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Restoring Nature's Balance.

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Wakefield Farms Ltd

*Site Delivery Plan
For Midhope, Upper Midhope
Natural England*

Date: April 2014	Ref: Specification
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Contents

Project Details.....	3
Restoration Overview	3
Outline of the restoration plan;	4
Midhope Delivery Plan and Methods.....	4
Description of the site.....	5
Access.....	5
Proposed Action Plan.....	6
Peat Pans.....	7
Gully Blocking.....	9
Drip Edge Re-Profiling	11
Aerial Application of lime, fertiliser and seed.....	12
Rates of aerial application:.....	13
Access Route	14
Drain Blocking	15
Heather Regeneration	15
Excavator Key Points	16
CDM	16
Appendix 1 – Plan	17
Appendix 2 –.....	18
Peat Dam Construction.....	18
Reprofiling & half dam.....	19
Half Dams.....	19
General dam construction -	21

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Project Details

Estate:	Wakefield Farms Ltd
Funding mechanism:	Higher Level Stewardship (Natural England)
Completion Date:	March 2018 (Capital Works)
Sites:	Midhope
Area:	circa 1200 ha site, containing approx. 18km of identified gullies within a 50 ha area
Location:	South Yorkshire
Grid Reference:	SK 18564 97147
Access:	Off Low Moor Lane, Upper Midhope & Estate Tracks
Environmental Constraints:	SSSI, SAC, SPA
Controlling Authority:	Peak District National Park Authority

Restoration Overview

Blanket peatlands are valuable environments providing a number of ecosystem services, including carbon storage, water provision, recreational areas and biodiversity to the UK's population. However, blanket peatlands are sensitive landscapes and are highly susceptible to change. Over the past 200 years, the pressure on blanket peatlands has increased due to various factors such as, atmospheric pollution and diversification of land used. This has resulted in substantial degradation, with a notable reduction in the ecosystem services they provide.

Dinsdale Moorland Services (DMS) has been designing and implementing pioneering strategies to alleviate the impact of degradation over the last ten years. DMS understands that blanket peatlands are heterogeneous environments and, that response to degradation and in turn restoration can vary in accordance with the individual topographic characteristics of peatland. Accordingly, DMS uses its own specialist knowledge and understanding of peatland processes to provide a package tailored specifically to each individual site, with the aim of restoring the hydrological and ecological integrity and in turn to protect the ecosystem services it provides.

DMS has extensive experience in the application of the following restoration strategies and are able to adapt each to individual site specific requirements:

- Grip and Gully blocking using peat, plastic, timber and stone dams
- Re-profiling for drip edges
- Turf translocation
- Heather Brush cutting (including sphagnum rich)
- Heather brush hand spreading and aerial application
- Fertilisation
- Aerial and terrestrial seeding (heather , native grasses, including nurse swards)
- Plug planting
- Coir Logs and heather bale installation
- Geo-jute Installation
- The use of specialised low ground pressure equipment
- Global Positioning System surveying

- Total project management

Previous examples of similar works undertaken by DMS include; United Utilities - Langden Head, Wolfhole Crag, Ashway Gap and numerous other sites for Yorkshire Water, the Yorkshire Peat Partnership, Moors for the Future, Cumbria Wildlife Trust, the National Trust and private sporting estates (e.g. Wemmergill, Walshaw, Hurst & Chunal, Wolfen Hall).

Outline of the restoration plan;

The restoration of upland eroding peat is a continuous and developing skill, and experience and knowledge gained from each project is used on the next. This specification and associated bill of quantities are provided to enable work to be carried out in the target restoration area and, to improve the existing, sensitive habitat. It is with intention that this plan shall aid the client to not only identify the treatment areas, the restoration techniques and project costing, but also be prepared for all eventualities.

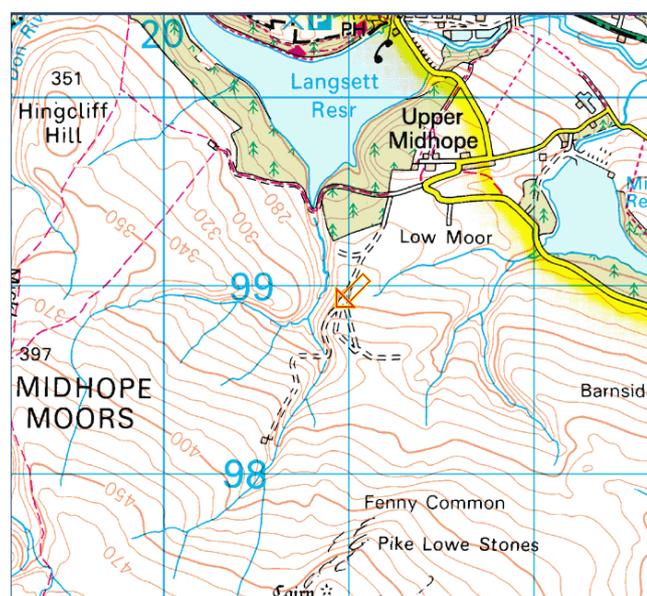
An additional aim is to enable the client to have maximum information, minimum risk of failure and produce a sustainable and quality restoration project.

Sites of this nature can have different approaches in order to meet the aims;

- To increase biodiversity and improve condition of the moorland to a SSSI 'favourable' condition.
- To significantly improve water quality by reducing Dissolved Organic Carbon (DOC) and, Particulate Organic Carbon (POC) release into surrounding water courses (not just those on water catchment areas).
- To reduce loss of an actively eroding valuable carbon store.

Evolving the restoration techniques is important to improve the results and improve efficiency ensuring value for money. DMS are always looking for both different and new techniques to improve our restoration projects and therefore, our proposal encompasses a wide variety to produce the regeneration package.

Fig1. Site location



Midhope Delivery Plan and Methods

Description of the site

Midhope comprises of an open rolling landscape, consisting mostly of heather and grassed areas crossed with open, bare peat sided gullies. Gully dimensions range from 1m to 3 m deep and 1m to 5m wide, with partially vegetated peat pans that generally lead into larger, deep washed out watercourses. Ground conditions are generally firm, with a good coverage of vegetation, offering good access to the areas of work. The far west of the site reaches up to a maximum height of 541m, where restoration works are to be carried out. However, due to the remoteness and elevation, it is essential that the contractor has proven experience in carrying out similar restorations to ensure no unnecessary damage is made to an already sensitive environment. Weather conditions will need to be taken into account as, thick fog is always a possibility that can close in rapidly and remain for long periods of time. Contractors would be advised to use handheld GPS units to map their routes onto the moor, ensuring that in adverse weather conditions egress can be achieved safely.

Access;
OS Grid; SK 209 988
Postcode; S36 4GX

Access

The estate does have good access and does not present any problems for delivery of plant. The track is a hard stone surface with one steel barrier and two gates leading onto an old, concrete tank road. Approximately 200m after the second gate, the track splits into a prominent, three way junction. This area provides a suitable place for the unloading of plant.

For the excavators, access to the fell would be achieved by following the far right track on the three way junction; this is a firm stone track that after 200m crosses a small, concrete cast bridge that will have to be assessed by the contractor to ensure it is crossable by all relevant plant. To make certain the bridge is not damaged, it would be advisable to use a banks man as, any damage would require repair at the contractor's expense.

Upon crossing the bridge, a stone track leads up to a recently built shooting hut, the track then takes a sharp right turn on to the fell. Additionally, the actual route to the work area must be agreed with the land owner prior to the work commencing and, on completion any damage must be reinstated before vacating the site.

A contingency is included for the upkeep and repair of the stone access this should be minimal however an important aspect to ensure the site access is left in the same condition as it is now.

Using the path as a guide, it gradually flattens out leading to the stone footpath (Cut Gate path) and, directly on the right will be Mickleden Edge re-entrant and directly ahead will be Bull Clough. The ground, to the work areas from this point is made up of a mixture of both shallow and deep, bare peat sided gullies. However, although the ground is generally firm, peat pipes are present but may actually be difficult to identify. Small gullies and peat hags will inevitably have to be crossed and therefore, when moving in between work areas it is necessary to assess all ground conditions. Works are to be carried out on either side of Bull Clough in the highlighted areas and, to the west it slowly levels out making crossing much safer and accessible for any excavators.

After taking the ground conditions and the sensitive environment in to account, it is advisable that excavators should be fitted with 800mm bog master tracks to minimise ground pressure and, to ensure the environmental impact is kept to a minimum. In addition, these machines should only be operated by suitably qualified (CPCS Blue Cards) and experienced operatives. It would also be advisable to have at least 2 excavators working in close proximity to ensure a quick recovery if and when required.

Helicopter lifting area; a clear area of hard standing next to a barn located at SK211 993 is suitable to store fuel and equipment. The work site is a maximum of 4 km from this location this should be used for the aerial application works.

Work Description

Proposed Action Plan

Year One (August 2014 - July 2015)

November 2014

- Access route improvement to make it suitable for the daily access
- Suitable low ground pressure machinery to work methodically across the upper reaches of the watershed and, along the western boundary of the estate. Gully blocking and associated minor re-profiling (where access is permitted) would be carried out as identified in the attached plans.
 - Gully Blocking
 - Drain Blocking
 - Re-profiling Pan Areas
 - Footpath Edge Re-profiling
- A suitable access plan must be devised and followed for the transportation and storage of fuel which, should be agreed in conjunction with the land owner and the Natural England representative.

Spring 2015

- LSF on the gully pan areas, access track and bare peat on Pike Low

Year Two (August 2015 - July 2016)

- Second year of re-profiling works (if required).
- Fencing Installation
- Heather Regeneration
- Restoration of eroded route and footpath
- Lime, seed and fertiliser of the above areas

Year Three

- Follow up lime, seed and fertiliser.

Peat Pans

There are areas highlighted as ‘pan areas’ and, although they do contain bare peat they are not the typical flat, open exposed peat pans. These are mainly large, undulating areas made up of bare and vegetated sided gullies that have eroded away in to additional small gullies. They range between 300mm and 1m deep and are generally leaving behind a bare, one sided hag. Where grassy pools are starting to develop, an environment is created which will contribute towards the growth of Sphagnum Moss. Nevertheless, it is important to note that they may be slowly eroding the ground causing peat pipes to develop. Although these pool areas are an encouraging sign for re-wetting of the fell and promoting sphagnum growth, it is recommended they are managed by installing peat or plastic dams to hold back the water in a controlled manner. This should allow a gradual wetting of the fell to allow sphagnum to flourish and continue to spread. If excavators are to be used within these areas, strips of vegetation could be used to cover and re-vegetate the bare peat areas to provide protection against erosion and to help with stabilisation.

There are a number of areas around the site which have been identified for re-profiling works to be undertaken. These have been identified into 3 types as found below. The amount of work within the areas will be dictated by the operator ensuring minimal impact on the ground but maximising the restoration. The drip edge within the areas will be re-profiled out as above and water compartmentalised where possible to reduce erosion flow, minimise water wave action and encourage re-vegetation to occur. Due to the type of work required an area has been given in the bill of quantities to price against.

Type 1

Re-profiling with small holding dams 0 - 0.5 m
Treatment; Lime, Seed and Fertilise



Type 2

Re-profile with peat dams 0 – 1 m



Type 3

Re-profile Hag area and bund/dam where applicable 0 – 2 m
Treatment; Lime, Seed and Fertilise



Where machinery access is achievable without causing unnecessary damage, it should be undertaken. It is down to the contractor to use their experience when undertaking the works. Re-profiling is an aesthetically pleasing and cost effective restoration technique.

Description	Quantity
Type 1	1.08 ha
Type 2	2.03 ha
Type 3	5.73 ha
Pike Lowe Bare Ground Treatment	14.20 ha

Gully Blocking

Gullies are found across the whole site in various sizes and profiles, by installing dams at regular intervals along the upper reaches of these eroding gullies, it will help to block and/or slow down the flow of water at source. This reduced flow encourages peat to settle and ultimately accumulate on the high side of the dam. There are several different materials and methods that can be utilised to construct effective dams which may include peat, plastic, timber and bales.

Average dam spacing is typically between 7-12 metres and will need to be adjusted according to the angle of each individual gully. Variation in the positioning of the dams may also be required in order to take into account the natural topography. There are no specific guidelines for the spacing of dams and, therefore an experienced operative is essential to achieve the correct results.

The overall depth of the gully will determine the height to which a dam can be constructed; for instance, shallow gullies allow full dam construction. In this case, the top of the dams would be slightly higher than the surrounding ground level to allow impounded water to overflow laterally and soak into the surrounding bog surface. Dams should be adequately placed, so that when water backs up the gully it is filled with water to a level just above the base of the next dam up slope.

Where deeper gullies are encountered, construction of ‘half’ dams will be more suitable. It should be noted, the term ‘half dams’ should not be interpreted literally to mean half the depth of the gully, when in actual fact construction would be to a level below the existing ground level, yet would still reduce the flow of water and reduce the level of erosion of peat along the gully length.

The construction of larger ‘full’ dams in deeper gullies could result in too larger head of water being retained and would be prone to potential failure. It should be noted; the creation of half dams is becoming standard practice throughout other moorland restoration sites and is illustrated in Appendix 2.

The retained water would create a head of water on the top side of the dam, allowing for Sphagnum to be spread and colonise in the pools, providing a suitable environment for aquatic insects to flourish whilst also raising the water table on the moor.

The table below is a key to the surveyed gullies, primarily showing the average width and depth to allow accurate costing and accountability of the restoration. Any conditions where risk of failure is high are to be left untouched, reducing the water impact at source will reduce the force downstream.

Peat dams are recommended for the entire site, due to the overall gradient and amount of vegetation these will have a minimal visual impact and produce excellent results.

Description	Quantity
Total Gully Blocking	18,107m

Gully/large grip class	Description		
	Width	Depth	sides
1a	≤1m	≤0.5m	severely sloping/vertical sides
1b			moderately sloping sides
1c		>0.5m≤1m	severely sloping/vertical sides
1d			moderately sloping sides
1e		>1m	severely sloping/vertical sides
1f			moderately sloping sides
2a	>1m≤2m	≤0.5m	severely sloping/vertical sides
2b			moderately sloping sides
2c		>0.5m≤1m	severely sloping/vertical sides
2d			with moderately sloping sides
2e		>1m	severely sloping/vertical sides
2f			moderately sloping sides
3a	>2m≤3m	≤0.5m	severely sloping/vertical sides
3b			moderately sloping sides
3c		>0.5m≤1m	severely sloping/vertical sides
3d			moderately sloping sides
3e		>1m	severely sloping/vertical sides
3f			moderately sloping sides
4a	>3m	All	severely sloping/vertical sides
4b			moderately sloping sides

Peat dams:

Peat dams are a more natural option and appear more aesthetically pleasing in comparison to plastic or other manufactured options. However, the major constraint is that they require an excavator to construct and are therefore restricted by requiring suitable access.

The proposal would be to utilise peat dams on the sections of the gully network where machinery access is achievable, peat is of sufficient depth to construct effective dams and machine movements do not cause unnecessary damage.

Typical Peat Dam with Vegetation Covering



Drip Edge Re-Profiling

Drip edge re-profiling is a tool developed to prevent weathering from frost heave and desiccation, which has subsequently caused erosion of gully/hag sides. This technique would be applied on hag edges. The contractor is to use the following methodology:

- The vegetation is firstly stripped from the hag top side and placed to one side for use later.
- The slope is then re-profiled to a suitable angle to allow successful seed mix application. (Figure 3).
- Once re-profiled the vegetation placed to one side is reintroduced to cover exposed areas of bare peat.



Fig.3 Drip edge re-profiling

Where there is little vegetation and a large area of bare peat exposed, the drip edge will be reduced only, to minimise the disturbance to the peat. In certain circumstances, it may be more beneficial not to disturb the areas of bare peat if the vegetation is out of reach and minimal. These could be lime, seeded and fertilised where required.

Aerial Application of lime, fertiliser and seed

Bare peat areas across the UK typically have significantly reduced levels of pH. This puts considerable pressure on natural moorland vegetation communities and changes the plant community composition to vascular species. Vascular species are less productive accumulators of peat and decay more readily. As a largely ombrotrophic peatland the site will have low natural nutrients levels and due to the degraded condition *may* have a poor seed bank. As a result, DMS believe that it is necessary to apply a relatively small amount of fertiliser and seed to encourage rapid, large scale re-establishment of vegetation across the site. DMS has successfully achieved an increase in the level of pH and increase in vegetation at several other sites, both within the Peak District, Bowland and the Yorkshire Dales using aerial application. We feel that aerial treatment at this site will lead to similar successful results.

The contractor will apply lime, seed and fertiliser to geo-referenced target areas across the restoration areas. These will be separately distributed by helicopter using spinning hoppers. First, lime will be applied, this application will be allowed to settle for around four to six weeks to allow time for the pH to increase, following this fertiliser and seed will then be spread. Global Positioning System (GPS) will be used to ensure that application all fall on the target areas and limited materials are wasted.



Fig. 8 Prior to treatment



Fig.9 Aerial application of lime using a spinning hopper



Fig.10 Following application of grass, heather mix



Fig.11 August 2013

The purpose of the rye grasses is merely to create an instant short lived nurse sward, this itself will provide a good root structure which upon the demise of the rye grasses will form a root matt, helping to stabilise the peat and thus enable native seedlings to strike and grow. The site must be monitored and if the nurse sward

needs prolonging to produce the desired effect and allow the native species to establish, it may prove beneficial for a second application of lime both in 2015 and possibly in spring 2016.

Rates of aerial application:

Seed – Following previous consultation with William Eyre & Son, DMS propose to apply the following moorland seed mixture:

Ohio Perennial Rye Grass;

Trocadero

Maxima 1

Triana

Quatro

Highland

&

Native Heather Seed

which has been used successfully in the past. (Again the precise species mix is obviously negotiable should NE have reservations or alternative prescriptions). This particular mixture is designed to stabilise and restore the bare peat areas. Where possible this mixture is sourced locally through a network of collectors across the North of England and is enriched with additional heather seed. It is hoped this along with any dormant seed bank and any that may be blown from established surrounding heather beds would achieve the required goal, thus restoring the area to one of ‘heather moorland.’ The seed mix is sown at a rate of 40kg/ha.

Lime (Calciprill) – 1000kg per hectare will be applied; this will raise the level of the pH.

Fertiliser – 250kgs of 10-30-15 fertiliser per hectare would be applied onto the target areas to encourage the existing plant species and stabilise the new germination of the aerially applied seed.

Timing – the lime and seed/fert should ideally be spread in the spring of the year to achieve the maximum benefit from that particular growing season. Allowing for the time lapse between the applications of the lime, followed by the seed/fertiliser, and to achieve maximum benefit, and to minimise disturbance to ground nesting birds; it may be advisable to spread the lime at the end of March/beginning of April followed by the application of seed/fertiliser in early/mid May, BUT before 15th May and avoiding the main hatch date of 24th May.

Access Route

Daily access to the north of the work area requires crossing a beck, in this area it is proposed to install matting to reduce further erosion, minimise impact and be able to restore the ground into favourable condition. Due to the width of the current impact as seen below installation of a grass track would improve the ground conditions.



The area can then be seeded and the reduction of movement over the ground will allow the surrounding ground to recover. The matting should be pinned down and over seeded to create a vegetation base to knit together.

Plastic Matting; Heavy Duty GrassProtecta 2kg

Description	Quantity
Reinforcement Matting	700 m
Access Repair	1300 m
Re-profiling of Footpath Vegetation	2 ha

Drain Blocking

To the north of the site running alongside Penny Common Ings there have been identified some lengths of drain blocking. These are to be blocked to reduce flow and prevent erosion. These have been identified on the Capital Works plan.

See Appendix 2 Peat dam construction.

Description	Quantity
Total Drain Blocking	524m

Heather Regeneration

Creation of Heathland LHX

There are three areas for Heather regeneration identified as part of the capital works plan. These areas are for the contractor to establish heather over old bracken beds.

The regeneration technique could be varied and as such a brief method statement should be included together with the total costing for the establishment of heather. Access may require low ground pressure machinery for the chosen methodology.

The contractor must use native seed for the regeneration.

Fencing Requirement

Fencing is required as identified on the Bill of Quantities to conform with the current British Standard specifications. This fencing will require rabbit netting as the areas within the enclosure will establish the Heathland regeneration. There are three areas identified for the restoration and the size and number could be subject to change.

Description	Quantity
Total Heathland Regeneration	17.00 ha
Total Fencing with Rabbit netting	4500 m
10' Field Gate Installed 1 per enclosure	3
Stile 3 per enclosure	9

Excavator Key Points

- Low ground pressure tracks (800mm)
- GIS equipment fitted in the cab to each machine
- Self fuelling hose to reduce and minimise any possible risk
- Two way radio installed for communication
- Spill Kit
- First Aid kits
- Biodegradable hydraulic oil
- Equipment regularly serviced and washed

CDM

The works will require more than 30 working days on site or 500 person days on site. It will therefore be notifiable to the Health and Safety Executive under the Construction and Design Management Regulations, 2007. It is likely that a CDM co-ordinator will need to be appointed by the client before any work may progress on site.

The client requires a suitable CDM co-ordinator for the project including in the tender, the contractor will ensure all work fulfils this requirement.

Appendix 1 – Plan

Midhope Capital Works Plan 1 – Attached PDF

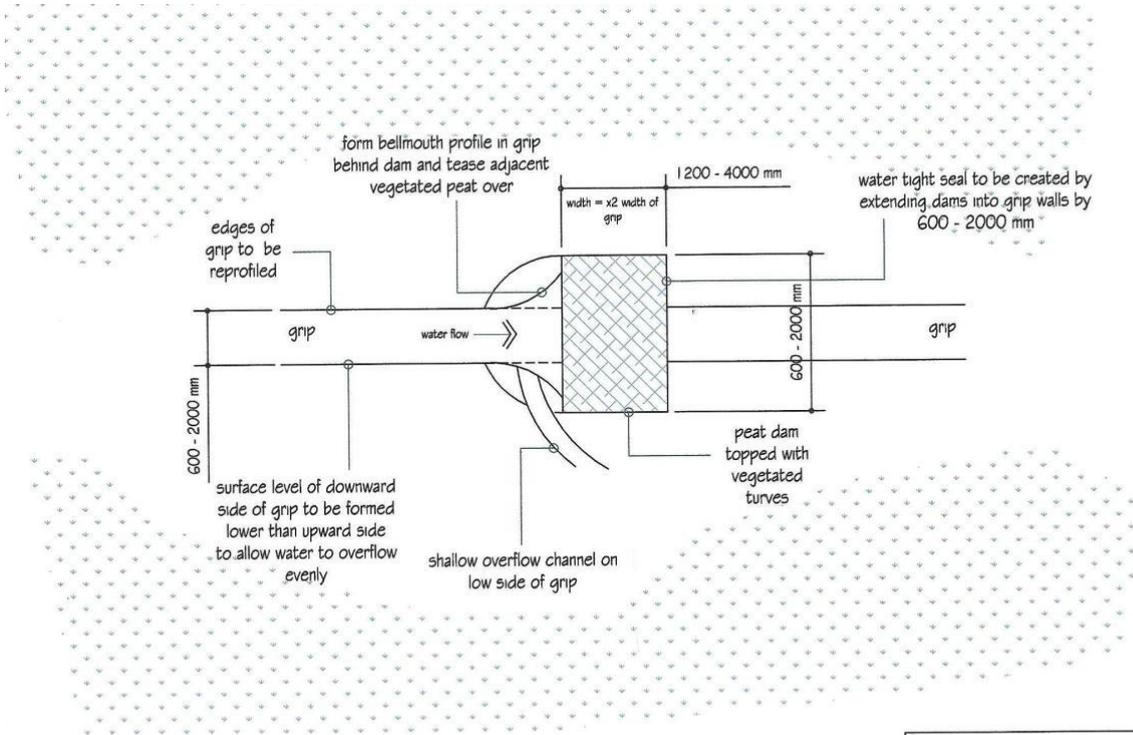
Midhope Capital Works Plan 2 – Attached PDF

The attached plans are interactive for the scope of works, with selectable background mapping and works required

Appendix 2 –

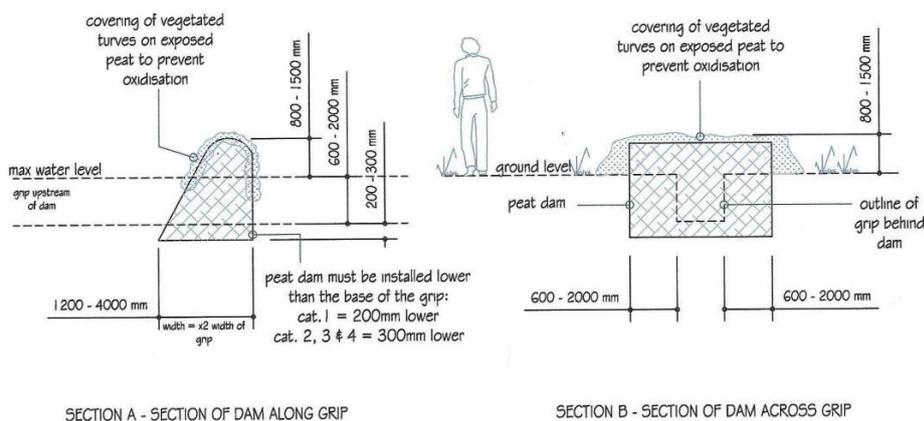
Peat Dam Construction

3.1 Plan View



GRIP BLOCKING USING PEAT DAMS:
PLAN VIEW
date 17th Sept 2011
Drawn by: D.V.Levens

3.2 Cross Section



GRIP BLOCKING USING PEAT DAMS:
CROSS SECTIONS
date 17th Sept 2011
Drawn by: D.V.Levens

Reprofiling & half dam

Gulley without reprofiling

Gulley with reprofiling



Half Dams



General dam construction -

- All gullies should be blocked starting from the top of the gully working down-slope.
- Where there are confluences, dams should be placed in the individual gullies before they join together.
- Where appropriate, excess water from the gully should be dissipated across the moor. The water should be directed laterally across the moor, away from the gully by digging a small crescent shaped overspill channel on the down slope side behind the dam.
- The block should be wider (0.5-1m) either side than the gully to prevent erosion at the gully edges.
- Half dams to be installed where appropriate.
- Variation in the positioning of the dams is required in order to take advantage of the natural topography.
- For shallow gully's, the top of the dams should be c0.2 - 0.5m or more higher than the surrounding ground level to account for subsidence as the dam ages and so that impounded water overflows laterally away from the dam and soaks into the bog surface.
- Where possible placement of the dams must be such that when the water backs up from the dam the grip is filled with water to a level above the base of the next dam up slope.
- The peat to be used must be well humified so that it is sufficiently impermeable.
- The locations of all dams will be recorded using sub-metre accuracy Global Positioning Systems.
- Average spacing of the dams should be 7-10m but adjusted to take account of the gradient and vegetation conditions of the individual grip. On level ground the dams should be no more than 12m apart. On steeper slopes the dams should be no more than 5m apart and may be much less on the steepest slopes.
- All peat dams must be constructed using a very low ground pressure 360 degree excavator with wide ("bog") tracks. Even with bog tracks, however, the total machine weight should be less than 10 tonnes and portable "bog mats" may be needed to traverse areas of wet deep peat. All machine operators must be able to demonstrate a high level of expertise in working in a bog environment.