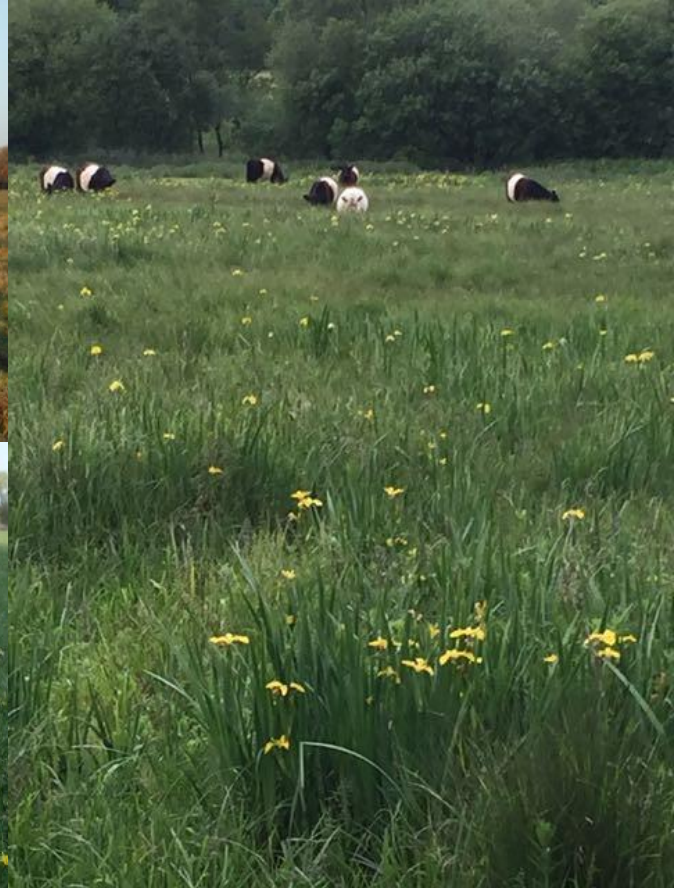


Oxford Flood Alleviation Scheme



Landscape and Habitat Creation – Delivery and Management Plan

February 2023 Rev. 08

Prepared by the Environment Agency, Jacobs and Gillespies



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1.0 INTRODUCTION

This document sets out the landscape and habitat creation proposals and long-term management objectives and responsibilities for the Oxford Flood Alleviation Scheme (OFAS), Oxford. The Landscape and Habitat Creation: Delivery and Management Plan (LHCDMP) has been prepared alongside Planting Plans 00-14 (and Landscape General Arrangement Plans 00-14). This document will provide a framework for the production of a detailed Landscape and Environment Management Plan (LEMP) which will cover the long-term management and monitoring of the site for 30 years +. The LEMP will be submitted if required by a planning condition.

Long-term management and monitoring are required to ensure that the environmental objectives of the Scheme are met, including the delivery of biodiversity net gain.

The proposals for off-site habitat creation, management and monitoring are set out in the Biodiversity Net Gain Report which is part of the Environmental Statement Addendum.

2.0 DEVELOPMENT DESCRIPTION

For practical purposes associated with the design and environmental assessment of the Scheme, the study area has been divided into four areas, Area 1 (North of Botley Road), Area 2 (Botley Road to Willow Walk North), Area 3 (Willow Walk to Devil's Backbone) and Area 4 (Devil's Backbone to the junction with Hinksey Stream and River Thames).

The Scheme will comprise:

New two-stage channel between the A34 to the west and the railway to the east, to the west of Oxford city centre. The channel will extend for a length of approximately 5km connecting with parts of the existing braided river network, south-easterly from the confluence of the Botley and Seacourt Streams north of Botley Road, to just south of Kennington running from the A420 Botley Road south-easterly to downstream of the A423 (southern ring road). For the main part, this will be approximately parallel to the A34 to its west and the railway to its east. The new channel, will accommodate excess flow from the Seacourt Stream, Bulstake Stream and Hinksey Stream, with the aim of reducing the water level in the main River Thames and so reducing the frequency of flooding in built-up areas. The channel will comprise two stages:

- First stage, a new stream that will look natural and connect with the existing braided network of streams at different points. The new stream will be permanently wet and carry flowing water all of the time; and
- Second stage, a wide, shallow-sloped channel created by lowering the ground between 0.5m and 1.2m on one or both sides of the first stage stream that blends into the existing ground level. which will increase the capacity of the floodplain during higher flows while remaining dry during low flows.

New flood embankments and walls to defend homes and businesses which would otherwise continue to flood even with the reduced river levels.

New culverts and bridges to maintain access routes.

Creation of new and/or improved habitat for flora, fauna and fisheries to help mitigate habitat losses, to meet Water Environment (Water Framework Directive) Regulations (WER) measures and support biodiversity targets. This work includes the creation of approximately:

- 3.5km of new river habitat
- 18ha of floodplain grazing marsh within the area of lowered floodplain, including ponds, backwaters and scrapes.
- 17ha of species-rich floodplain meadow (MG4)
- 10ha of wet woodland
- 3.5km of hedgerow

These habitats are illustrated on General Arrangement plan drawing IMSE500177-CH2-L00-00-VS-L-0600. Full details of habitat net gains and losses are set out in Section 8 of the Environmental Statement.

The habitat improvement work also includes:

- in-channel habitat improvements to existing watercourses
- removal of Towles Mill weir, which in conjunction with a separate scheme at the upstream end of the Seacourt Stream, will facilitate unimpeded fish passage around the west of Oxford for the first time in over a century.

3.0 HABITAT CREATION AND MANAGEMENT OBJECTIVES

The following aims and objectives set out a framework for guiding habitat creation and management of the site.

Aim 1: To sensitively maintain and enhance the ecological value of the Scheme area

Objectives:

- Ensure that the biodiversity net gain predicted for the Scheme is achieved and maintained.
- Maintain and conserve a rich biodiversity and ecology to benefit important flora and fauna.
- Maintain a rich mosaic of fresh-water habitats across the Scheme area, creating a wetland wildlife corridor to the west of Oxford.
- Maintain an adequate level of maintenance of marginal planting so the scheme's ecological habitats continue to function effectively allowing natural geomorphological evolution to occur, whilst ensuring the flood scheme operates to the required standard.
- Ensure that replacement trees planted to mitigate tree losses during construction are maintained in a healthy condition in the long-term and that the predicted canopy cover is achieved.

Aim 2: To enhance the aesthetic quality of the landscape in an ecologically sensitive manner

Objectives

- Maintain and enhance views towards the historic city skyline from the protected views of the 'Oxford Views Cones' from higher ground to the west of the Scheme area through removal or screening of intrusive features. Conversely to maintain clear views towards the western hills from the Scheme area.
- Maintain a cohesive, high quality riparian landscape appropriate to the river valley setting by managing small blocks of wet woodland outside the lowered floodplain, tree and shrub groups along the new stream, and hedgerows following the top of the lowered floodplain in parts of the Scheme area to break up the open fields.

Aim 3: To maintain and enhance the amenity value of both the proposed development and the existing landscape

Objectives

- Maintain a high quality, visually attractive setting for site users.
- Improve pedestrian and cycle access across the site.
- Provide opportunities for local communities and visitors to engage with the natural environment.

Aim 4: To manage the Scheme area sustainably

Objectives

- Maximise the sustainability of site maintenance operations.
- Promote a cost-effective management strategy which demonstrates value for money e.g. through local re-use of the hay from the meadow and local re-use of arisings from woodland management.
- Promote an ecological-based best practice management approach.
- Maintain a flexible management approach which responds to landscape change, monitoring results and user requirements.
- Ensure that undesirable invasive and dominating plant species are prevented from establishing in the newly designed landscape.

4.0 PROPOSED FARMING INFRASTRUCTURE

Much of the scheme area is already farmed and, as a result, a lot of the required infrastructure is already in place. In those areas where the field layout will be altered by the scheme and the management regime changed, we have been taking advice from our collaborative partner, Earth Trust, on the cattle handling facilities, fencing and gates that will be required and also the best way to retain public access.

5.0 MANAGEMENT RESPONSIBILITIES

During Construction: Land within the red line boundary

Some areas of existing habitat or proposed habitat creation will be in place and require maintenance while the scheme is being built. This work will be undertaken by a landscape contractor appointed by the Environment Agency, under the supervision of the Environment Agency's Environmental Clerk of Works and Landscape Clerk of Works.

Post-Construction Years 1-5: Land within the red line boundary

For the first five years, all of the land within the red line boundary will be managed by a landscape contractor appointed by the Environment Agency. Management activities will be undertaken in accordance with this Delivery and Management Plan and the LEMP. The maintenance work will be supervised by the Environment Agency's appointed Landscape Clerk of Works and Environmental Clerk of Works.

Where land within the red line boundary does not form part of the permanent scheme, it will remain in the possession of the existing landowners, with the EA seeking the right to occupy the land during

construction. When the land is no longer required, it will be reinstated and made available to the landowner again once the quality of the reinstatement meets pre-construction conditions. No changes are proposed to the type and condition of existing habitats in these areas, meaning that no change will be required to the landowner's current management regime.

Post-Construction Years 6-30+: Land that is part of the permanent scheme

- Management of Land Owned by the Environment Agency

Once the scheme is constructed, the Environment Agency expect to own around 61ha of land, including areas of the new stream, lowered floodplain, wet woodland and floodplain meadows. After the initial 5 years of landscape management and establishment via a landscape contractor, this land will be leased to an environmental organisation to act as land manager. Through the lease agreement the land manager will be required to undertake habitat and landscape maintenance to ensure biodiversity net gain is delivered and the functionality of the flood scheme is maintained.

The long-term lease agreement will ensure that specialist skills needed to maintain the habitats remain dedicated to the scheme. It will also facilitate opportunities for the public and volunteers to get involved and encourage engagement with local schools and universities. This could involve using the area as a living laboratory; monitoring, learning and sharing as the new wetland habitats develop. This will increase public awareness of the environment and increase local ownership of the scheme, to ensure that the new landscape and habitats are looked after for the lifetime of the scheme (100 years) and beyond.

- Management of Land Owned by Others

It is anticipated that some land within permanent scheme area will be handed back to the existing landowner once construction is complete. In this situation either one or both of the following will apply:

- a) The Environment Agency will retain the right to access and maintain the land to ensure operation of the Scheme and delivery of the associated biodiversity net gain so as to comply with the requirements of any planning permission granted; or
- b) The landowner will enter into a covenant agreement with the Environment Agency that will ensure the long-term maintenance, monitoring and delivery of the biodiversity net gain so as to comply with the requirements of any planning permission granted.

6.0 MANAGEMENT FUNDING

Maintenance (operational and landscape) will be funded by the Environment Agency for the lifetime of the scheme. This will be secured as part of the Scheme's funding package for the first 10 years and after this it will be funded through an annual maintenance budget. Funding brought in by the land manager will be supplementary.

7.0 MONITORING

The proposed long-term monitoring programme for the scheme is set out in Section 17.2 of the Environmental Statement Addendum.

In addition to this over-arching monitoring plan, all habitat creation areas will be monitored to compare how they are developing in comparison to the anticipated 'time to target condition' as set out under the Biodiversity Metric 3.1 Technical Supplement. Monitoring results will be reported to

the Local Planning Authority as required to demonstrate the delivery of biodiversity net gain. The monitoring results may lead to the habitat management plans being amended and updated. This will be an iterative process. The Environment Agency will maintain oversight of all the monitoring.

8.0 HABITAT CREATION AND MANAGEMENT PROPOSALS

The habitat creation, delivery and management proposals for the scheme are set out over the next few pages and should be read in conjunction with Planting Plans 00-14. More detailed management and monitoring specifications for each habitat type will be submitted in the form of a Landscape and Environment Management Plan (LEMP) if required by a planning condition.

New Stream and Existing Streams Target Priority Habitat – River

Description

The new stream will be created by excavating 1.5-1.6m below existing ground levels. It will be permanently wet and carry flowing water all of the time.

Aims

The new stream has been designed to look and behave like a natural river whilst still playing its role in the management of flood waters. There will be diverse geomorphology; with pools where the water is deeper and flows slowly, and gravel riffles where the water is shallower and flows quickly. Backwaters will also be excavated. This will lead to greater biodiversity in the new river than in the existing channels, which have been over-widened over the years. Away from structures such as bridges, natural river processes of bank erosion and silt/gravel deposition will be allowed to occur and the new stream may move within the lowered floodplain.

Delivery



1. Topsoil strip

Prior to excavation of the new stream, topsoil from the existing fields will be stripped and carefully stored separately from subsoil and topsoils that have been stripped from other parts of the site. Topsoil removed from the existing river banks where the riparian vegetation includes Himalayan balsam will be taken off site to a licenced tip.

2. Excavation

The new stream will be created by lowering the ground between 1.5 and 1.6m. It will be excavated to have a varied profile in cross section and long section to create the type of profile that would occur naturally.

3. Seeding

The banks of the new stream will be seeded with a wetland meadow mix of 100% grass seed: common bent, crested dogstail, slender creeping red fescue and smaller cat's tail. Ideally, seeding will follow on immediately after topsoil spreading and cultivation to avoid the risk of weeds gaining a foothold or of a flood event washing away all the soil prior to establishment of the sward.

4. Natural regeneration

Bankside/riparian vegetation will establish through natural regeneration and the site will be managed to allow for this.

5. Trees and shrubs

Native tree and shrub planting is proposed close to the new stream in order to provide pockets of shaded habitat along its length. The areas of tree and shrub planting have had to be carefully designed so that they will not restrict flows but will increase biodiversity and complement the existing landscape character of the area. Feathered trees (with the bottom branches retained) will be planted rather than standard trees (with the bottom branches removed), in order to avoid creating a 'parkland' landscape.

6. Control of harmful weeds and invasive non-native species.

If weather conditions allow, seeding on the banks of the new stream will take place immediately after topsoil spreading and cultivation to avoid the risk of harmful weeds and invasive non-native species gaining a foothold prior to establishment of the sward. If there is a delay between cultivation and seeding, weeds that grow on the seedbed will be sprayed with herbicide before they can flower and set seed. An allowance has been made for the hand-pulling of weeds across the site, as required.

7. Maintenance Years 1-5.

- Weed control - hand-pulling or spot-spraying of harmful weeds twice a year. Some mechanical cutting may also be required
- Litter/Debris removal – litter picking and debris removal to maintain flows.
- Silt removal – this may be required periodically around bridges and culverts in order to maintain the designed capacity of the new stream and existing streams.

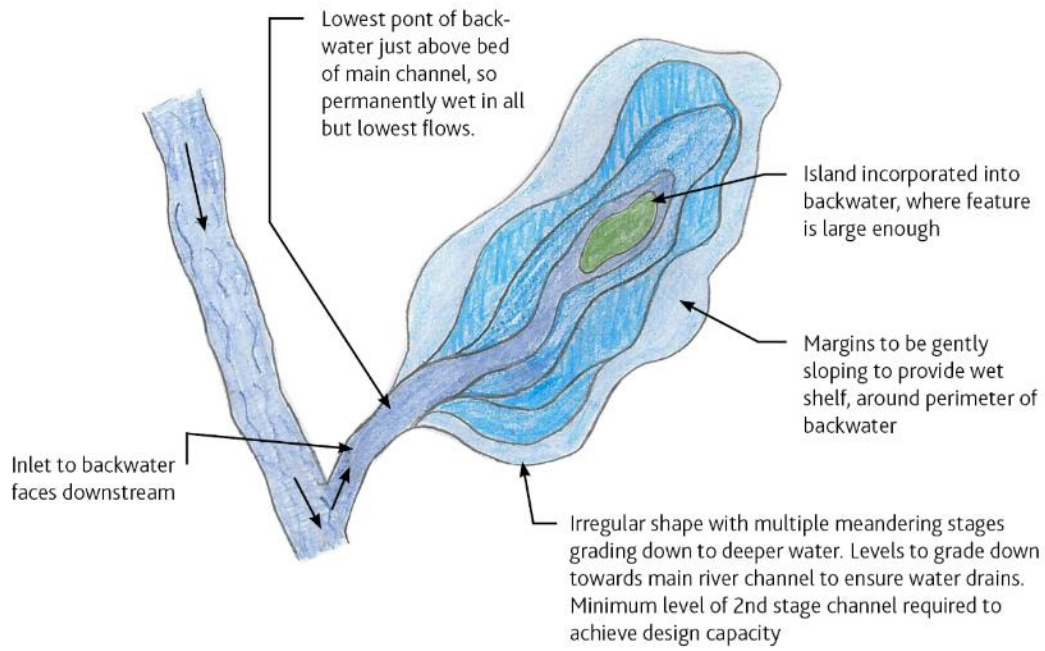
8. Long term management and maintenance

Weed control, debris removal and silt removal around structures will be undertaken as required to maintain channel capacity and maximise biodiversity.

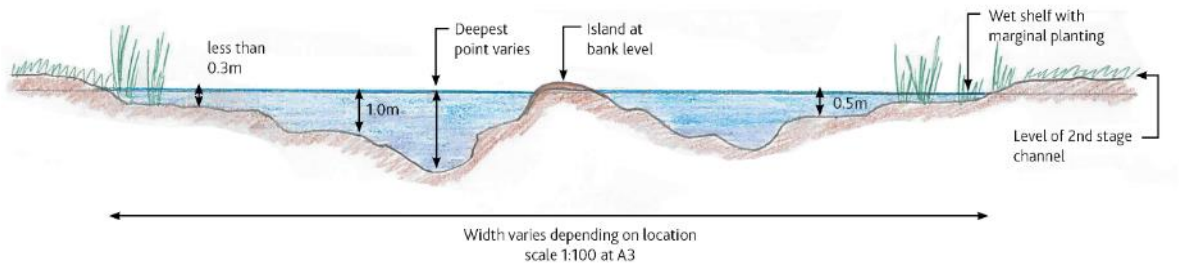
Creating backwaters

Backwaters are areas of water that are open to the river channel at one end (usually the downstream end). They are characterised by slack and shallow water and silt substrates. Backwaters can be formed naturally as the main river migrates across the floodplain, cutting off meanders. The creation of a new flood channel presents an opportunity to include a range of backwater habitat types on the Oxford FAS by:

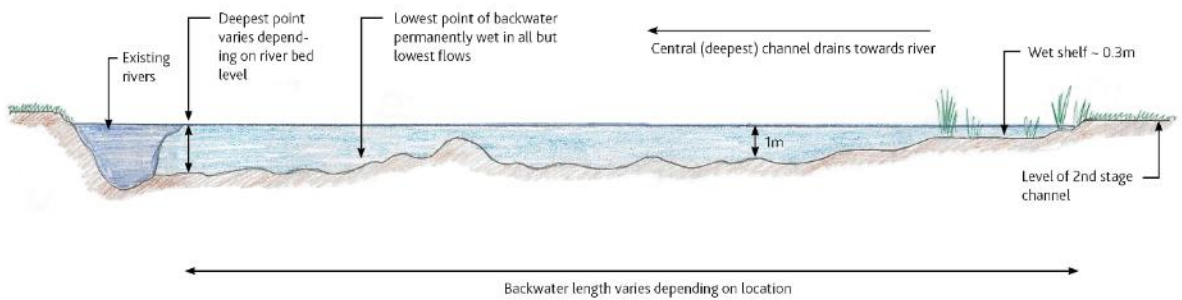
- Creating new off-line spawning and rearing habitat adjacent to the new stream.
- Retaining the existing watercourses that will be cut off in low flows.
- Backwaters provide important habitat for a range of aquatic flora and fauna, including invertebrates, macrophytes and fish. They can help deliver objectives of the Water Framework Directive by:
 - Providing refuge for juvenile fish during times of flood.
 - Increasing morphological diversity and enhancing the ecological value of the streams.



TYPICAL PLAN VIEW OF NEW BACKWATER



TYPICAL CROSS SECTION OF NEW BACKWATER



TYPICAL LONG SECTION OF NEW BACKWATER



A backwater being excavated at Cossington Meadows, Leicestershire in September 2014 (Photos A. Driver)



The backwater at Cossington Meadows, Leicestershire in November 2014

Linking in with existing streams

We are combining flows from the Bulstake Stream and Hinksey Stream into a new section of stream. Up to where they combine, these existing streams will maintain their existing alignments and flows. The new stream is designed to provide higher quality habitat than the existing water courses and should be as good if not better for wildlife. The existing streams will also be enhanced. None of the existing streams provide high quality pristine river habitat because they have been subject to historic re-sectioning and engineering. We intend to improve their ecological quality by placing gravels on the stream bed and creating a series of riffles to provide more diverse channel substrates and varied profiles.

The existing downstream end of the Bulstake Stream will be isolated. This is already impounded by the River Thames. This section will become a backwater to the River Thames in low flows and it will look the same as it does now.

The Hogacre Ditch does not have flow all year round. The ditch is dry for much of the year and tends to contain still water habitat when it is wet. It will become 'off-line' and as a consequence will receive less silt and become more like a linear pond.

Lowered Floodplain (Area 1, Planting Plan 01)

Target Priority Habitats – Reedbed, fen and ponds

Description

The lowered floodplain in Area 1 will be created by lowering the ground between 0.5m and 1 m. The ground will then be very wet for much of the year because it is already very damp at its existing level. The habitats created will be wet grassland, reedbed, fen and ponds. The area will be too wet to graze so a mechanical cut will also be carried out twice a year (if required) to keep down woody growth. In this way, the lowered area will be able to function as part of the flood alleviation scheme whilst providing valuable habitat.

Aims

The aim is to create freshwater habitats that are nationally in decline. We will create and manage the habitats so that they meet the definitions 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.

Delivery

Methodology

1. Topsoil strip

Prior to excavation of the lowered floodplain, topsoil will be stripped and carefully stored separately from subsoil.

2. Excavation

The lowered floodplain will be created by lowering the ground between 0.5m and 1m to east and west of the existing Seacourt Stream.

3. Seedbed preparation

Once the lowered floodplain has been excavated, it is envisaged that much of the ground will permanently hold water, creating ponds, fen and reedbeds. Above the water, if the ground is dry enough, a thin layer (100-150mm) of the stored topsoil will be spread over the subsoil. The aim is to have sufficient fertility to allow the area to vegetate and stabilise quickly (prior to a flood event) but to also create conditions that will allow a diverse flora to establish.

3. Seeding

Ideally, seeding will follow on immediately after topsoil spreading to avoid the risk of weeds gaining a foothold or of a flood event washing away all the soil prior to establishment of the sward. If it is not possible to spread topsoil because the ground is too wet, then seeding will take place straight onto the subsoil.

The grass and wildflower seed mixes have been chosen to reflect the existing local flora and to grow in the very wet conditions that are likely to develop in this area.

- The margins of the ponds will not be seeded in order to allow natural regeneration to take place.
- The rest of the lowered floodplain in Area 1 will be seeded with a wetland meadow/floodplain pasture grass and wildflower mix, 80% grass seed and 20% wildflower seed. This will include species such as lady's bedstraw, yellow rattle, selfheal and ragged robin.

4. Natural regeneration

It is anticipated that some natural regeneration of wetland species, such as common reed (*Phragmites australis*), will occur and the site will be managed to allow this.

5. Control of harmful weeds and invasive non-native species.

Only topsoil removed from the site will be replaced on the lowered floodplain. Himalayan Balsam has not been identified in Area 1 as yet but if it is then topsoil removed from areas of the river bank where the riparian vegetation includes Himalayan balsam will be taken off site to a licenced tip. If weather conditions allow, seeding will take place immediately after topsoil spreading to avoid the risk of weeds gaining a foothold prior to establishment of the sward. If there is a delay between cultivation and seeding, weeds that grow on the seedbed will be sprayed with herbicide before they can flower and set seed. An allowance has been made for the hand-pulling of weeds across the site, as required.

6. Maintenance Years 1-5.

- Weed control - spot spraying and hand-pulling of harmful weeds twice a year.
- Mowing and removal of arisings - 2 cuts in the first growing season followed by an annual or twice yearly cut, as required to keep down goat willow and other woody growth or unpalatable plants.

7. Long-term management and maintenance.

At the end of Year 5, it is envisaged that the habitat will be established and be in a condition that is suitable for handover to the long-term land manager. It is envisaged that the habitat in this area will develop and be managed as reedbed, fen ponds and wet grassland. The ponds will silt-up and revert to terrestrial habitat over time so they will be managed to include a range of vegetation stages from clear, open water with submerged, floating and emergent plants to reed swamp and marsh. A programme of rotational clearance/slubbing-out will be required and this will be based on observations of the work required to maximise ecological interest. All pond clearance work will be undertaken in late summer and early autumn. The cleared material will need to be drained next to the pond and then removed off site.

The area will be monitored and managed so that the target conditions of each habitat can be met within the anticipated timescales set out in the Defra 3.1 Metric Technical Supplement.

Lowered Floodplain (Area 2, Planting Plans 02, 03) Target Priority Habitats – Lowland Meadow and Other Neutral Grassland

Description

The lowered floodplain in Area 2 has been kept as narrow as possible in order to minimise the impact on the MG4a floodplain meadow in Hinksey Meadow. It will be created by lowering the ground down to a maximum of approximately 0.6m, with a gradual 1:20 slope. The ground at the top of the slopes will have the same characteristics as the surrounding meadow but the ground will become increasingly wet down to 0.6m.

Aims

Since MG4a is on the dry end of the MG4 spectrum, it is envisaged that the upper parts of the lowered floodplain in Area 2 may be able to support an MG4 community and be dry enough to manage as part of Hinksey Meadow; with a summer hay cut and aftermath grazing. Vegetation that prefers wetter ground will develop in the lower areas and it is likely that these will be too wet to graze, so a mechanical cut will be carried out twice a year (if required) to keep down woody growth. In this way, the lowered floodplain will be able to function as part of the flood alleviation scheme whilst providing valuable habitat.

Delivery

Methodology

1. MG4a Turf Translocation

In the area of the lowered floodplain which overlaps with the existing MG4a, the turf will be carefully lifted and translocated to a suitable donor site. Full details are set out in the MG4a Mitigation Strategy which can be found in Appendix D of the Environmental Statement. It will not be possible to replace the turf at the top of the slopes after the ground has been slightly lowered because of the risk of the turf drying out while the excavation work is carried out in Area 2.

2. Topsoil strip

Prior to lowering the floodplain in areas that are not currently MG4a, the topsoil will be stripped and carefully stored separately from subsoil. Excavation will take place from within the final footprint of the lowered area to minimise damage to the MG4a.

2. Excavation

The lowered floodplain will be created by lowering the ground down to 0.6m. Tracking over the lowered ground will be avoided wherever possible to minimise soil compaction.

3. Seedbed preparation

Once the lowered area of the floodplain has been excavated, where the ground is dry enough, a thin layer (100-150mm) of the stored topsoil will be spread over the subsoil. The aim is to have sufficient fertility to allow the area to vegetate and stabilise quickly (prior to a flood event) but to also create conditions that will allow a diverse flora to establish.

3. Seeding

Ideally, seeding will follow on immediately after topsoil spreading to avoid the risk of weeds gaining a foothold or of a flood event washing away all the soil prior to establishment of the sward. If it is not possible to spread topsoil because the ground is too wet, then seeding will take place straight onto the subsoil.

The grass and wildflower seed mixes have been chosen to reflect the existing local flora and to grow in the conditions that are likely to develop in this area and will be of local provenance.

- The upper slope of the lowered floodplain in Area 2 will be seeded with MG4a seed that is either harvested from Hinksey Meadow (with landowner agreement) or from the nearby Clattinger Meadow.
- The lower slopes of the lowered floodplain in Area 2 will be seeded with a wetland meadow/floodplain pasture grass and wildflower mix, 80% grass seed and 20% wildflower seed. This will include species such as lady's bedstraw, yellow rattle, selfheal and ragged robin.
- The sections of the lowered floodplain that will include the existing jubilee scrape will be seeded with a pond edge mix of 80% grass seed and 20% meadow and wetland wildflower seed, such as tufted vetch, meadow buttercup, meadowsweet and purple loosestrife.

4. Natural regeneration

It is anticipated that some natural regeneration of wetland species will occur in the wetter part of the site and the vegetation will be managed to allow this.

5. Control of harmful weeds and invasive non-native species.

Only topsoil removed from the site will be replaced on the lowered floodplain. If weather conditions allow, seeding will take place immediately after topsoil spreading to avoid the risk of weeds gaining a foothold prior to establishment of the sward. If there is a delay between cultivation and seeding, weeds that grow on the seedbed will be treated with herbicide (lower slopes) or physically removed (upper slopes next to MG4a) before they can flower and set seed. An allowance has been made for the hand-pulling of weeds across the site, as required.

6. Maintenance Years 1-5.

Upper Slopes:

- Weed control - hand-pulling of harmful weeds twice a year and/or as required to prevent seed setting/dispersal that would lead to any impacts on the quality of the existing Hinksey Meadow.
- Cut twice in the first year to encourage sward development – arisings to be removed off site.
- Years 2-5: Single summer hay cut with aftermath grazing.

Lower Slopes:

- Weed control - spot spraying and hand-pulling of harmful weeds twice a year.
- Mowing and removal of arisings - 2 cuts in the first growing season followed by an annual or twice yearly cut, as required to keep down goat willow and other woody growth or unpalatable plants.

7. Long-term management and maintenance.

At the end of Year 5, it is envisaged that the habitat will be established and be in a condition that is suitable for handover to the landowner for long-term management and maintenance, where agreed.

Upper Slopes – It is envisaged that it will be possible to manage the upper slopes in the same way as the rest of Hinksey Meadow, with a summer hay cut followed by aftermath grazing. The infrastructure is already in place to enable this management regime and the detailed arrangement of any new fencing and gates will be agreed with the landowner to ensure that grazing can continue.

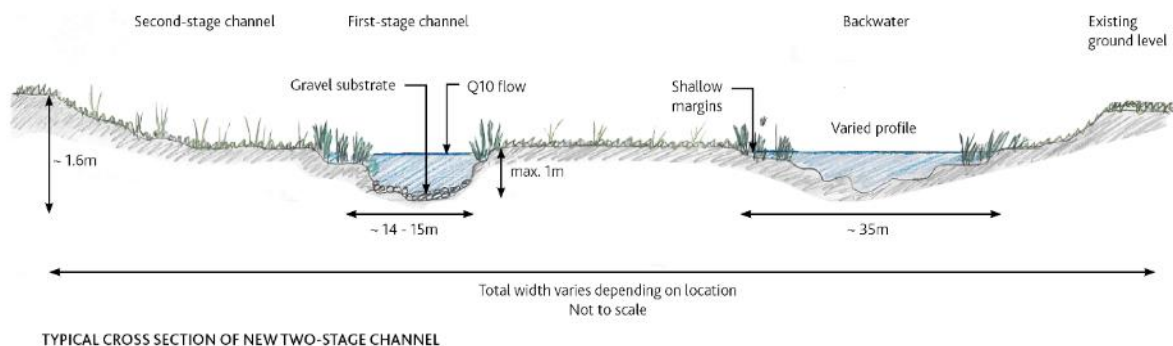
Lower Slopes – It is likely that an annual or twice yearly cut will be required to keep down goat willow and other woody growth or unpalatable plants. This will either be undertaken by the Environment Agency or the landowner, depending on any agreements that are reached.

Lowered Floodplain (Area 3, Planting Plans 04, 06, 07, 08, 09)

Target Priority Habitats – Other Neutral Grassland/Floodplain Grazing Marsh with Ponds and Scrapes

Description

The lowered floodplain will be created by excavating the ground between 0.5m and 1m to one or both sides of the new stream and existing streams. The lowered floodplain will hold flood water only when river levels are sufficiently high. This may occur regularly during wetter periods, especially during the winter months. The scheme has been designed so that this periodic flooding together with the lowered, damper ground will create conditions to support over 20ha of floodplain grazing marsh with a mosaic of ponds, scrapes and backwaters. The area will be grazed in the summer months. If necessary, a mechanical cut will also be carried out in late summer each year (outside the bird nesting season) to keep down woody growth/unpalatable plants. In this way, the lowered floodplain will be able to function as part of the flood alleviation scheme whilst providing valuable habitat and maintaining the existing agricultural land use.

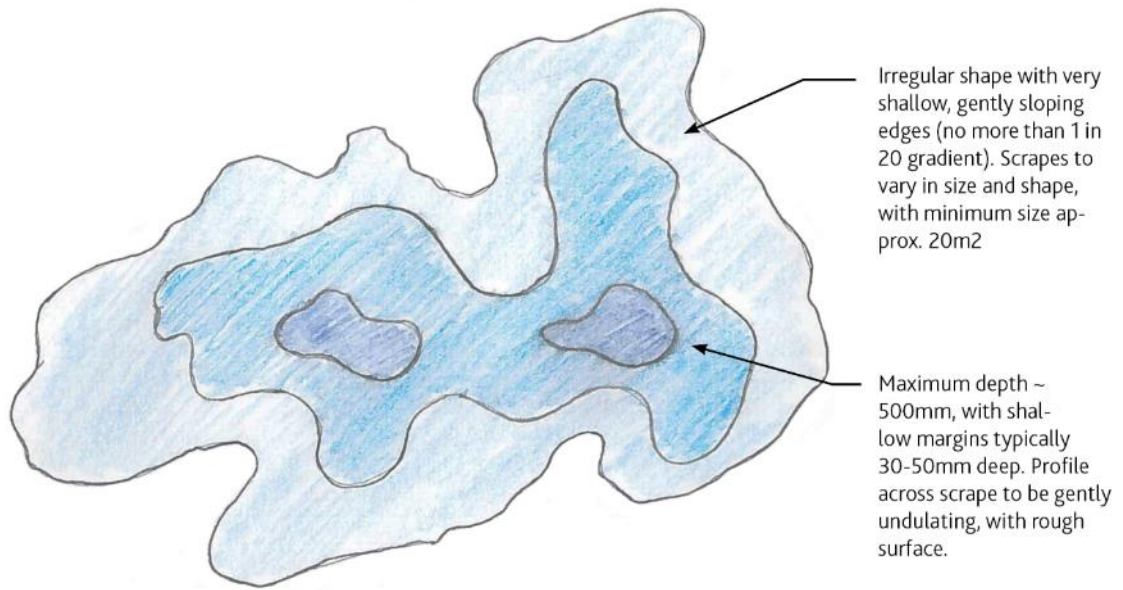


Aims

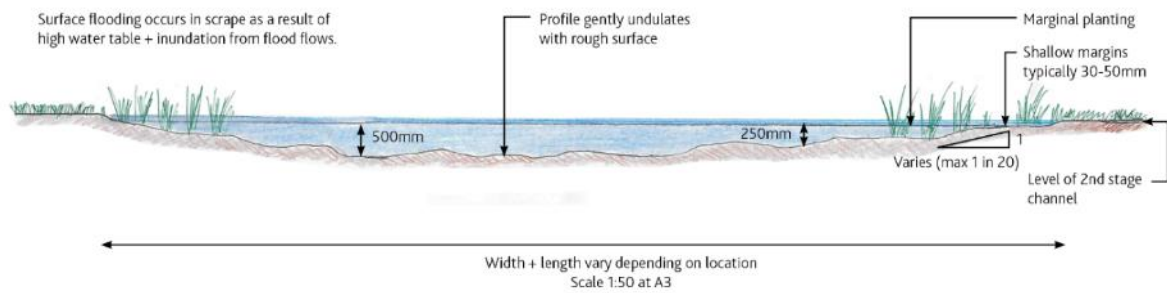
The aim is to create over 18ha of floodplain grazing marsh in Area 3 and to introduce and extend freshwater habitats by excavating a network of backwaters, scrapes and ponds. These habitats are nationally in decline, as are the species that they support. Working at a landscape scale, the scheme will link up existing wetland wildlife sites to the west of Oxford.

Grazing marsh is defined as periodically inundated pasture, typically with ditches or rills containing standing fresh water. In the case of the lowered floodplain, it will be the mosaic of ponds, scrapes and backwaters that will contain the standing water. Due to the complexity of creating floodplain grazing marsh, for the purposes of the Defra biodiversity metric, we are counting these areas as Other Neutral Grassland.

The majority of floodplain grazing marsh sites support bird species of high conservation value, while the associated freshwater features tend to be especially rich in plants and invertebrates. This is what the Scheme will be aiming to achieve.

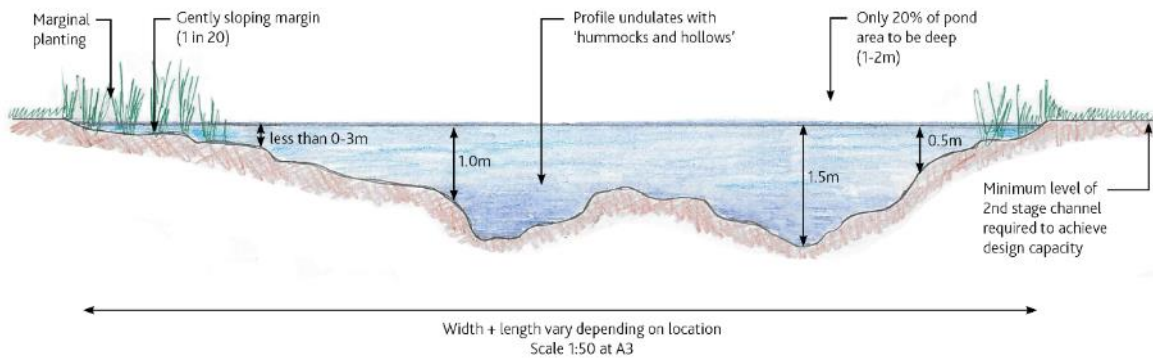


TYPICAL PLAN VIEW OF NEW SCRAPE

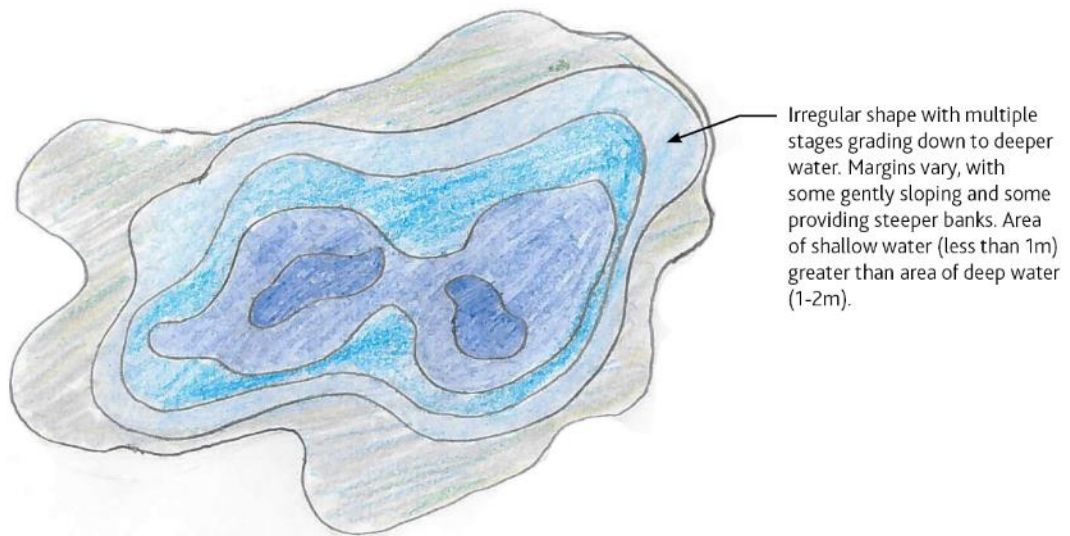


TYPICAL CROSS / LONG SECTION OF NEW SCRAPE





TYPICAL CROSS / LONG SECTION OF NEW POND



TYPICAL PLAN VIEW OF NEW POND

Delivery



A scrape being created at Cossington Meadows, Leicestershire in September 2014.



The scrape at Cossington Meadows, Leicestershire in November 2014

We will create and manage the wetland 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.

Methodology

1. Topsoil strip

Prior to excavation of the lowered floodplain, topsoil from the existing fields will be stripped and carefully stored separately from subsoil and topsoils that have been stripped from other parts of the site. Topsoil removed from the existing river banks where the riparian vegetation includes Himalayan balsam will be taken off site to a licenced tip.

2. Excavation

The lowered floodplain will be created by excavating the ground between 1m and 1.5m to one or both sides of the new stream. Tracking over the lowered ground will be avoided wherever possible to minimise soil compaction.

3. Seedbed preparation

Once the floodplain has been lowered, a thin layer (100-150mm) of the stored topsoil will be spread over the subsoil and cultivated prior to seeding. The aim is to have sufficient fertility to allow the area to vegetate and stabilise quickly (prior to a flood event) but to also create conditions that will allow a diverse flora to establish.

3. Seeding

Ideally, seeding will follow on immediately after topsoil spreading and cultivation to avoid the risk of weeds gaining a foothold or of a flood event washing away all the soil prior to establishment of the sward.

The grass and wildflower seed mixes have been chosen to reflect the existing local flora and will be of local provenance where possible.

- Much of the lowered floodplain will be seeded with a wetland meadow mix of 100% grass seed: common bent, crested dogstail, slender creeping red fescue and smaller cat's tail.
- The margins of the ponds, scrapes and backwaters will not be seeded in order to allow natural regeneration to take place.
- The areas between and around the ponds, scrapes and backwaters will be seeded with a wetland meadow grass and wildflower mix, 80% grass seed and 20% wildflower seed. This will include species such as lady's bedstraw, yellow rattle, selfheal and ragged robin.

4. Natural regeneration

It is anticipated that some natural regeneration will occur around pond margins and across the rest of the lowered floodplain and the site will be managed to allow this.

5. Control of harmful weeds and invasive non-native species.

Only topsoil removed from the fields will be replaced on the lowered floodplain. Topsoil removed from areas of the river bank where the riparian vegetation includes Himalayan balsam will be taken off site to a licenced tip. If weather conditions allow, seeding will take place immediately after topsoil spreading and cultivation to avoid the risk of weeds gaining a foothold prior to establishment of the sward. If there is a delay between cultivation and seeding, weeds that grow on the seedbed will be sprayed with herbicide before they can flower and set seed. An allowance has been made for the hand-pulling of weeds across the site, as required.

6. Maintenance Years 1-5.

- Weed control - spot spraying and hand-pulling of harmful weeds twice a year.
- Mowing and removal of arisings - 2 cuts in the first growing season followed by an annual or twice yearly cut, as required to keep down goat willow and other woody growth or unpalatable plants.
- Grazing – No grazing in Year 1 then grazing from April-October in Years 2-5

7. Long-term management and maintenance.

At the end of Year 5, it is envisaged that the habitat will be established and be in a condition that is suitable for handover to a third party for long term management and maintenance:

Floodplain Grazing Marsh – summer grazing with an annual cut (as and if necessary) to keep down goat willow and other woody growth or unpalatable plants. The area is currently grazed in the summer so much of the farm infrastructure required is already in place to enable this. Our environmental partners, Earth Trust, have advised on any additional infrastructure required and this has been included in the detailed construction plans for the Scheme. The detailed arrangement of new fencing and gates will also be discussed and agreed with the environmental partner who takes on the long-term management of the site.

Ponds and Scrapes – the ponds and scrapes will silt-up and revert to terrestrial habitat over time. It is envisaged that they will be managed to include a range of vegetation stages from clear, open water with submerged, floating and emergent plants to developed reedswamp. A programme of rotational clearance/slubbing-out will be required and this will be based on observations of the work required to maximise ecological interest. All pond clearance work will be undertaken in late summer and early autumn. The cleared material will need to be drained next to the pond and then removed off site.

The area will be monitored and managed so that the target conditions of each habitat can be met within the anticipated timescales set out in the Defra 3.1 Metric Technical Supplement.

MG4 Mitigation (Area 3, Planting Plan 05)

Target Priority Habitat – Lowland Meadow (Species Rich Floodplain Meadow)

Description

As part of the mitigation for the loss of 1.3ha of the species-rich MG4 grassland in Hinksey Meadow, approximately 17ha of species-rich floodplain meadow will be created. Fields near Osney Mead, which are currently under an Environmental Stewardship Scheme, have been identified as a suitable location for sward enhancement in order to create areas of good quality floodplain-meadow habitat. Details of this work are included in a report by the Floodplain Meadows Partnership that can be found in Appendix C of the Environmental Statement. The MG4 Mitigation Strategy can be found in Appendix D of the Environmental Statement.

Aims

The aim is to increase the total area of species-rich grassland in the floodplain to the west of Oxford, helping to link existing sites and increase the benefits that they provide. Creating larger areas of floodplain meadow will enhance the resilience of these plant communities to external pressure, such as climate change.



Existing MG4 at Hinksey Meadow



One of the proposed MG4 Meadows, near South Hinksey.

Delivery

The existing sward will be enhanced either by over-seeding or by means of supplementation with green hay harvested from Hinksey Meadow or another MG4 meadow such as Clattinger Meadow. Sward supplementation is a method that was successfully used at Swill Brook Meadow, Lower Farm, Wiltshire and is presented as a case study of floodplain meadow restoration by the Floodplain Meadows Partnership: <http://www.floodplainmeadows.org.uk/about-meadows/restoration/case-studies>

In July, the meadows that are to be enhanced will be cut tight to the ground. A spring tine harrow will be used to break up the sward and create bare ground by pulling out the remnant thatch and any dead vegetation lying on the soil surface. This will ensure that seeds that are sown or spread in the green hay are able to reach the ground to germinate.

If green hay is used then, subject to agreement with the landowner, the green hay will be cut and baled from Hinksey Meadow, transported to the receptor fields and then spread within a few hours using a straw spreader.

Maintenance Years 1-5

After spreading the green hay, or over-seeding, the meadow will be left to settle for a few weeks, then grazed lightly by cattle.

Following this, the meadow will be managed by a hay cut in mid-late July followed by aftermath grazing by cattle. The area is currently grazed in the summer so the farm infrastructure is already in place to enable this. The detailed arrangement of new fencing and gates will be agreed with the existing tenant farmer and our environmental partner to ensure that grazing can continue.

Long-term management and maintenance

The meadow will be cut for hay in mid-late July each year, followed by aftermath grazing by cattle.

Grassland outside the lowered floodplain that will not be managed as MG4 (Planting Plans 04, 06, 07, 08, 09, 10, 11, 12, 13)

Target Habitat – Lowland Meadow or Other Neutral Grassland managed as pasture

Description

When the contractor has finished using land outside the lowered floodplain for working/storage, the areas that are not likely to be grazed will become lowland meadow. Other areas will be sown as pasture and returned to grazing.

Aims

The aim is to maintain existing sustainable land uses and to create a network of lowland meadow habitats in the floodplain that will be valuable for insects, birds and other wildlife.

Delivery

We will create and manage the grassland habitats that remains in our ownership so that they meet the definitions 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.

1. Topsoil strip or protection

Prior to the use of working areas, the topsoil will either be protected from compaction in-situ or will be stripped and carefully stored separately from subsoil and topsoils that have been stripped from other parts of the site. Topsoil removed from areas containing Himalayan balsam will be taken off site to a licenced tip.

2. Seedbed preparation

Once the working area is no longer required, the topsoil protection will be removed and the area will be cultivated prior to seeding. Where the topsoil in the working area has been removed, the exposed subsoil will be inspected by the landscape contractor and any compacted ground will be cultivated, prior to a layer (75-125mm) of the stored topsoil being spread and cultivated prior to seeding. The aim is to have sufficient fertility to allow the working areas to green-up quickly but to also create conditions that will allow a diverse flora to establish.

3. Seeding

Ideally, seeding will follow on immediately after topsoil spreading and cultivation to avoid the risk of weeds gaining a foothold or of a flood event washing away all the soil prior to establishment of the sward. Seed will be of local provenance wherever possible.

The grass and wildflower seed mix for the drier meadow areas has been chosen to reflect the existing local flora and will be 80% grass seed, including fescues, crested dog's tail and common bent and 20% wildflower seed, including self-heal, oxeye daisy, yellow rattle, meadow buttercup and others. The seed mix for the areas that will be returned to grazing has been chosen to match the existing pasture and will include fine grasses such as common bent and crested dogstail.

4. Control of harmful weeds and invasive non-native species.

If weather conditions allow, seeding will take place immediately after the working areas have been prepared for seeding to avoid the risk of weeds gaining a foothold prior to establishment of the sward. If there is a delay between cultivation and seeding, weeds that grow on the seedbed will be sprayed with herbicide before they can flower and set seed. An allowance has been made for the hand-pulling of weeds across the site, as required.

6. Maintenance Years 1-5.

- Weed control - spot spraying and hand-pulling of harmful weeds twice a year.

- Meadow Areas - Mowing and removal of arisings - 2 cuts in the first growing season followed by an annual summer cut.
- Pasture - 2 cuts in the first growing season followed by grazing from year 2 onwards.

7. Long term management and maintenance.

At the end of Year 5, the habitat will be established and be in a condition that is suitable for handover to the landowner or a third party for long term management and maintenance.

Proposed Trees and Woodland Scrub (Throughout) Target Priority Habitats – Wet woodland and Lowland Mixed Deciduous Woodland

Description

Approximately 11ha of native, deciduous woodland will be planted to mitigate for the trees that will need to be felled to build the scheme.

Aims

Within the existing landscape to the west of Oxford trees have grown to create linear features along the edges of the existing watercourses and ditches, and along the urban fringes. They have also grown to create triangles and blocks of woodland in some of the more inaccessible corners of the fields. At Kendall Copse, woodland has been planted on an old landfill site to create a community woodland.

Within the Oxford FAS, the aim is for the proposed woodland to reflect the existing landscape character and patterns of woodland growth and to maintain and enhance the existing network of woodland habitats wherever possible. There will be a diverse structure in each new woodland area with woodland edge species and glades.



Small woodland block at North Hinksey



Willow trees growing along a ditch near North Hinksey

We will create and manage the woodland 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.

Delivery

1. Choice of tree and shrub species

Native tree and shrub species have been selected that are found growing locally and that will thrive in the existing/predicted ground conditions. Ash has been avoided due to the risk of spreading Ash die-back.

2. Source of trees and shrubs

Local provenance trees and shrubs will be used and will be sourced through contract growing where possible.

3. Size of plant stock

Apart from those areas where some immediate screening is required, smaller nursery stock has been selected for planting because research has demonstrated that smaller transplanted trees become established more quickly and ultimately lead to larger trees in the landscape (Watson (1985)).

4. Planting

Shrubs and smaller-growing tree species will be used to create a woodland edge, with taller-growing trees towards the centre of the planting areas. The trees and shrubs will be planted in random groups of the same species with some gaps and glades.

Where we are planting the woodland in existing grassland, this will be retained. An area 1m in diameter will be cleared around each tree and shrub. In this way, canopy, shrub and field layers can develop within the woodland.

5. Natural regeneration

If not removed through maintenance, self-seeded shrubs and trees, such as goat willow and birch will often grow faster than the trees and shrubs that have been planted. Natural regeneration will be encouraged within the woodlands to help create a non-uniform, natural and diverse habitat.

6. Maintenance Years 1-5

Tree and shrub guards will be used to protect the plants from deer and rabbits. These will be removed at the end of Year 5.

An area 1m diameter around each tree and shrub will be kept clear of weeds during years 1-5 through a combination of herbicide application and hand-pulling. After this time, the woodland should be sufficiently established to no longer require weed clearance.

7. Long-term management and maintenance

A bespoke long-term management plan will be developed for each area of tree planting towards the end of Year 5. Dead or dangerous trees/branches will only be removed near paths or other areas with public access and will otherwise be retained for the benefit of wildlife. Some thinning and/or coppicing may be desirable to maximise biodiversity.

The wet woodland and mixed deciduous woodland will be monitored and managed so that the target conditions of each habitat can be met within the timescales anticipated and set out in the Defra 3.1 Metric Technical Supplement.

Some tree planting will take place along the proposed hedgerow and in the lowered floodplain to create linear features. Larger, individual trees will be planted to mitigate for losses along Willow Walk.

Proposed hedgerows with trees (Area 3 Planting Plans 04-09)

Target Priority Habitat – Hedgerow

Description

3.5km of new hedgerow will be planted across the scheme area. Trees will be planted within the hedgerow and managed so that they can grow to full height.

Aims

The aim is to create hedgerows that are in keeping with the existing landscape character; where trees and shrubs have grown on the banks of the existing ditches and streams creating narrow, linear belts of vegetation lengthways along the valley, and hedgerows have also been grown to divide up the fields. The hedgerow will provide resources for wildlife: food, shelter, nesting sites, refuge from farm operations and a corridor across the landscape.

Delivery

We will create and manage the hedgerows 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.

1. Choice of hedgerow and tree species

Native hedgerow and tree species have been selected that are found growing locally and that will thrive in the existing/predicted ground conditions. The species will have a diversity of flowering and fruiting times to help wildlife. Ash has been avoided due to the risk of spreading Ash die-back.

2. Source of trees and shrubs

Local provenance trees and shrubs will be used and will be sourced through contract growing where possible.

3. Size of plant stock

Smaller nursery stock has been selected for planting because smaller transplanted hedgerow plants become established more quickly and create a better/denser hedge than larger stock.

4. Planting

Two staggered rows will be planted

5. Natural regeneration



Woodland planting to link up existing habitats and reinforce existing landscape character.



A diverse woodland structure increases biodiversity

If not removed through maintenance, self-seeded shrubs and trees, such as goat willow and birch will often grow faster than the trees and shrubs that have been planted. Natural regeneration will be encouraged within the hedgerows to help create a non-uniform, natural and diverse habitat.

6. Maintenance Years 1-5

Tree and shrub guards will be used to protect the plants from deer and rabbits. These will be removed at the end of Year 5.

An area around the base of the hedgerow will be kept clear of weeds during years 1-5 through a combination of herbicide application and hand-pulling. After this time, the hedgerow should be sufficiently established to no longer require weed clearance.

7. Long term management and maintenance

The hedgerow will be trimmed in sections on a three year cycle as studies have shown that this will result in much better flowering and fruit production, and will help birds and insects. Cutting in sections will allow a variety of hedge heights and widths to develop, providing a range of habitats for wildlife. Trimming will be undertaken in January or February rather than the autumn to allow berries to be used by wintering birds, and to avoid the destruction of birds' nests during the spring and summer.

The hedgerows will be monitored and managed so that target conditions can be met within the timescales anticipated and set out in the Defra 3.1 Metric Technical Supplement.



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