

## CM1: Creation of Constructed Farm Wetlands for the treatment of field runoff, land drain water and lightly fouled farmyard run-off

Constructed Farm Wetlands (CFWs) are man-made systems which function by mimicking the water treatment properties of natural wetlands (WWT CFW Guide, 2015). CFWs are a series of shallow constructed ponds (cells) which are fed by surface water flows from runoff and ditch flow, slowing this flow down to cause sediment deposition and utilisation of nutrients by aquatic vegetation.

CFWs will require construction of some or all the following features:

- Sediment/silt traps
- Multi-cell shallow ponds of varying depths
- Widening of channels to create large ponds within a ditch system
- Flow control structures to direct flow from existing field ditches and/or control flow between cells
- In-field soil bunds to direct the flow of water
- Banks and bunds around the edges of cells

Once built, ongoing maintenance of the wetland is vital to ensure its long-term performance, this will predominately be through vegetation management and sediment removal. Wetlands should be considered as functional farm infrastructure with ongoing monitoring and maintenance requirements over many decades.

For wetlands to work well, the design needs to be based on sound environmental information and the prevailing hydrological conditions. Support will be available for the scoping and development of viable Projects.

An initial concept design approved by the Market Operator (EnTrade) is all that is required to register a potential wetland project and for you to offer prices to supply it. In addition to any supply payment that is secured, all successfully contracted wetlands will receive an index-linked, annual payment for the length of the Agreement to cover the cost of maintenance and use of land for the wetland. These payments and rates are published by the Market Operator in a Catchment Opportunities Statement prior to the opening of bids in the Market.

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### Length of Nature-based Project Agreement available

Nature-based Project Agreements for wetlands will be offered for *permanent* land-use change from agricultural use to a wetland environment. *Permanent* in this context means a minimum of 80 years and the Agreement will include conditions that guarantee this permanence, even if transferred to different owners, thus preventing any future change to any other land use, be it agricultural, forestry, housing development or anything other than wetland.

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## Where to use this option

- In locations that are or can be **connected to a permanent or otherwise intermittent surface water inflow such as a stream or field ditches and drains that drain a minimum area of 25ha** (smaller field scale interception features may be viable for smaller areas)
- In locations that collect surface water runoff from grassland or arable fields which is at times sediment laden.
- Where upstream land use is intensive or likely to result in nutrient loss due to soil properties/slope and management/ drainage properties.
- In locations where wetlands would naturally exist in the landscape and perhaps where they have sedimented up and lost function over time e.g., low lying flat areas in valley bottoms / natural basins that lie damp year-round or are seasonally wet.
- **In locations with impeded drainage; typically, on high clay content soils.**
- In combination with strategic landscape objectives e.g., ecological opportunity areas, Nature Recovery Networks. where they would enhance natural corridors.

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## Where this option cannot be used – Projects will be reviewed against these constraints

Surprisingly, this option is not suitable for areas that are susceptible to regular flooding – these flood events would damage the wetland and remobilise trapped nutrients.

Additionally, CFWs will not be able to be sold in the Market:

- Where an ecological assessment of the proposed location would show that the wetland or its constructions works would cause unacceptable impacts on any rare and protected species or habitats.
- To treat slurry, silage effluent, heavily fouled water, or concentrated pesticide spills and washings (as defined as such under the Nitrate Vulnerable Zone Regulations, Slurry, Silage and Agricultural Fuel Oil (SSAFO) Regulations or by the Health and Safety Executive).
- Where the source of pollutant loss to be addressed by the wetland could or should be easily addressed by in-field or source control measures alone.
- In areas with shallow/surface groundwater and or where the wetland discharge would result in groundwater pollution.
- Where the impact upon the movement of fish could have a detrimental effect upon fish populations.
- In areas that flood regularly (Flood Map for Planning Zones 2/3) where ground raising is prohibited.
- On historic or archaeological features, sites impacted by Tree Protection Orders or designated habitat sites. For guidance see Defra's [Magic Map](#).
- Where any part of the site would be in receipt of Countryside Stewardship or other grant payments prior to contracting to supply to the Catchment Market.

- Where the size or slope of the proposed site prevents the use of gravity-fed flows or prevents retention of flows for an adequate time.

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## Requirements

Establish and manage the wetland according to a Concept Design and Construction Plan and then commit to carry out the basic maintenance requirements following the requirements set out below, plus any additions that may be specific to the site, as ultimately specified in a Nature-based Project Agreement signed by successful suppliers.

Potential suppliers of CFWs must complete a Concept Design to specify location, flow rates, size and retention times in different flow conditions so that the performance of the wetland can be accredited. This can be developed in conjunction with teams from EnTrade or any consultant that is willing and able to conform to the requirements of the Market Rules.

### Concept Design:

- The wetland design, size and specification should be provided by a person with proven experience of designing this type of wetland and be scaled to retain the **peak flow at the inlet for a period of at least 6 hours**. Peak flow is calculated for the location's watershed using hydrology methods specified in the Catchment Market's Interim Nutrient Accreditation Standard, or is the maximum flow constrained by appropriate flow control structures.
- Create a sediment trap of approximately 20% of the total surface area of the wetland. This sediment trap should include a deeper depression of up to 1-1.5 metres depth before flowing into the main wetland area.
- The overall design of the wetland should maximise the retention time of water and contact time with the substrate and vegetation e.g. long and narrow, shallow (max 50cm, ideally with a gentle undulating base that reduces depth to about 30cm at the outlet) ponds with no defined channel (i.e. design should avoid creation of preferential flow pathways), divided by berms with inlets and outlets distanced from each other.
- The main wetland inlets and outlets, where possible, should consist of straight sections (6-10m) that could accommodate flow measuring weirs.
- Overflows or flow control valves may be required on inlets to maintain stream flows or manage storm flows.
- Locate to allow gravity feed throughout, with a layout that is sympathetic to the existing habitat.
- Locate to allow natural colonisation by wetland plants adjacent to the site. Where there is no evidence of nearby natural wetland plant colonies, living plants and seed-containing substrates can be added from other nearby farm ponds and wetlands, provided relevant environmental and biodiversity laws are complied with.
- Ensure adequate access is provided and maintained to undertake maintenance around sediment traps and wetland cells e.g. to allow accumulated sediment removal and vegetation management.

- Make sure that most of the margin from berms into cells is gently sloping, with banks no more than 1:4, to create a large drawdown zone and extensive shallows (where landscape allows).
- Ensure that all work meets any relevant British Standards - examine copies of the most up-to-date standards for guidance, most notably the *Constructed Farm Wetlands Design Manual for Scotland and Northern Ireland*. (See Additional Information)

### Construction - Planning and general advice:

- Prior to commencing any construction works, ensure that relevant advice or consents, permits or licenses from the Environment Agency, Local Planning Authority or flood risk management authority have been acquired. For some constructions works, you may also be required to ensure compliance with the relevant parts of the Construction (Design and Management) Regulations 2015. These can be obtained before or after signing a Nature-based Project agreement to contract to supply the wetland, but the timescales to do so must be considered when specifying your delivery date in the agreement.
- Construction should be directed by a detailed construction plan. This can be completed after signing a nature-based project agreement. The final design specified by the construction plan must achieve the hydraulic retention times calculated by the Market Operator from the Concept Design.
- Advice on the construction plan should be obtained from a wetland design specialist or contractor with experience of working with wetland or flooding and should aim to use onsite materials wherever possible.
- Carry out the work when conditions for access are suitably dry for the use of heavy machinery, and when environmental harm will be minimised, e.g., outside of specified bird-nesting periods.
- Peg out the outline of the wetland before excavations start, making sure that ponds have extensive shallow areas around the edges.
- If ground contamination is identified during construction the advice of the Environment Agency should be sought for appropriate investigation and remediation.
- Create a variety of water depths, from very shallow margins to deeper pools (where landscape allows, and as specified by designs drawn up by a wetland specialist).
- To construct bunds, dig a depression in the ground to a suitable depth (as specified by the design provided by a wetland specialist) and build up a bank with the excavated material around the edge of the depression. Grade side slopes of the depression and the banks to no more than 1:4. The most suitable and effective shape of the bund will depend on where the water is coming from and whether the bund is to divert or hold the water.
- Allow vegetation to establish on bunds and banks to help stabilise soil. This may be assisted by importing mud and with it the seedbank from a nearby site (ensuring it is clear of invasive species) alternatively the site may be planted with stock plug plants.
- To construct in-ditch silt filtration barriers and seepage barriers (for slowing the movement of water to allow pollutants to settle out before reaching larger waterbodies) use a structure of either timber piling or horizontal planks (with gaps between the boards to allow water flow),

stone filled gabions or dams constructed with large stones. Multiple dams/barriers at intervals along the same ditch are most effective.

- Unless contaminated, spread any excess soil thinly across the land, away from the excavated area and outside of any associated floodplain.
- Fence the wetland area at a suitable distance from the water's edge to prevent access by livestock and people whilst enabling maintenance operations to take place.

#### Maintenance - general:

- Ensure regular inspection (at least annually, and after every high rainfall event) of wetland flow and function, and unblock or repair inlets and outlets as necessary.
- Maintain and operate flow control structures to avoid excessive backing up and flooding upstream of the inlets or between wetland cells.
- During inspections, undertake, or make plans for, appropriate actions to meet basic sediment and vegetation management controls:

#### Maintenance - Sediment management:

- Keep the wetland and sediment trap in working order and maintain the original capacity of both by removing sediment according to accumulation rates, and by no later than when 10cm depth of sediment has accumulated in any main cell. Attentive maintenance of sediment traps (typically every 1-5 years) can minimise requirements to remove sediment from the main wetland body. The work required to maintain wetland features in working order will vary depending on the load (sediment and organic material) carried in inflows entering the feature from permanent or temporary inlets or from overland flow and surface run-off.
- When clearing sediment traps block the outlet of the sediment trap into wetland cells. When clearing sediment from the main wetland body block outlets from the wetland.
- Extracted sediment should be disposed of in compliance with relevant Waste Management and Environmental Protection laws. If spread to land, then it should be spread:
  - thinly
  - outside of the floodplain
  - preferably upstream of the wetland
  - on land with nutrient requirement and at such rates and timing to be beneficial to the crop.
- Excavated material/sediment (waste code 170506) is likely to be exempt from requiring an environmental permit but will require registration of waste exemption U10 - Spreading waste to benefit agricultural land) with the Environment Agency.

#### Maintenance - Vegetation management:

- If the wetland does not colonise naturally and bare soils persist a year after construction, planting of stock plug plants will be required to fill gaps. Density and species mix must be agreed with the Market Operator
- Restrict encroachment of scrub and maintain the area of open water as designed.

- Cut back vegetation around the inflow and outflow pipes and channels and any sampling points twice yearly.
- When clearing out the main wetland cells, ensure that this is carried out in a phased manner over several years to provide a mosaic of different age vegetation.
- Prevent and control any invasive non-native species present.
- Ensure all rules regarding protected species and nesting birds are adhered to.

### Monitoring of wetland function and effectiveness:

- Suppliers of wetland projects will be required to grant the Market Operator and its agents pre-notified access to the site for the purpose of monitoring the project's performance and to validate its maintenance and condition, this may be more frequent in first 3 years whilst the site is established.

### Restrictions

- Do not plant trees or shrubs:
  - around the southern margin of the wetland
  - anywhere around a wetland located within an open landscape
  - anywhere that could restrict access to the wetland for maintenance
- Do not use spoil to form a mound or bank around the wetland, or to fill and level neighbouring wet areas.
- Do not dispose of spoil on historic or archaeological features.
- Do not fill in or allow the feature to become full of sediment.
- Do not remove all or part of the wetland features, including soil bunds.
- Do not remove any silt filtration dams or seepage barriers unless required when cleaning ditches. Ensure that they are replaced as soon as the ditch has been cleaned.
- Do not use herbicides to control aquatic plants and bankside vegetation.
- Do not introduce any plants or animals e.g., fish to the wetland, unless specified as part of the wetland design provided by a wetland design specialist. Any introduced species may be required to be removed to maintain wetland function.
- Do not feed wildfowl in or around the pond or wetland.

### Keeping records and payment terms

Suppliers of wetland projects will enter a Nature-based Project Agreement with a Project Investor (eg EnTrade). This will govern the obligations on both parties, including the duration of the agreement and the records that must be kept.

Holders of Nature-based Project Agreements for wetlands will need to keep the following records and supply them with the initial payment claim:

- Contracts, invoices or other documents confirming that the technical specification for the works has been met.
- Receipted invoices, or bank statements where a receipted invoice is not available.
- Photographs of the site before works starts and of the completed works.
- Any consents, permissions or licenses from the Environment Agency, Local Planning Authority and where relevant the Internal Drainage Board or other competent body connected with the work.
- Demonstration of compliance with the Farming Rules for Water, Nitrate Vulnerable Zone, Environmental Permitting and Silage, Slurry and Agricultural Fuel Oil (SSAFO) regulations.
- Farm and field information needed to run a diffuse nutrient loss tool for the farm and calculate the reduction in nutrient loss to water arising from this work. This will include farm data relating to livestock numbers, crop areas and fertiliser and manure inputs.
- Self-declaration that the terms of the Nature-based Project Agreement have been adhered to (*key terms are listed above*)
- Successful applicants are required to sign a declaration confirming that:
  - i. reasonable precautions are taken to prevent nutrients and soil getting into watercourses or from being leached to groundwater to an extent that could cause pollution.
  - ii. The relevant fields have not been (i) the source of a recorded pollution incident which could have been prevented by taking reasonable precautions to prevent that pollution and or (ii) the subject of a warning, fine, prosecution or BPS deduction issued by the Environment Agency or RPA for a breach of NVZ rules or Farming Rules for Water in the past 5 years.

Holders of Nature-based Project Agreements for wetlands will need to keep the following records and supply them with each ongoing claim for payment, and upon request:

- Contracts, invoices or other documents detailing the works undertaken as ongoing maintenance of the wetland.
- Receipted invoices, or bank statements where a receipted invoice is not available.
- Recent photographs of the site.
- Demonstration of ongoing compliance with the Farming Rules for Water, Nitrate Vulnerable Zone and Silage Slurry and Agricultural Fuel Oil (SSAFO) regulations.

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## Additional information

Useful documents:

Constructed Farm Wetlands Design Manual for Scotland and Northern Ireland -  
<https://www.sepa.org.uk/media/131412/constructed-farm-wetlands-manual.pdf>

WWT Constructed Farm Wetlands Guide (2015) - Treating agricultural water pollution and enhancing biodiversity -

[https://www.wwt.org.uk/uploads/documents/1429707026\\_WWTConstructedFarmWetlands150422.pdf](https://www.wwt.org.uk/uploads/documents/1429707026_WWTConstructedFarmWetlands150422.pdf)

Silt trap construction guide -

<https://www.fwagsw.org.uk/Handlers/Download.ashx?IDMF=966d20d3-9224-466d-9fc5-77f1c43f417b>

In-ditch features - <https://www.fwagsw.org.uk/Handlers/Download.ashx?IDMF=0ebe02c3-22a2-4815-bd74-78daaccac990>

In-field soil bund construction –

<https://www.fwagsw.org.uk/Handlers/Download.ashx?IDMF=83c3582b-76e1-43d9-a6ff-30af05d8c1a5>

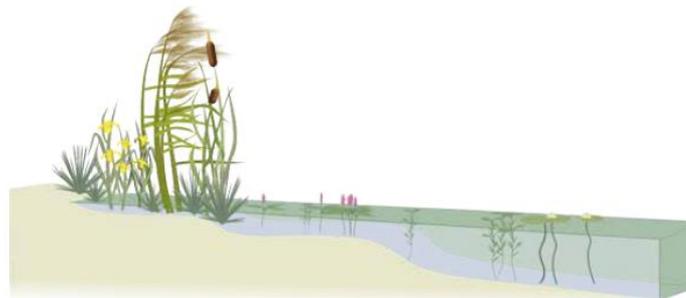
## Wetland examples:

(from Wildfowl & Wetlands Trust Constructed Farm Wetlands Guide)

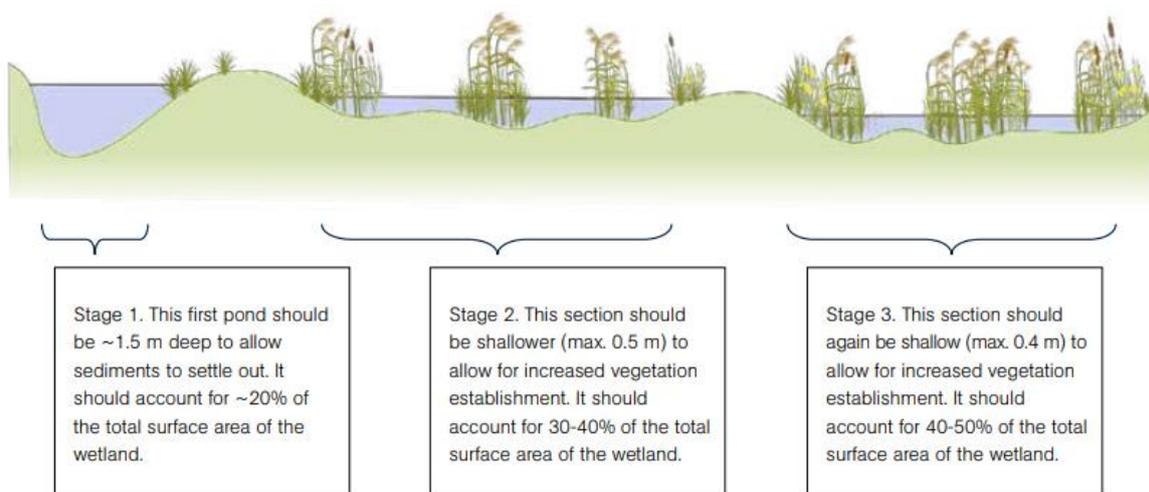


Newly created sediment pond with clay lining as part of a constructed farm wetland.

*Image credit: WWT*



Cross section of an ideal edge, illustrating the benefits of the various water depths for biodiversity (emerging, floating and submerged plants and associated animal communities). *Image credit: WWT*



Three-stage constructed wetland. *Image credit: WWT*