Restoration activities on peatlands in Wales: activity classification and codes

Guidance note-

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What is this document about?

This guidance sets out peatland restoration activity types and their reporting requirements. Each activity type has an 'Activity code' and 'GIS data type'. These are used in standardised activity tracking maps by the National Peatlands Action Programme (NPAP) to collate and report on activities across Wales.

Who is this document for?

Anyone doing restoration work on peatlands in Wales

Contact for queries and feedback

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Contents

A classification and coded glossary of restoration activity types

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Acronyms used in this document:
GIS – Geographical Information Systems
NPAP – National Peatland Action Programme
NRW – Natural Resources Wales
RSPB – Royal Society for the Protection of Birds
INNS - Invasive Non-Native Species

A classification and coded checklist of restoration activity types

This working document is a classification and coded checklist of restoration activity types undertaken on peatlands and their application in restoration activity tracking.

Introduction

Peatland restoration has been occurring on an individual project basis for many years in Wales. The result is that restoration activity data across Wales is held by multiple organisations, in different software, and data formats with different levels of information recorded. This makes reporting on Wales's progress towards national targets such as Net Zero very challenging.

The National Peatland Action Programme (NPAP) have developed a single data structure and reporting system. This will improve consistency and transparency of data recording and reporting across Wales.

This guidance describes over 100 different restoration activity techniques. You can use it as a reference document for recording peatland restoration activity in line with set reporting protocols. The protocols are briefly described in each section. You can find them in detail in: 'Standard Methods for Tracking of Peatland Restoration Activity, (2023)'.

The restoration activity techniques set out in this guidance include those that have proved to be successful over time, as well as those that have not. This is a record of different types of restoration interventions. It **is not** a recommendation or suggestion of techniques to use.

Each restoration technique or activity type is assigned an 'Activity code' and 'GIS data type'. These are used in standardised activity tracking maps by the National Peatlands Action Programme to collate and report on activities across Wales (Standard Methods for Tracking of Peatland Restoration Activity, 2023).

Activity types

Each activity type is classified into one of six broad activity types:

- Hydrologic restoration
- Erosion control
- Tree management
- Vegetation management
- Grazing
- Nutrient control

Often, a series of restoration activities are applied on a site, for example:

- grazing following vegetation management

- hydrologic restoration following tree management.

In these cases, each of the activities that have taken place on the site are mapped with reference to the activity codes provided here.

Activity codes

Each activity type has an unique code to use for reporting.

GIS data types

Each activity has a 'GIS data type' to map each of the different activities. It is either a point, polyline, or polygon (area) vector.

In some cases, an optional type can be provided in addition to that required for tracking.

Hectare reporting

The hectares of peatland targeted by restoration works are reported for each of these broad types. The method used by NPAP to calculate this area for 'hectare reporting' is also noted here for each activity that is tracked as either a line or point.

Typically, a buffer is applied around these features to provide the area of peatland targeted by each measure. The buffer width is standardised for each activity type in line with consensus and best available knowledge at the time of writing. Wherever possible, areas are comparable to those applied in the New version of the Peatland Code launched | IUCN UK Peatland Programme (iucn-uk-peatlandprogramme.org).

For some types of activities, such as those designed for nutrient control, an on-site assessment will be required by restoration delivery lead officers to assess the target area. This is indicated in the text where applicable.

Hydrological restoration

Hydrologic restoration aims to reverse the impact of harmful activities that have resulted in adverse changes to hydrological regimes. This may include raising water levels to promote peat forming plants, such as sphagnum mosses, or restoring key water supply pathways and processes.

Hydrologic restoration features can usually be discretely mapped as lines or points. Exceptions, that are best captured as polygon areas, are the restoration of groundwater influence to a specific area of peatland, and ground smoothing techniques usually applied to recover the hydrology of previously afforested, drained peatland.

Activities included in hydrological restoration:

Contour bund with surface bund
Deep packed trench Contour bund without surface bund

Contour bund with surface bund

Low elevation peat bunds (often referred to as contour bunds where these follow surface contours) – these features overlie a trench packed with peat to reduce seepage. These features used to raise water levels and reduce seepage over areas of peat wider than discrete drainage features. Record all lengths of bund as lines. See also deep packed trenches lacking contour bunds below.

Activity code: **hydrocbun**

GIS data type: polyline

Low elevation contour bund at Cors Caron (west Bog).

Contour bund without surface bund

Features designed to reduce subsurface flow in cracked or porous peat by packing well humified peat into an excavated trench. Record all lengths of packed trench as lines.

Activity code: **hydrodptr**

GIS data type: polyline with optional polylines

Fish scale bunding

Low elevation peat bunds arranged in a mosaic of interconnecting spurs, creating a 'fish scale' pattern of cells across the landscape. Features used to raise water levels over areas of peat wider than discrete drainage features. Record the area over which the fish scale bunding is applied as a polygon with optional polylines for the bunds.

Activity code: **fishbund**

GIS data type: polygon with optional polylines

Cell bunding

Low elevation peat bunds (often referred to as contour bunds where these follow surface contours) arranged as a series of linear spurs that cross at regular intervals, creating a grid like pattern of cells. Features used to raise water levels over areas of peat wider than discrete drainage features. Record the area over which the cell bunding is applied as a polygon with optional polylines for the bunds.

Activity code: **cellbund**

GIS data type: polygon with optional polylines

Pressure bund

Pressure bunds (Peat banks constructed to an original height of 0.5 m or more above the surface). Function of bunds is to raise water levels and usually installed next to marginal ditches. Rarely used as a modern technique. Record all lengths of bund as lines.

Activity code: **hydropbun**

GIS data type: polyline

Weir, sluice, or penstock

Structures installed to raise water levels whilst allowing overflow. Weirs and penstocks may have an adjustable overflow level and are constructed of a range of materials. Indicate changes in water level achieved at this point in the comments. Record point locations of the weir/sluice installed.

Activity code: **hydrowrsl**

GIS data type: Point

Adjustable weir installed together with a stock bridge and pedestrian bridge for access to enable adjustment or measurement. Drop boards can be added or removed to achieve target water levels. Cors y Farl SSSI, Anglesey. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Simple timber sluit built in-situ to increase water levels in an over-deepened ditch, Cors Hirdre SSSI (Penllyn). Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Adjustable pipe intake in a pool with stock-friendly margins. Adjustment of the pipe elbow can raise or lower levels by c. 0.7 m. This pipe serves to enable drainage freeboard from 3rd party land to the right whilst allowing rewetting of fen to the left. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Adjustable penstock used to control the discharge of water into a constructed wetland at Cors Erddreiniog NNR. The Photo: P.S.Jones/Anglesey & Llyn Fens Project.

Weir or sluice area

Area of influence of weir/sluice. Indicates the area of influence of the weir or sluice on the hydrology of the peatland. Provide details of the type of construction, extent, and range of water level change in the comments. Identify the relevant area in consultation with the National Peatland Action Programme (NPAP).

Activity code: **hydrowsar**

GIS data type: polygon

Spring or seepage

Increasing the area of peatland influenced by springs or seepages. This includes a range of techniques to increase the area of peatland influenced by springs, usually where this has been reduced artificially by drainage. Techniques include surface reprofiling, ditch infilling and use of bypass pipes. Record as polygons areas of peatland where spring influence has been restored.

Activity code: **hydroseep**

GIS data type: polygon (with optional points)

Upslope runoff

Increasing the area of peatland influenced by upslope runoff. This includes a range of techniques to increase the area of peatland influenced by runoff from upslope, usually where this has been reduced artificially by drainage. Techniques include surface reprofiling, ditch infilling and use of bypass pipes. Record as polygons areas of peatland where upslope runoff influence has been restored.

Activity code: **hydroroff**

GIS data type: polygon (with optional points)

Waterway over banking

Increasing the area of peatland influenced by stream/river over-banking. This includes a range of techniques to increase the area of peatland influenced by overbanking, usually where this has been reduced artificially by drainage. Techniques include surface reprofiling, removing bunds/levees and in-channel measures. Record as polygons areas of peatland where overbanking influence has been achieved.

Activity code: **hydroovba**

GIS data type: polygon (with optional points)

Broken field drain

Breaking up field drains. This covers measures to prevent the operation of buried field drains. Record as lines of drains broken up or blocked with optional points for (e.g.) clay dams.

Activity code: **hydrofdrn**

GIS data type: polyline (and optional points)

Field drains broken area

Area of influence of field drains on the peatland hydrology. Indicates the area of peatland influenced by breaking up field drains. Provide details of the type of drain, method used to break it as well as the extent and range of water level change in the comments. Identify the relevant area in consultation with the National Peatland Action Programme (NPAP).

Activity code: **hydrofdar**

GIS data type: polygon

Sealed peat cracks

Sealing cracks in peat. Plastic piling or sheets of plywood are sometimes used to provide a seal across peat cracks, with sections of variable length inserted at a right angle to the feature. Record as point features here for discrete features. For extensive cracks, capture these as plastic piling or timber dams with/without in filling.

Activity code: **hydroseal**

GIS data type: points

Curtain dam

Curtain dams. Timber or plastic piling inserted to raise water levels at locations other than discrete ditches or erosion gullies. Record as lines or points, depending on length.

Activity code: **hydrocdam**

GIS data type: polyline (with optional points)

Installation of a 245 m curtain dam made of interlocking heavy duty plastic piling at Cors Erddreiniog, Anglesey. This approach was needed to counteract a ditch which the neighbouring land-owner wanted to maintain at soil drainage levels. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Hydrological other measures

Increasing the area of peatland influenced by other measures. Please specify the measures adopted in the 'comments' column. Record as polygons areas of peatland where irrigation has been achieved and record the method.

Activity code: **hydroarot**

GIS data type: polygon (with optional points)

Historic hydrological management

Overall area subject to historic hydrologic restoration. This provides a definition of an area managed historically through hydrologic restoration where detailed capture of individual activity measures was not undertaken at the time.

Activity code: **hydroarea**

GIS data type: polygon

Hydrological restoration – dams

Ditch blocking or 'grip blocking' involves the installation of dams into linear ditches Dams may be installed with or without back filling with material such as heather brash or peat. Pipes are sometimes used to allow water to pass through rather than over the dam, usually to reduce the risk of dam failure or where some drainage function needs to be retained. Rather than create a separate dam type here, we ask that the use of pipes in this way can be included in the comments column when mapping these features.

Peat dam no infill

Dams constructed of peat for the purpose of raising water levels within ditches and where the length of the ditch between dams is not infilled or reprofiled. Lines should represent sections of ditches where water levels have been raised using peat dams. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damptni**

GIS data type: polyline (and optional points)

Standard peat dams have been installed at roughly 5m intervals along a former forestry drain in the vicinity of the Nant Gwinau on a forest to bog restoration site in

the Cambrian Mountains, with the intention of raising the water table of the surrounding peat

Plastic dam no infill

Dams constructed of sheets of interlocking plastic for the purpose of raising water levels within ditches and where the length of the ditch between dams is not infilled or reprofiled. Lines should represent sections of ditches where water levels have been raised using plastic piling dams. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damppni**

GIS data type: polyline (and optional points)

Plastic piling raising water levels in an old peat cutting. Cors Fochno, Ceredigion. Photo: P.S. Jones.

Timber dam no infill

Timber dams in ditches not infilled or reprofiled. Dams constructed of timber for the purpose of raising water levels within ditches and where the ditch is not infilled or reprofiled. Lines should represent sections of ditches where water levels have been raised using timber dams. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damtini**

GIS data type: polyline (and optional points)

A timber dam used to block a former forestry drain in in the vicinity of the Nant Gwinau on a forest to bog restoration site in the Cambrian Mountains, with the intention of raising the water table of the surrounding peat.

Heather dam no infill

Heather bales in ditches not infilled or reprofiled. Dams constructed of heather bales for the purpose of raising water levels within ditches and where the ditch is not infilled or reprofiled. Lines should represent sections of ditches where water levels have been raised using heather bales. Points can be added to record each bale location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damheni**

GIS data type: polyline (and optional points)

Brash dam no infill

Brash dams in ditches not infilled or reprofiled. Dams constructed of brash for the purpose of raising water levels within ditches and where the ditch is not infilled or reprofiled. Lines should represent sections of ditches where water levels have been raised using heather bales. Points can be added to record each brash dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **dambrni**

GIS data type: polyline (and optional points)

Other dam no infill

Other dam types in ditches not infilled or reprofiled. Any technique used other than those itemised as AH.2.1 – 2.5 for the purpose of raising water levels within ditches and where the ditch is not infilled or reprofiled. Please state the technique in the 'comments' column.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damotni**

GIS data type: polyline (and optional points)

Peat dam peat infill

Dams constructed of peat for the purpose of raising water levels within ditches and where the length of the ditch between dams is also infilled with peat or reprofiled. Lines should represent sections of ditches where water levels have been raised using peat dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damptpt**

GIS data type: polyline (and optional points)

Plastic dam peat infill

Plastic piling dams in ditches infilled with peat or reprofiled. Dams constructed of sheets of interlocking plastic for the purpose of raising water levels within ditches and where the ditch is also infilled with peat or reprofiled. Lines should represent sections of ditches where water levels have been raised using plastic piling dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **dampppt**

GIS data type: polyline (and optional points)

Timber dam peat infill

Timber dams in ditches infilled with peat or reprofiled. Dams constructed of timber for the purpose of raising water levels within ditches and where the ditch is also infilled with peat or reprofiled. Lines should represent sections of ditches where water levels have been raised using timber dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damtdpt**

GIS data type: polyline (and optional points)

Heather dam peat infill

Heather bales in ditches infilled with peat or reprofiled. Dams constructed of heather bales for the purpose of raising water levels within ditches and where the ditch is

also infilled with peat or reprofiled. Lines should represent sections of ditches where water levels have been raised using heather bales dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damhept**

GIS data type: polyline (and optional points)

Brash dam peat infill

Brash dams in ditches infilled with peat or reprofiled. Dams constructed of brash for the purpose of raising water levels within ditches and where the ditch is also infilled with brash or reprofiled. Lines should represent sections of ditches where water levels have been raised using brash dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **dambrpt**

GIS data type: polyline (and optional points)

Other dam infill

Other dam types in ditches infilled with peat or reprofiled. Any technique used other than those itemised as AH.3.1 - 3.5 for the purpose of raising water levels within ditches and where the ditch is also infilled with peat or reprofiled. Please state the technique in the 'comments' column. Lines should represent sections of ditches where water levels have been raised. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damoth**

GIS data type: polyline (and optional points)

Peat dam brash infill

Peat dams in ditches infilled with brash or reprofiled. Dams constructed of peat for the purpose of raising water levels within ditches and where the ditch is also infilled with brash or reprofiled. Lines should represent sections of ditches where water levels have been raised using peat dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damptbr**

GIS data type: polyline (and optional points)

Plastic dam brash infill

Plastic piling dams in ditches infilled with brash or reprofiled. Dams constructed of sheets of interlocking plastic for the purpose of raising water levels within ditches and where the ditch is also infilled with brash or reprofiled. Lines should represent sections of ditches where water levels have been raised using plastic piling dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damppbr**

GIS data type: polyline (and optional points)

Timber dam brash infill

Timber dams in ditches infilled with brash or reprofiled. Dams constructed of timber for the purpose of raising water levels within ditches and where the ditch is also infilled with brash or reprofiled. Lines should represent sections of ditches where water levels have been raised using timber dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damtibr**

GIS data type: polyline (and optional points)

Heather dam brash infill

Heather bales in ditches infilled with brash or reprofiled. Dams constructed of heather bales for the purpose of raising water levels within ditches and where the ditch is also infilled with brash or reprofiled. Lines should represent sections of ditches where water levels have been raised using heather bales dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damhebr**

GIS data type: polyline (and optional points)

Brash dam brash infill

Brash dams in ditches infilled with brash or reprofiled. Dams constructed of brash for the purpose of raising water levels within ditches and where the ditch is also infilled with brash or reprofiled. Lines should represent sections of ditches where water levels have been raised using brash dams and by infilling. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **dambrbr**

GIS data type: polyline (and optional points)

Other dam brash infill

Other dam types in ditches infilled with brash or reprofiled. Any technique used other than those specified in 'Hydrologic restoration -Dams' for the purpose of raising water levels within ditches and where the ditch is also infilled with brash or reprofiled. Please state the technique in the 'comments' column. Lines should represent sections of ditches where water levels have been raised. Points can be added to record each dam location.

Please indicate in the comments whether pipes were also included in the dam along with details on the material and height at which the pipes were installed.

Activity code: **damotbr**

GIS data type: polyline (and optional points)

Hydrological restoration – ground smoothing

Throughout plantation forests in Wales, extensive drainage networks often run alongside rows of coniferous trees that are grown on the raised, prepared, ground in between the ditches. Here we list some known techniques used to restore the hydrology of such sites. This is a developing area of restoration.

Stump removal offsite

Stump removal. Smoothing of the ground surface with tree stumps removed from the site. If brash was also removed offsite, please capture this additionally as 'brash removed', code 'smbrrem'.

Activity code: **smstremoff**

GIS data type: polygon

Stumps windrowed

Stump windrowing. Smoothing of the ground surface with tree stumps and brash windrowed on site. This is done where the peat profile is more shallow; stumps are slid/moved and stacked into windrows running up and down slope.

Activity code: **smstremwin**

GIS data type: polygon

Stump flipping

Stump flipping. Smoothing of the ground surface with tree stumps inverted and placed in to furrows to reduce ridge and furrow topographical variation as well as reducing water loss in furrows. Reduced cost and site disturbance compared to removal of stumps from site. If brash has also been removed from the site, please also capture this as a polygon for 'Brash removed' code 'smbrrem'.

Activity code: **smstf**

GIS data type: polygon

Stump grinding

Stump grinding. Similar to 'stump flipping' but the stumps are mechanically ground to further smooth the terrain. Smoothing of the ground surface with tree stumps inverted and placed in to furrows to reduce ridge and furrow topographical variation

as well as reducing water loss in furrows. Reduced cost and site disturbance compared to removal of stumps from site. If brash has also been removed from the site, please also capture this as a polygon for 'Brash removed' code 'smbrrem'.

Activity code: **smsg**

GIS data type: polygon

Cross tracking

Cross tracking. Smoothing of the ground surface of sites with old stumps to compress stumps as well as flatten topographical variation of ridge and furrow. This involves tracking back and forth over ridge and furrow or other shallow surface drainage features to compress them and irradicate their drainage impacts. If brash has also been removed from the site, please also capture this as a polygon for 'Brash removed', code 'smbrrem'.

Activity code: **smcr**

GIS data type: polygon

Wave damming

Wave damming. Peat dams in channels with insufficient peat depth to include deep excavation. An excavator is used to drag peat from the ridges into the furrows at regular intervals to impede the existing drainage. If brash has also been removed

from the site, please also capture this as a polygon for 'Brash removed', code 'smbrrem'.

Activity code: **smwave**

GIS data type: polygon

Brash removed

Brash removed. Removal of brash from an area prior to or in conjunction with Ground smoothing activities. Please also capture the appropriate smoothing technique as well as this polygon for removal of brash when both have been done.

Activity code: **smbrrem**

GIS data type: polygon

Turf inversion

Turf inversion. Areas where turf has been excavated and over-turned and recompressed to re-initiate vegetation development without changing gross topography and also eliminating disposal of excavated material.

Activity code: **smtinv**

GIS data type: polygon

Turf stripping

Turf stripping involves the excavation and removal of turf and damaged or enriched surface peat. Turf and peat stripping may be done as an exceptional measure to remove enriched dry peat and reveal wet oligotrophic peat for habitat recovery, usually where enrichment is a significant issue.

Activity code: **smtstr**

GIS data type: polygon

Turf and peat stripping at Cae Gwyn, Cors Erddreioniog, Anglesey. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Erosion control

Erosional features such as haggs and gullies expose areas of bare peat which are prone to further degradation if left uncontrolled. Gullies also act as drainage features even in the absence of active erosion. Techniques such as hagg reprofiling and gully blocking aim to protect the peat from exposure to the elements and reduce weathering from wind and water and sometimes high foot-fall, whilst also contributing to the recovery of water levels.

A distinction is made here between control of erosional features such haggs and gullies and the hydrologic restoration of man-made features created to drain peatlands. Hagged areas exposing bare peat are most readily mapped as polygons that can be used to define the areas over which erosion control techniques are applied whereas blocked gullies are mapped as lines.

Activities included in erosion control:

Surface stabilisation
Reprofiled
Footpath routed
Historic erosion control management
Erosion control - gully blocking

Surface stabilisation

Surface stabilisation using matting, brash/litter spreading etc. Stabilisation of exposed peat surfaces by spreading brash (e.g. heather), litter (e.g. purple moor-grass) or manufactured matting.

Activity code: **erosstabl**

GIS data type: polygon

Reprofiled

Hag and gully re-profiling. Reprofiling of hag margins to achieve a sloping surface less prone to erosion. Record as polygons areas of peatland managed by this technique. Optional addition of lines representing lengths of reprofiled hag faces or gully edges.

Activity code: **erosrprof**

GIS data type: polygon (optional polylines)

Footpath routed

Re-routing walker access. Record as polygons areas of peatland managed by this technique. Optional addition of lines representing lengths of surfaced path.

Activity code: **erosfpath**

GIS data type: polygon (optional polylines)

Historic erosion control management

Overall area subject to historic erosion control measures. This provides a definition of an area where eroded peat has been historically managed for erosion control through revegetation measures and / or gully blocking but detailed capture of individual activity measures was not undertaken at the time.

Activity code: **eroarea**

GIS data type: polygon

Erosion control - gully blocking

Gullies are erosional features that can be blocked in a similar way to man-made ditches. The aims are to reduce erosion by water channelled through the gully, reduce exposure of the peat to weathering elements and increase water levels across the peatland to encourage peat-forming plants.

Often, gullies are wider than ditches so plastic piling tends not to be used in these instances as it is more likely to fail. Partial blocking using baffles is sometimes deployed where dam failure is considered likely or where creating pools behind dams is unacceptable, though this is far less effective in reducing the erosional power of water draining through them or increasing water levels.

Lines should represent sections of gullies where water levels have been raised using peat dams. Points can be added to record each dam location.

Gully blocked peat no infill

Gully blocking with peat dams installed across gullies to raise water levels. Dams constructed of peat for the purpose of raising water levels within erosion gullies. No infilling of the area behind the dam. Lines should represent sections of gullies where water levels have been raised using peat dams. Points can be added to record each dam location.

Activity code: **gullptni**

GIS data type: polyline (with optional points)

Gully blocked timber no infill

Gully blocking with timber dams installed across gullies to raise water levels. Dams constructed of timber for the purpose of raising water levels within erosion gullies. No infilling of the area behind the dam. Lines should represent sections of gullies where water levels have been raised. Points can be added to record each dam location.

Activity code: **gulltini**

GIS data type: polyline (with optional points)

Gully blocked heather no infill

Gully blocking with heather bales installed across gullies to raise water levels. Dams constructed of heather bales for the purpose of raising water levels within erosion gullies. No infilling of the area behind the dam. Lines should represent sections of gullies where water levels have been raised. Points can be added to record each dam location.

Activity code: **gullheni**

GIS data type: polyline (with optional points)

Gully blocked baffles

Partial gully blocking with baffles installed across part of the width of a gully to reduce flow velocity and encourage sedimentation. The area behind the dam may naturally fill in but the area behind the baffles is not usually filled in with brash. Lines should represent sections of ditches affected by baffles. Points can be added to record each baffle location.

Activity code: **gullbaff**

GIS data type: polyline (with optional points)

Gully blocked peat infilled

Gully blocking with peat dams installed across gullies to raise water levels. Infilled. Dams constructed of peat for the purpose of raising water levels within erosion gullies. Infilling with brash, heather bales peat, etc behind the dam. Please indicate the material used for infilling in the comments column. Lines should represent

sections of gullies where water levels have been raised using peat dams. Points can be added to record each dam location.

Activity code: **gullptin**

GIS data type: polyline (with optional points)

Gully blocked timber infilled

Gully blocking with timber dams installed across gullies to raise water levels. Infilled with brash. Dams constructed of timber for the purpose of raising water levels within erosion gullies. Infilling with brash behind the dam. Lines should represent sections of gullies where water levels have been raised. Points can be added to record each dam location.

Activity code: **gulltiin**

GIS data type: polyline (with optional points)

Gully blocked heather infilled

Gully blocking with heather bales installed across gullies to raise water levels. Infilled with brash. Dams constructed of heather bales for the purpose of raising water levels within erosion gullies. Infilling with brash behind the dam. Lines should represent sections of gullies where water levels have been raised. Points can be added to record each dam location.

Activity code: **gullhein**

GIS data type: polyline (with optional points)

Gully blocked other infill

Gully blocking with other material to raise water levels. Please indicate the type of material used, e.g. *Molinia*, in the comments column of the map attributes. Polygons or Lines should represent sections of gullies where water levels have been raised.

Activity code: **gullhein**

GIS data type: polyline (with optional points)

Micro-erosion blocking

Construction of multiple features created using peat to block micro-erosion in small early gullies and runnels. Typically applied to erosion features that are less than 0.3m below the level of the surrounding mire surface. It involves blocking the erosion feature using surrounding peat and can be done by hand due to the size of such features. To be captured as a polygon.

Activity code: **micerosb**

GIS data type: polygon

Tree management

The majority of 'Tree Management' techniques for peatland restoration described here involve conifer plantation on peatland drained for this purpose and the regeneration of those species and expansion onto unplanted land including adjacent peatland habitats. We use 'scrub control' when describing activities to manage broadleaf trees and bushes.

Tree Management techniques are often used in conjunction with Hydrologic Restoration and or grazing after the removal of trees or stumps from the site. In these cases, please map each of the activities that have taken place on the site.

Activities included in tree management:

Scrub control
Tree management – conifer plantation
Historic tree management

Scrub control

Scrub control. Scrub refers to broadleaf on peatland. Include a description of the type of scrub managed, whether scrub was removed offsite or remained on site and whether stem injection, stump treatment, foliar application, etc were applied in the 'Comments' column. Record as polygons areas of peatland managed by this technique. Any ongoing management using grazing should be captured as a separate Grazing activity.

Activity code: **scrubc**

GIS data type: polygon

Tree management – conifer plantation

Harvested

Tree canopy removed (harvested). Harvesting of conifer plantation. Record as polygons areas of peatland managed by this technique.

Activity code: **forharv**

GIS data type: polygon

Thinned

Tree canopy thinned. Thinning of plantation for early or failed conifer crop harvest. Record as polygons areas of peatland managed by this technique.

Activity code: **forthin**

GIS data type: polygon

Regeneration removed

Plantation regeneration and/or seeding removal. Removal of regenerated / reseeded of plantation forestry on former clear fell or an area never previously planted. Material is removed offsite.

Activity code: **forregen**

GIS data type: polygon

Ring barking

Ring barking. Ring barking is making a circular cut into the bark around the trunk to kill conifer trees on afforested peatlands. Please capture this as the area over which ringbarking was applied in this way.

Activity code: **forringb**

GIS data type: polygon

Cutting and snedding

Cutting and snedding. Cutting of trees and removal of branches (snedding) leaving material stacked onsite. Please capture this as the area over which cutting and/or snedding took place.

Activity code: **cutsned**

GIS data type: polygon

Conifer mulched or chipped

Mulching or chipping of conifer. This refers to mulching of conifer plantation. Please indicate in the comments whether this is whole trees or just stumps. For mulching of heather and/or Molinia please

Activity code: **chipcon**

GIS data type: polygon

Historic tree management

Overall area subject to historic management afforested peat, and peatland management associated with conifer plantation forestry. This defines an area where afforested peat has been historically managed but detailed capture of individual activity measures was not undertaken at the time.

Activity code: **forarea**

GIS data type: polygon

Vegetation management

The purpose of vegetation management in peatland restoration is usually to control the dominance of small numbers of abundant species (e.g. Molinia, Calluna) to ensure the recovery and persistence of mire vegetation typical to the context. It is often used as an adjunct or prelude to grazing and can also be used to help mitigate the effects of nutrient enrichment. Many techniques also involve the revegetation of peatlands. Invasive Non-Native Species (INNS) are eradicated as far as possible because they are not a component of natural peatland communities and have detrimental impacts on native ecosystems.

Activities included in vegetation management:

Vegetation management – mowing
Vegetation management – mulching and chipping
Vegetation management – INNS
Vegetation management – revegetation
Vegetation management – burning
Historic vegetation management area

Vegetation management – mowing

Mowing refers to a range of activities used to remove or control usually dense vegetation growth to restore open vegetation suitable for a wide range of both typical and often scarce mire species. It is often used as a prelude to grazing and can also be used for specific purposes such as fire-break creation.

Mown no collection

Mechanised topping/mowing, no collection of cut material. Mowing of habitat using a tractor or specialist wetland cutter with no collection of cut material.

Activity code: **mownc**

GIS data type: polygon

Mown with collection

Mechanised topping, collection of cut material. Mowing of habitat using a tractor or specialist wetland cutter with cut material collected and removed from the mown area.

Activity code: **mowcol**

GIS data type: polygon

Mowing of rich-fen vegetation with simultaneous collection of cut material using a specialist Pistenbully wetland harvester. Bryn Mwcog (Cors Erddreiniog), Anglesey. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Hand cut no collection

Hand-cutting, no collection of cut material. Mowing of habitat using hand tools (including powered strimmers/brushcutters) with no collection of cut material. For cutting of *Molinia*, please capture this as *'Molinia* cutting', Activity code 'molcut'.

Activity code: **mowhandnc**

GIS data type: polygon

Hand cut with collection

Hand-cutting with collection and removal of material. Mowing of habitat using hand tools (including powered strimmers/brushcutters) with cut material removed by

raking. For cutting of *Molinia*, please capture this as *'Molinia* cutting', Activity code molscr.

Activity code: **mowhandc**

GIS data type: polygon

Hand-mowing of sensitive hummocky rich-fen vegetation with a strimmer (background) and hand-raking (foreground) for placement into bags (not shown). Cors Nant Isaf, Anglesey. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Mown fire breaks

Mowing of firebreaks. Mowing to create fire breaks to limit the likely size of areas burnt by managed burns or wildfire. Digitise firebreak outlines.

Activity code: **burnmow**

GIS data type: polygon

Vegetation management – mulching and chipping

This refers to the use of chipped or mulched native trees or shrubs as a vegetation management activity. Mulched brash or larger 'chips' of wood are used as ground protection as well as a means of disposing of cut material on site in contexts where removal is not possible.

In this classification of restoration activities, mulching of conifer plantation trees is dealt with under 'Tree Management' for plantation forests on peat (see 'Conifer mulched or chipped', Activity code: chipcon).

Heather mulched or chipped

Mulching or chipping of heather. This refers to the use of heather as a mulch.

Activity code: **chiphe**

GIS data type: polygon

Other mulched or chipped

Other mulching or chipping. This refers to mulching that is neither heather nor conifer plantation trees/stumps. Please indicate in the comments' column what was mulched e.g. *Molinia*. For trees, please indicate in the comments whether this is whole trees or just stumps.

Activity code: **chipot**

GIS data type: polygon

Vegetation management – INNS

Invasive Non-Native Species (INNS) have, by definition, a tendency to dominate at the expense of native, diverse peatland plant communities. These are eradicated as far as possible because they are not a component of natural peatland communities and have detrimental impacts on native ecosystems. Examples of INNS include Rhododendron *ponticum,* Japanese knotweed (*Reynoutria japonica*) and Himalayan balsam (*Impatiens glandulifera*). Mechanical and manual removal, stem injection and cutting are among the methods used to manage these species. These plants are notoriously challenging to manage and new methods for removal continue to emerge to tackle their expansion in the UK.

INNS control

INNS (Invasive Non-Native Species) management by removal, cutting, stem injection or other means. Please specify the type of control and INNS in the 'comments' column.

Activity code: **veginns**

GIS data type: polygon

Vegetation management - Molinia treatment

Purple moor grass, *Molinia caerulea*, is a natural component of peatland communities but tends to dominate and outcompete other species on degraded, unhealthy peatlands. *Molinia* management techniques include scraping and cutting as well as trials of new treatments.

Molinia scraping

Molinia scraping. Mechanical scraping of *Molinia* to remove tussocks and/or smooth the peat surface after cutting of *Molinia*.

Activity code: **molscr**

GIS data type: polygon

Molinia cutting collected

Molinia cutting with collection and removal of material. Please describe the method used for cutting in the 'comments' column. For cutting of other types of vegetation, please use codes for hand cutting (mowhandc, or mowhandnc)

Activity code: **molcutc**

GIS data type: polygon

Molinia cutting not collected

Molinia cutting with no collection / removal of material. Please describe the method used for cutting in the 'comments' column. For cutting of other types of vegetation, please use codes for hand cutting (mowhandc, or mowhandnc)

Activity code: **molcutnc**

GIS data type: polygon

Molinia other

Other *Molinia* management techniques. Please specify the type of treatment applied in the 'comments' column.

Activity code: **moloth**

GIS data type: polygon

Vegetation management – revegetation

Active revegetation of peatlands with desirable species includes spreading of green hay, seeding, and the introduction of plugs of propagated or harvested material. Passive revegetation by natural colonisation is also adopted when there is sufficient availability of peatland species to regenerate.

Green hay

Spreading green hay. Introduction/re-introduction of target species by spreading green hay and typically applied on restored exposed peat or into existing vegetation treated by a range of potential management techniques.

Activity code: **revgghay**

GIS data type: polygon

Llion Jones and Emyr Humphreys of NRW spreading green hay onto the artificially stripped wet peat and marl surface at Cae Gwyn, Cors Erddreiniog, Anglesey. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Reseeded

Re-seeding of peatland surfaces with peatland species. Introduction/re-introduction of target species by re-seeding and typically applied on restored exposed peat.

Activity code: **revgseed**

GIS data type: polygon

Plugs

Planting plugs etc. Introduction/re-introduction of target species by planting plugs of propagated or harvested material.

Activity code: **revgplug**

GIS data type: polygon

Passive recovery

Passive recovery from seedbank etc, no intervention. Allowing vegetation development by natural colonisation.

Activity code: **revgpass**

GIS data type: polygon

Vegetation management – burning

Burning of areas of peatland is sometimes used as a carefully planned and executed vegetation restoration or management tool to arrest the proliferation of dominant species and encourage regeneration of desirable, peat-forming species and more diverse plant communities typical of healthy peatlands. Burning should only be considered as an exceptional activity and must follow the requirements of the [Heather and Grass Burning Code](#).

Burnt patch

Small-patch burning. Management by fire limited to small patches. Digitise boundaries of burnt patches.

Activity code: **burnpatch**

GIS data type: polygon

Burning management

Overall area managed by burning. The provides an option to digitise the overall area managed by burning and should be used in addition to mapping out small patch burning and fire-breaks.

Activity code: **burnmgmt**

GIS data type: polygon

Conservation burning at Cors Bodeilio NNR being used to control dense sedge and litter cover. Photo: Justin Hanson/Anglesey & Llyn Fens LIFE project

Historic vegetation management area

Overall area subject to historic vegetation management measures. This provides a definition of an area where vegetation has been historically managed but detailed capture of individual activity measures was not undertaken at the time.

Activity code: **vegarea**

GIS data type: polygon

Grazing

As a restoration and management activity, grazing is widely employed to restore and manage peatland habitats. Depending on the current and desired composition and structure of the plant communities, the grazing regime may need to be increased, reduced, or changed, grazing introduced or, in some circumstances, removed. For activity tracking, the area of peatland managed by the grazing regime is mapped as a polygon (area) and any infrastructure installed to facilitate grazing activity is recorded as points or lines according to the infrastructure types detailed here.
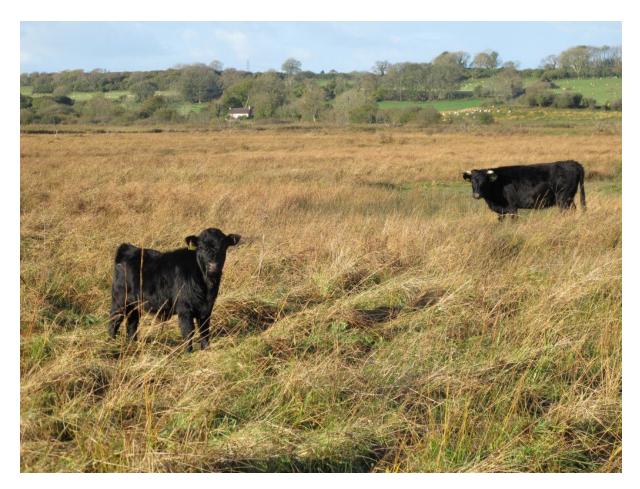
Activities included in grazing:

Grazing control

Grazing controlled to achieve restoration/conservation objective. Record as polygons areas of peatland where some form of agreed grazing regime is in place to achieve restoration or conservation objectives. This activity reflects grazing that is managed but unchanged. Please capture changes in grazing regime using classifications for 'livestock reduced, excluded, increased or introduced' respectively (see further detail below). Record the type of grazing and livestock in the 'comments' column. If known, please also describe the grazing regime, numbers and types of animals, periodicity of grazing, etc. in the 'comments' column.

Activity code: **grazcont**

GIS data type: polygon

Grazing with Welsh black cattle at Cors Bodeilio NNR, Anglesey. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Livestock reduced

Livestock reduced. Record as polygons areas of peatland where reduction in stock numbers has been achieved to support restoration or conservation objectives. Please specify the type of grazing and livestock in the 'comments' column.

Activity code: **grazredn**

GIS data type: polygon

Livestock excluded

Livestock excluded. Record as polygons areas of peatland where stock exclusion has been achieved to support restoration or conservation objectives. Please specify the type of grazing and livestock in the 'comments' column.

Activity code: **grazexcl**

GIS data type: polygon

Livestock increased

Livestock increased. Record as polygons areas of peatland where increases in stock numbers have been achieved to support restoration or conservation objectives.

Activity code: **grazincr**

GIS data type: polygon

Livestock introduced

Livestock introduced. Record as polygons areas of peatland where livestock has been introduced to an area previously ungrazed or reintroduced after a period of absence. Please specify the type of grazing and livestock in the 'comments' column.

Activity code: **grazintr**

GIS data type: polygon

Shepherding

Shepherding in place. Record as polygons areas of peatland where shepherding is in place to support restoration or conservation objectives.

Activity code: **grazshep**

GIS data type: polygon

Physical fence

Physical fencing. Installation or maintenance of physical fencing to enable grazing. Record as polygons for areas enclosed/exclosed or lines of fence.

Activity code: **grazfenc**

GIS data type: polygon / polyline

Solar-powered electric fencing being used to achieve a temporary grazing focus on rich-fen (right-hand side of image) at Cors Bodeilio NNR, Anglesey. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Virtual fence

Virtual fencing. Installation or maintenance of virtual fencing (e.g. using cattle collars) to enable grazing. Record as polygons of areas affected or lines.

Activity code: **grazcoll**

GIS data type: polygon / Polyline

Gate

Stock access - gates. Installation or maintenance of gates. Record as points.

Activity code: **grazgate**

GIS data type: points

Gate with interpretation board, side access and a gravel hard-standing to enable grazing access at Cors Bodeilio NNR, Anglesey. A traditional Anglesey limestone gate-post has been incorporated in this design. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Bridge

Stock access - bridges. Installation or maintenance of bridges. Record as points.

Activity code: **grazbrid**

GIS data type: points

Stone and fill bridge with culvert over a deep boundary drain at Matharn Uchaf, Penllyn. The image shows Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

Timber bridge used to enable access by stock and pedestrians, Cors Bodeilio NNR, Anglesey. Photo: P.S. Jones

Stock pen

Stock handling pens. Installation or maintenance of pens. Record as points.

Activity code: **grazpen**

GIS data type: points

Other grazing infrastructure

Other Infrastructure to enable grazing. Optional recording of any features used to support livestock. Please specify troughs, access to drinking water (waterway) / food etc in the 'comments' column

Activity code: **grazoth**

GIS data type: points / polyline / polygon

Historic grazing management area

Overall area subject to historic grazing treatments. This provides a definition of an area an area where grazing measures were adopted historically but detailed capture of individual activity measures was not undertaken at the time.

Activity code: **grazarea**

GIS data type: polygon

Nutrient control

Most peatland environments are low nutrient status systems and are sensitive to even modest loadings of the main macronutrients, notable N and P. Therefore, measures undertaken to control the nutrients available to plants growing on peatland often involve the restriction of nitrogen and phosphorus-based nutrients that tend to favour undesirable plant species and communities on many types of peatland. Under some circumstances, for example where bare peat has been exposed and offers limited resources for newly establishing plants, fertiliser or lime is applied to make conditions more favourable for vegetation growth.

Activities included in nutrient control:

Constructed wetland
CWT target area
Agreement for nutrients
Hedgerow
Earth banks
Interception trench
Swales
Farmyard runoff separation
Farmyard drainage

Constructed wetland

Constructed water treatment wetlands used to reduce point-source nutrient inputs. Record the outline of constructed water treatment wetlands as polygons.

Activity code: **nutcwt**

GIS data type: polygon

Small, constructed wetland used to treat water from a point source marginal input at Cors Bodeilio NNR, Anglesey. Photo: P.S. Jones/Anglesey & Llyn Fens LIFE Project.

CWT (Constructed Water Treatment) target area

Peatland areas targeted to benefit from constructed water treatment wetlands. Record as polygons areas of peatland downgradient of and assumed to be benefitting from installed constructed water treatment wetlands. Identify the relevant area in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nccwtarea**

GIS data type: polygon

Agreement for nutrients

Agreements to reduce/eliminate nutrient application / change practices. For land under management agreements to reduce applications of nutrients, record the area of peatland subject to reduced nutrient loading as polygons. Identify the relevant area in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nutagr**

GIS data type: polygon

Hedgerow

Planting hedgerows. Record as lines lengths of hedgerows planted to aid nutrient input reductions. The area of peatland impacted by this method will also be defined on a case-by-case basis in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nuthedg**

GIS data type: polyline **and** polygon

Earth banks

Earth banks. Banks (sometimes referred to in Welsh as Cloddiau) can be used parallel to wetland boundaries and used to help intercept downslope runoff as a nutrient reduction technique. Record banks as lines. The area of peatland impacted by this method will also be defined on a case-by-case basis in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nutbank**

GIS data type: polyline and polygon

Interception trench

Interception trenches. Record as lines lengths of interception trenches installed to aid nutrient input reductions. The area of peatland impacted by this method will also be defined on a case-by-case basis in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nuttrch**

GIS data type: polyline and Polygon

Swales

Swales. Swales are linear depressions installed to aid nutrient input reductions. Record these as line features. The area of peatland impacted by this method will

also be defined on a case-by-case basis in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nutswal**

GIS data type: polyline and polygon

Farmyard runoff separation

Farmyard runoff separation measures. Record locations where farmyard water runoff separation measures have been employed as points. The area of peatland impacted by this method will also be defined on a case-by-case basis in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nutroff**

GIS data type: Point and polygon

Farmyard drainage

Farmyard drainage measures. Record locations where measures have been employed to divert nutrient-enriched farmyard drainage away from peatlands as points. The area of peatland impacted by this method will also be defined on a case-by-case basis in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nutfydr**

GIS data type: Point and Polygon

Package plant

Package plant installation. Record locations of package plant installations as points. The area of peatland impacted by this method will also be defined on a case-by-case basis in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nutpplt**

GIS data type: Point and Polygon

Other nutrient control

Other nutrient control measures introduced. Please indicate the type of control implemented in the 'comments' column. e.g. septic tank removal / repair. The area of peatland impacted by this method will also be defined on a case-by-case basis in consultation with the National Peatland Action Programme (NPAP).

Activity code: **nutoth**

GIS data type: Point / Polyline and Polygon

Historic nutrient control

Overall area subject to historic nutrient control measures. This provides a definition of an area where peatland has been managed historically for nutrient control, but detailed capture of individual activity measures was not undertaken at the time.

Activity code: **nutarea**

GIS data type: polygon

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