All Works Specifications and Mitigations

• Contents

- # Environmental Mitigations

  Materials stored on vegetation in the SSSI will not remain on the same area for more than two weeks to avoid shading out.

  - All works undertaken will comply with the codes of conduct for Operations on Sites of Special Scientific Interest, Water Catchment Land, Environment Agency Regulations, Regulations issued by Dept. of Environment, DEFRA.
  - All waste materials will be removed from site.
  - Should ground conditions be such that the works represent an unacceptable risk of damage to the ground (i.e. if considered excessively wet or excessively dry) the works will be halted, temporarily, until conditions are assessed as appropriate for restart.
  - Any evidence of protected animal species within works areas observed during surveying or during the works themselves will be recorded and an exclusion zone established in consultation with the Nominated Officer.
  - Any works on the ground and airlifiting will only be undertaken between 16th August and 31 March (outside of bird breeding season). No works to be completed from 1st April to 15th August inclusive.
  - No works that require access to the ground will be undertaken during bird breeding activity. If MFFP is made aware by any stakeholder that bird nesting activity is occurring early or late, NE will be consulted before any further work is carried out.
  - Sensitive areas, such as Upland Flushes, Fens and Swamps as identified by the Priority Habitat Inventory, will be avoided by the works including specifically avoided during machine works, machine access routes and aerial load lifting works.
  - If applicable persons working on site will follow biosecurity measures to prevent the spread of Avian Flu / other diseases. This will include disinfecting footwear with Virkon disinfectant before and after entering a site, and reporting of any diseased or dead animals.
  - Where heather brash is harvested from a Donor Site that is separate to the Works site it will have cleared biosecurity checks focused on pests and disease such as heather beetle, tick and Phytophthora as per the protocol in "NCPGS: Restoration Grant- Guide for Applicants 2023 (final): Annex 2 Biosecurity" and supporting document MFFP_Q2_Biosecurity Methodology and in consultation with the landowner.
  - Machinery & vehicles will be cleaned prior to use at the Works Site.

- # Protection of Archaeology

  - Local HER records have been checked by a qualified archaeologist and a Historic Environment Assessment has been carried out.

- Further ground survey may be carried out by a qualified archaeologist. Survey results will be used to describe the potential impact of proposed works on the historic environment, including adjacent monuments, donor sites, access routes etc.
- The location and methods for works will then be selected to avoid or minimise risk of damage to archaeological features of interest.
- Agreed standoffs will be adopted for any designated Scheduled Monuments or other important features.

• Movement and use of Machinery

Vehicles

- All vehicles (plant/machinery and vehicles) driving onto or across open moorland (blanket bog or dry heath) and away from existing established tracks will be low ground pressure of no greater than 3 psi when fully laden to prevent damage. Vehicles may include use of flotation tyres, wide bog tracks and/or dual-wheeled tractors.
- Excavators used on work sites are between 4 and 8 tonnes in weight. Excavators will be tracked, fitted with suitably wide "bog" tracks to have a ground pressure of no greater than 3 psi, to spread the load across the ground surface and minimise risk of rutting or damage.
- Wherever possible, biodegradable hydraulic oils will be used to minimise the risk of chemical spills on protected sites.
- Emergency spill kits will be carried for all vehicles at all times and use will be in accordance with the manufacturer's instructions.
- Where access points are on soft ground, bog mats will be used to protect the ground from disturbance.
- Bog mats will be available on site with excavators, in the event that they are required, to reduce the amount of vehicle access on and off site.
- If a vehicle did become stuck the operator must **stop immediately**, **turn off the engine and exit the machine,** THEN make the machine safe (e.g. drain fuel if necessary) if safe to do so. Finally, inform MFFP and Natural England.No recovery should be attempted until the relevant authorities have been contacted and a recovery plan has been agreed.

Route selection

- A banksman will be available for access and egress, to walk at a safe distance in front of the machine.
- Existing made tracks, where available, will be used to access onto the site. Vehicle access to sensitive moorland areas must be carefully managed and routes chosen so as not to cause damage to the designated features of the SSSI/SAC/SPA or rutting of the peat surface.
- Chosen routes across open moorland will only be used if the ground is in good condition (with respect to access/tracking), or otherwise avoided, and alternative route will be selected from

within the hatched area on the access maps. Should no access route in suitable good condition be found within the hatched area, works will halt and alternative access discussed and agreed with Natural England. Representative photographs of 'good' and 'bad' condition are shown below in Photos 1–4.

- Vehicles will avoid crossing the sensitive areas, HER features, recently restored areas, where vegetation is newly established and vulnerable to disturbance (e.g. establishing nurse crop, or bryophyte cover with limited vascular plants, rewetting programmes – visible surface water, bog polls). Movement of machinery over previous cutting areas, sphagnum planting or other well-established revegetation works is considered non-damaging, unless visual assessment of ground conditions by MFFP consider it at risk.
- Where vehicles are found to be causing disturbance to the surface or rutting occurs, passage over these areas will cease until the habitat has recovered.
- Repeat vehicle movements along the same routes will be avoided.
- Access will be restricted to periods where it can be anticipated that the ground is dry, firm or frozen, avoiding periods of very wet weather.
- The proposed work aims to deliver all excavator works on a given site in one contract or phase where possible, to avoid the potential cumulative impact of additional use of vehicles tracking on/off.
- At any point where ground or weather conditions deteriorate and lead to an unacceptable risk of damage, relevant operations will cease until such time as their resumption will not cause persistent tracks, disturbance or rutting.

Access track in 'Good Condition'

- Figure 1 Photo showing some compressed vegetation. There will be no persistent tracks visible after 12 months.

- Figure 2 Photo showing some disturbance to the surface. There will be no visible signs of tracking after 12 months.

Access track in "Bad Condition"

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- Figure 3 Photo showing increased surface disturbance and if not repaired could show visible signs of tracking after 12 months.

- 
- Figure 4 Photo showing access route in bad condition and if not repaired would still show visible signs of tracking within 12 months.

- **Refuelling**
  - All vehicles will be refuelled by trained staff, will be fitted with a fuel stock bund or other recognised method for containing spills.
  - All access routes for the transport of fuel for the excavator machinery must be agreed with the nominated officer and are detailed on the access maps.
  - Alternatively, a suitable bunded fuel cube will be positioned at temporary location(s) on the work site to reduce vehicle movements. The fuel cube will be airlifted into position on site in vicinity of the working area, on level ground away from watercourses and sensitive features. The fuel cube may be repositioned to other working areas on the site periodically by airlifting, and/or airlifted offsite for refilling offsite. The fuel cube will be removed from site at the end of the works by airlifting.
  - All refuelling will take place away from watercourses and will take place on as level ground as reasonably possible. This should only be necessary at the Lift Site
  - Emergency spill kits will be carried for all vehicles at all times and use will be in accordance with the manufacturer's instructions.

- **General**
  - All vehicle access and movements on work sites will be outside of the main ground nesting bird breeding season (1 April–15 August inclusive).
  - There will be no persistent vehicle tracks visible after 12 months.
  - All vehicle movements on the work site will be kept to a minimum.
  - All vehicles left on site for the duration of the operations will not be stored on sensitive or recently restored areas. Vehicles will be stored away from well used footpaths or desire lines.
  - Operators will be competent in the use of and maintenance of machinery/vehicles, ensuring that vehicle tyre pressure is regularly checked and maintained at the correct pressure and that the vehicle is fit for purpose.
  - Where required, all vehicles will follow biosecurity measures to prevent the spread of Avian Flu / other diseases. This will include ensuring vehicles are clean before accessing the work site.

- **Transportation of Materials to Work Sites by Helicopter**
  - The Authority anticipates that transportation of Materials to the Works Sites will mostly require aerial load lifting (e.g. for transport of Coir, Timber, Stone, Bales,).
  - All airlifting operations will take place outside of bird breeding and will not take place from 1st April to 15th August, inclusive. Airlifting will only take place from 16th August to 31st March.
  - Transportation of other Materials may be undertaken by low-ground-pressure tracked ground vehicles. These routes are shown on the Access Maps. The tracking of vehicles will adhere to Section 4 Movement and use of Machinery.

- All other access required to the site will be undertaken on foot, save for vehicle refuelling.
- Helicopter drop sites will be marked (with canes/flags) for the loads of Materials at the Works Sites. These will ensure sensitive areas (such as upland flushes, springs and fen Priority Habitat or sphagnum carpets), are avoided.
- The means of transporting the Materials will be efficient operation and flight paths will vary depending upon wind speed and direction.
- The Operator will ensure that it has all the required Equipment and Machinery and personnel to satisfactorily complete the Works including but not limited to helicopter lifting bags, skips, nets, secondary hooks, extension strops, slings, and Load strops/ropes.
- The Operator is responsible for Marshalling and will provide sufficient personnel to Marshal each load and Drop Site at the Works Sites.
- Ground staff to direct the material drops will either walk onto site or be dropped off by the helicopter. It is anticipated that two members of ground staff will be needed to direct drops, with another two to act as marshals for the safety of the public.
- Bags used for lifting will be new to minimise the risk of loss of integrity.
- Materials will be dropped at works sites prior to materials being needed, and waste materials removed within two weeks where practicable, to minimise the loss of light to vegetation beneath the dropped bags. Materials may require storage on site for up to a month before being installed, spread or removed from site.
- Emptied bags will be bundled together (see brash spreading specification) to prevent any being blown away.
- Refuelling of the helicopter will take place by trained staff at the lift site on hardstanding, away from water courses and sensitive habitats using bunded fuel bowsers.
- Spill kits will be available at the lift site, and in the helicopter.
- Marshalls and warning notices will be in place to protect members of the public.
- It will be demonstrated that all machinery used is in good working order.
- All airlifting operations will be compliant with CAA regulations.

Helicopter Lift Site

- The helicopter lift site will need to be carefully considered from the perspective of health and safety and vehicular access for deliveries. Timings will be considered especially in case the lift site is on a SSSI.

Timing

- The lift site will be used for delivery and storage of materials, normally outside of bird breeding season.
- The lift site will be used for the airlifting of materials, normally outside of bird breeding season

- It is expected that each works season the temporary trackway will be in place for a maximum of 7 months, or whatever is agreed as part of the SSSI consent.

• Lift site operations

- The Materials will be delivered on flat bed trailers, or small wagons to the lift site. The delivery vehicles will not leave the trackway. Vehicle use will comply with Section 4.
- A small digger/telehandler will be used to load stone into the helicopter bucket, this vehicle, or any other vehicles will not leave the trackway.
- The Materials will then be airlifted, by helicopter, out from the lift site to the drop sites.
- The helicopter will have a support vehicle on the trackway with a fuel bowser for refuelling. The helicopter will have to land in order to refuel from a bunded fuel bowser. Helicopter refuelling operations will be carried out on the temporary trackway operating area.
- The helicopter contractors will carry spill kits and firefighting equipment in case of emergency.
- All materials (heather, stone, timber, sphagnum, lime, seed and fertiliser) will be stored on the Temporary Trackway. Brash, bales, stone and timber are all untreated natural materials so present no risk to surrounding environment. Lime, seed and fertiliser will be stored in waterproof and sealed bags, should a spillage occur the materials are granular and are easily swept up immediately. Spill kits will be available.
- All waste materials will be bundled securely at the lift site, on the trackway to avoid being blown away. If the trackway has already been removed the waste materials will be stored at the edge of the track and comply with Section 1.1. The waste materials will be removed at the end of each job, as soon as possible, but before the 1st April.

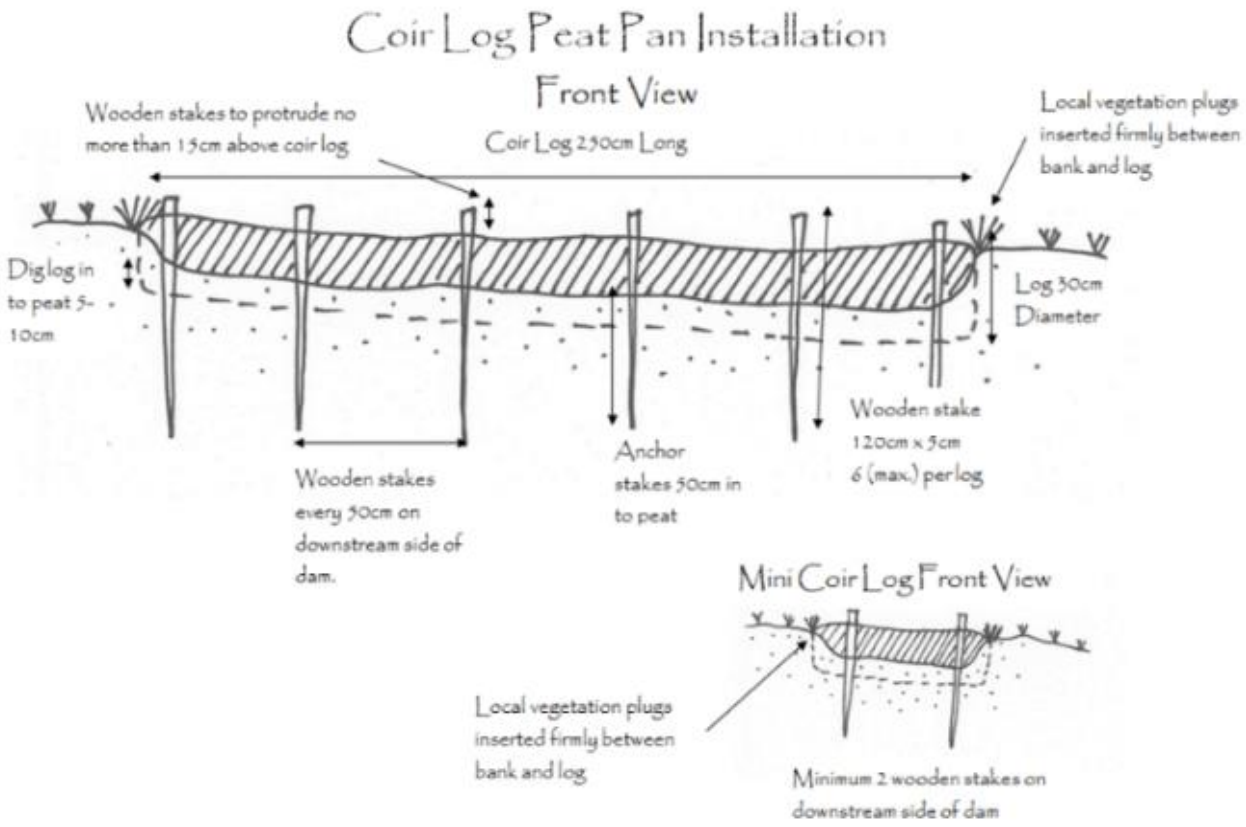
- **Work Specifications**
- **Gully Blocking – Natural fibre log dams**

  - **Environmental Mitigations**
    - Coir Logs will be transported (normally via helicopter) onto the works sites in 1m³ dumpy bags, containing up to 16 logs per bag.
    - Installation of dams will be done by staff on foot with the use of hand tools (spades) in small teams (5–10 people).
    - Installation of the dams requires them to be dug 5–10cm into the peat. Log edges will be keyed into channel sides and vegetated with locally-source turves to prevent erosion channels forming around dams.
  - **Supply of Natural Fibre Logs**
    - Logs will be filled with a natural organic fibre such as coir.
    - Logs will be 100% biodegradable and not contain synthetic materials, including the netting.
    - Each Dam Unit equates to

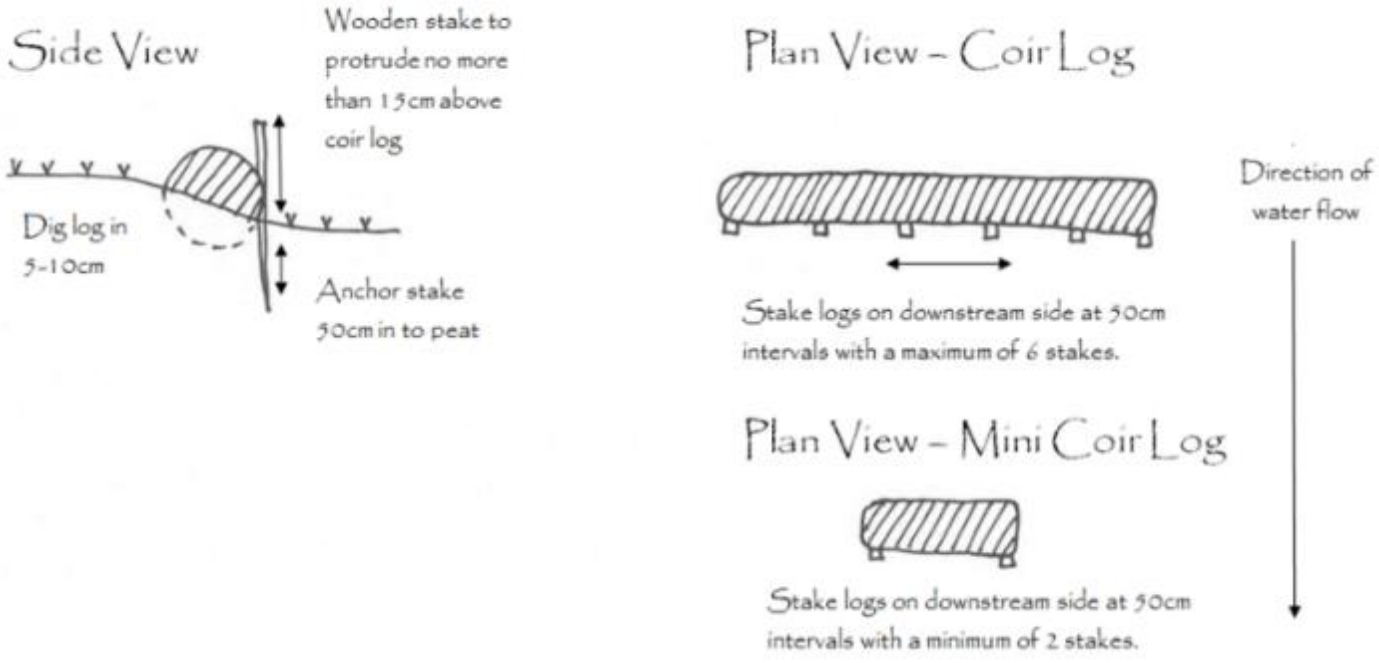
- Mini Log – 1 Coir Log (80x30cm) and 2 wooden stakes.
- Log – 1 Coir Log (250x30cm) and 6 wooden stakes.

- **Location of Individual Natural Fibre Log Dams**
  - Each Coir Log will need to be moved by hand from the Drop Site to the Dam location. Every practicable effort will be made to keep the distance from Drop Site to Dam location to a minimum but it is expected that some Logs may need to be moved up to approx. 50m
  - It is expected that Logs will weigh between 20–35kg. Prevailing weather conditions during transport and at the Works Site itself may result in water absorption leading to an increase in weights. These figures are for information purposes and no reliance should be made on this statement.
- **Construction of Log Dams**
  - Dam construction will be in low energy flat areas of "Peat Pans" and/or gullies less of less than 5 degrees of slope and where water flow is slow enough to prevent washing away.
  - Dams for Peat pans will be constructed at strategic points where the water flows out of the peat pan in order to hold water and create pools.
  - Where there are large outflows it may be necessary to construct Dams of more than one Log.
  - Each Dam Unit equates to

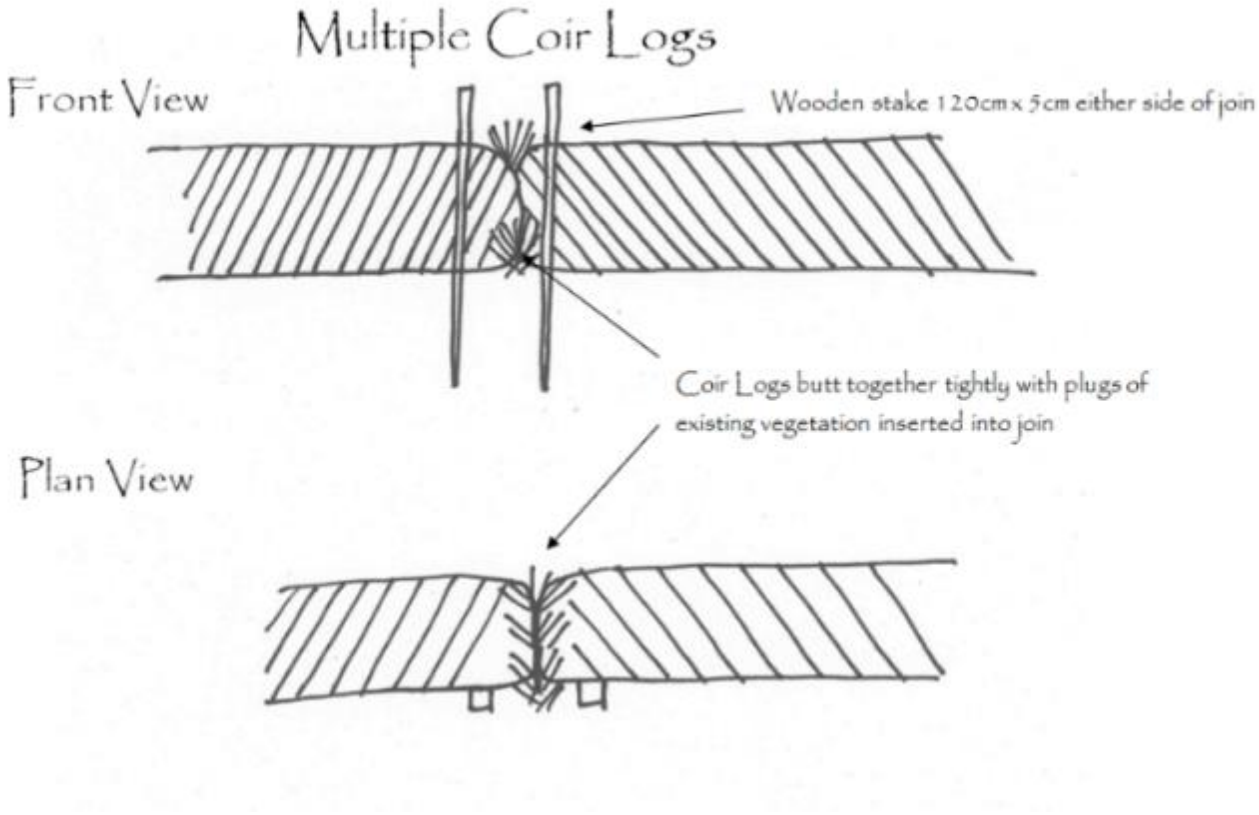
- Mini Log – 1 Coir Log (80x30 cm) and 2 wooden stakes.
- Log – 1 Coir Log (250x30 cm) and 6 wooden stakes.
    - The Logs will be dug in to the peat 5–10 cm and keyed into the side of the gully/ outflow. It is important that the Log butts tightly to the side of the bank to prevent scouring around the sides of the Dam.
    - Peat removed from the hole will be backfilled and compacted around each Log to ensure a good fit and any spare peat should be left on the upstream side of the dam.
    - Stakes will be used to secure the Log in position on the downstream side of the dam every 50cm. Each stake should be driven into the peat to 50cm.
    - Once a Dam has been installed local vegetation plugs such as cotton grass or wavy hair grass (NOT heather) will be planted at either side of the Dam.
    - Where multiple Logs must be used to construct a Dam, the Logs will join in order to prevent water scouring through the gap. Stakes will be positioned on either side of the join. Local vegetation plugs must be inserted firmly into joins.



- Figure 5 Diagram showing front view of coir logs



- Figure 6 Coir log



- Figure 7 Multiple coir logs

• Gully Blocking – Heather bale dams

• Environmental Mitigations

- Heather bales will be transported (normally via helicopter) onto the works sites in 1 m^3 dumpy bags, containing up to 4 bales per bag.
- Installation of heather bale dams will be done by staff on foot with the use of hand tools (spades) in small teams.
- Installation of the bales requires them to be dug 1/3 to 1/2 of bale height into the peat. Bale edges will be keyed into channel sides and vegetated with locally-source turves to prevent erosion channels forming around dams.

• Supply of Heather Bales

- Each Heather Bale shall conform to the following requirements:
- Small 'square' bales of dimensions 40cm high x 45cm wide and between 75 and 80cm in length;
- Baled to a density that gives a bale weight of between 20 and 40 kg when dry;
- Securely tied with a natural sisal twine;

- Each Heather Bale must only contain Heather;
- Heather Bales containing a proportion of foreign materials (e.g. soil, grass or other plant materials other than heather) as deemed inappropriate by the Nominated Officer shall be rejected. The decision of the Nominated Officer shall be final.
- The Heather Bales will not be seed rich, though must be fit for the purpose of Heather Bale dam creation and in such condition in the opinion of the Nominate Officer that the Heather Bales are intact and securely fastened and baled dense enough to avoid a loose construction;
- Be clearly suitable for dam construction;
- The Contractor is required to put the Heather Bales into Bags for transportation and airlifting.

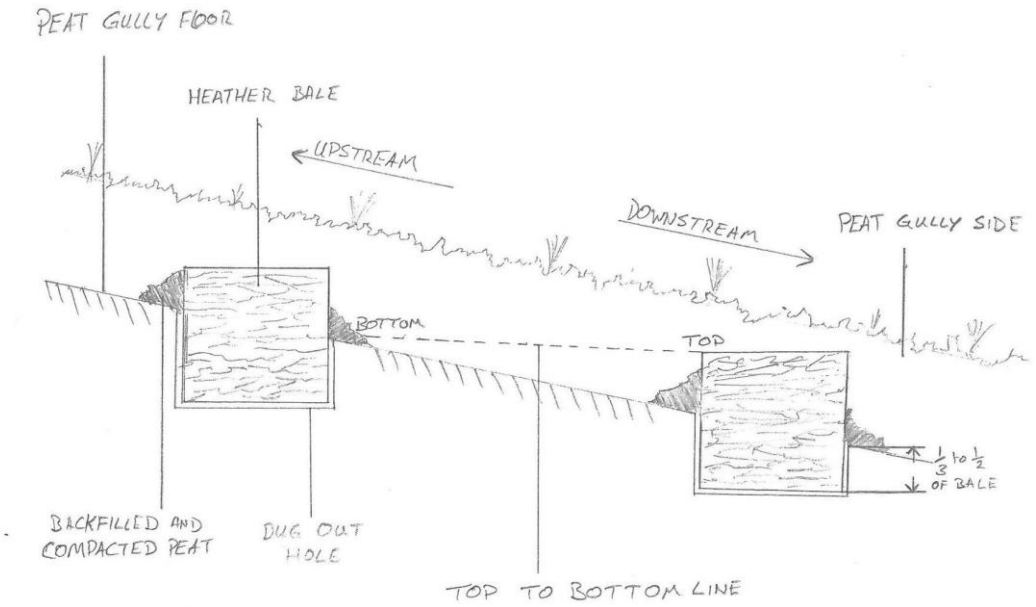
Location of Individual Heather Bale Dams

- Each Heather Bale will need to be moved by hand from the Drop Site to the Dam location. Every practicable effort will be made to keep the distance from Drop Site to Dam location to a minimum but it is expected that some Bales may need to be moved up to approx. 50 m.
- It is expected that Bales will weigh between 25 – 55 kg. Prevailing weather conditions during transport and at the Works Site itself may result in water absorption leading to an increase in weights. These figures are for information purposes and no reliance should be made on this statement by the Contractor.

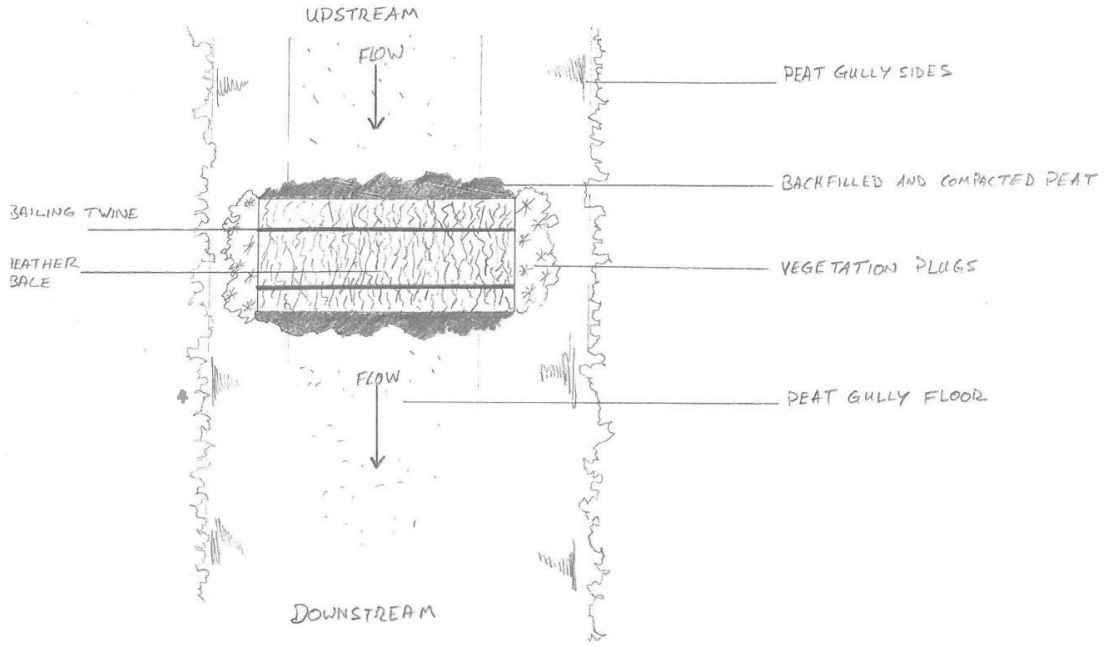
Construction of Heather Bale Dams

- Dam construction will be in low energy flat areas of "flushes" and/or gullies less of less than 5 degrees of slope.
- Dams for flushes will be constructed at strategic points where the water flows out of the flush.
- Where there are large outflows it may be necessary to construct Dams of more than one Heather Bale.
- In the case of very large Peat Pans, it may be beneficial to break up the bare peat area using Dams of more than one Heather Bale.
- Dams for small gullies will start as near to the top of the gully system as is reasonably practicable and work downstream. Dams in small gullies will be placed in strategic locations, such as pinch points, confluences and changes of direction.
- The Heather Bales will be dug into the ground using hand tools at between a third and a half of their height and keyed into the side of the gully/outflow. This is done to prevent scouring around the sides and base of the Dam. The Heather Bale will be dug into the ground so the heather stalks lie horizontally and in-line with the direction of water flow.
- Peat removed from the ground will be backfilled and compacted around each Heather Bale to ensure a snug fit. Any spare peat will be placed along the upstream face of the Dam and packed in behind the bales.

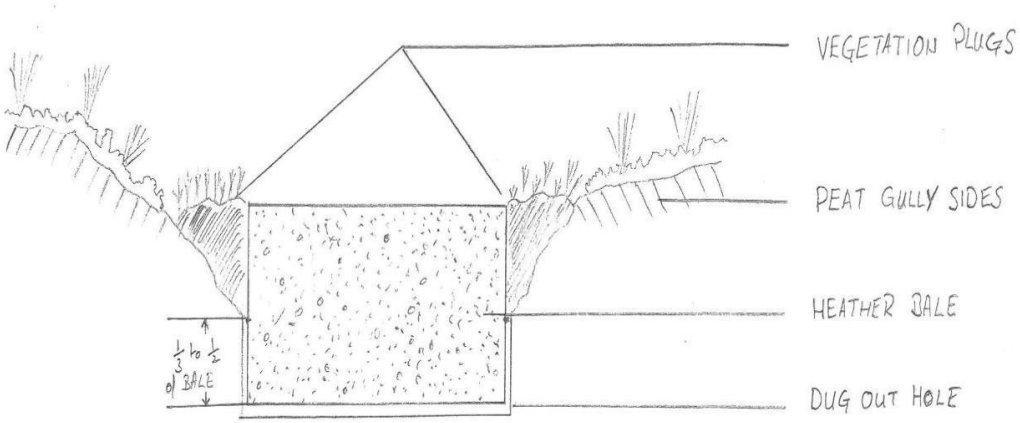
- Dams constructed in small gullies will follow the "top-to-toe" principal, i.e. the top of the downstream Dam should be level with or high than the bottom of the upstream Dam.
- Once a Dam has been installed, small turves will be taken from vegetation nearby (cotton grass is preferred) and translocated to the upstream corners of bales, such that the edges of Dams and the joints between Heather Bales are vegetated. Where possible, these should be taken from within the eroding gully/flushes into which the bales are being installed.



- Figure 8 Side view of installed heather bales



- Figure 9 Plan view of installed heather bales



- Figure 10 Cross section of heather bale installed in a gully

Gully Blocking – Timber Dams

Environmental Mitigations

- Timber will be airlifted onto the works site in packs, containing up to 80 planks.

- The material is driven into the peat using hand tools ensuring at least half its height is within the peat enabling the material to withstand the volume and pressure exerted by the water which will build up behind it.
- The dam will be driven into the sides of the gully far enough for structural strength and to prevent scouring around the sides.
- Dams will be constructed so as to minimise the risk of water overflow resulting in erosion - a low point (notch) will be incorporated into the construction, allowing water to overflow in the middle of the dam, to prevent side cutting, with a splash plate to prevent erosion from this overflow point.
- Care will be taken to ensure that the dams are installed at an appropriate height (i.e. lower than the surrounding vegetation) to reduce their visual impact.

Supply of Timber

- Each Timber Dam is to consist of between 4 and 6 fencing boards and 2 stakes.
- Fencing Boards will be: untreated FSC timber; either softwood or hardwood or equivalent and approved by the Nominated Officer; – 2400 mm X 125 mm X 25 mm.
- Stakes will be untreated FSC timber; either softwood or hardwood or equivalent and approved by the Nominated Officer – 1500 mm x 75 mm x 75 mm.

Construction of Timber Dams

- Ditch vegetation will be scraped back along the line of the Timber Dam and put to one side before putting in the stakes, and then moved back into place on Timber Dam completion.
- The stakes will then be driven into the base of the gully (minimum 400mm peat depth required) at approximately 1000mm centres.
- The first fencing board will be completely buried in the peat to prevent scouring at the base of the Timber Dam.
- The fencing boards will be keyed into the Gully sides by at least 200mm on both sides of the Gully, to prevent erosion at the Gully edges.
- Fencing boards will be nail-fastened using appropriate nails (on the upstream side), to the supporting upright fencing stakes.
- The top board of each Timber Dam will have a right angled, 50mm deep x 200mm long **square-shaped notch cut in it to its central point**, to allow water to flow through the middle of the Timber Dam rather than scour the sides of the gully.
- Timber Dams will require **a splash plate** placing on the Gully floor immediately downstream of the square notch in the Timber Dam, to prevent turbulence erosion as water flows over the top. Splash plates are to be implemented using locally won stone or other material with the Nominated Officer's prior approval.

- Timber Dams will be placed at approximately 8m intervals, with Timber Dams closer together on steeper slopes and further apart on flatter areas, following the "Top to Toe" principle i.e. the top of the downstream Dam should be level with or higher than the bottom of the upstream Dam.
- Variation in the positioning of the Timber Dams may be required in order to take advantage of the natural topography (e.g. pinch points, peat depth, gully shape etc.)
- Timber Dams will be constructed up to a typical maximum of 3m in width. Timber dams may be constructed in steeper gullies than peat dams, however the suitability of the peat and feasible spacing of preceding & subsequent dams will determine the maximum slope as opposed to a specified maximum angle alone.

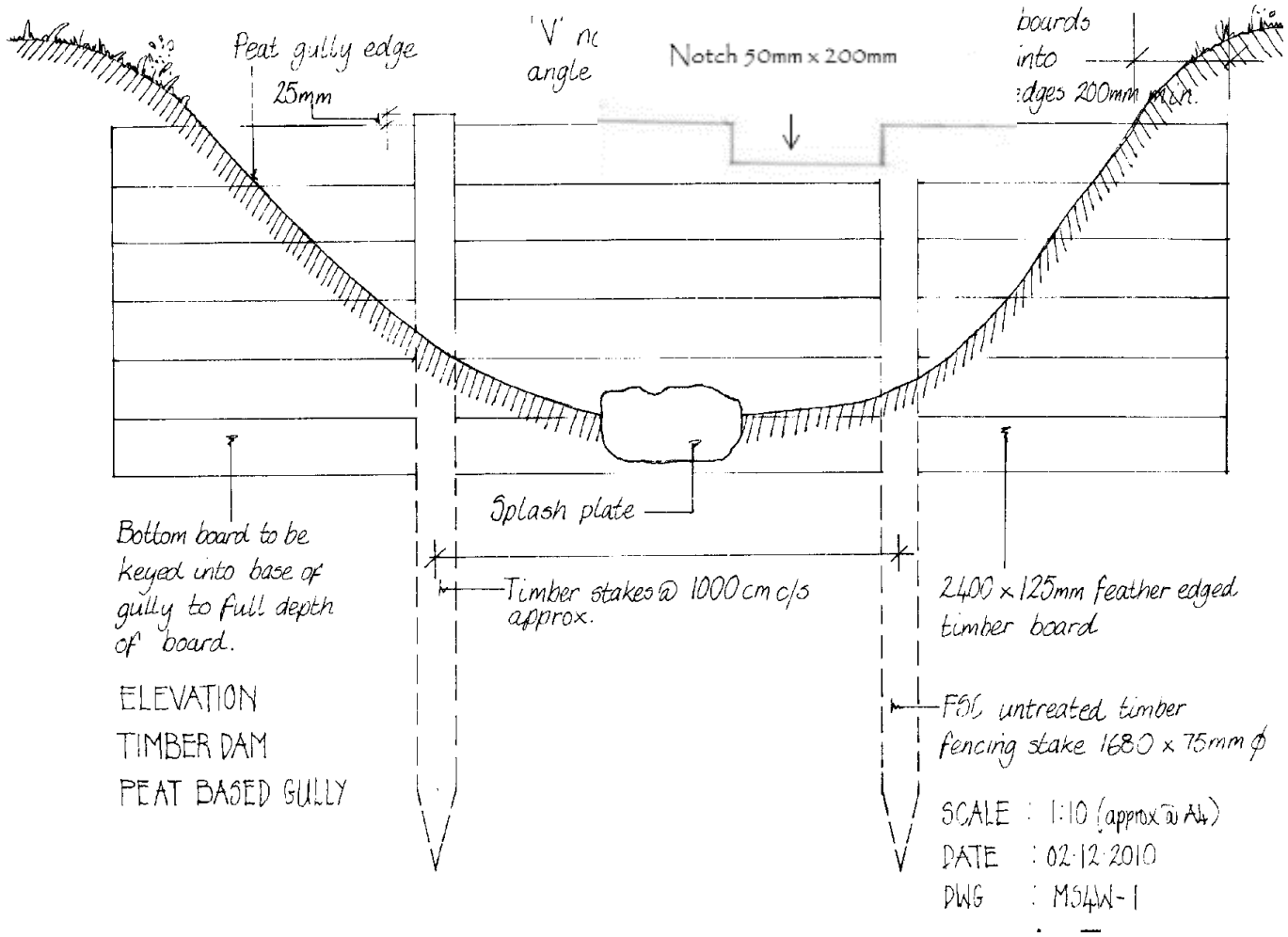
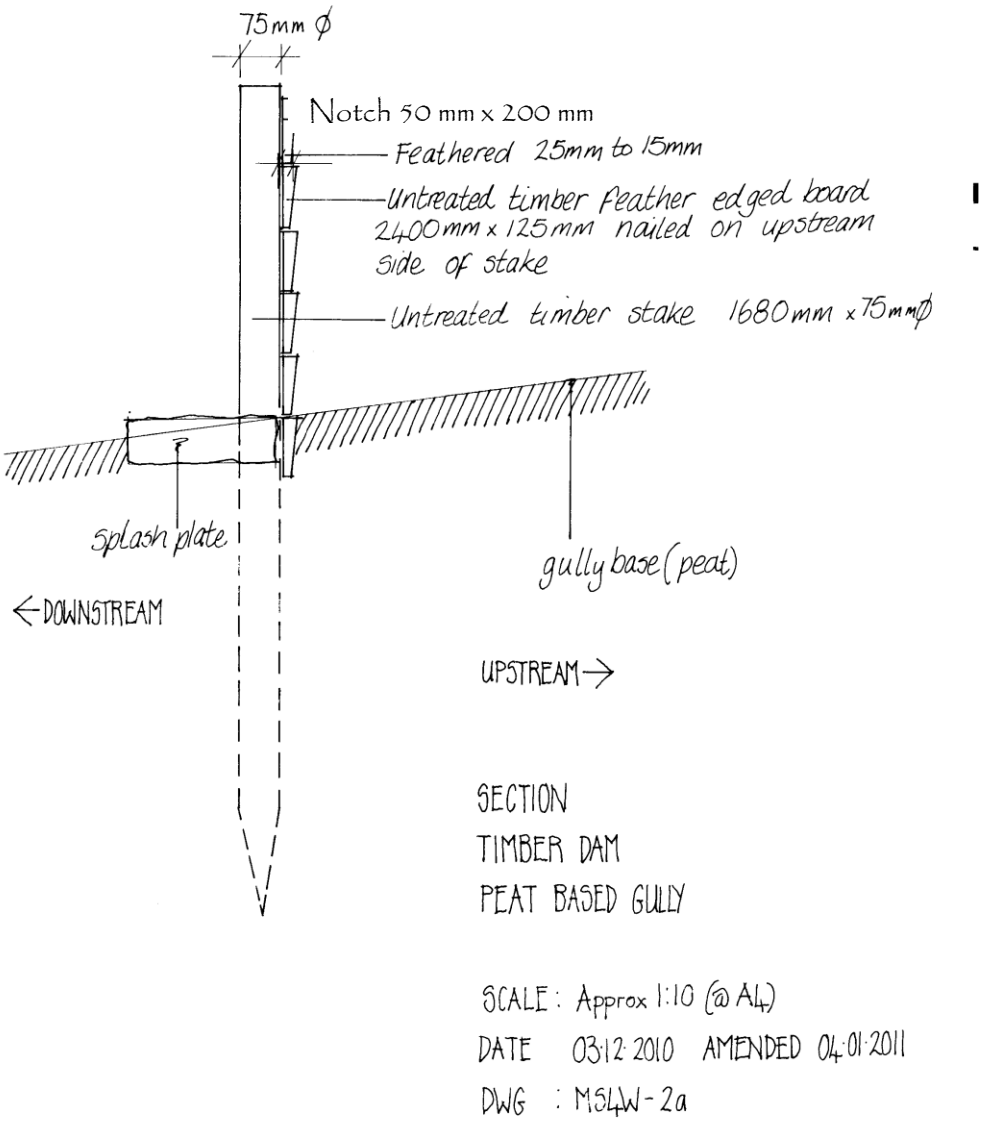

Peat gully edge
25mm
'V' no
angle
Notch 50mm x 200mm
boards
into
edges 200mm min.
Splash plate
Bottom board to be keyed into base of gully to full depth of board.
Timber stakes @ 1000 cm c/s approx.
2400 x 125mm feather edged timber board
FSC untreated timber fencing stake 1680 x 75mm ϕ
ELEVATION
TIMBER DAM
PEAT BASED GULLY
SCALE : 1:10 (approx @ A4)
DATE : 02-12-2010
DWG : MSAW-1

Figure 11


75mm ϕ
Notch 50 mm x 200 mm
Feathered 25mm to 15mm
Untreated timber feather edged board 2400mm x 125mm nailed on upstream side of stake
Untreated timber stake 1680mm x 75mmϕ
Splash plate
gully base (peat)
DOWNSTREAM
UPSTREAM
SECTION
TIMBER DAM
PEAT BASED GULLY
SCALE: Approx 1:10 (@ A4)
DATE 03.12.2010 AMENDED 04.01.2011
DWG : MS4W-2a

- Figure 12

Debris Timber Dams (or Leaky Barriers)

- **Environmental Mitigations**
- Minimise disruption to surrounding vegetation when sourcing suitable wood from the natural supply of fallen trees/branches.
- No use of machinery. All materials must be moved by hand to reduce ground damage.
- Ensure logs are secured (stake if necessary) to prevent debris being swept downstream in episodic flood events.

Construction

- Use the guidance below for the construction blue-print.

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Leaky barriers

IMAGE © Moors for the Future Partnership.

Leaky barriers can be constructed in a variety of locations across the catchment. These structures are often built from logs and woody materials and are placed in streams or ditches to hold back water. Where possible, these structures are designed to mimic the natural complexity of rivers and create a variety of habitats and flow conditions.

NFM purpose

Leaky barriers slow and divert flood flows and allow increased infiltration of water into the soil. They are designed to slowly drain trapped water once the flood flow has passed.

Leaky barriers are set above normal stream level so only flood flows are blocked. A network of leaky barriers work well on a local scale to control channel flows.

How you do it

Large logs can be laid across small streams in a cross formation and wedged into position. Smaller woody material can be wedged in between the large logs. To maximise impact, it is recommended to place more than one leaky barrier at different locations across the land holding.

If possible use locally sourced wood from the catchment.

Debris bundles can also be constructed in wooded areas to further roughen the surface of the floodplain and trap overland flows.

Site suitability

Throughout catchment, often alongside wooded areas in smaller watercourses. Leaky barriers work well alongside other woodland measures such as understorey planting.

Leaky barriers can also be constructed in ditches in open farmland, as well as in small upland ditches in open land, away from woodland and flowing channels. Due to possible effects on fish passage, In-ditch barriers are more suited to small watercourses and ditches where fish passage is less important, or where the watercourse runs dry during the summer months.

Benefits

- Delays flood peaks further down stream
- Traps sediment
- Can provide additional habitat for fish and invertebrates
- Low cost and effective
- Can be designed to incorporate a silt trap, improving water quality
- Reduces runoff.

Considerations

- Risk of woody material moving further downstream
- It is recommended to consider the potential impacts downstream and to follow design standards (such as those available from the Forestry Commission)
- Surrounding land may need to be capable of withstanding periodic flooding due to spill over when there is a high rainfall event
- Requires consent of Lead Local Flood Authority (LLFA).

Level of maintenance

Medium – May require periodic checking to ensure the integrity of the leaky barriers and remove any sediment or blockages where necessary. High longevity if well maintained.

Gully Blocking – Stone Dams

Environmental Mitigations

- Stone will be delivered by helicopter in a load containing 750kg per dam.
- The load of stone will be positioned directly in place in the gully at the identified GPS location
- Once the helicopter has placed the stone, a small team of staff will manually move the stones by hand into the required dam shape.

Supply of Stone

- Gully blocking stone shall be clean quarried sandstone from the carboniferous age *Millstone Grit* formation[1], or a sandstone with suitably similar physical and geochemical characteristics subject to approval by the nominated officer.
- The stone must not contain brick, concrete or tarmacadam, and shall be free from organic content, metal, plastic, rubbish or other deleterious material.
- The contractor is required to state their proposed source of stone for acceptance prior to importing; stating quarry location and rock characteristic as described in 1.2.1 as well as providing a representative sample of material.
- Stone shall be between 125mm (minimum) and 300mm (maximum) in any dimension (noting below grading tolerances). Stone should be graded to contain a range of sizes between these two dimensions to provide a balance between dam strength and flow resistance/sediment trapping.
- Grading Tolerances:

  (1) Less than 15% (by weight) finer(smaller) than 125mm

  (2) less than 15% (by weight) greater than 300mm.

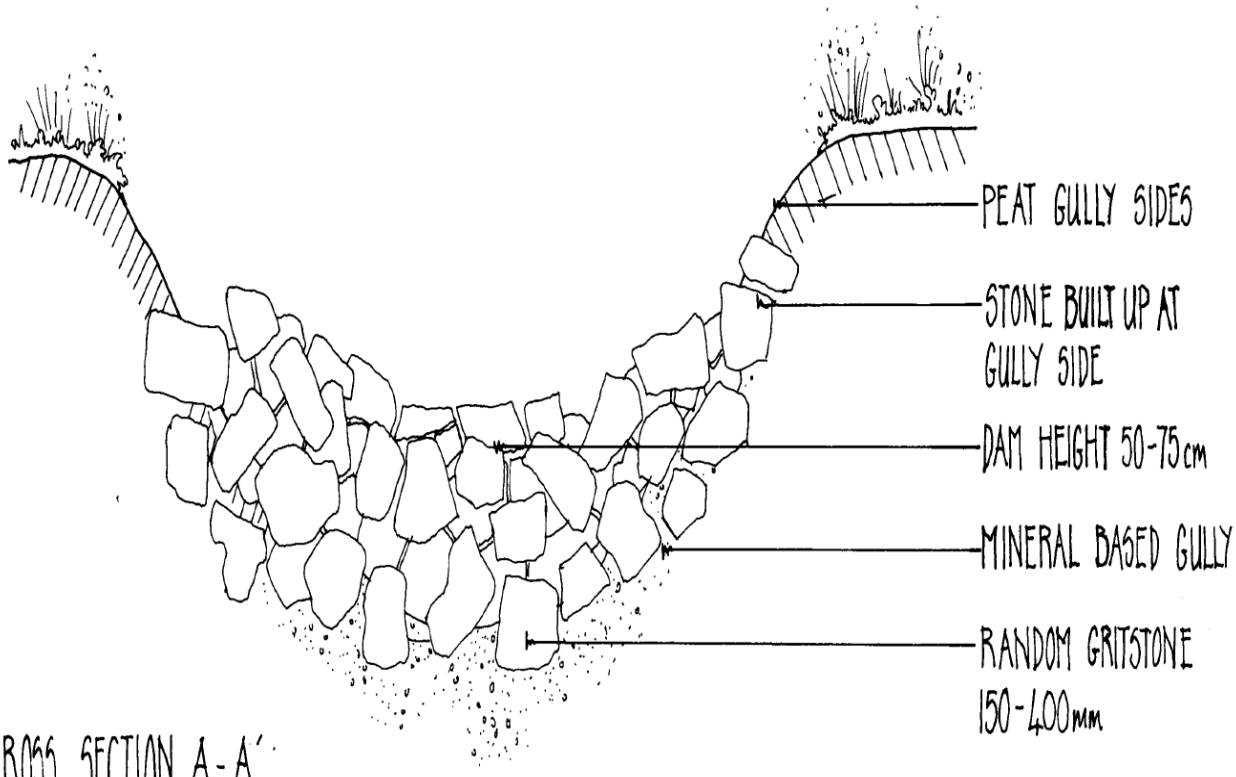
  (3) Less than 5% (by weight) smaller than 200mm

  (4) 0% (by weight) greater than 500mm

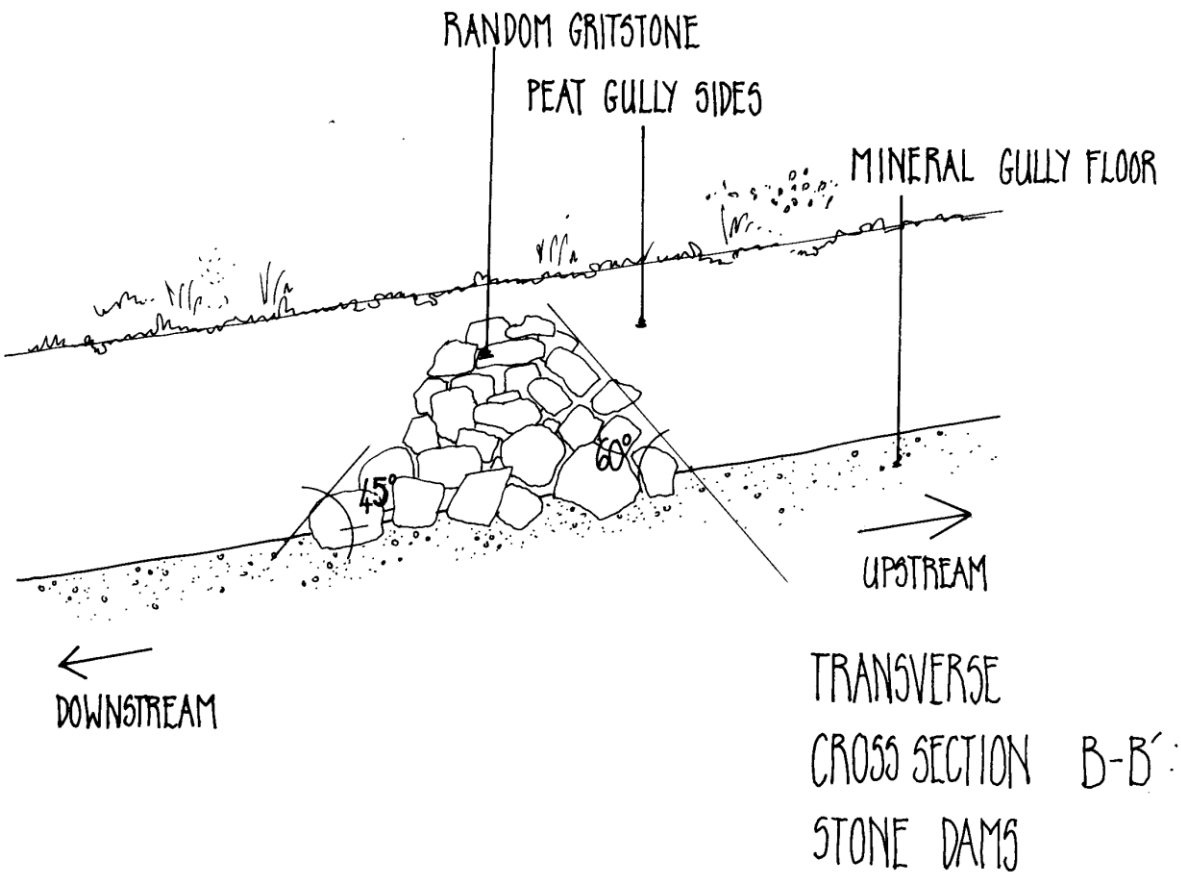
Construction of Stone Dams

- Each Stone Dam will contain a single Dam Unit and therefore each helicopter load is to weigh approximately 750kg.
- Dependent on the size and nature of the Gully more than one Dam Unit may be required to complete the Stone Dam.

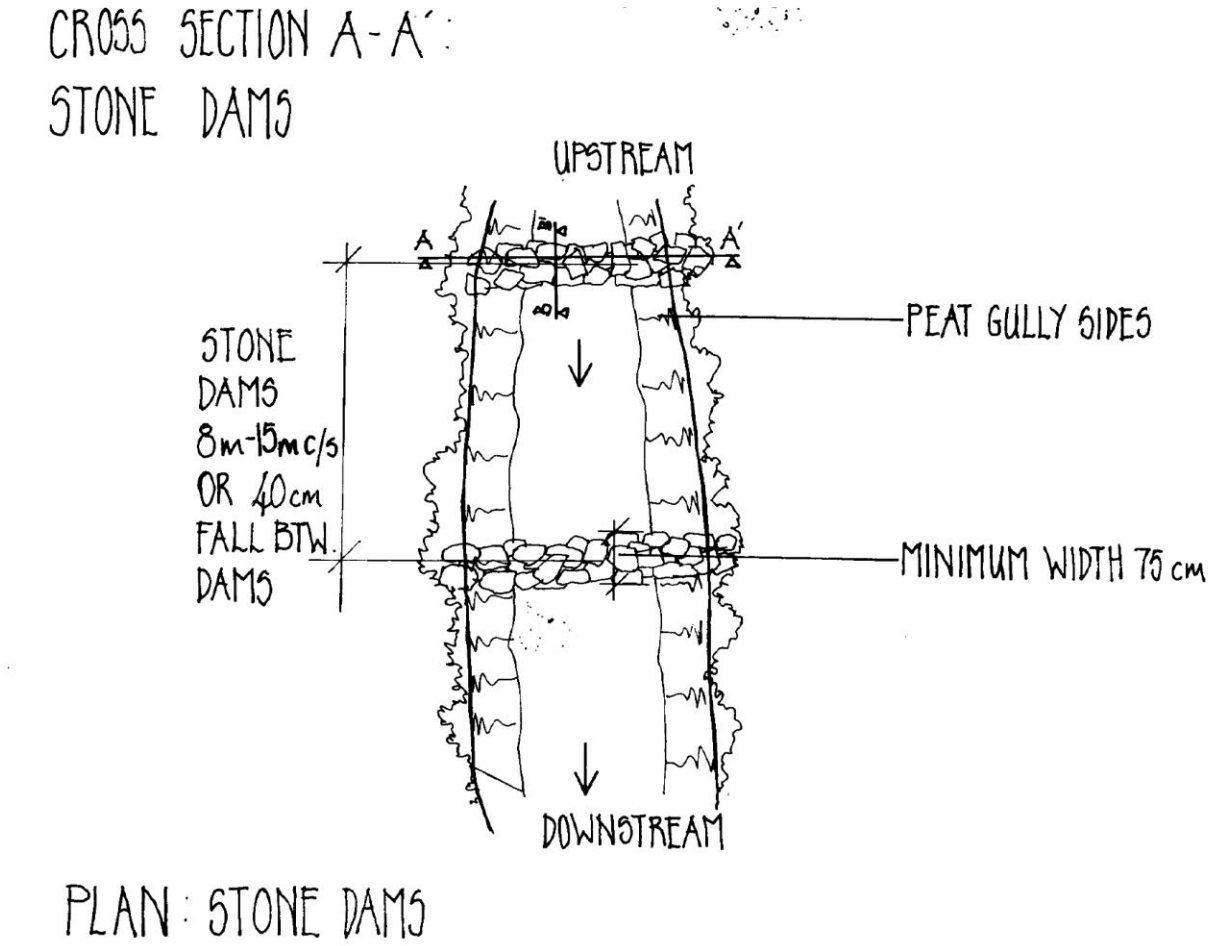
- Stone Dams will be a minimum of 50cm high and at least 75cm in transverse width upstream to downstream and span the full width of the Gully.
- Stone Dams must be no taller than 1m in height for safety reasons.
- Stone Dams should have a steep face (approximately 60 degrees) on the upstream side and have a slope of approximately 45 degrees on the downstream face.
- Stone Dams should be higher at each side than in the middle to allow water to flow down the middle of the downstream face of the dam and prevent scouring around the sides of the Dam.
- There will be some hand movement of Stone required after the Dam Unit has been initially dropped into place to ensure that the Stone Dam conforms to the right shape and size as set out above.
- Stone Dams, consisting of more than a single Dam Unit, may be placed at pinch points, confluences, at locations to co-ordinate with other works (i.e. as baffles to co-ordinate with gully side reprofiling), or at changes from mineral to peat-based substrate.



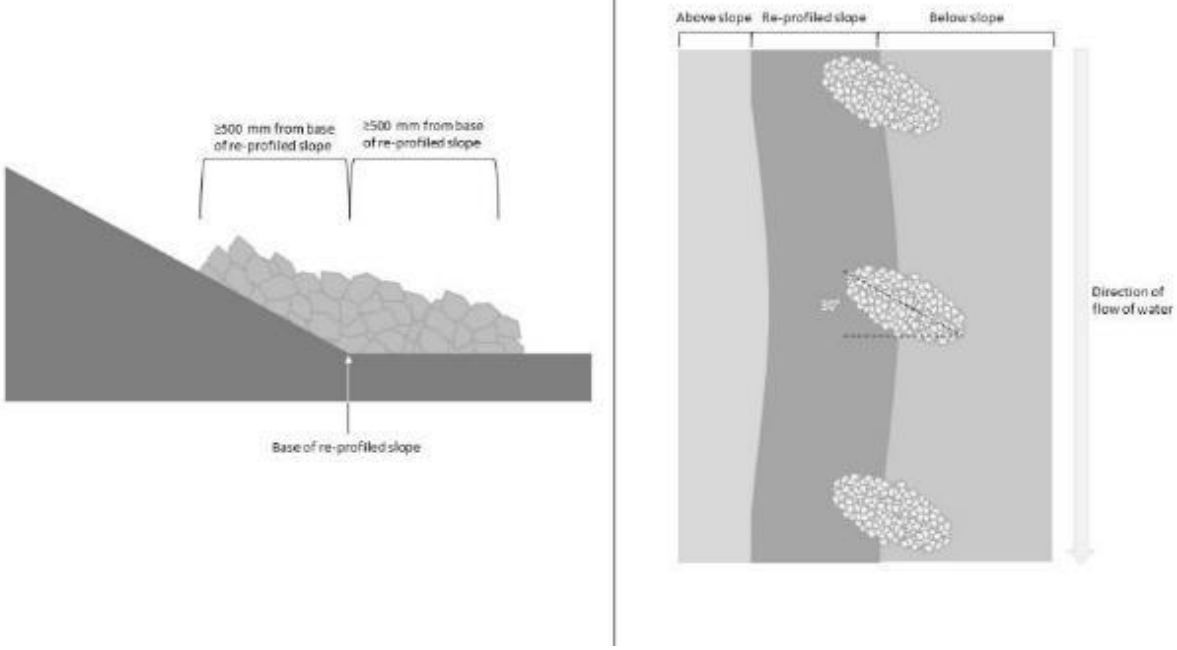
- Figure 12


RANDOM GRITSTONE
PEAT GULLY SIDES
MINERAL GULLY FLOOR
60°
45°
UPSTREAM
DOWNSTREAM
TRANSVERSE
CROSS SECTION B-B´:
STONE DAMS

- Figure 13


CROSS SECTION A-A':
STONE DAMS
UPSTREAM
A
A'
PEAT GULLY SIDES
STONE DAMS 8m-15m c/s OR 40cm FALL BTW. DAMS
MINIMUM WIDTH 75 cm
DOWNSTREAM
PLAN: STONE DAMS

- Figure 14



- Figure 15 Stone baffle dam construction

• Sphagnum planting

- Sphagnum moss plug plants will be planted into suitable habitat present on the site and according to the methodology given below. The purpose of introducing Sphagnum is to initiate wider colonisation by the mosses in areas lacking Sphagnum, and to accelerate its recovery in places where it is present.

• Environmental Mitigations

- Planting will be done by small teams of staff on foot (4–6 people).
- Sphagnum plugs will be carried on foot on to the sites each day and any waste materials carried off at the end of each day.
- Plugs will be planted into suitable habitat to ensure they have the best chance of thriving.
- Sphagnum plugs used will have been propagated in greenhouses to be free from pest, disease and unwanted species. Some or all of the following species will be included in the plugs:
- *S. capillifolium*
- *S. papillosum*
- *S. palustre*
- *S. magellanicum*

- *S. subnitens*
- *S. fallax*
- *S. cuspidatum*
- *S. fimbriatum*
- *S. squarrosum*
- *S. tenellum*
- *S. denticulatum*

- Each Plug Plant will conform to the following requirements:
- Of local provenance, i.e. propagated from material collected from within the Peak District/South Pennines SAC.
- Grown in medium with:
- Zero peat content
- a pH of between 3 and 4; and
- low nutrients and high metal ions.

Transporting Plants to the Work Sites

- If the planting period coincides with the airlifting of other materials then the Plug Plants may be transported to the Works Sites by helicopter.
- Transportation of Materials may be undertaken by low-ground-pressure tracked ground vehicles. These routes are shown on the Access Maps in Restoration Plan. The tracking of vehicles will adhere to Section Movement and use of Machinery.

Plug Plant Care Guidelines

Storage and care of Plugs;

- Plugs should be kept in a cool, sheltered location with some natural sunlight (not in direct sunlight but also not in the dark)
- Plugs should not be allowed to freeze
- Plugs should be kept moist (whitening of plant branches indicates drying out)
- Plugs should only be watered with rainwater (tap water will kill them)
- Plugs should be stored so they are not getting squashed by the weight of other Plants on top.
- Plugs should be kept out of reach of animals

Sphagnum Plug Planting Guidelines

- Sphagnum Plugs will be delivered in Bundles of 20 Sphagnum Plugs wrapped together in one bundle with cling film or specially designed paper. A bag will contain 20 x Bundles / 200 Plugs.

- Figure 16 Sphagnum Bundle of 20 Plugs securely wrapped in clear film. The Bundle is moist and vibrant green.

- The bag will show the type of mix of species and name(s) on the bag. This could include:
- **Moorland Mix** – a mix of 11 species (this is the traditional mix that we plant the most) and includes a broad mix of different types of species including both flush and hummock or chunky species.
- **Chunky Mix** – a mix of 5 hummock or chunky species
- **Pool Mix** – a mix of 6 species including some specific hummock and flush species, with a larger proportion of *cuspidatum*.
- This guide should apply to the planting of ALL types of plugs; irrespective of the type of mix (see the following section for a specific guide to the different mixes).

- **Planting density**
- This should be specified by MFFP to the site manager, and **ALL** planters should be aware of the number of plugs that should be planted in an area. Please note, this is a guide and the distanced will vary depending on the suitability of the planting area and should not be a rigid rule.
- **What am I looking for?**
- Plant in an area that feels wet underfoot. Areas dominated by Heather, Bilberry and Crowberry can be dry, especially on slightly higher ground.
- Preferably, an area with common cotton grass present (a good indicator of a wet area).
- Small, sheltered spaces (micro-habitats) in-between existing vegetation (newly planted plugs require shelter from the drying wind and sun to get established).
- Where there have been cuts in the vegetation – areas that have had either Heather, Cotton grass or Molinia cut prior to planting. These areas can be planted if the conditions covered here apply.

- 

  - Figure 17 Ideal vegetation cover for Sphagnum sp. wet area with cotton grass providing shelter and light to get through.

- **What should I avoid?**
- Bare peat & peat pans – in contrast to garden plants, Sphagnum plugs need shelter from surrounding vegetation to establish, therefore you should never plant in to an area of bare peat, and in peat pans, where the water level regularly changes and sediment can cover the plugs. However, planting into the edges of these areas is acceptable if protected from the sun and wind (therefore the south and western edges can be suitable) and away from any risk of going under water.

- Figure 18 Bare Peat and Peat Pans are not appropriate for Sphagnum planting

- Figure 19 Acceptable to plant in Peat Pans along edges if Sphagnum Plugs are protected from sun and wind

- Standing water – only a few species like regular inundation, therefore it is best to avoid planting directly into standing water. The only exception to this is *S. cuspidatum* (see Single Species Guide below) We are currently trialling a 'Pool Mix' that will be suitable for planting directly in standing water, such as behind peat dams and bunds.

Figure 20 Example of Gully block pool – peat dam on left. Dams can be stone, timber, plastic, heather bale or coir log.

- Gullies with regular running water; only plant on the edges.
- Directly behind gully blocks – these areas are regularly under water and sediment can be an issue. Only plant along the edge of the waterline further away from the block to reduce issues with sediment build-up and raising water levels.
- Top gully edges where the water table is low; these areas will remain very dry during times of little rain.
- An area that is not too densely vegetated; this can be the case with hares-tail cotton grass, heather, bilberry, crowberry and Molinia-dominated areas, or gullies thick with common cotton grass where there is very little space in between the vegetation to plant a plug.

Figure 21 Areas of thick vegetation unsuitable for planting

Planting Method

- Hold the Bundle the right way up (vivid green capitula on top). Unroll until you get to the first plug. This allows you to look at the size of the plug.
- Once you have identified a suitable location (micro-habitat), break the surface of the peat and make a hole deep and wide enough to fit in the plug (please note there will be some small variations in size). This can be done using different tools such as a gardener's trowel, dibber, screwdriver or thumb.

Figure 22 Make a hole deep and wide enough to fit in the plug

- Place/push the plug into the hole leaving only the live capitula heads (vivid green, and sometimes, other colours) sticking out of the ground. Plant the plug so that the capitula heads are as tight together as possible; if too much of the stalks is sticking out, the stems will fall-over with an increased risk of drying out.

- Pinch or push the peat back to secure the plug into the ground (this is essential to ensure that the plug remains in place.

  - Figure 23 Plug in hole with peat pushed in to secure plug in place

Types of sphagnum mixes:

- **Moorland Mix** – a mix of 11 species (this is the traditional mix that we plant the most) and includes a broad mix of different types of species including both flush and hummock or chunky species.
- As this is a 'general' mix, the concept is that no matter where the plug is planted following the guidelines above, one or some of the species present will thrive and grow. This type of mix is ideal for a site with variation in micro-habitats and lacking in any Sphagnum species in general. This is especially the case for large areas of newly revegetated areas of bare peat including a lot of blocked erosion gullies.

- **Chunky Mix** – a mix of 5 hummock or chunky species.
- This mix is being targeted for areas that are in unfavourable condition, but are largely vegetated and not heavily eroded by gullying. These areas are more typical and are more hydrologically intact and therefore may have areas of Sphagnum, in particular flush species already present to a degree in the wetter flushes and gullies. In order to move these areas into more-favourable conditions, diversification is key, and in particular, the introduction of Sphagnum species associated with functioning blanket bogs because of their ability to form peat layers.
- It is also worth noting that Natural England are moving towards the type of key Sphagnum species present on site, as opposed to general Sphagnum presence when assessing condition.

- **Pool mix** - A mix of five species that consists of aquatic and semi-aquatic species (S. cuspidatum and S. denticulatum) and some hummock species. This mix was developed to optimise sphagnum
- establishment and growth in pools and wetter areas; common features where hydrological
- restoration work has taken place.

Upland Pathwork Specs and Drawings

- The purpose of the pathwork is to combat active erosion and provide a path that blends with the surrounding landscape. Pathwork will appear natural, with a durable and walkable path surface, which will attract use of the path, thus preventing further vegetation loss and soil erosion of the adjoining slopes. All works will take account of the nature of path use.

- The path is to be restored and constructed on a natural line on or close to the existing path alignment keeping straight lengths to a minimum. The alignment and location of specific works are available in the GIS files provided.

- The constructed path will be of a natural looking and variable width, but varying between no less than 100cm and no wider than 150cm.

- The finished appearance of the pathwork, landscaping and other works will look natural, and blend with the adjacent and surrounding ground and features, with path edges softened and contained by path edge landscaping. It will provide an attractive and easily used surface.

- Excavation for path and drain construction will preferably be hand dug to avoid unnatural alignment. Any permitted machine dug excavations must be protected from water flow during the progress of the works.

- The finished path surface will provide a crossfall, camber or gradient which will shed water into path drains, or off the path to the naturally draining downhill slope.

- The path and drains will be constructed to be stable and durable, with no loose or rocking construction stones. There will be no surrounding areas of loose soil that will be susceptible to water or path user erosion. Eroded path edges and surrounding ground will be stabilised by landscaping.

- Insitu stone on the path line, or stone excavated in the course of the work, will only be incorporated in the path construction if it is at an appropriate angle and provides a good foothold and durable walking surface.

- Any insitu stone removed during the path construction will be used to landscape the path sides to contain the path edges, and path use, with any large stone bedded in naturally, with weathered face uppermost.

- All vegetation removed during path and drainage construction will be carefully excavated, ensuring minimal soil loss and no damage to the root structure. It will be moved to the best position for use and transplanted to contain or form path edges, used within revetment walls, or in landscaping of eroded areas.

- Excavated vegetation will be transplanted as soon as possible to avoid root desiccation. In dry or windy conditions, or if transplanting is delayed, it will be protected by sacking or permeable covering.

- All soil excavated during path, drain and ditch construction will be moved to the best position for use to infill construction gaps and joins, and in revegetation and landscaping path edges and eroded areas.

- The contractor will source and supply suitable stone, and all other materials for the works, unless otherwise specified. The contractor will use any suitable sized insitu stone within the path or, from the slopes adjacent to the line of the path. Stone from side slopes will be collected sensitively, and randomly, taking care not to denude large areas or create the risk of additional erosion.

- During collection and movement of stone care will be taken not to damage surrounding ground or vegetation. Continual use of the same route, creating trampled areas, will be avoided.

- Where the stone supply is airlifted to site the lifting bags, strapping, wooden blocks, pallets, or any other unnatural loading materials, will be removed off the site of works, during and before the completion of the works.

- To ensure a natural look to the path all the visible surfaces of imported flags, pitching or drain stone used in the path construction and landscaping will be undressed, weathered or natural, cleaned of any markings or other detritus which will be bagged up and disposed of off site.

- Any excess stone, which may be left when construction is completed, will be used in landscaping as appropriate and specified, or moved off the site of work.

- The path may be regularly used during the day and evenings and heavily used at weekends. Particular attention will be paid to ensuring that excavated material, stone supply, or other obstructions are moved off the path line at the end of each working day, and to the safety and security of materials and other equipment on site.

Aggregate/Substrate Path

- Aggregate stone base and surfacing material will be used to construct an aggregate path as detailed in Drawing, over the specified lengths.

- The construction depth of the path will be to an average of 200mm, comprising approximately 150mm of base material and 50mm of surfacing material. Where the path is constructed over an insitu aggregate or gravel surface the construction depth may be reduced to 125mm.

- The finished compacted path surface will be no lower than the adjoining ground, with a draining camber or crossfall to shed water off the path surface to lower ground on either side of the path, to lateral ditches or to the naturally draining side slope as appropriate to the surrounding ground levels. The draining crossfall or camber will be between 2° and 5°.

- The path tray required for the construction depth will have a levelled and compacted mineral or organic soil base, formed by excavating a trench along the line of the path, to a variable width as specified. Any large stone on the line of the path may be retained insitu if it provides a suitable walking surface, or should be used to provide a natural path edge, with the path taken around it.

- The path tray should provide the appropriate depth for the construction to achieve a draining path surface level as specified above, with well formed sides to contain the path construction. The tray sides may need to be formed with excavated material, insitu boulders or path edge turfs.

- Where the existing path line is gullied narrower than the specified path width the side banks will be excavated to form the path tray edges and the gully infilled. Where the existing surface is gullied or eroded to a depth or width greater than the specified construction it will be infilled, with excavated soil, or rubble stone, graded and compacted to form a levelled path tray base and sides.

- Where insitu aggregate or gravel is excavated to provide the required construction depth the excavated material will be incorporated within the new path surface wherever suitable.

- Over deep peat sections where a firm base may not be achieved, and the ground is soft or wet, the tray will be formed with a geotextile base and turf sides (see Section 4).

- The aggregate base material will be spread and compacted in two layers, each with a minimum of four passes with a tamper, vibratory roller or wacker plate, until there is no further movement, to provide a sound path base of approximately 150mm depth with the required camber or crossfall.

- The aggregate surface material provided will be spread and compacted, as above, to provide a sound path surface of approximately 50mm depth with the required camber or crossfall.

- The path surface above open stone cross drains or water bars will be carefully graded over a length of at least 3.0m to provide a drainage fall towards the drain and well compacted to prevent any later settling.

- All existing vegetation and top soil excavated during path tray and ditch excavation will be carefully excavated, spread and bedded in along the finished path edges to contain, stabilise, revegetate and provide a natural edge to the path, or moved and used for landscaping

• Pitched Path

- Random sized block stone will be used to construct a stone pitched path as detailed in Drawing, over specified lengths.
- Stones will be pitched in an excavated path tray of variable width, with outer edge stones pitched to provide an irregular, natural looking path edge.
- All stone will be pitched to provide a solid construction using larger stones as anchors for uphill stones at regular intervals throughout the length and at downhill edges.
- To achieve a stable construction the depth of stone pitched into the ground will be no less than 250mm.
- The pitching will be constructed and the edges landscaped to provide a finished surface that is contained at least 100mm below the adjacent ground level wherever possible in order to deter off path use.
- Where the existing ground nature and profile necessitates edge stones to be exposed, excavated soil will be graded, compacted and turfed to create a raised path side that contains and landscapes the path edge, and prevents trampling or water scouring of the path side.
- Stones forming the path edges will form an irregular, natural looking path edge.
- The uppermost surface of all stones will provide irregular shallow rise step treads which are offset across and along the path to ensure a random but good selection of walking footholds. This may be achieved by placing two, or more, stones with narrower upper surfaces together.
- The walking surface of any stone, or of level adjoining stones forming step treads, will be large enough to provide a good, walkable foothold, of 250mm minimum length along the walked line of the path.
- The downhill gradient of footholds will be approximately 2°, for surface drainage, but must not be more than 5°, to ensure a comfortable walking surface, with no steep "ramped slopes".
- Each irregular and random offset step rise must be less than 75mm height rise wherever the gradient allows. On steeper slopes, the height rise may increase, if necessary, to 150mm. On very steep, difficult slopes this may occasionally need to be increased to an absolute maximum of 200mm, in order to achieve the required footholds specified above.
- To reduce excessive step rise on very steep or difficult slopes the path gradient will be reduced by angling on a curved or zigzag line benched across and using the full available width of the slope.
- On steep sections, and at angled path corners the path swill be constructed to the maximum specified width, in order to provide a good selection of footholds across the path.
- The specified offset footholds and height rises must be at irregular intervals across and along the path to avoid a formal staircase effect. Regular rows of stones across the path width giving a formal step appearance must be avoided.
- Where the path angles across or is benched into a steep side slope, stone revetments, may be required to support the lower path edge and to stabilise the slope above or below the path. Use of large, stable insitu rocks should be made wherever possible by taking the path around, and above them.

- At intervals of approximately 10m, but as the water shedding nature and slope of the surrounding ground allows, the stone will be pitched to incorporate open stone cross drains.

- Stone forming the drain sides and the path surface immediately below and above open stone drains will be pitched to maintain the specified surface foothold treads and rises.

- Stone pitched immediately above the drains will provide an adequate downhill draining surface, (5°), into the drain channel.

- All path, and drain, stones will interlock tightly, avoiding four way cross-joins, in order to provide a stable construction.

- Construction gaps will be firmly packed with small stones, to provide a solid and stable construction, which will not loosen and will not allow water into and under the path. Surface gaps will then be infilled with well compacted soil to ensure no later settlement.

- Insitu stone on the line of the path will be used if of an appropriate size, angle and height, or if it can be reset at the correct surface tread angle and step height as specified above.

- Unsuitable insitu stones on the line of the path will be removed and used at the side of the path for landscaping. Where large and stable, they will be used to provide a natural, stabilising and containing path edge, with the path taken around or above them.

- Soil and vegetation excavated by angling or benching the path into the slope will be used to form natural mounds below the path edges and at corners, in addition to revetments, and stabilised with stones and transplanted turves from the path excavation, or from adjacent moorland, to prevent path user movement off the constructed path.

- All vegetation removed from the line of the path, and excavated soil will be used.

• Stone Water Bar/Cross-Drain

- Suitable sized random block stone will be used to construct water bars as detailed in Drawing , at the intervals specified, or at specified locations.
- The position and alignment of the water bar will be to shed downhill pathwater run off away from the path to the naturally draining downhill slope.
- The angle of the water bar to the path will be between 20° and 45° depending on the path gradient and surrounding ground levels, but to provide a minimum downhill draining gradient in the drain channel of 5°.
- The water bar construction will extend to 500mm minimum on the outfall path side and 300mm on the inflow path side, in order to prevent erosion and water scour of the path edge, with extending drain channel stones on the outflow side. The outflow channel will be further extended with a large splash plate stone to prevent edge erosion.
- Extending outflow drainage ditches will be cut at least 1.0m long but extended as far as necessary to ensure maximum effective water catchment and dispersal away from the path area.
- All water bar construction stone will be firmly set into the ground to achieve a solid, stable and durable construction, with no loose or rocking construction stones.
- Stones used for the water bar will be pitched in to at least 50% of their maximum height, with adjacent stones closely interlocking to prevent water flow through the bar. Depending on the thickness of the bar stones it may be necessary to construct a double overlapping row to provide a stable construction.
- The bar stones will be pitched with a flat upper surface to provide good footholds that tie in and are level with the downhill path surface.
- The upstand of the bar stones will be between 125mm and 175mm above the channel stones, with the bar faces interlocking and level to provide easy shedding of water across the path.
- The stones extending either side of the path will be larger and with a higher upstand than those in the centre of the path, to ensure water catchment and dispersal from the path sides, and to deter off path movement.
- Stones used for the channel above the bar will be bedded in with the upper surface edge level with the uphill path surface and angled from the path surface down to the bar stone.
- The width of the channel will be no less than 200mm and the surface faces should be smooth enough to be relatively self cleaning to prevent a build up of silt and debris. Depending on the width of the channel stones it may be necessary to construct an overlapping double course to provide the required channel width.
- The channel stones will interlock closely with each other and the bar stones with gaps kept to a minimum to prevent water ingress or scour.
- Where drains are constructed within a vegetated, natural mineral, aggregate or flagged path on a gradient, the path surface may be pitched, for approximately 0.5m above and below the cross drain to strengthen construction

on the downhill side, and facilitate water flow from the uphill path into the drain channel. The stones adjacent to the uphill and downhill path will be pitched so that the upper stone surfaces are level with the regraded, and compacted, restored path surface.

- Where cut off bars are constructed within a pitched path the stones immediately above the bar will be pitched to form a natural drop and channel between the bar and the uphill pitched surface. Path stones below the bar will be pitched in to provide a foothold with the bar stones and form a shallow step up from the downhill path surface.

- Where the drains are constructed within a vegetated, natural mineral, aggregate or flagged path the uphill path surface will be graded over at least 3m above the water bar channel uphill to provide a draining gradient along the path into the constructed channel.

- The downhill path surface will be graded over at least 2m below the water bar as necessary to provide a surface flush with the upper surface of the bar stones.

- All drain stones will interlock tightly. Construction gaps will be firmly packed with compacted small stones, to provide a solid and stable construction that will not loosen and will not allow water into and under the construction. Surface gaps will be infilled with well-compacted soil, to ensure no later settlement.

- Soil/substrate excavated for ditches will be placed to form a stable mound on the downhill side of the bars and ditches, adjacent to the side of the path.

- **Please Note: Most of the damaged pathways are used by the Mountain Bike Community. Please take this into account during construction as we are trying to reduce the impact of these activities by shedding water, not trying to stop the biking.**

• Stone Supply

- Stone will be sourced from a MFFP approved source and delivered to the Lift Site. The stone will then be airlifted to the specified location using suitable lifting equipment.

- The tonnage to be sourced will be computed from the specified and detailed length, width and depth of pathwork and the specified and detailed stone drains and revetments.

- Suitable insitu stone will also be utilised.

- Stone which is suitable for aggregate path construction will be:-
- Carboniferous Sandstone/Gritstone
- Base material – graded 75mm to 10mm
- Surface material – graded 25mm to dust

- Stone which is of a suitable size for pitching, drains and revetments will be to the following dimensions:-
- Carboniferous Sandstone/Gritstone

- Minimum depth of 150mm on any face
- Maximum depth of 500mm on any face.

- Each stone should have at least one face with a dimension greater than 300mm, Each stone should have only one face with the minimum dimension of 150mm.

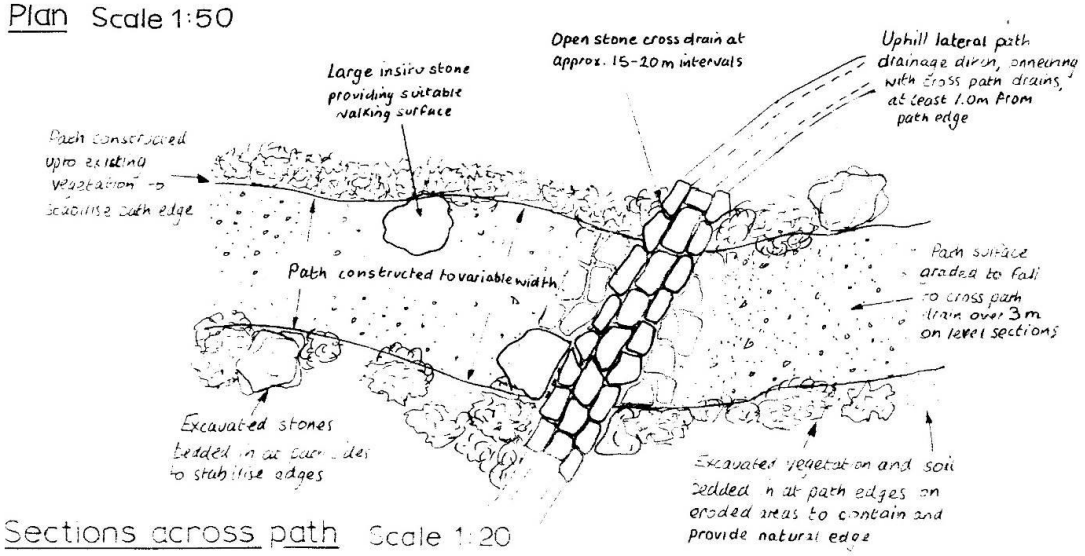
- The stone supply may be moved from approved storage points along the path line to the position of work by track barrow or similar low ground pressure machinery.

- Airlift bags, pallets, barriers and any other load bearing materials, will be removed off the site as the work progresses.

- **Illustrations of techniques below:**

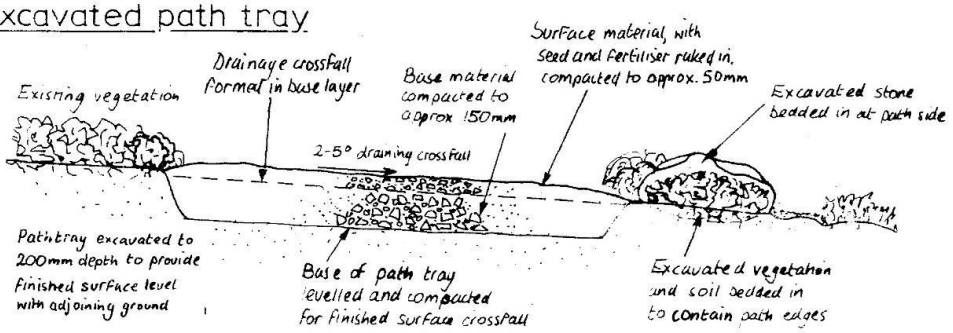
AGGREGATE PATH

Plan Scale 1:50

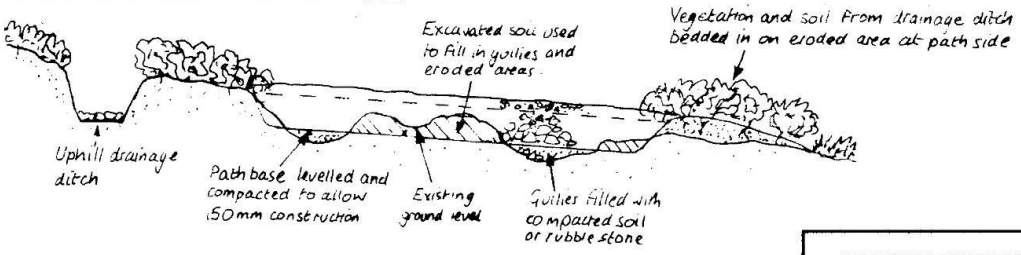


Sections across path Scale 1:20

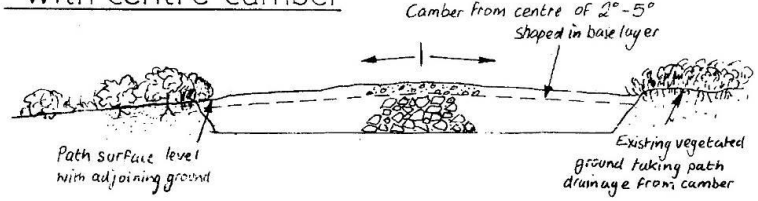
- excavated path tray



- gullied or eroded base



- with centre camber



MOORS FOR THE FUTURE
PATHWORK SPECIFICATION

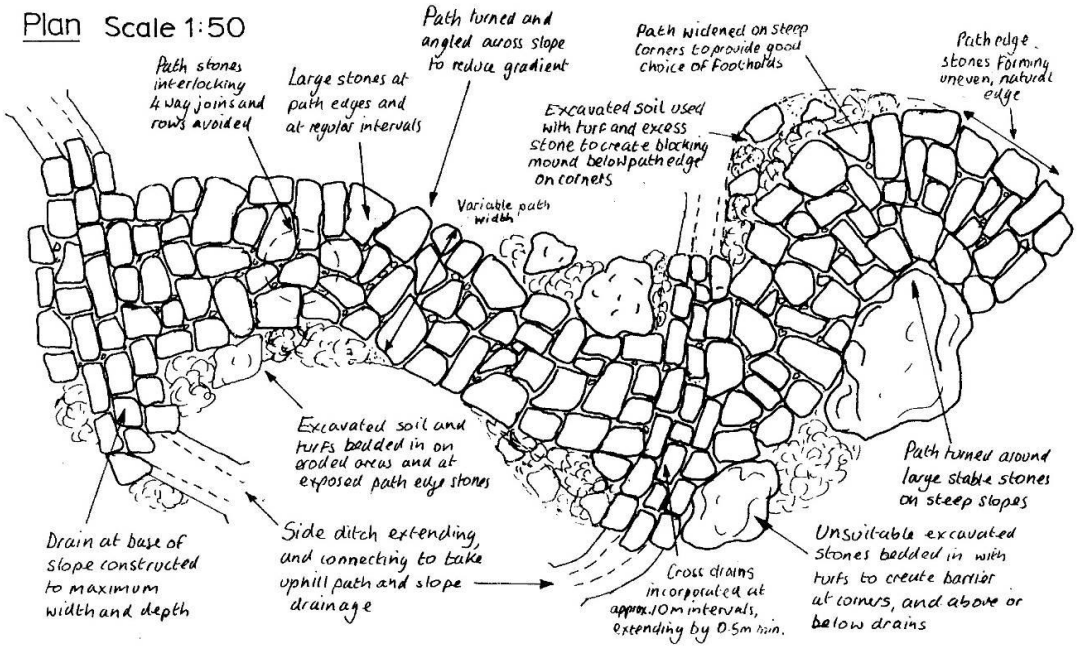
DRAWING 2

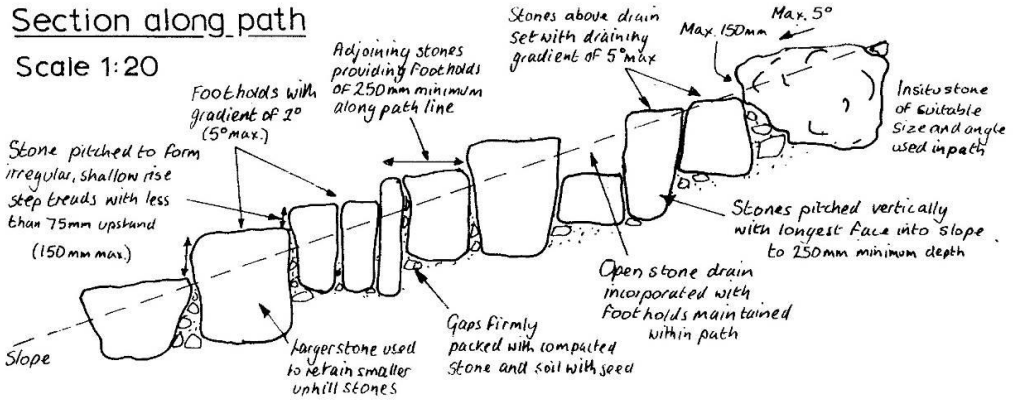
AGGREGATE PATH

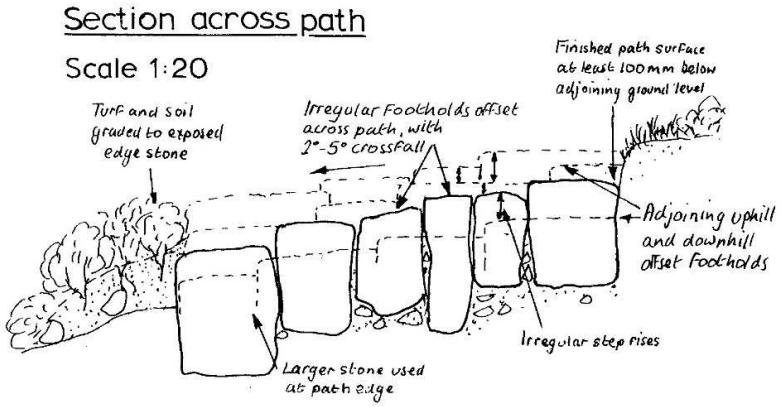
Scale: as shown

Drawn: M Thomas Date: March 2005

PITCHED PATH







MOORS FOR THE FUTURE
PATHWORK SPECIFICATION

DRAWING 7

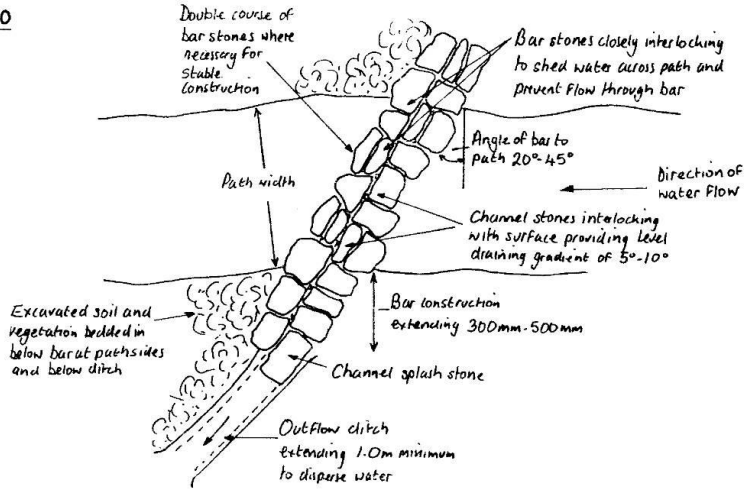
PITCHED PATH

Scale: as shown

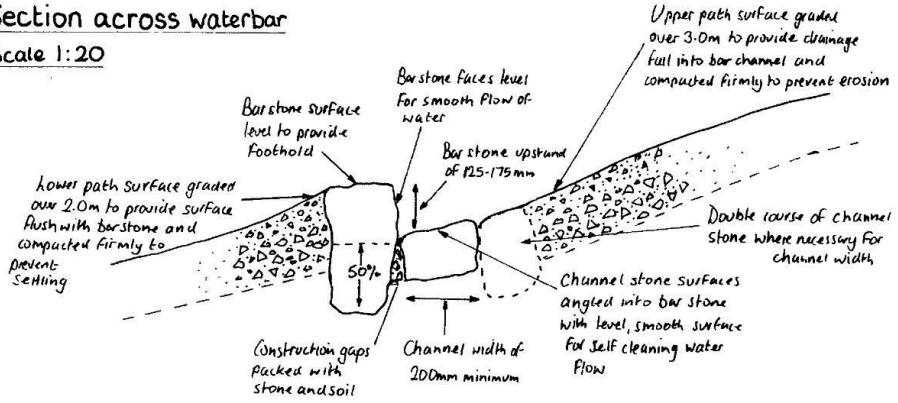
Drawn: M Thomas Date: March 2005

STONE WATER BAR

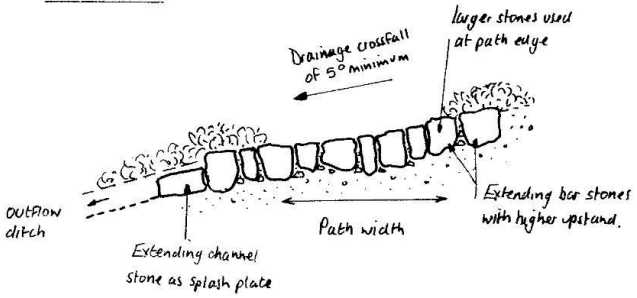
Plan
Scale 1:50



Section across waterbar
Scale 1:20



Section across path
Scale 1:50



MOORS FOR THE FUTURE **PATHWORK SPECIFICATION**
DRAWING 9
STONE WATER BAR
Scale: as shown
Drawn: M Thomas Date: March 2005

- **Bracken Management**

The Aim of the Management

This is to reduce to dominance of a single species which has spread rapidly over much of the lower lying North slope of Ilkley Moor. It will be the start of ongoing management which will be continued by BMDC through their volunteer scheme.
The initial cutting will be followed up by tree planting over the entire cut area and continued cutting/rolling beyond 31st March 2025 to ensure the trees are not outshaded.

Technique and Environmental Mitigations

Cutting by machinery is possible but only accessible for small equipment (such as a flailbot). This equipment will be brought onto site via the Keighley Road 4x4 track to the West.
There is too much sensitive archaeology across the site for larger machinery and the ground is steep and uneven.
On sensitive archaeological areas, cutting should be carried out using hand-held strimmers/sickles or sythes. Bracken litter should be removed across small archaeological areas by raking.
In areas where it is too difficult to use cutting techniques (such as around archaeological sites), the bracken can be crushed instead of cut.
Please check the Archaeological details we will provide prior to work commencing.

- **Tree Planting**

Aim

To reduce the dominance and continued spread of the bracken on the steeper, non-peatland slopes.
In addition, the trees will provide corridors for wildlife by linking up other small plantations/clough woodlands and speed up the rate of natural tree recovery which is already evident (although primarily by a single species, Rowan).
Choice of species and density of planting is based upon the existing species which are on the site, along with the Guiding Principles for Clough Woodland, plus further advice from Woodland Trust and Peak District National Park Authority.

Environmental Mitigations

Planting should avoid trees being in close proximity to archaeological features such as Earthworks.

Planting should not cross the break of slope on the upper extent of planting. This reduces the opportunity for predation of birds by other animals.

The trees should not be planted closer than 20m from the edge of Peat bog (which is present to the South of the proposed woodland areas). This is to stop the spread of the woodland onto the peat thus causing drying.

Planting density should mirror natural processes: for Clough Woodland planting 15m spacing is advised, however in bracken areas there is approximately 50-60% success rate, hence we are aiming for 8m spacing but this has yet to be agreed by Natural England.

The planting must not block access to existing paths across the moor.

Avoid long sections of straight line planting in order to ensure the planting looks natural. Use the natural contours of the land.

Supply and fix 75cm high Tubex shrub guards and 90cm x 32mm square stake

Technique

Trees should be planted a minimum distance of 8m apart.

- Step 1

Press your spade all the way into the ground, then push it forwards to create a slit. Make sure it's deep enough for the tree roots.

- Step 2

Keep the slit open with your spade and place your tree inside with the root plug about 2cm below ground level.

- Step 3

Remove the spade and push the soil back around the tree.

- Each tree whip should be protected with tree guards using FCS approved stakes. Tree guards should be attached securely to the stakes using two ties.

Trees should only be planted between the months of December and March to ensure they do not suffer from water stress during warmer, drier periods.

Figure 24Eastern Clough planting area. Note: the planting will not extend up the steep slope which is visible. This will act as a buffer to the spread of woodland onto the Peat bog above.

Figure 25 Western Clough Planting Area

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