habitat(s).	The natural scrub regeneration area is within the other neutral grassland field, which will be subject to grazing. This will enable a well-developed edge to establish with herb species present.
There are clearings, glades or rides present within the scrub, providing sheltered edges.	Grazing and browsing is expected to retain open areas within the scrub. Annual monitoring will identify if any areas have become too dense. Cutting back of some scrub will be undertaken as necessary.

Ponds and Temporary Pools

Habitat establishment

A series of ponds and temporary pools will be created within the arable fields in areas that are known to be regularly flooded during winter. Deeper ponds will be created in the western and central fields, and temporary pools will be created in the eastern field. The deeper ponds will be connected by a series of ditches to allow easier movement of water during flooding events.

Nine deep ponds will be created with the majority having areas between 200m2 and 800m2; one larger pond will be created in the central field of 1400m2. Each pond will be excavated to provide a wide shallow drawdown zone (an area of mud and vegetation which is flooded in winter and spring, and progressively dries as water levels fall in summer) of depths varying from 0-10 mm and 20-30mm. The drawdown zone is the most biodiverse area of a pond as it's where diverse aquatic vegetation can establish, thereby attracting wildlife. Pond slopes will be shallow and no more than a 1:5 slope.

The deeper sections of the pond (up to 1.5m depth) is to cover approximately 15% of the total pond area and a depth of no more than 1.5m. The ponds are unlikely to require a liner given the soil type and hydrology of the site.

The temporary pools in the eastern field will have areas between 60m2 and 900m2. They will be excavated to a maximum of 50cm in the centre and will have gently sloping sides at a 1:8 slope.

All spoil created in the excavation of the ponds will be kept on Site and used to create invertebrate and reptile banks. These banks should be orientated east to west, presenting a long South facing bank. These are linear bunds that support a mosaic of colonising vegetation, inert material, and bare ground, which provide optimal conditions for rare invertebrate and butterfly species to thrive. Sheltering, hibernating, and basking opportunities are also provided for reptiles.

The ponds and temporary pools will colonise naturally over time and natural regeneration is an important stage in pond development, therefore the majority of the pond margins will be left unplanted. Natural regeneration of the ponds will be accelerated through the inclusion of the UK native marginal plants listed below, which are specified to provide a combination of tall marginal vegetation, low growing vegetation, and emergent plants, which will provide egg-laying opportunities for species such as great crested newt.

Plants will be introduced as 7cm root trainers at a density of 8 plants/m2 in clumps of similar species and planted in the drawdown zone at depths between 10-30mm. The optimal time for buying pond plants is between mid-spring and early summer as they are in their best condition, however we suggest planting these as early or late in the season as possible to protect for drier spells.

Figure 4 illustrates the different planting zones within a pond. It is recommended that species are selected from the following list:

- *Alisma plantago-aquatica* – (common water-plantain)
- *Alopecurus geniculatus* – (marsh foxtail)
- *Butomus umbellatus* – (flowering rush)
- *Callitriche stagnalis* – (water starwort)

- *Caltha palustris* – (marsh marigold)
- *Cardamine pratensis* – (cuckoo flower)
- *Carex aquatilis – (water sedge)*
- *Carex riparia – (greater pond sedge)*
- *Eleocharis palustris – (common spike-rush)*
- *Geum rivale – (water avens)*
- *Glyceria fluitans – (floating sweet-grass)*
- *Iris pseudacorus – (yellow flag-iris)*
- *Lychnis flos-cuculi – (ragged robin)*
- *Lycopus europaeus – (gypsywort)*
- *Lysimachia nummularia – (creeping jenny)*
- *Menyanthes trifoliata – (bogbean)*
- *Myosotis scorpioides – (water forget-me-not)*
- *Phalaris arundinacea – (reed canary grass)*
- *Polygonum amphibium – (water smartweed)*
- *Potamogeton crispus – (curled pondweed)*
- *Potamogeton natans – (broad-leaved pondweed)*
- *Potamogeton pectinatus – (sago pondweed)*
- *Ranunculus aquatilis – (water crowfoot)*
- *Sparganium erectum – (branched bur-reed)*
- *Veronica beccabunga – (brooklime)*
- *Veronica catenate – (water speedwell)*

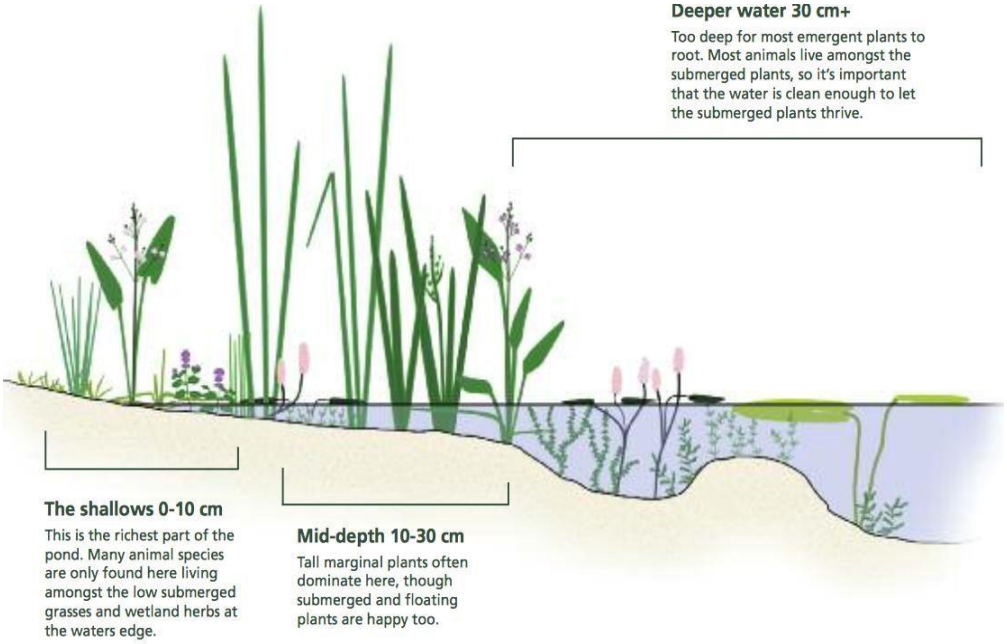

Figure 4: Different ecological zones of a wildlife pond showing shallow drawdown zone (Freshwater Habitats Trust, Pond Creation Guide)

Habitat management

The ponds will be managed as wildlife ponds and will be within grasslands areas subject to light grazing: 0.5 livestock units per hectare have been recommended. Temporary fencing is desirable to allow the marginal plants to establish; however, it is recommended that the long-term management allows the grazing animals to access the ponds, as they can browse the marginal vegetation and prevent the ponds from becoming choked with vegetation.

If permanent fencing is desirable, it is recommended that a cutting regime is introduced once the marginal vegetation is established. An annual cut removing approximately 1/5 of the marginal vegetation will be carried out in the autumn, any in pond vegetation that's removed should be left next to the pond for 3-5 days to allow any pond species to return before being moved for further away. Cut vegetation can be kept on Site and used to create habitat piles for amphibians and small mammals near the ponds.

The proposed habitat creation and management measures incorporate rewilding principles to achieve the optimal outcome for biodiversity and reflect the Defra Metric 4.0 Habitat Condition Assessment Sheets criteria for pond habitat type, as detailed in Table 11 below.

Table 11: Management measures to achieve moderate condition ponds.

CONDITION ASSESSMENT CRITERIA	MANAGEMENT MEASURE TO MEET CONDITION CRITERIA
The pond is of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution. Turbidity is acceptable if the pond is grazed by livestock.	Ponds and temporary pools will be situated in a restored floodplain ecosystem with low levels of management. Marginal and aquatic vegetation will retain good water quality. This will be monitored annually.
There is semi-natural habitat (i.e., moderate distinctiveness or above) for at least 10m from the pond edge.	Ponds and temporary pools will be surrounded by floodplain wetland mosaic and CFGM, lowland meadow and other neutral grassland, which are of high and medium distinctiveness respectively.
Less than 10% of the pond is covered with duckweed or filamentous algae.	Eutrophication is not anticipated due to the semi-natural landscape that will surround the ponds. This will be monitored annually, and action taken as necessary.
The pond is not artificially connected to other waterbodies, either via streams, ditches or artificial pipework.	The pond systems will be connected to the existing ditches that cross the Site, to allow for water movement throughout the pond network. This condition criteria will therefore not be achieved.
Pond water levels should be able to fluctuate naturally throughout the year. No obvious dams, pumps or pipework.	The ponds will be fed by spring, rainwater, and floodwater. There will not be any artificial pipework and the water levels will fluctuate naturally.
There is an absence of non-native plant and animal species.	Signal crayfish are known to be present in the River Evenlode and may colonise the ponds. It is expected that signal crayfish would be predated by wader species, particularly in the winter. Annual monitoring will record the presence of Schedule 9 species and action taken as necessary.
The pond is not artificially stocked with fish. If the pond naturally contains fish, it is a native fish assemblage at low densities.	The ponds are expected to naturally contain fish due to the River Evenlode flooding. It is expected that predation will keep the assemblage at low densities. This will be monitored annually.
In non-woodland ponds, plants, be they emergent, submerged or floating (excluding duckweeds), should cover at least 50% of the pond area that is less than 3 m deep.	The combination of natural regeneration and plug planting will ensure that marginal and aquatic vegetation is established. The cover of vegetation will be monitored annually, and additional planting will be undertaken if required.
The surface of non-woodland ponds is no more than 50% shaded by woody bankside species.	All of the non-woodland ponds are located within open grassland that will be managed as hay meadows and grazed. This will reduce the encroachment of woody vegetation; however, some may still establish on the bankside. This will be monitored annually, and remedial action taken as necessary.

Hedgerows

There are four established hedgerows and one recently planted hedgerow currently on Site. The established hedgerows are assessed to be in moderate condition and will be enhanced to a target condition of good. The recently planted hedgerow will be established and then subject to long term management to also achieve a target condition of good.

Hedgerow establishment

The recently planted hedgerow is currently within the establishment phase, which is approximately five years. During this phase, the shrubs are monitored, and any failed specimens are replaced like for like to stop gap developing.

Within the first few years of establishment the shrubs will be cut down to 45 - 60cm above the ground; this will be undertaken once and in the spring. This hard pruning encourages the shrubs to spread out and create a dense structure, which will reduce the likelihood of gaps developing at the hedgerow base in the future. The density of weeds and competition from grasses at the base of each shrub will be monitored throughout the growing season and cut back as necessary. Mulching the base of each shrub with a wellrotted woodchip can help prevent weeds and grasses becoming overgrown as well as improving water retention in the soil and feeding the new planting.

Hedgerow enhancement and long-term management

Hedgerow enhancement will focus on meeting the following two Defra Metric 4.0 Habitat Condition Assessment Sheets criteria for hedgerows:

- Criterion B1 - Gap between ground and base of canopy <0.5m for >90% of length (unless 'line of trees').
- Criterion C1 - Plant species indicative of nutrient enrichment of soils dominates <20% cover of the area of undisturbed ground.

In order to plug the gaps at the base of the hedgerow there are two options that can be applied. The first is to undertake additional planting with UK native species such as hazel (Corylus avellana), guelder rose (Viburnum opulus), field maple (Acer campestre), and spindle (Euonymus europaeus). Hawthorn and blackthorn would also be suitable; however, all the hedgerows on Site already support these species. It is recommended that the shrubs are planted on the side of the hedgerows that receives the most sun to encourage successful growth and establishment. If this is not possible, endeavour to select species that are more shade tolerant. Long-term management will require cutting the hedgerow every three years, many hedge species like hawthorn and blackthorn produce their fruit from that year's flowers, so annual cutting removes a huge resource for wildlife. Where possible, hedgerows should only be cut between November and February, the later the cut the more winter food will be available for birds and wildlife.

The second option is to manage the hedgerows by laying. This ancient practise maintains the functionality and vigour of hedge species by creating a dense thicket of vegetation with new, productive shoots. The benefit of laying over more modern techniques such as cutting/flailing, is that laying creates dense structure with lots of young growth. It also helps maintain a stock proof barrier that does not become open with gaps at the bottom. Lay each hedgerow every 5-10 years and in varying years to ensure winter food resources are retained. This should be done in November-February, while plants are dormant.

It is expected that criterion C1 detailed above will be achieved through the conversion of the arable land, adjacent to the hedgerows, to other neutral grassland. The management of this grassland through its establishment and as a hay meadow in the long-term will gradually reduce the soil nutrient levels and alter the plant species composition.

Woodland (broadleaved and mixed)

There are two areas of young plantation woodland currently on Site: an area of broadleaved woodland in the western arable field and a buffer of mixed woodland along the southern Site boundary adjacent to a railway line. They are currently assessed to be in poor condition; however, this is because they are young and still establishing, therefore do not yet support a varied age and vegetation structure, regeneration, mature and veteran trees, and deadwood. It is expected that moderate condition woodland can be achieved with longterm management.

Woodland enhancement will aim to meet the following Defra Metric 4.0 Habitat Condition Assessment Sheets criteria for woodlands. These are selected from a larger list:

- Five or more native tree or shrub species found across woodland parcel.
- > 80% of canopy trees and >80% of understory shrubs are native.
- 10 – 20% of woodland has areas of temporary open space, unless woodland is <10ha in which case lower threshold of 10% does not apply.
- All three classes present in woodland: trees 4-7cm dbh, saplings and seedlings or advanced coppice regrowth.
- Three or more storeys across all survey plots or a complex woodland.
- 50% of all survey plots within the woodland parcel have standing deadwood, large dead branches/ stems and stumps.

The long-term goal for the woodlands is to establish a good structure with varying canopy heights, natural regeneration, developed understorey and a rich ground flora. The trees are currently young and will need to establish further before introducing a shrub understorey. It is recommended that a shrub understorey is introduced when the trees are 3m tall. The following UK native species are recommended:

- Hazel (*Corylus avellana*)
- Holly (*Ilex aquifolium*)
- Field Maple (*Acer campestre*)
- Elder (*Sambucus nigra*)
- Honeysuckle (*Lonicera periclymenum*)

Habitat management

A management regime is to be implemented every five years to ensure that a varied woodland structure is established. Thinning, coppicing and pollarding techniques can be utilised modestly to manage the woodland to invigorate growth of the respective trees and shrubs and create areas of open space available for ground flora to flourish. It is recommended that 5% of trees are thinned, coppiced, or pollarded at any one time, if deer pressure is a risk, then the coppice stool (cut stumps) will need protecting, this can be achieved using the cut material to create a fence or scatter these over the stool. The trees chosen for management will be semi-mature; any trees that have potential to be future veterans will be retained. Any trees that show signs of decay will also be left so they can provide standing deadwood.

Any timber from the management works will be retained on Site and used to create log piles within the woodland, scrub, or near the ponds, or will be left in situ to become a deadwood resource.

Specific monitoring objective: understorey planting to be implemented once the already planted woodland trees are 3 metres tall.

HABITAT MONITORING REPORT

Adaptive Management Approach

Adaptive management is a systematic approach to natural resource management that involves monitoring and evaluating the effectiveness of management actions and then adjusting as necessary to improve outcomes over time. It is an iterative process in which management actions are followed by targeted monitoring outcomes. These, in turn, inform the ongoing management.

Monitoring results inform necessary management changes to promote achieving BNG targets stated in the statutory biodiversity metric and HMMP. The monitoring can pick up any unexpected, external influences. Some examples are dealing with a new plant disease, an invasive species that is thriving due to climate change, or changes to site access due to site flooding.

Observations and notes from day-to-day management are important for delivering adaptive management. Consider how this information will be captured and fed into changes in management prescriptions, then through to subsequent monitoring reports.

Regular robust monitoring, and reporting to the responsible authority, should identify issues early on. Then you can make conscious decisions to implement effective actions. If the BNG objectives are affected by external factors, it is important to agree decisions on changes to the management prescriptions and targets with the responsible authority. Following the review, record any changes in this management plan and schedule.

Site Monitoring

The Owner will permit access to the Site for monitoring by the competent ecologist, as his contractor, and periodic site inspections by the council.

Site monitoring will be undertaken by competent ecologists familiar with the details of this management plan to assess the success of the habitat creation and enhancement measures and whether the Defra Metric habitat condition criteria have been met. The surveys will be undertaken at a suitable time of year for the habitat type using the UK Hab classification system and complimentary condition assessment sheets. Monitoring methods and intervals are summarised in Table 12 below.

An annual monitoring report will be produced by a competent ecologist and provided to the Owner. Evidence relating to habitat type and condition will be gathered during each visit and included within these reports.

During the monitoring visits, if habitats are found to be failing or not meeting target conditions outlined within the biodiversity net gain calculation, remedial action will be required, and the management plan will be adapted as necessary. Remedial measures will be implemented using suitably experienced professionals in a way that minimises damage to the existing habitats (e.g., vehicle tracks, herbicide use, etc). Updated/adapted versions of the HMMP will be submitted to the council.

Reports will be submitted to the council as soon as reasonably practicable, and not after the 1st of February each year, as well as other relevant information (including but not limited to soil analyses, photographs, and species lists).

A final audit of the project will be sent to the council at the 30-year endpoint.

The Habitat Monitoring Report will be submitted in the following format:

1) Introduction
2) Methodology
3) Results
4) Evaluation
5) Remedial actions
6) HMMP updates
7) Monitoring Schedule Updates
8) Appendices

a. Habitat map
b. Condition Assessment sheets
c. Metric calculation results

The Report will be submitted to the council as an electronic document (where possible, as PDF or Microsoft Word documents). Supporting documents (e.g., species lists, condition assessment sheets, and photographs) should also accompany the ecological report.

Table 12: Monitoring methods and intervals

Habitat type	Monitoring Method	Monitoring Interval	Project year	Date of submission
All habitats	Site appraisal by walk through	Annually	All	With annual report
Grassland	Rapid assessment of grassland	Every 3-5 years		With annual report
Grassland/ ponds	Full ecological survey and condition assessment during summer months (June-August).	Year 1, 2, 3, 4, 5, 10, 15, 20, 25	Year 1, 2, 3, 4, 5, 10, 15, 20, 25	With annual report
Woodland/ hedgerow/ scrub	Full ecological survey and condition assessment during summer months (April-August).	Year 1, 2, 3, 4, 5, 15, 25	Year 1, 2, 3, 4, 5, 15, 25	With annual report
Woodland understorey planting	Check height of planted trees – once they are 3 metres tall, understorey planting is required.	Year 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and as needed/agreed	All	With annual report
All habitats	Landowner annual report, covering all management activities on TOE template	Annually	1-30	October 31 all years
All habitats	Fixed and non-fixed-point photography	Flowering period	annually	With annual report July all years
All habitats	Soil tests	every 3 years	1,3,6,9,12,15,18,21,24,27,30	With annual report

HABITAT ESTABLISHMENT WORKS SCHEDULE

Habitat type / feature	Habitat creation / enhancement task	Frequency / duration	Timing												Protected species considerations	Date completed
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lowland meadow	Cut the existing modified grassland to 150 mm and remove arisings.	Twice annually for 5 years				■			■	■	■				Ensure that nesting bird checks are undertaken prior to cutting.	04/2023
Lowland meadow	Cut to 50 mm, harrow, and overseed existing grassland with green hay or a suitable seed mix.	Once (timing is method dependent)							■		■				N/A	04/2023
Other neutral grassland	Plough existing arable fields to depth of 50 cm and invert soil. Break soil to a fine tilth with a rotary tiller / power harrow.	Once at any time of year (optimal immediately before seeding)			■	■				■	■				N/A	04/2023
Other neutral grassland	Seed with green hay or a suitable seed mix.	Once (timing is method dependent)			■				■		■				N/A	04/2023
Other neutral grassland	Cut grassland to 150 mm and remove arisings from site.	Once in first year of establishment						■	■						N/A (grassland is unlikely to be suitable for nesting birds while still establishing)	04/2023
Floodplain wetland mosaic and CFGM	Cut the existing neutral grassland to 150 mm and remove arisings.	Twice annually for 3 years						■	■						Ensure that nesting bird checks are undertaken prior to cutting.	04/2023
Floodplain wetland mosaic and CFGM	Cut to 50 mm, harrow, and overseed existing grassland with local seed sources or a suitable seed mix.	Once (timing is method dependent)						■	■						N/A	04/2023
Mixed scrub	Plant tree / shrub whips in natural clusters.	Once (replace any failed specimens as necessary)	■	■									■	■	N/A	01/2023
Ponds / Temporary pools	Excavate ponds and temporary pools.	Once (during period when ground is dry)				■	■	■	■	■	■	■				04/2023
Invertebrate banks	Use spoil from pond earthworks to create invertebrate banks.	Once (during pond creation work)				■	■	■	■	■	■	■			N/A	04/2023
Ponds / Temporary pools	Plant marginal and emergent vegetation	Once (replace any failed specimens as necessary)				■	■	■							N/A	04/2023
Hedgerow (recently planted)	Replace any failed specimens	During initial five years	■	■									■	■	N/A	01/2023

Hedgerow (recently planted)	Cut to 45 – 60 cm to encourage dense growth and mulch base.	Once (within the first 1-2 years of establishment)			■	■									N/A (hedgerow will not be suitable for nesting birds while still establishing)	01/2023

Habitat type / feature	Habitat creation / enhancement task	Frequency / duration	Timing												Protected species considerations	Date completed
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hedgerows (existing)	Plug existing gaps by additional planting	Once (replace any failed specimens as necessary)	■	■									■	■	N/A	01/2023
	Or plug existing gaps by hedgerow laying.	Once	■	■									■	■	N/A	01/2023
Woodland (existing)	Plant trees / shrubs to establish an understorey.	Once (replace any failed specimens as necessary)	■	■									■	■	N/A	01/2023

HABITAT MANAGEMENT SCHEDULE

Habitat type	Habitat management task	Frequency / duration	Timing												Protected species considerations	Date completed
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lowland meadow / Other neutral grassland	Manage as a hay meadow and cut to 150 mm. Leave cut material in situ for a week to drop seeds.	Annually						■	■						Ensure that nesting bird checks are undertaken prior to cutting.	
Other neutral grassland	Cut existing field margins on a rotational basis (2/3 left uncut each year)	Annually						■	■						Ensure that nesting bird checks are undertaken prior to cutting.	
Lowland meadow / Other neutral grassland	Light winter grazing, removing livestock if poaching levels exceed 20%	Annually	■	■						■	■	■	■	■	N/A	
Floodplain wetland mosaic and CFGM	Regular mowing to maintain species diversity. Mowing once, usually in late summer. Light grazing, typically after mowing.	Annually							■	■	■				Ensure that nesting bird checks are undertaken prior to cutting.	
Mixed scrub	Cut back scrub if necessary to maintain clearings / glades.	As necessary based on annual monitoring									■	■			N/A	

Ponds / Temporary pools	Manage marginal vegetation through grazing or cutting. If cutting, remove 1/5 vegetation annually.	Annually if cutting or as necessary based on grazing levels													Undertaking pond management in autumn minimises risks to wildlife.	
Hedgerows	Cut hedgerow.	Every three years													N/A	
	Or re-lay hedgerow.	Every five to ten years													N/A	
Woodland (existing)	Thin, coppice or pollard 5% of semi-mature to mature trees (retain future veterans and leave decaying trees as standing deadwood)	Every five years													Ensure that any trees with potential bat roosting features are retained.	

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Online resources:

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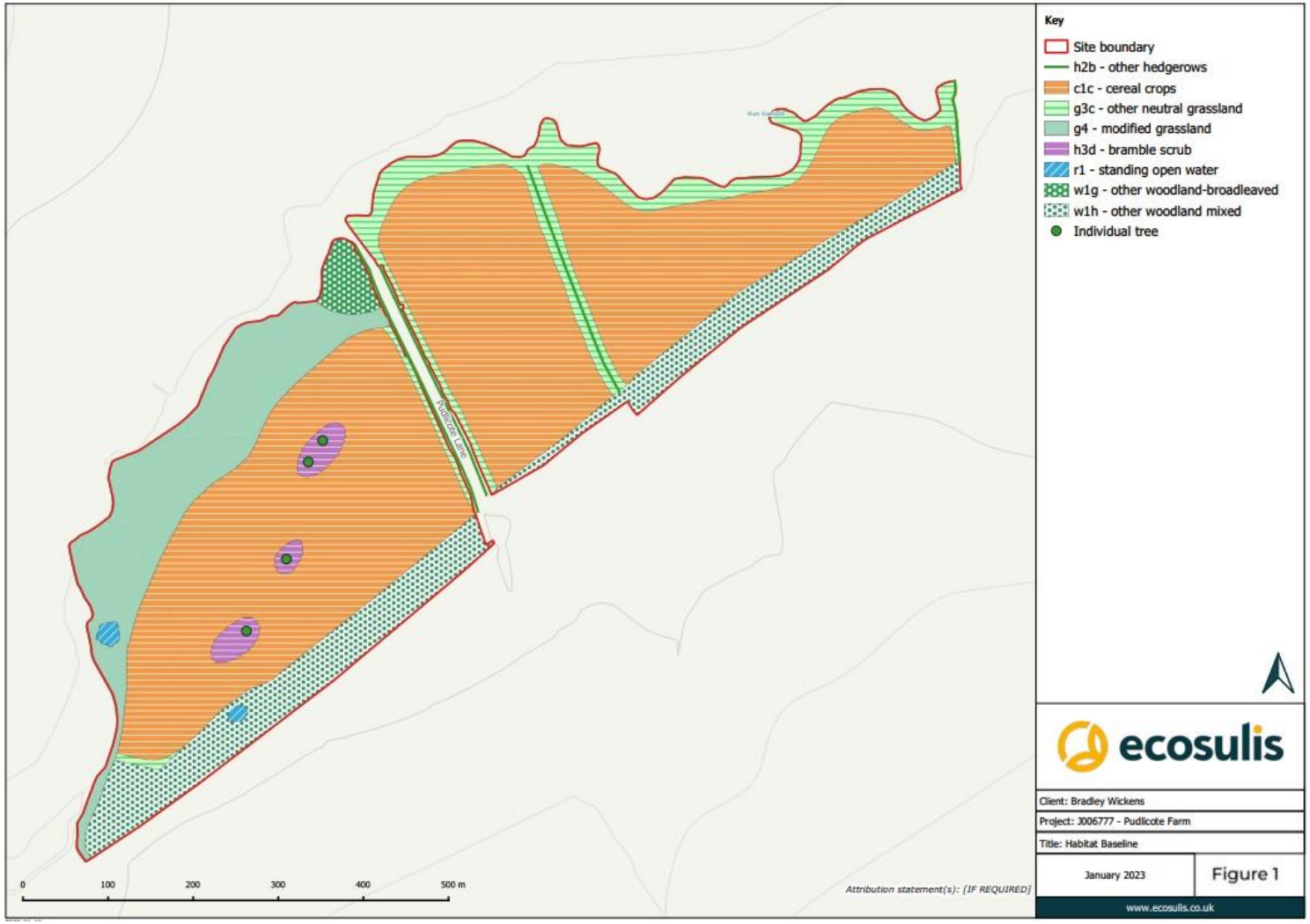
Magnificent Meadows How to create invert mounds (magnificentmeadows.org.uk) [Accessed 24th January 2023)

Rare Breeds Survival Trust, (Rare Breeds Survival Trust (www.rbst.org.uk)) [Accessed 24th January 2023)

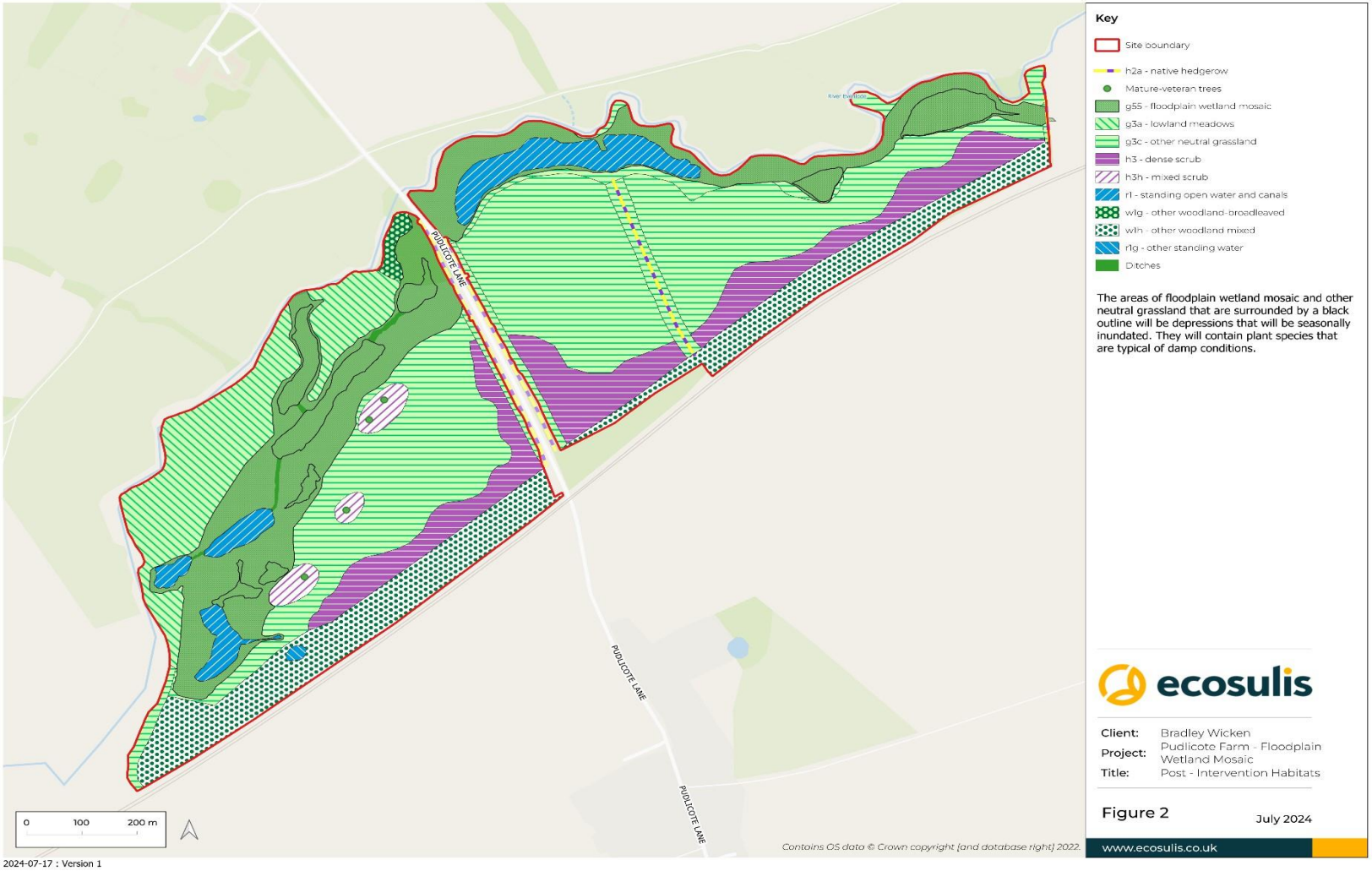
APPENDIX I: BASELINE HABITATS



APPENDIX II: BASELINE HABITAT CONDITION JUSTIFICATION

DEFRA 4.0 HABITAT TYPE	HABITAT CONDITION	CONDITION JUSTIFICATION
Grassland - Modified grassland	Poor	Passes five of the seven criteria in the Defra 4.0 condition assessment table for low distinctiveness grassland habitat types. Fails criteria one and two because the species diversity is low (less than 4 species per m2), and the sward height is even throughout (grass is cut to a uniform height)
Grassland - Other Neutral Grassland	Poor	The grassland areas either pass two or three of the six criteria in the Defra 4.0 condition assessment table for medium and high distinctiveness grassland habitat types. Fails criteria one, two, five and six because the appearance and composition of the grassland does not match the characteristics required for the 'other neutral grassland' habitat type, the sward height is tall throughout, there is a cover of species that indicate sub-optimal condition that is more than 5% of total area (38%-53% in total), and there is not consistently more than 9 species per m2 (the average across site is 3-5 species per m2).
Ponds	Moderate	Pass seven of the nine criteria in the Defra 4.0 condition assessment table for non-woodland ponds. Fail criteria one and two due to moderate water quality and because there is not distinct semi-natural habitat (of medium distinctiveness and above) for at least 10m from the edge of the pond; currently the surrounding landscape is modified grassland and arable.
Bramble Scrub	N/A	No condition assessment required
Arable	N/A	No condition assessment required
Other woodland; broadleaved	Poor	Woodland parcel scores a total of 24 points in the Defra 4.0 condition assessment table for woodland habitat types. Failures relate to woodland structure, regeneration, deadwood, absence of mature and veteran trees, as the woodland has been recently planted and has not established yet.
Other woodland; mixed	Poor	Woodland parcel scores a total of 25 points in the Defra 4.0 condition assessment table for woodland habitat types. Failures relate to woodland structure, regeneration, deadwood, absence of mature and veteran trees, as the woodland has been recently planted and has not established yet.
Hedgerows (native species-rich with trees and native with trees)	Moderate	All pass functional group A relating to height and width (between 3-5 m wide and 3-5 m tall) and functional group D relating to the presence of invasive non-native species and damage. Failures relate to a high percentage cover of undesirable species (20-40%), the presence of gaps at the base or canopy, and the number of trees present.

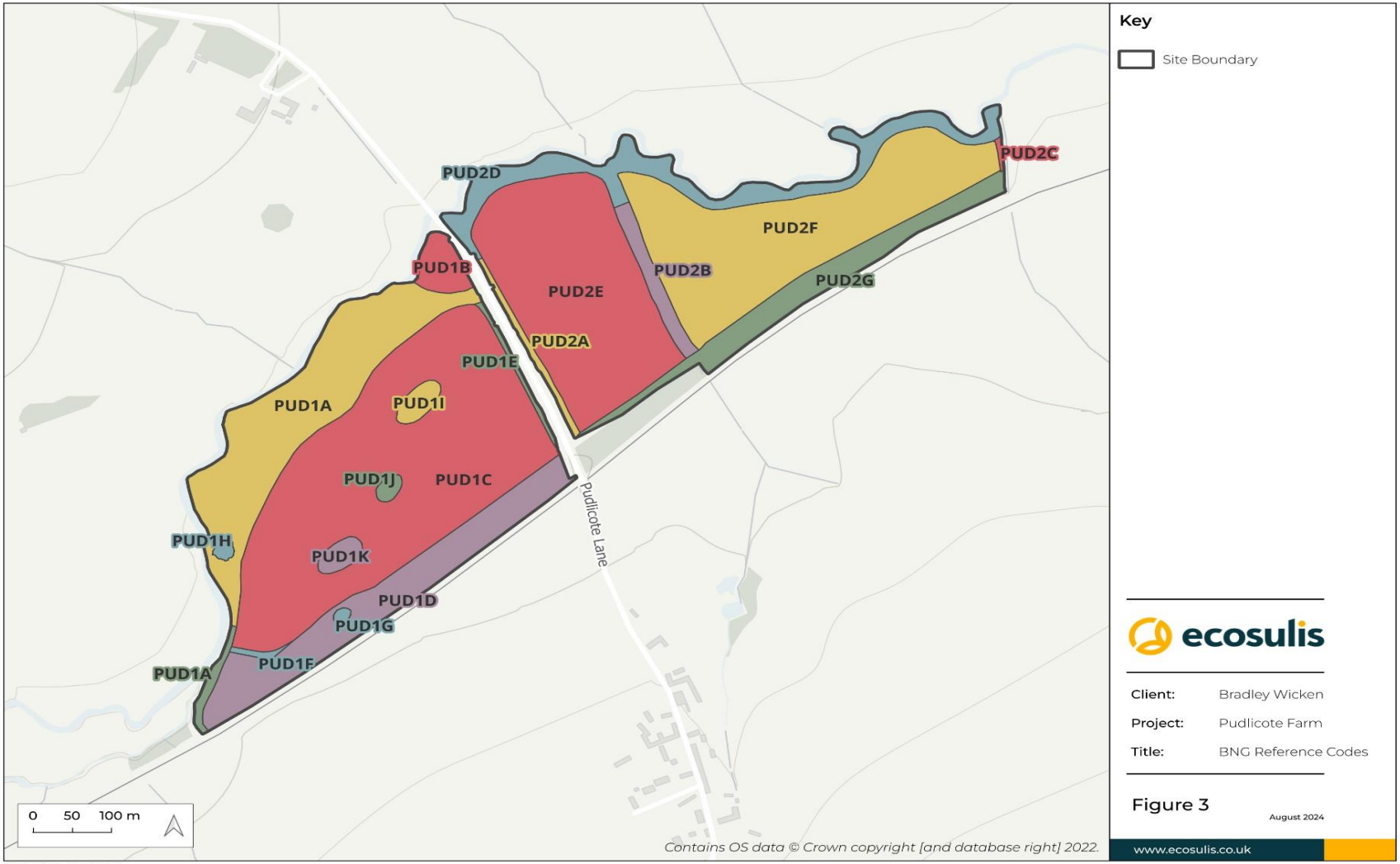
APPENDIX III: PROPOSED HABITATS



APPENDIX IV: DEFRA METRIC 4.0 OFF-SITE HEADLINE RESULTS

Off-site baseline	*Habitat units*	90.01	
	Hedgerow units	13.51	
	Watercourse units	0.00	
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	278.24	
	Hedgerow units	21.21	
	Watercourse units	0.00	
Off-site net change (units & percentage)	*Habitat units*	188.23	209.12%
	Hedgerow units	7.69	56.91%
	Watercourse units	0.00	0.00%
Combined net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	188.23	
	Hedgerow units	7.69	
	Watercourse units	0.00	
Spatial risk multiplier (SRM) deductions	*Habitat units*	0.00	
	Hedgerow units	0.00	
	Watercourse units	0.00	
FINAL RESULTS			
Total net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	188.23	
	Hedgerow units	7.69	
	Watercourse units	0.00	

APPENDIX V: BNG REFERENCE CODES



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