Penny Anderson Associates Ltd
CONSULTANT ECOLOGISTS

CANAL & RIVER TRUST

THE CONSTRUCTION OF A PERMANENT VEHICULAR ACCESS TRACK LEGALLY REQUIRED AS A MEASURE IN THE INTEREST OF SAFETY UNDER THE RESERVOIRS ACT FOR ESSENTIAL SAFETY WORKS, ONGOING INSPECTION, MAINTENANCE, AND EMERGENCY ACCESS AND THE ERECTION OF FENCING AT MARCH HAIGH RESERVOIR

BIODIVERSITY MITIGATION AND MANAGEMENT PLAN

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BIODIVERSITY MITIGATION AND MANAGEMENT PLAN

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This project has been undertaken in accordance with PAA policies and procedures on quality assurance.

Signed: ___

Penny Anderson Associates Ltd
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1. INTRODUCTION

Background

1.1 The Canal & River Trust (the 'Trust') proposes to construct a permanent access track and fencing to facilitate ongoing inspection, maintenance and emergency access at March Haigh Reservoir (the 'Development'), located approximately 1.6km north-west of the town of Marsden, in the Metropolitan Borough of Kirklees, West Yorkshire and centred on grid reference SE 016 093 (the 'Site').

1.2 The access track will be installed ahead of a proposed project to address several other measures in the interests of safety[1] at March Haigh Reservoir, legally required to be completed by the Trust before February 2024, which would have been otherwise inaccessible without an access track.

1.3 The Site falls within the South Pennine Moors Site of Special Scientific Interest[2], as well as forming part of the South Pennine Moors Special Area of Conservation[3] and South Pennine Moors Phase 2 Special Protection Area[4].

1.4 This report provides the Biodiversity Mitigation and Management Plan[5] for the scheme, developed to avoid adverse effects on the integrity of the Site's features, along with additional mitigation measures for construction and operations impacts identified during the Environmental Impact Assessment[6] process.

Outline of the Scheme

Location

1.5 The access track begins on an existing track just off Blake Lea Lane (grid reference SE 0259 1272) and runs towards the reservoir spillway (grid reference SE 0172 1305) and in part crosses the open moorland area that forms part of the South Pennines protected sites.

1.6 After this point the Site then diverts south over the spillway and along the base of the existing reservoir embankment for approximately 180m (grid reference SE 0171 1287 401717, 412878). The associated permanent stock fencing is installed along this section, to provide protection of the dam embankment from grazing cattle on the wider moorland.

1.7 Associated upgrades to the section of the existing track just off Blake Lea Lane that runs below the farm buildings and corresponds with the new track alignment will also be required, to accommodate access by the necessary vehicles.

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[1] *MIOS*

[2] *SSSI*

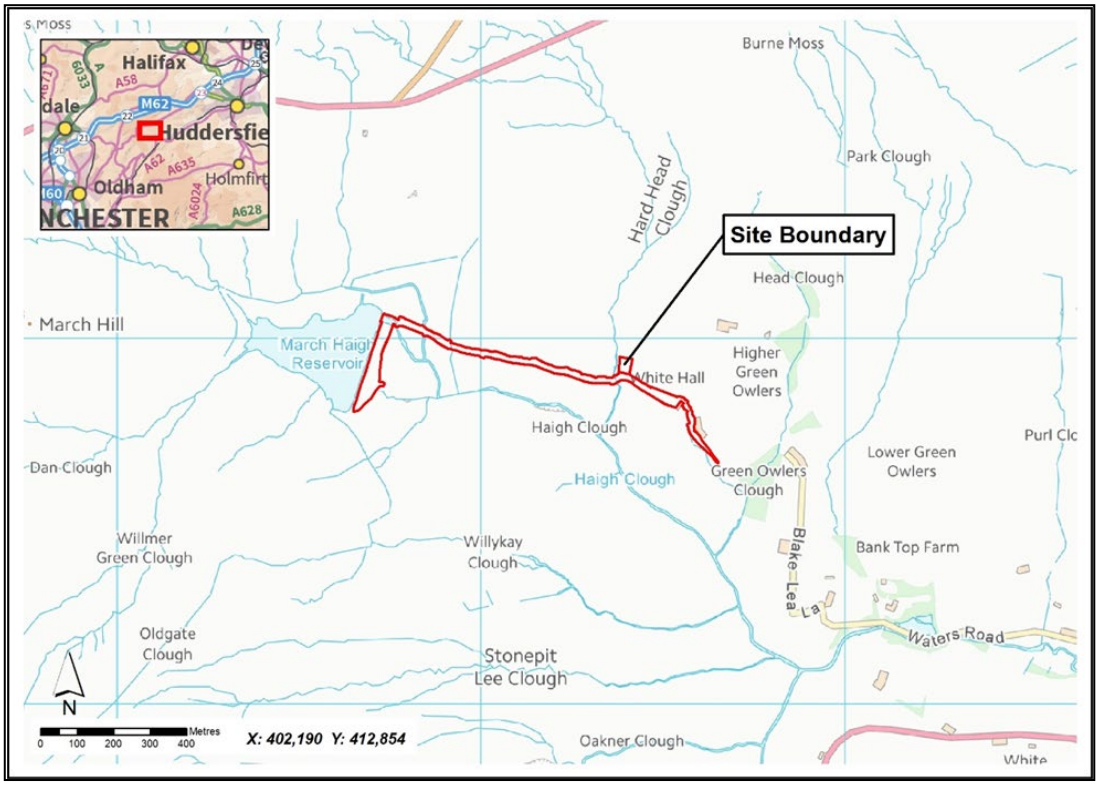
[3] *SAC*

[4] *SPA*

[5] *BMMP*

[6] *EIA*

Figure 1 General Site Location



Construction Design

1.8 The proposal is for a 4m wide track, made with materials selected to minimise impacts on habitats and hydrology and to blend with the landscape. The track has been designed to be capable of transporting the vehicles required to ensure the safe operation of March Haigh Reservoir.

1.9 The stone depths will be of minimum pavement depth 250mm between Points A and C (Chainage 0 to 325m) and 530mm beyond Point C (Chainage 325m to 965m). Stone usage has been reduced as far as is practicable by use of geogrid and geotextile layers. This will improve durability and reduce the volume of material required. The track surface will be unbound, with no kerb or edging, so that water is able to continue to flow through the track.

1.10 Minor earthworks have been allowed for along the northern edge of the track to re-profile the batter of the track pavement to be at grade with the existing ground level to promote natural drainage and reduce future degradation of the track.

1.11 Some infill will also be used to fill minor gaps along the southern edge and peat excavated from construction works will be utilised to cover the southern edge of the track, ensuring the peat used for this purpose is of sufficient integral integrity to minimise future risk of erosion.

1.12 Three passing places at Chainages 340, 560 and 705m have been located at strategic positions along the track which aim to give optimal sight distance between them. The passing place dimensions will be 3m wide and 6m long on the outside edge with an entry/exit taper, making them approximately 12m long on the outside tracked edge.

Schedule of Works

1.13 The construction timeframe is 12 weeks between September 2023 and February 2024.

Structure of this Report

1.14 This report provides the details of the comprehensive biodiversity mitigation and monitoring schemes developed for this access track works. The report covers both the construction period of the access track and the post-construction monitoring requirements.

1.15 The report summarises the predicted impacts on biodiversity as identified in the Shadow Habitat Regulations Assessment[7] (HRA) report (PAA 2023a) and the Environmental Statement[8] Volume 1 Main Text report (PAA 2023b). These are presented in Section 2 of this report.

1.16 Measures to protect biodiversity features on the site during construction (as identified in the Construction Environment Management Plan[9], PAA 2023c) are presented in Section 3, with on-site post-construction biodiversity monitoring presented in Section 4.

1.17 This report also includes off-site measures, which occur on two compensation sites: *Holme Moor (Round Hill)* which provides compensation measures for impacts on the protected areas, and *Land at Redbrook Reservoir* which provides compensation measures in relation to achieving Biodiversity Net Gain[10]. The compensation scheme, including monitoring requirements, are presented in Sections 5 and 6 of this report, respectively. Detailed information is also provided as Appendices 1 and 2 to this report and baseline survey reports for these two sites are available on request (PAA 2023d, 2023e, 2023f).

1.18 Appendix 3 of this report provides a timeframe for all actions.

[7] *HRA*

[8] *ES*

[9] *CEMP*

[10] *BNG*

2. SUMMARY OF THE POTENTIAL EFFECTS ON BIODIVERSITY

Construction Phase

2.1 The potential effects of the Development on the South Pennine Moors SSSI/SAC and South Pennine Moors Phase 2 SPA at the construction stage are summarised below (Tables 2.1 to 2.3).

2.2 In addition, the biodiversity interest on the Development site includes a small population of common lizard (*Zootoca vivipara*) plus suitable habitat for common toad (*Bufo bufo*) and some wild mammals species, including badger (*Meles meles*), water vole (*Arvicola amphibius*) and brown hare (*Lepus europaeus*).

Table 2.1 Summary of Potential Effects on Features of the South Pennine Moors SSSI - Construction Phase

Receptor and Value	Potential Effect	Mitigation
Blanket bog within SSSI/SAC.	Permanent loss of 0.4296ha plus modification of 0.076ha due to peat re-use on Site	Embedded mitigation through careful route selection, design and construction methods.
Semi-improved and improved acid grassland.	Permanent loss of 0.077ha with creation of 0.32ha of new acid grassland along track edges. Temporary loss and recreation of 0.14ha of acid grassland on the Contractor compound area.	Embedded mitigation through careful route selection, design and construction methods.
Moorland breeding bird assemblage (SPA/SSSI features).	No anticipated impacts due to seasonal timing of construction works to period October 2023 to February 2024.	None required – but measures included in case of unavoidable overrun of programme.
General breeding bird assemblage.	No anticipated impacts due to seasonal timing of construction works to period October 2023 to February 2024.	None required - but measures included in case of unavoidable overrun of programme.
Geological sites noted within SSSI.	No effects identified due to distance from Site.	None required.
Peat hydrology.	Changes in hydrological function, localised wetting or drying of peat/habitats on and adjacent to Site.	Impacts minimised with embedded mitigation through careful route selection, design and construction methods but unavoidable loss of peat/other material with resulting effects on peat hydrology will occur, which cannot be mitigated.
Water quality (of peat resource and watercourses).	Risk of accidental pollution; introduction of unsuitable construction material at risk of altering local water chemistry will all be avoided with embedded mitigation.	Embedded mitigation best practice pollution control during construction. Selection of suitable stone type similar to the natural geology of the local area (i.e. gritstone).
Peat soil resource and carbon store.	Loss of 493m^3 of peat within Development footprint. Further disruption of peat soils along track route, additional impacts on localised areas of undisturbed peat due to cut and fill requirements, risk of carbon loss through peat removal from Site and/or inappropriate handling and storage.	Embedded mitigation through careful route selection, design and construction methods but likely to be unavoidable disruption which cannot be mitigated. Re-use of peat on site to reduce carbon losses.

Table 2.2 Summary of Potential Effects on Qualifying Features of the South Pennine Moors SAC – Construction Phase

Potential Effect	Qualifying Feature		
	European Dry Heath	**Blanket Bog**	**Old Sessile Oak Woods**
Loss of peat resource and hydrological function	No effect – habitat is not present	Yes – permanent loss of peat within footprint and potential indirect effects on peat hydrology which cannot be fully mitigated. Compensation will be required.	No effect – habitat is not present
Impacts on water chemistry	No effect – habitat is not present	No – embedded scheme design will use locally suitable stone. A CEMP with best practice measures to safeguard the water environment will be adopted during construction.	No effect – habitat is not present
Altered/increased run-off and localised erosion	No effect – habitat is not present	No – bare peat areas will be vegetated, and heather bales/coir rolls used at stream crossing points to prevent erosion	No effect – habitat is not present

Table 2.3 Summary of Potential Effects on Qualifying Features of the South Pennine Moors SPA – Construction Phase

Potential Effect	Qualifying Features	Predicted Impact
Disturbance during construction	Golden plover (*Pluvialis apricaria*)	No – works to take place outside of breeding season. If works are delayed into start of breeding season, an Ecological Clerk of Works[11] will monitor golden plover activity and advise on measures to avoid disturbance.
	Merlin (*Falco columbarius*)	No – no evidence of breeding site within zone of visual influence.
	Breeding bird assemblage present on/near Site – golden plover, curlew (*Numenius arquata*), dunlin (*Calidris alpina*), snipe (*Gallinago gallinago*), common sandpiper (*Actitis hypoleucos*) and wheatear (*Oenanthe Oenanthe*)	No – works to take place outside of breeding season. If works are delayed into start of breeding season, an ECoW will monitor breeding bird activity and advise on measures to avoid disturbance.

[11] *ECoW*

Potential Effects – Operational Phase

2.3 The potential effects of the scheme on the South Pennine Moors SSSI/SAC and South Pennine Moors Phase 2 SPA at the operational stage of the Development are described below (Tables 2.4 to 2.6).

Table 2.4 Summary of Potential Effects on Features of the South Pennine Moors SSSI - Operational Phase

Receptor and Value	Potential Effect	Mitigation
Moorland breeding bird assemblage. Very high value.	Disturbance from potential for increased recreational use. Permanent loss of approximately 0.5ha of habitat used for nesting, foraging/feeding.	Slow-moving vehicles only. Padlocked gates to prevent unauthorised vehicle use. Pedestrian use of stone track deterred. Suite of measures and actions to redress ongoing impacts, with ongoing monitoring and review. Inclusion of suitable seed mix to enhance area for twite (*Linaria flavirostris*) in restoration of temporary works areas and acid grassland creation along track edge.
General breeding bird assemblage. High value.	Disturbance from potential for increased recreational use	As above

Table 2.5 Summary of Potential Effects on Qualifying Features of the South Pennine Moors SAC – Operational Phase

Potential Effect	Qualifying Feature		
	European Dry Heath	Blanket Bog	Old Sessile Oak Woods
Loss of peat resource and hydrological function	No effect – habitat is not present	No – embedded mitigation uses free-draining stone to avoid adverse effect on peat hydrology, with monitoring and maintenance to maintain flows through track in long term	No effect – habitat is not present

Table 2.6 Summary of Potential Effects on Qualifying Features of the South Pennine Moors SPA – Operational Phase

Potential Effect	Qualifying Feature		
	Golden Plover	**Merlin**	**Breeding Bird Assemblage**
Increased disturbance from recreational use	No – locked gates to prevent unauthorised use and ongoing monitoring by applicant with additional commitment to work with National Trust and other stakeholder and employ additional mitigation measures needed.	No – this species is unlikely breeding in vicinity.	No – locked gates to prevent unauthorised use and ongoing monitoring by applicant with additional commitment to work with National Trust and other stakeholder and employ additional mitigation measures needed.

3. ON-SITE BIODIVERSITY PROTECTION MEASURES - DURING CONSTRUCTION

Ecology Management

3.1 Key ecological features on Site are the sensitive upland habitats, populations of breeding birds, and a small population of common lizard. In addition, there is a low risk of common toad, mountain hare (*Lepus timidus*) and water vole being present in the local area, although no evidence of these species has been detected on or near to the Site.

3.2 Protected faunal species may be found in the associated habitats and features:

- Trees;
- Scrub and dense vegetation, such as bracken (*Pteridium aquilinum*[12]) or rushes (*Juncus* ssp.);
- Large brash piles;
- Undisturbed moorland habitats;
- Bare earth and recently cleared ground, and
- Gaps and holes in dry stone walls or other structures.

3.3 Habitat clearance and/or construction works and vehicle movements in suitable habitats may inadvertently harm or disturb these protected species.

3.4 The risks to habitats and faunal species during construction are managed through a series of Precautionary Working Method Statements[13] presented below.

3.5 The associated underlying peat deposits are dealt with below under Peat Soil Management.

Habitat Precautionary Working Method Statement

3.6 The key aim is to minimise the extent of impacts on habitat outside of the Development footprint, and this will be achieved by the Contractor undertaking the following measures under guidance from ECoW:

- Route and footprint of track and passing places to be clearly demarcated on the ground with flags/fencing or similar;
- Contractor working from the line of the track only, with no machinery entering any adjacent habitat and no peat to be removed other than the absolute minimum required to create the track footprint;
- No vehicles being taken off the route of the track or parked on adjacent habitats for any reason;
- Materials and waste stored within the designated areas on the compound only;

[12] *Botanical species names follow Stace (2019)*

[13] *PWMS*

- Vehicle servicing and refuelling to take place in designated areas only within the compound;
- No hot-works and no smoking anywhere other than designated areas;
- No littering of the Site;
- Suitable protection zones clearly established and maintained around adjacent retained features, such as trees, scrub, watercourses, dry stone walls, etc; and
- Suitable protection measures employed as required to avoid risk of erosion or pollution of the water environment and peat resource (see sections below).

Herptile Precautionary Working Method Statement

3.7 A small population of common lizard is known to be present on Site, with a single animal observed at the western end of the Site close to the reservoir embankment. There is suitable habitat for common toad to be present on Site.

3.8 Common lizard may shelter in any of the denser tussocky vegetation or dry-stone walls on or near to the Site and bask on more open areas, such as exposed rocks, shorter grassland/bare soil areas and dry-stone walls. Common toad could potentially use damper tussocky vegetation and gaps in dry stone walls for shelter.

3.9 Given the low risk in relation to these two species, a herptile displacement approach will be adopted. This will comprise:

- Clearance of suitable habitat in a sensitive manner, by initial strimming of any taller areas to 200mm in height and then a further strim no less than two hours later to 50mm height. The strim will occur in an east to west direction across the habitat to allow any reptiles to move towards unaffected habitat off-Site;
- The ECoW will inspect the area between strimming episodes and after the final strim to ensure no herptiles remain. Should any be found during the ecologist checks, they will be carefully moved by hand off Site to other suitable habitat;
- Once clear of the risk of sheltering herptiles, the remaining vegetation will be removed within one week by stripping to bare soil;
- Re-strimming and checks by the ECoW will need to be repeated if vegetation removal cannot be completed within one week of strimming;
- The final stripping of vegetation to bare soil will only occur when weather is suitable for herptile movement, with temperatures 9ºC or higher, and with no heavy rain/fog or high winds; and
- Clearance (stripping to bare soil) will not be undertaken during the winter period (December to February, inclusive) as reptiles will be in hibernation and unable to be displaced.

3.10 If common lizard or common toad are found on Site at any time, the ECoW should be notified for advice.

Wild Mammal Precautionary Working Method Statement (Badger, Water Vole and Mountain Hare)

3.11 No sighting or evidence of badger, water vole or mountain hare have been confirmed on Site to date. However, some suitable habitat is present on Site and, as a precautionary measure, supervised vegetation clearance is recommended.

3.12 A pre-work walkover survey will be conducted by the ECoW to look for any new indications of these species being present on or close to the Site to confirm continued absence.

3.13 The approach adopted for vegetation clearance under the reptile PWMS will also enable any risks to these species to be managed by ensuring careful managed removal of potential habitat.

3.14 Should any of these species be confirmed on Site, the ECoW will provide additional guidance on appropriate steps. Actions with regard to confirmed badger setts and/or presence of water vole may require a separate licence to be in place before works can recommence.

Breeding Bird Precautionary Working Method Statement

3.15 For the purposes of this Method Statement, the main bird nesting season is taken to be within the period March 1st to August 31st.

3.16 All work is planned to occur in the period October 2023 to February 2024, which is outside of the main nesting season for most species. An approach to adopt if nests are discovered at any time of year (and to also cover works within the nesting season, if unavoidable) is, however, provided. See below for further details.

3.17 It is possible to find nesting birds outside of this window and so precautions shall be taken if weather conditions are deemed suitable for nesting by the ECoW. For example, a very mild winter may trigger early nest building during February.

3.18 Habitat clearance will be carried out during September to October 2023 (inclusive) to avoid the main nesting season. There is no requirement for ECoW supervision within this period in respect of nesting birds, however, supervision will be required as part of the herptile PWMS and the management of the peat resource and works to other sensitive areas such as the stream crossings.

3.19 Should any signs of a nesting bird be observed on Site at any time during the construction period, the ECoW should be immediately notified and work in that area ceased until advice is given. The ECoW may need to undertake further observational surveys to confirm any active nest/nesting behaviour before providing advice, and in such cases, works in the area will remain suspended until such time as works can proceed without risk of disturbance to nesting birds.

3.20 Every effort will be made to avoid works extending beyond February 2024. However, the following steps will be taken if works unavoidably extend beyond this date:

- ECoW to provide a toolbox talk to all operatives on risk to nesting birds and the deterrent and mitigation measures that will be deployed, how to recognise the signs of a nesting bird and what steps to take in event that a nest is found (i.e. cease work in that area and contact the ECoW);
- Maintaining a stripped vegetation corridor along the construction route to ensure suitable nesting habitat is not present/does not develop (it should be noted that the entire construction corridor will have been strimmed and stripped of vegetation to expose the underlying previously temporary track prior to commencement of works in autumn 2023 and will be maintained in this stage for the duration of construction);
- Use of a controlled dog with handler in hi-vis clothing to walk the route from February 2024 onwards, typically every two to three days, or more often as needed, to deter nesting attempts within the immediate footprint;
- Use of temporary visual screening along either side of the track, under the guidance of the ECoW where needed, e.g. if nests are established on adjacent land, so that a suitable undisturbed buffer is maintained; and

- If necessary, the temporary cessation of work within a suitable buffer zone of nesting attempts until young have successfully left the nest (buffer zones to be advised by the ECoW in accordance with recent advice developed by NatureScot (Goodship and Furness 2022)).

3.21 Additional detail is provided below.

Bird Deterrent Measures

3.22 Measures to deter nesting birds from nesting within the immediate footprint of the track will be adopted prior to construction, if works extend into 1st March 2024 or beyond. The aim of bird deterrent measures is to deter nesting by any of the moorland breeding bird assemblage along the construction route by making the route and immediate environs less attractive. This will be achieved through a combination of:

- Retaining closely strimmed vegetation along the length of the construction area; and
- Use of controlled dog walking to supplement the above measure, walking the route at particular times or locations, as required.

3.23 The deterrent measures would be removed as track construction progresses.

Temporary Screening

3.24 Temporary visual screening will be installed, if needed, along either side of the track with location and extent of any fencing to be determined by the ECoW on the moorland area if ground nesting species are confirmed in this area.

3.25 The screens will comprise Heras fencing covered in a suitable mesh to provide a visual barrier, securely fastened in place and tethered as necessary to reduce risk of wind damage. The screens will be checked each morning by the Contractor and any damage/re-instatement required is to be dealt with promptly to ensure that the visual screen remains in place at all times.

3.26 If the bird monitoring indicates that the use of screening needs to be extended further along the working area, this will be implemented as necessary, and its use will be recorded and monitored by the ECoW. Conversely, as soon as monitoring confirms that screening is no longer required it will be carefully removed.

Contingency if Nesting Birds Found Within Construction Route

3.27 It is anticipated that use of the above-described bird mitigation methods would be sufficient to deter nesting birds from the majority of the immediate construction footprint. However, should any nesting bird be located within the route of the track, then all work will cease at that location until monitoring confirms that any chicks have successfully left the nest.

Hydrology Management

3.28 All permanent and temporary works are situated outside of the flood zone of Haigh Clough and any works in the vicinity of the March Haigh spillways will be designed appropriately with all crossings suitably sized to ensure there is no negative impact on surface water flood risk. A suitable drainage solution will be implemented to remedy any negative effects of the permanent access track impeding subsurface flow paths whilst minimising impact on the peat deposits and retaining the hydrological connectivity across the access track.

3.29 Heather bales or coir rolls will be used as required to prevent localised erosion, e.g. at stream crossings points.

3.30 Pollution prevention measures will be put into place where working in the watercourse cannot be avoided. Further information is presented under the 'Watercourse Protection' section below.

3.31 All on-Site plant with hydraulic systems working in, over, or within 10m of watercourses, vulnerable groundwater zones and sensitive areas, such as Sites of Special Scientific Interest (SSSI), will use biodegradable hydraulic oil.

Peat Management

3.32 All cutting into peat or filling in of the existing levels of on either side of the track will be overseen by the ECoW, to ensure the peat resource is handled appropriately.

3.33 Peat underlies much of the habitats across the Site and is deep (>50cm) in some localised areas. Some of the peat is re-deposited material following the former temporary track construction (that was later re-buried) and is likely to be highly unconsolidated. To enable the track to be constructed these peat deposits need to be removed and/or earthworks completed that will disrupt the peat.

3.34 The aim is to re-use a proportion of the more intact consolidated peat material on the Site to form a batter along the southern side of the track where it crosses the moorland, or during re-instatement of the inbye field that will be temporarily used as the Contractor's compound.

3.35 The unconsolidated peat that is unsuitable for re-use and any other non-peat material removed from Site will be treated as per the Waste Management Plan.

3.36 Peat to be temporarily stockpiled for re-use will be handled as follows:

- Following vegetation stripping, peat will be removed and stockpiled on the compound, using a suitable geotextile as a base;
- Once stockpiled, the peat should remain undisturbed until re-used on site to avoid double handline and protect the peat structure;
- Peat stockpiles will be no more than 2m in height and covered with a suitable material to reduce desiccation and prevent 'weedy' plant species from establishing on them;
- Stockpiles will be formed in such a way as to prevent material instability or risk of runoff into watercourses and sited away from watercourses. Stockpiles would include appropriate bunding where required to achieve stability; and
- Peat storage bunds will be suitably labelled and kept separate from other materials or non-peat soil storage areas.

3.37 Peat will be re-used to form batters and complete minor earthworks along the edges of the track where it crosses the moorland, and within the reinstatement scheme for the compound. Further details are provided in the 'Biodiversity Restoration Measures' section below.

Watercourse Protection

3.38 The main Contractor will implement a pollution incident response plan, in accordance with JNB OES 003, to ensure activities are controlled in a way to minimise the potential for an environmental incident in the first instance. Pollution Prevention Guidelines[14] and CIRIA guidance will be followed and adhered to within this section of the CEMP, as well as reflecting the guidelines below:

[14] *PPG*

- PPG 1: General Guide to the Prevention of Water Pollution;
- PPG 5: Works in, Near or Liable to Affect Watercourses;
- PPG 6: Working at Construction and Demolition Sites;
- PPG 21: Incident Response Planning;
- PPG 23: Maintenance of Structures Over Water;
- CIRIA C532: Control of Water Pollution from Construction Sites; and
- CIRIA C648: Control of Water Pollution from Linear Construction Projects.

3.39 The pollution control responsibilities, information and procedures will be communicated to all project staff and Site operatives during Site inductions and reiterated during emergency response drills.

3.40 The main Contractor will take all necessary precautions to protect all watercourses, together with groundwater in underlying strata, against silting, erosion and pollution.

3.41 Pollution protection measures to be included during works to culverts will include temporary works damming and over-pumping of existing watercourse, control of pump inlets to avoid suction of bed silts (this will include suspension of pump inlet hoses), also use of pollution barriers including oil spillage booms and spill response kits. All plant and machines to use bio fuels/oils, site operatives trained in pollution clean-up techniques.

3.42 Environmental mitigation measures will include ecology visits and input, fish-friendly inlet hoses on pumps, silt mitigation at pump outlets, also dissolved oxygen and water quality checks at downstream locations. All to be included in JNB's Pollution Response Plans.

3.43 To reduce likelihood of spillages occurring on-Site, it will be ensured that:

- Equipment is maintained to ensure efficiency and to minimise emissions;
- All fuel, hydraulic fluids, lubricating oils or chemicals stored in bulk on working areas are located as far away as reasonably possible from any watercourse/drain and that such stores are sited on impervious bases and surrounded with an effective and impervious bund capable of holding the full contents of the store plus 10%. The tank vent pipe should always be directed downwards into it, as per PPG 1;
- All stores are kept locked when not in use, and all containers are clearly labelled with their contents. Leaking or empty oil drums or chemical containers shall be removed from the Site immediately;
- Equipment which leaks any fuel, lubricant or hydraulic fluid is not used, and all static equipment using fuel or oils is located as far away as reasonably possible from any watercourse, with oil-absorbent material to contain spills or leaks available and use of drip trays as appropriate.
- Refuelling or servicing of equipment is undertaken in designated locations by pumping through a trigger type delivery nozzle where possible;
- Refuelling to always take place further than 10m from any watercourse. To ensure spillage response can be timely and effective, the following will be ensured on Site at all times:
    - An adequate supply of oil absorbent materials is always readily available on Site and in close proximity to plant/equipment;
    - Staff are appropriately trained on use of absorbent materials. Any spillage is immediately contained, removed from Site and disposed of to a licensed tip.

Emergency drills will be conducted to ensure all Site operatives and project staff are aware of the procedures following a spill;

- Appropriate spill kits are held on-Site and in close proximity of plant and equipment, as per PPG 1; and
- An up-to-date drainage plan will be maintained and kept on Site with hazards identified on this, with a contingency plan for if there is a pollution incident. This will include advice on what action to take and who should be informed in the event of an incident. These will be stored on Site and displayed clearly, with regular incident response drills undertaken.

Biodiversity Restoration Measures

3.44 The majority of the Site comprises a permanent track that would remain *in-situ* for the operational phase of Development. Some small areas of cut and the batter along the southern side of the permanent track across the moorland will require some habitat creation to stabilise bare peat areas.

3.45 This area is allocated for acid grassland habitat creation using a suitable native grass and heather seed mix as presented in Table 3.1, sown at a rate of 50kg/ha.

3.46 A suitable geotextile will be installed prior to seeding where there is risk of peat erosion, to be installed using biodegradable pins (not plastic or metal).

3.47 The installation of the permanent fence along the base of the embankment would have minimal impact on the habitats and soils and as such no restoration is required in this area. The fence route and post-and-wire fence design (with stock netting) will be to the agreed plans and specifications.

3.48 The only area requiring significant restoration is the temporary Site compound east of Hard Head Clough.

3.49 On completion of works, the compound will be re-instated for agricultural use by removing the stone surface or geotextile, spreading over no more than 500mm of peat (as excavated from the moorland section of the track) and re-seeding the field with a suitable native grass and heather seed mix as presented in Table 3.1, sown at a rate of 50kg/ha.

3.50 The seed mix will be supplemented with seed of additional plant species that will support foraging twite as an enhancement measure, comprising autumn hawkbit (*Scorzoneroides autumnalis*), cat's ear (*Hypochaeris radicata*), sheep's sorrel (*Rumex acetosella*) and common sorrel (*Rumex acetosa*). These additional species will be in equal proportions by weight within the seed mix sown at a rate of 10kg/ha.

3.51 The ECoW will provide input throughout the above restoration process to ensure the target habitat is achieved. Any poor establishment of reseeded area will be addressed by the Contractor to the satisfaction of the Client.

Table 3.1 Upland Acid Grassland Seed Mix[15]

Common Name	Scientific Name	% By Weight
Common bent	*Agrostis capillaris*	40
Sheep's fescue	*Festuca ovina*	40
Wavy hair-grass	*Deschampsia flexuosa*	10
Heather	*Calluna vulgaris*	10
	Total	**100**

[15] *To be supplemented with autumn hawkbit, cat's-ear, sheep's sorrel and common sorrel*

4. ON-SITE BIODIVERSITY MONITORING METHODOLOGY - POST CONSTRUCTION

General Site Measures and Monitoring

4.1 A post-construction programme of regular monitoring and maintenance will be implemented as set out within the Operation and Maintenance[16] Plan for the scheme to identify and address localised issues to prevent any long-term disruption to the peat mass, in particular accelerated scour and erosion.

4.2 Monitoring and maintenance activities will comprise:

- Frequent visual inspection of the track at least once a year, and more frequently as needed e.g. following storm events; and
- Remedial measures that could range from small scale filling of pot-holes and replacement of erosion protected (coir rolls, heather bales etc), to more significant works such as replacement of drainage pipes or the topping-up of the track surface.

4.3 Suitable specialist technical/ecological advice and all necessary permits will be in place as required for any remedial measures undertaken.

4.4 The following additional measures will be employed to manage of impact of the potential for increased recreational use, such as increased numbers of walkers, dog walkers and runners, on the SPA designated birds:

- Litter picks around March Haigh Reservoir and along access track by the Trust (operatives to visit at least twice a week, potential to increase this if litter becomes a substantially increased problem);
- Installation of barriers and 'no parking' signage on road verges at Blake Lea Lane to prevent increased numbers of cars parking here;
- Addition of finger posts to direct users to Public Rights of Way[17] (suitable locations to be confirmed);
- Ensure locked gates are maintained as such;
- The inclusion of additional signage on finger posts and stiles to identify the need to keep dogs on a lead during the bird nesting season (suitable wording and locations to be confirmed).

4.5 The Trust will continue to monitor levels of recreational use and will act in partnership with the National Trust if there is a notable increase in visitors to the area such that there is an observed response in the behaviour of breeding birds recorded during proposed breeding bird monitoring in Years 1, 2 and 3 after development. This could include, for example, clear evidence of a reduction in species or nesting attempts compared with the baseline survey results e.g. due to nest trampling by people or disturbance by dogs.

[16] *O&M*

[17] *PRoW*

4.6 Potential additional remedial management measures will be devised jointly with the National Trust, with the Trust contributing funding towards National Trust Ranger time to be used, for example, for visitor management or footpath repair.

Habitat Monitoring

4.7 Habitat monitoring of the Development Site, including the restored site compound and areas of bare peat to be re-seeded alongside the track, would be carried out in the summer of Years 1 and 3, following completion of construction. Monitoring in Year 1 would allow for any issues to be identified and rectified, with monitoring in Year 3 to check progress.

4.8 Monitoring along the permanent track would comprise a visual inspection to check for evidence of erosion or any other hydrological impacts along with vegetation monitoring.

4.9 The vegetation monitoring will comprise a walkover of the re-seeded bare peat areas alongside the track and (former) site compound to produce a full botanical species list and relative species abundance[18] across each area, with track and site compound habitats recorded separately.

4.10 In addition, a total of 5no. 1m x 1m quadrats will be taken within each area (track and site compound sampled separately) to record plant species and bare ground percentage cover so that the habitat can be assessed in accordance with the Common Standards Monitoring[19] Guidance for Upland Habitats (Joint Nature Conservation Committee[20] 2009).

4.11 Although the restored habitat will include a small percentage of heather seed and, in the restored compound additional seed-bearing forbs suitable for foraging twite, the predominant habitat type will be acid grassland. Therefore, the CSM criteria for upland acid grassland will be used as the basis for vegetation monitoring.

4.12 If the monitoring identifies that the habitat restoration of restored areas has failed (as measured against the CSM criteria for upland acid grassland) the areas will be re-seeded within the next available growing season with additional measures such as control of soft rush or the removal of other undesirable species implemented as required.

4.13 A post-construction Habitat Assessment report will be prepared and submitted to Kirklees Council and Natural England after the Year 3 monitoring episode, including detailed survey methods and results and recommendations for any additional mitigation requirements if necessary.

Breeding Bird Monitoring

4.14 A programme of ongoing bird monitoring will be implemented during construction, for any part of the works that take place during the bird breeding season (1st March to 31st August, inclusive). As outlined in the previous section, this will involve regular inspections of the location of breeding birds by a suitably experienced ornithologist and observations on the efficacy of any bird deterrence and mitigation measures. The supervising ornithologist will provide regular reports to the Contractor to allow the disturbance measures to be modified and adapted in response to any changes in breeding bird behaviour.

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[18] DAFOR abundance scale (Where D= Dominant, A= Abundant, F= Frequent, O= Occasional and R= Rare)

[19] CSM

[20] JNCC

4.15 The Development's schedule is, however, programmed to complete by the end of February 2024 prior to the main bird nesting season starting.

4.16 Post-construction monitoring will aim to identify if the existence of the track and/or any associated change in authorised or un-authorised recreational use results in an observable effect on bird species numbers, distribution, breeding success or other behaviour changes such as avoidance of the Site.

4.17 The post-construction monitoring will comprise a repeat of the baseline breeding bird survey with repeat visits between mid-April and end-June to provide comparable data with the baseline breeding bird survey.

4.18 The monitoring visits will take place in Years 1, 2, 3 and 5 after completion of the scheme and every three years thereafter, for a total of 30 years.

4.19 A Bird Monitoring Report will be submitted to Kirklees Council and Natural England after each of the monitoring events, including detailed survey methods and results and recommendations for any additional management measures if necessary.

5. OFF-SITE BIODIVERSITY COMPENSATION STRATEGY – HOLME MOOR

Off-site Habitat Compensation Scheme

5.1 Due to the impacts on the degraded blanket bog habitat, which cannot be mitigated and will comprise the permanent loss of 0.42ha of peatland habitat, modification of 0.076ha of peatland habitat due to peat re-use, and indirect effects on peat hydrology at the construction stage which cannot be fully mitigated, it will be necessary to provide habitat compensation.

5.2 In addition, there will be a permanent loss of habitat of approximately 0.5ha for SPA qualifying bird species namely golden plover, curlew, snipe and wheatear which cannot be mitigated *in-situ*. The majority of this habitat loss is within the SPA, but there are also very small areas of acid grassland loss immediately adjacent to the track edges on functional land outside of the SPA. The permanent habitat loss would result in the loss in extent and distribution of habitat that could be used for nesting as well as foraging/feeding by these species. The habitat compensation area will, therefore, also be managed to provide compensatory habitat for golden plover, curlew, snipe and wheatear.

5.3 Habitat compensation proposals have been designed to provide a significant area of enhanced moorland habitat within close proximity to the Site, while also being situated on land outside of any designated areas (SSSI/SAC/SPA) where habitat enhancement and long-term management is unlikely to have otherwise been brought forward. The compensation scheme will deliver habitat enhancement to compensate for the permanent loss of blanket bog habitat as well as increasing the structural diversity of a currently purple moor-grass (*Molinia caerulea*)-dominated moorland to provide habitat for SPA qualifying bird species.

5.4 The habitat compensation works will be implemented across at least 3.5ha of purple moor-grass-dominated moorland owned by the National Trust at Holme Moor (Round Hill). This area of land is illustrated in Appendix 1. It is located to the east of the Site by Deer Hill Reservoir in Marsden and is also outside of any protected/designated areas. An agreement has been reached with the National Trust to implement habitat enhancement work that will be funded by the Trust and secured in perpetuity.

5.5 The area selected for the application of enhancement measures within the compensation site is 3.5ha, within a total area of approx. 5ha of moorland of Holme Moor (Round Hill). This provides a ratio of 1:7 habitat losses to gains.

5.6 In time, the Holme Moor compensation area would become designated as an extension to an existing European site, or as a new site, when the quality of the feature(s) of interest reach the expected condition. Thus, the compensation measures will ensure that the overall coherence of the national European site network is maintained by providing an increase in the extent of the qualifying feature(s).

5.7 The habitat of the compensation area does not conform to a blanket mire specification (being habitat on peats <40cm depth) although some deeper pockets of peat may occur locally. The site is dominated by dense purple moor-grass tussocks with very few other species present, and, therefore, lacks diversity and has minimal opportunities to support moorland ground nesting bird species. This general characteristic is, however, similar in terms of peat depths and vegetation type to the Site at March Haigh, where thin peats and purple moor-grass vegetation is similarly dominant.

5.8 The compensation scheme aims to diversify the species-poor habitat with a series of well-established techniques (tussock flailing and plug planting of both higher plants and *Sphagnum* species) that will encourage a more diverse range of plant species to develop across the Site.

This will create a habitat that moves towards a wet heath vegetation (NVC M15 *Scirpus cespitosus – Erica tetralix* plant community as per Rodwell (1991)), which is in itself a valuable habitat typical of moorland areas that is able to support a wide range of important moorland faunal species, including breeding birds. This is a similar habitat to that which would be expected from restoration of habitats at March Haigh, on thinner peat and on the edge of the wider March Haigh Flats blanket bog area. Peats are typically thinner at these edge locations as the landform changes to steeper valleys and edge slopes. Therefore, the targets of this compensation scheme are considered suitable for the impacts predicted for the Development scheme.

5.9 The works will be undertaken by the National Trust's specialist Contractors and volunteers and can proceed within the appropriate window as required by the Development, with a suitable lead in time to allow for plug plants to be procured. Appendix 1 provides the Compensation Scheme proposal, and the approach is summarised below.

5.10 The programme of restoration measures on the Holme Moor compensation site are as follows:

- September/early October 2023 – First mechanical flailing of purple moor-grass, after the bird breeding season and the peak fire risk season. Vehicles used for the machine mounted flail to be fitted with low ground pressure tyres, and route carefully chosen over firmer ground;
- September/early October 2024 – Second mechanical flailing of purple moor-grass; and
- October/November 2024 to March 2025 – Heather seeding, and if available cross-leaved heath seeding (*Erica tetralix*). Plug planting of all species and hand removal of tussocks as required.

5.11 Maintenance of the vegetation will be through grazing and trampling by stock, with grazing restricted to the spring, summer and autumn. It is important to graze the area as hard as possible in the early spring prior to planting the plugs to reduce the vigour of the remaining purple moor-grass tussocks.

5.12 Cattle grazing is best to control the purple moor-grass, but it is recognised that this site is currently grazed by sheep[21] which should fulfil a similar function of grazing new grass re-growth after flailing. Stocking levels (currently 100 to 140 ewes between 1st April to 31st October) are compatible with the restoration objectives.

5.13 Grazing levels will be carefully monitored to understand the impact on the purple moor-grass and the planted plugs. The effects of grazing will be monitored in accordance with the criteria below and grazing regime adjusted as far as reasonably practicable (being subject to approval by the relevant parties).

Monitoring

Habitat Monitoring

5.14 Monitoring methods for the habitat compensation area would be based on Natural England CSM adapted for the habitat present at Holme Moor (Round Hill) is provided below with details presented in Appendix 1.

[21] *There are concerns around using cattle on this site due to the presence of leats that feed into potable water supply reservoirs, and potential risks around Cryptosporidium.*

5.15 The peat depth on the compensation area is variable, with significant areas supporting less than 40cm peat (i.e. shallow peat). The target vegetation, mixed cottongrass/dwarf shrubs with *Sphagnum* plug planting is, however, considered to be best assessed against blanket bog criteria of CSM, rather than wet heath criteria. This is to recognise the aspiration of the restoration measures to provide additional benefits above what would be considered baseline targets for wet heath. It is not the intention of the restoration to increase the peat depth, however.

5.16 Two measures will be used to assess success/failure of the vegetation changes on the Site, and both must be fulfilled.

- Measure 1: Assessment guided by Moors for the Future's '*Blanket bog Decision Making Toolkit*'[22] The restoration principle is to move from a grass/sedge-dominated vegetation (equivalent to State 4) to a mixed vegetation, with frequent to locally abundant *Sphagnum* on the deeper peat areas (equivalent to State 5);
    - The interim monitoring should indicate that the restoration is on a trajectory to be compatible with the restoration objectives, as assessed by an appropriately experienced Ecologist; and
    - That 3.5ha have been restored from a grass vegetation to a mixed cottongrass/dwarf shrub vegetation (similar to State 5 blanket bog vegetation) by March 2056.
- Measure 2: Assessment based on the JNCC's CSM for Blanket Bog;
    - Assessment against the CSM criteria for Blanket Bog (pp.44 to 47 of CSM Guidance for Upland Habitats 2009[23]) with the following variations, and noting that peat depth across the site is and will remain variable, with significant areas supporting less than 40cm peat;
    - Frequency of Indicator Species – at least four (not six) indicator species present at $4m^2$ scale;
    - Cover of Indicator Species – on a trajectory for at least 35% (not 50%) of vegetation cover, consisting of at least three indicator species at $4m^2$ scale by no later than 2056; and
    - Cover of Other Species – in addition to existing criteria, the site should be on a trajectory for less than 65% of vegetation cover to consist of purple moor-grass by no later than 2056.

5.17 The success of the interventions will be monitored in Years 1 and 3 following the addition of the plug plants.

- Year 0 = March 2025;
- Year 1 = March 2026;
- Year 3 = March 2028;
- Year 5 = March 2030; and

[22] *https://www.moorsforthefuture.org.uk/__data/assets/pdf_file/0034/87568/Blanket_Bog_Land_Management_Guidance_Factsheet.pdf*

[23] *https://hub.jncc.gov.uk/assets/78aaef0b-00ef-461d-ba71-cf81a8c28fe3*

- Thereafter, every 3 years (2033, 2036, 2039, etc).

5.18 It is expected that by Year 3 of monitoring (2028) the desired species will be successfully establishing. Monitoring will be continued at Year 5 and every three years thereafter unless an alternative frequency of monitoring is agreed with the relevant parties.

5.19 Should the criteria not be met, further intervention, to be agreed with the appropriate parties (Kirklees Council and Natural England), will be undertaken to fulfil the restoration objectives. Such interventions will likely comprise:

- Repeating the flailing and plug planting measures in targeted areas;
- Replacing any failed areas of plug planting with appropriate species;
- Reviewing grazing stock regimes; and
- Reviewing the suitability any innovative/new measures that come forward over time to identify their usefulness in meeting/sustaining the desired targets for the Site.

5.20 A Habitat Monitoring Report would be provided to Kirklees Council and Natural England after each year of monitoring.

Breeding Bird Monitoring

5.21 To assess the efficacy of habitat enhancements for SPA-qualifying species and the wider moorland breeding bird assemblage at the compensation site, a baseline breeding bird survey has been completed in spring 2023 prior to any habitat enhancements commencing. The baseline survey follows the breeding bird survey methodology devised jointly by the British Trust for Ornithology[24], the Royal Society for the Protection of Birds[25] and the JNCC (1996) comprising repeat survey visits between mid-April and end June. The survey covers the compensation area, covering all parts of the area and an approximate 100m buffer. All bird registrations including species, numbers, age and sex, habitat associations and breeding behaviour will be mapped and described.

5.22 Subsequent monitoring visits (repeating the same methodology) will be timed to follow each major habitat intervention, with the first monitoring survey in 2024, repeated in 2025 and 2026, then every three years thereafter to tie in with the timing of the bird monitoring surveys at the Development Site.

5.23 A report will be submitted to Kirklees Council and Natural England after each post-development monitoring event, with recommendations for additional habitat interventions, if required, to support the requirements of SPA qualifying species and the wider moorland breeding bird assemblage.

[24] *BTO*

[25] *RSPB*

6. OFF-SITE BIODIVERSITY COMPENSATION STRATEGY – REDBROOK RESERVOIR

6.1 To achieve the desired BNG outcome of a +10% net gain, plus satisfying the Trading Rules within the Defra Metric[26], an off-site compensation scheme for enhancement of purple moor-grass-dominated moorland habitat is provided at Redbrook Reservoir.

6.2 The land at Redbrook Reservoir is owned and managed by the Canal & River Trust and comprises 2.01ha of species-poor purple moor-grass-dominated degraded blanket bog, currently assessed as being in Poor condition. The site is not within an SSSI/SPA/SAC notified area.

6.3 The target habitats are the enhancement of 2.01ha acid grassland to provide a more diverse sward (achieving Good condition). This will be achieved through:

- Reduction of purple moor-grass dominance by mechanical flailing over two consecutive years (avoiding the bird nesting season);
- Sowing with heather seed immediately after flailing to help establish suitable vegetation cover;
- Planting of selected moorland species after flailing to enhance the diversity of the sward, and;
- Undertaking suitable monitoring and adjusting habitat management accordingly to ensure target habitats are maintained.

Overview

6.4 The almost complete dominance of purple moor-grass over the northern and southern areas of the survey area (Areas 1 and 6 = 2.01ha) results in a low ecological value of this land. Both areas are considered suitable for enhancement towards a habitat with greater blanket bog characteristics in terms of plant species diversity.

6.5 Areas 2 to 5 are not recommended to be taken forward to enhancement as they are unsuitable for any significant areas of habitat restoration due to factors such as landform/access difficulty, non-peat substrates and/or habitats that have intrinsic value (such as heather/grass mosaics or watercourses). Some historic features also cross these areas, such as the route of a former Roman Road.

6.6 Areas 7 and 8 are on former spoil areas and associated with the Engine House Grade II Listed Building and other historic features such as Standedge Tunnel. These areas have steep slopes and unstable skeletal soils which provide suitable substrate for development of a sparse flora with a range of lichens and mosses. As such, these areas are considered unsuitable for habitat enhancement/creation proposals.

6.7 The purple moor-grass across Areas 1 and 6 creates a dense shade cover, both on the tussocks and in the space between them, resulting in a very poor vascular plant and bryophyte flora. This, in turn, reduces the value of the area for birds and other fauna. A build-up of litter typical on these vegetation types is also prone to spring and summer fires during periods of dry weather, which can damage both vegetation and peat deposits and encourage further

26 https://publications.naturalengland.org.uk/publication/5850908674228224

dominance of purple moor-grass, as this species is able to survive fires and regrow rapidly afterwards. The purple moor-grass is, therefore, creating a monoculture of low-value vegetation on a peat substrate which could support a higher value habitat. All of Areas 1 and 6 within the Trust's ownership are considered suitable for enhancement measures.

6.8 The purple moor-grass is tussocky and dense which can be a significant deterrent to stock grazing, particularly sheep. Purple moor-grass is a palatable and nutritious grass in the spring, as the new shoots appear, but is often ignored by grazing stock when there is other vegetation available and more easily accessible. This means that grazing regimes alone are typically not enough to reduce the dominance of this species and additional restoration/enhancement measures are necessary.

6.9 The proposal is that Areas 1 and 6 will be subject to restoration measures to decrease the dominance of grasses and increase the floristic biodiversity of the Site. Tracks and informal paths will be unaffected by the proposals, as will areas of known archaeological and historic interest. Areas of peat will not be significantly disturbed under the enhancement proposals (with vegetation only being removed in a suitably managed way), therefore, there is unlikely to be a need for any historic feature review beyond that contained within this report. The land is within the ownership and management control of the Trust.

6.10 Restoration and enhancement options are outlined below.

Gully/Channel Blocking

6.11 There are two artificial drains (grips) on Area 1. These are already well-vegetated and do not appear to be maintained but are likely to still increase water flow off localised areas under prolonged wet conditions of periods of heavy rainfall. Installing some low-level timber dams or plastic piling at suitable points along these drains may be appropriate to help hold more water on the Site for longer. One drain is along the boundary with the adjacent landholding and agreement with the neighbouring landowner/manager may be required.

Reduction in Grass Dominance

6.12 The aim of any restoration works on Site is to reduce the abundance and dominance of purple moor-grass (Areas 1 and 6) and other grasses such as tufted hair-grass (*Deschampsia caespitosa*, Area 2) and create a more diverse moorland habitat.

6.13 The restoration proposal has a three-point plan:

- Reduce the grass tussocks by flailing/cutting to decrease vigour;
- Alter the grazing regime to utilise cattle, if possible, or increase the sheep stocking density on this area of the moor; and
- Add additional moorland plant species to the area.

Reduction of Tussocks

6.14 The areas selected for enhancement will be flailed to decrease the vigour of the grass tussocks. The most effective way to achieve this is likely to be using a machine-mounted flail set at a height of approximately 20 to 15cm above ground level. This will cut the top off the majority of tussocks, immediately reducing their vigour. The type of flail and machine would be a decision made by a Contractor or the Trust. The Site is uneven with slopes and as such could present challenges for the use of some machinery.

6.15 Any vehicle brought onto the moorland should be fitted with suitable, low ground pressure tyres, to prevent damage to, and compaction of, the peat and vegetation. The access route to the different areas will be agreed prior to the works to minimise the potential damage to the peat.

6.16 The timing of the cut/flailing should be late summer/autumn (August to October) to avoid disturbance to nesting birds and disruption to other species which might utilise those areas. The flailed material can be left on the Site, as it rapidly breaks down and disperses naturally. It is recommended that flailing takes place in two consecutive years, with the height of cutting machinery lowered in the second year if practicable.

Grazing Regime

6.17 Cattle are the preferred grazing animal for managing purple moor-grass growth as they are less selective grazers and, therefore, take more of the coarse grass available, and their additional weight also helps disrupt/destroy the tussocks. Spring cattle grazing can be most effective at reducing purple moor-grass dominance and encouraging greater diversity. Cattle grazing may not be possible on this Site, however, due to the need to protect drinking water supplies.

6.18 Sheep grazing may also have the desired effect but, to achieve the required reduction in purple moor-grass dominance/abundance, a higher density of sheep than is currently in place would be required within the restoration area, at least initially, to check re-growth. This may prove difficult and/or time consuming to achieve. By cutting the tussocks the area will be more accessible for the existing stock. If they can be encouraged into this area by the placement of licks/supplements (if allowed in the existing stock agreement) that can have the effect of higher localised stocking levels and would have more impact on the grass regrowth.

6.19 Grazing is vital to sustain any reduction in the vigour of the purple moor-grass achieved by the flailing. The grazing of the moor is a matter for the Trust to address with the existing agreements/stock in place or to negotiate an alternative regime.

Sward Diversification

6.20 The baseline data demonstrates a very limited range of species in the areas targeted for restoration, with an average of only 2.5 species per quadrat across the dataset.

6.21 Heather seed is relatively cheap and abundant and should be added to the Site rather than heather plug plants to reduce costs. Scattering heather brash, which may be able to be obtained from adjacent moorland (when creating fire breaks etc), would also be beneficial. Bilberry (*Vaccinium myrtillus*) is present on the wider Site, and it is expected that this will be spread slowly, but naturally, by birds rather than necessitating adding plugs.

6.22 Planting plug plants of cross-leaved heath, crowberry (*Empetrum nigrum*) and occasional cowberry (*Vaccinium vitis-idaea*) would significantly diversify the dwarf shrubs on Site. Seed introduction would also be possible, but the overall success rate is likely to be lower for these species.

6.23 Hare's-tail cottongrass (*Eriophorum vaginatum*) occurs at low abundance in very localised areas. Additional plug plants should be added, expanding these patches. It would be beneficial if tussocks of this species are avoided in any cutting/flailing regime (although they can recover from cutting, albeit slowly).

6.24 *Sphagnum* plug planting is recommended, targeted on the deepest peat that are more likely to retain moisture for longer and, therefore, be capable of supporting *Sphagnum* once re-introduced. No *Sphagnum* was recorded on the Site during the baseline assessments. It is unlikely that any propagules that might arrive naturally from adjacent land would establish through the dominant purple moor-grass vegetation.

6.25 It is recommended that the plug planting is not undertaken on a grid basis, rather in an appropriate microhabitat on Site, on a microtopographic scale, i.e. *Sphagnum*, cross-leaved heath and hare's-tail cottongrass on the wetter areas and crowberry and cowberry on the drier

areas. Any plug plants should be obtained from a well-established provider, use locally native material and be suitably hardened before being planted out.

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8. ABBREVIATIONS

BMMP	Biodiversity Mitigation and Management Plan
BNG	Biodiversity Net Gain
BTO	British Trust for Ornithology
CEMP	Construction Environment Management Plan
CSM	Common Standards Monitoring
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
ES	Environmental Statement
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
MIOS	Measures in the Interests of Safety
O&M	Operation and Maintenance
PRoW	Public Rights of Way
PWMS	Precautionary Working Method Statement(s)
RSPB	Royal Society for the Protection of Birds
SAC	Special Area(s) of Conservation
SPA	Special Protection Area(s)
SSSI	Site of Special Scientific Interest

APPENDICES

APPENDIX 1

Compensatory Scheme For March Haigh Reservoir Proposed Access Track - Holme Moor (Round Hill)

COMPENSATORY SCHEME FOR MARCH HAIGH RESERVOIR PROPOSED ACCESS TRACK

RESTORATION AND ENHANCEMENT OF HABITAT AT HOLME MOOR (ROUND HILL)

1. Proposed Scope of Works

The area of Holme Moor close to Round Hill and east of Ellen Clough, is not designated as SSSI nor is it included within any SAC/SPA designations. It is within the same locality as March Haigh, being on the edge of the town of Marsden. It, therefore, offers a suitable site for compensatory measures in relation to the unavoidable impacts of the proposed access track at March Haigh Reservoir on the South Pennines Moors SAC and SPA designated features.

Purple moor-grass is dominant over wide areas at Holme Moor resulting in an impoverished vegetation and low biodiversity. Restoration and enhancement, by reducing the cover of purple moor-grass, maintaining it at a lower cover through grazing and increasing plant diversity by the addition of dwarf shrubs, cottongrass and *Sphagnum* will increase the value of the habitat.

Mixed vegetation can also significantly reduce the fire risk compared to a purple moor-grass dominated vegetation, particularly in the spring. Spring fires are especially harmful to wildlife, including ground nesting birds.

The compensation proposals focus on diversification of at least 3.5 ha of purple moor-grass dominated vegetation of the plateau areas around Round Hill – east of Ellen Clough and north of Deer Hill Conduit, part of Holme Moor. This area is identified as Area 6 within the baseline habitat and peat depth survey report (Figure 1, PAA 2023a). This includes mechanically flailing the purple-moor-grass for two consecutive years, followed by seed sowing and plug planting.

National Trust contractors and volunteers are considered best placed to undertake the works due to their familiarity and experience with the type of works. Similar works are already occurring on adjacent areas of Holme Moor.

The works will be implemented and then managed in perpetuity.

2. Intervention Description

The aim of the works is to re-establish a more diverse mixed cottongrass-dwarf shrub moorland vegetation, and this requires a number of steps:

- Flailing purple moor-grass tussocks to reduce dominance and open up the sward;
- Seeding with appropriate native seed to encourage increased plant diversity and provide vegetation cover on newly flailed areas; and
- Plug planting to introduce a wider diversity of key moorland species such as cotton grasses, dwarf shrubs and *Sphagnum* mosses.

The habitat enhancement measures to compensate for the loss of blanket bog will also increase structural diversity for moorland breeding birds such as golden plover, curlew, snipe and wheatear. The land is currently dominated by *Molinia* and the flailing and addition of *Sphagnum*, cottongrass and dwarf shrub plants will restore a habitat mosaic, in close proximity to in-bye land and adjacent open moorland habitats of Binn Moor and Deer Hill Moss.

The March Haigh scheme will also affect the designated SSSI as the SAC and SPA have a number of qualifying habitats and species that overlap with the SSSI features. In addition, some impacts on the wider breeding bird assemblage of the SSSI are also identified which includes twite. The proposed compensatory measures and post-development monitoring developed for the SAC/SPA features have been designed to also provide suitable compensation for the affected SSSI features including the breeding bird assemblage.

Purple Moor-grass Flailing

Mechanical cutting of purple moor-grass is required to break up the vegetation tussocks, to reduce the vigour of the purple moor-grass and to create space and light for other species to thrive between the tussocks.

- Flailing is to be undertaken in two consecutive years to reduce the tussock height and the vigour of the plant; and
- The areas flailed to be mapped in the field by walking the boundary of the areas.

Seeding

The purple moor-grass has been dominant for many years and the seed bank of other species in the peat is likely to be poor. Heather is present on the site as mature/degenerate plants in localised areas of very thin peat.

To prevent purple moor-grass becoming dominant again after the flailing, there needs to be additional species present that are able to compete with the grass. It is proposed that heather seed is applied across the area which has been flailed. This is not to create a heather monoculture, but to add seed which will germinate and establish to aid the development of a mixed moorland vegetation. Heather seed can germinate in

a wide range of conditions and there will be ample opportunity for heather establishment.

The quantity of seed sown will depend on the source of the seed; purchased cleaned seed, self-harvested by the National Trust with debris in the seed collection or double chopped forage harvested brash material.

The seeding rate will be a decision based on seed availability and cost.

Cross leaved-heath is a species which can be added as seed if there is sufficient seed available. This would be best sown in smaller targeted areas as the seed supply will be limited and much more expensive than heather.

Plug Planting

Additional plug planting of the following species would be advantageous:

- Cross-leaved heath (*Erica tetralix*);
- Hare's-tail cottongrass (*Eriophorum vaginatum*);
- *Sphagnum;*
- Crowberry (*Empetrum nigrum*); and
- Cowberry (*Vaccinium vitis-idaea*) (if available).

The areas for the restoration and, therefore, planting will be selected to occur on the deeper peats. The whole of the area identified is considered generally suitable for cross-leaved heath, hare's-tail cottongrass and *Sphagnum,* with a more limited role for the crowberry and cowberry which prefer slightly drier conditions (some bilberry is already present on site, associated with the localised heather areas).

The proportions and planting density will be dependent on the individual plug costs and availability.

Approximate distribution would be a ratio of 3:3:1 hare's-tail cottongrass: *Sphagnum:* cross-leaved heath. With only one tenth of the cottongrass numbers for the crowberry and cowberry.

There is likely to be some benefit in planting a number of plugs of a given species in a particular area within which the purple moor-grass tussocks are reduced further by screefing by hand at the time of planting. This creates a more bare and less shaded area for the plugs to establish. However, this has the risk of stock 'grazing out' all the plants in one area if they locate the patch so the planting should not be too dense.

Plant plug densities of 9/m^2 is proposed, however, planting location and densities are best decided on the ground after the flailing has occurred and the ground conditions are clearer.

It should be noted that bilberry is the prevalent dwarf shrub in this area. The clearance of purple moor-grass should allow more of the seed defecated by the birds to germinate and spread, and for this reason additional bilberry planting is not recommended.

3. Location Plan

The compensation works will be implemented on an area of at least 3.5ha of the purple moor-grass dominated vegetation on Holme Moor (Round Hill). Further survey in summer 2023 will delineate the areas of deeper peat and the most preferred location of the works. The exact areas to be restored will be decided in the field when the practical considerations are fully assessed on the ground but will be no less than 3.5ha. A revised plan of the areas restored after treatment will be provided.

4. Maintenance

Maintenance of the vegetation will be through grazing and trampling by stock with grazing restricted to the spring, summer and autumn. It is important to graze the area as hard as possible in the early spring prior to planting the plugs to reduce the vigour of the remaining purple moor-grass tussocks.

Cattle grazing is best to control the purple moor-grass, but it is recognised that this site is currently grazed by sheep which should fulfil a similar function of grazing new grass re-growth after flailing. Stocking levels (currently 100 to 140 ewes between 1st April to 31st October) will need to be compatible with the restoration objectives.

Grazing levels should be carefully monitored to understand the impact on the purple moor-grass and the planted plugs. The effects of grazing will be monitored in accordance with the criteria in Section 6 'Monitoring and Evaluation' and grazing regime adjusted as far as reasonably practicable (being subject to approval by the relevant parties).

5. Programme

September/early October 2023 – First mechanical flailing of purple moor-grass, after the bird breeding season and the peak fire risk season. Vehicles used for the machine mounted flail to be fitted with low ground pressure tyres, and route carefully chosen over firmer ground.

September/early October 2024 – Second mechanical flailing of purple moor-grass

October/November 2024 to March 2025 – Heather seeding and, if available, cross-leaved heath seeding. Plug planting of all species and hand removal of purple moor-grass tussocks as required.

6. Monitoring and Evaluation

Post Enhancement Monitoring Programme

The success of the interventions will be monitored in Years 1 and 3 following the addition of the plug plants.

Year 0 = March 2025 (all enhancement measures completed)

Year 1 = March 2026

Year 3 = March 2028

It is expected that by Year 3 of monitoring (2028) the desired plant species will be successfully establishing. Monitoring will be continued at Year 5 (2030) and every 3 years thereafter unless an alternative frequency of monitoring is agreed.

Should the criteria not be met, further intervention, to be agreed with the relevant parties, will be undertaken to fulfil the restoration objectives.

Assessment of Success

The peat depth on the Holme Moor (Round Hill) compensation area is variable, with some areas supporting less than 40cm peat (i.e. shallow peat) as established by the baseline habitat and peat depth survey report (PAA 2023a).

Two measures will be used to assess success/failure of the vegetation changes on the site, and both must be fulfilled.

Measure 1: Assessment guided by Moors for the Future's (MFF) '*Blanket bog Decision Making Toolkit*.' The restoration principle is to move from a grass/sedge dominated vegetation (equivalent to State 4) to a mixed vegetation, with frequent to locally abundant *Sphagnum* on the deeper peat areas (equivalent to State 5).

- The interim monitoring should indicate that the restoration is on a trajectory to be compatible with the restoration objectives, as assessed by an appropriately experienced Ecologist; and

- That 3.5ha have been restored from a grass vegetation to a mixed cottongrass/dwarf shrub vegetation (similar to State 5 blanket bog vegetation) by March 2056.

Measure 2: Assessment based on JNCC's CSM for Blanket Bog.

- Assessment against the CSM criteria for Blanket Bog (pp.44-47 of CSM Guidance for Upland Habitats 2009) with the following variations, and noting that peat depth across the site is and will remain variable, with significant areas supporting less than 40cm peat;
- Frequency of Indicator Species – at least four (not six) indicator species present at $4m^2$ scale;
- Cover of Indicator Species – on a trajectory for at least 35% (not 50%) of vegetation cover consisting of at least three indicator species at $4m^2$ scale by no later than 2054; and
- Cover of Other Species – in addition to existing criteria, the site should be on a trajectory for less than 65% of vegetation cover to consist of purple moor-grass by no later than 2054.

Repeat of Baseline Surveys

The vegetation quadrats collected as part of the baseline habitat survey (PAA 2023a) will be repeated in Year 5 (2030). Ten 2m x 2m quadrats will be taken across the areas that have received the enhancement measures to record in more details any changes in vegetation composition.

The baseline breeding bird survey (PAA 2023b) will be repeated across the entire area in Year 1 (2026), Year 3 (2028) and Year 5 (2030) after enhancement measures, to assess any changes in the breeding bird assemblage.

Reports will be provided to the LPA after each monitoring period and include an assessment of the change over time in vegetation composition and breeding bird assemblage and an assessment of the effects of the enhancement measures on this.

7. Management and Maintenance

Management and maintenance will occur in perpetuity with a walkover and subsequent report conducted in Year 1 (2025) and then every three years to assess the general integrity of the site, observations on management and condition of habitats as assessed against the set monitoring targets.

The management and maintenance will be undertaken in accordance with recommendations arising from monitoring including any failures against the targets

set. This may trigger the need for further intervention (to be agreed) so that the agreed compensatory habitat is delivered and maintained on the site.

8. Force Majeure

There will be no requirement to restore the compensatory habitat if it is destroyed or damaged due to any direction of government, pandemic, flood, fire, bomb or unexploded ordnance. In such circumstances a revised monitoring, management and maintenance process will be agreed with the appropriate parties.

9. References

PAA 2023a. *Holme Moor (Round Hill). Baseline habitat and peat depth survey*. Unpublished report to Canal & River Trust.

PAA 2023b. *Holme Moor (Round Hill). Baseline breeding bird survey*. Unpublished report to Canal & River Trust.

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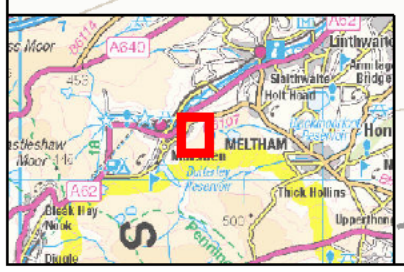

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Central Meridian: -2.000000
Scale Factor: 0.999601
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Metres

0 20 40 80 120

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Canal & River Trust
Making life better by water

Penny Anderson Associates Ltd
Consultant Ecologists

Penny Anderson Associates Ltd,
Parklea, 60 Park Road,
Buxton, Derbyshire SK17 6SN.

Legend

- Habitat survey area
- Habitat areas (1-6)
- Quadrat locations
- Target Note
- Track/footpath

Title

Holme Moor Habitats

Project	March Haigh Reservoir	
Scale	1:3,400	Drawing No. Figure 1
Drawn By CC	Originator SRS	Date 14/06/2023
PAA Ref.		Revision A

G:\CART02_March_Haigh\Maps\CART02_4_Compensation\Holme_Moor_Habitats\Figure 1 - Holme Moor Habitats - CART02-4 CC 230613.mxd

APPENDIX 2

Compensatory Scheme for March Haigh Reservoir Access Track – Land at Redbrook Reservoir (North)

COMPENSATORY SCHEME FOR MARCH HAIGH RESERVOIR PROPOSED ACCESS TRACK

RESTORATION AND ENHANCEMENT OF HABITAT AT REDBROOK RESERVOIR (NORTH)

1. Proposed Scope of Works

The area of land at Redbrook Reservoir (North), north-east of the A69, is not designated as SSSI, nor is it included within any Special Area of Conservation/ Special Protection Area (SAC/SPA) designations. It is within the same locality as March Haigh, being on the edge of the town of Marsden and set within the wider moorland environment. It, therefore, offers a suitable off-site compensation area for Biodiversity New Gain (BNG) in relation to the proposed access track at March Haigh Reservoir on the South Pennines Moors SAC and SPA designated features. The inclusion of the off-site compensation area enable to scheme to meet the desired +10% net gain in overall biodiversity, as measured using Metric 3.1.

Purple moor-grass is dominant over the off-site compensation land at Redbrook Reservoir (North) resulting in an impoverished vegetation and low biodiversity. Restoration and enhancement, by reducing the cover of purple moor-grass, maintaining it at a lower cover through grazing and increasing plant diversity by the addition of dwarf shrubs, cottongrass and *Sphagnum* will increase the value of the habitat.

A mixed vegetation can also significantly reduce the fire risk compared to a purple moor-grass dominated vegetation, particularly in the spring. Spring fires are especially harmful to wildlife including ground nesting birds.

The compensation proposals focus on diversification of 2.01 ha of purple moor-grass dominated vegetation of the plateau areas around Redbrook Reservoir (North), part of the wider Close Moor massif. This locations for the enhancement measures are identified as Areas 1 and 6 within the baseline habitat and peat depth survey report (Figure 1, PAA 2023). The measures comprise mechanically flailing the purple-moor-grass for two consecutive years, followed by seed sowing and plug planting to enhance the moorland plant species diversity.

The works will be implemented and then managed for 30 years.

2. Intervention Description

The aim of the works is to re-establish a more diverse mixed cottongrass-dwarf shrub moorland vegetation, and this requires a number of steps:

- Flailing purple moor-grass tussocks to reduce dominance and open up the sward;
- Seeding with appropriate native seed to encourage increased plant diversity and provide vegetation cover on newly flailed areas; and
- Plug planting to introduce a wider diversity of key moorland species such as cottongrasses, dwarf shrubs and *Sphagnum* mosses.

The habitat enhancement measures will also increase structural diversity for moorland breeding birds such as golden plover, curlew, snipe and wheatear. The land is currently dominated by *Molinia* and the flailing and addition of *Sphagnum*, cottongrass and dwarf shrub plants will restore a habitat mosaic in close proximity to in-bye land and adjacent open moorland habitats Close Moss.

Purple moor-grass flailing

Mechanical cutting of purple-moor-grass is required to break up the vegetation tussocks, to reduce the vigour of the purple moor-grass and to create space and light for other species to thrive between the tussocks.

- Flailing is to be undertaken in two consecutive years to reduce the tussock height and the vigour of the plant.

Seeding

The purple moor-grass has been dominant for many years and the seed bank of other species in the peat is likely to be poor. Heather is present on the site as mature/degenerate plants in localised areas of very thin peat.

To prevent purple moor-grass becoming dominant again after the flailing there needs to be additional species present that are able to compete with the grass. Heather seed will be applied across the area which has been flailed to aid the development of a mixed moorland vegetation. Heather seed can germinate in a wide range of conditions and there will be ample opportunity for heather establishment.

The quantity of seed sown will depend on the source of the seed; purchased cleaned seed, self-harvested locally with debris in the seed collection or double chopped forage harvested brash material.

The seeding rate will be a decision based on seed availability and cost.

Cross leaved-heath is a species which can be added as seed if there is sufficient seed available. This would be best sown in smaller targeted areas as the seed supply will be limited and much more expensive than heather.

Plug planting

Additional plug planting of the following species would be advantageous:

- Cross-leaved heath;
- Hare's-tail cottongrass;
- Sphagnum;
- Crowberry; and
- Cowberry (if available).

The areas for the restoration and, therefore, planting will be selected to occur on the deeper peats. The whole of the area identified is considered generally suitable for cross-leaved heath, hare's-tail cottongrass and *Sphagnum* with a more limited role for the crowberry and cowberry which prefer slightly drier conditions (some bilberry is already present on site, associated with the localised heather areas).

The proportions and planting density will be dependent on the individual plug costs and availability.

Approximate distribution would be a ratio of 3:3:1 hare's-tail cottongrass: *Sphagnum:* cross-leaved heath. With only one tenth of the cottongrass numbers for the crowberry and cowberry.

Plant plug densities of 9/m^2 is proposed, however, planting location and densities will be decided on the ground after the flailing has occurred and the ground conditions are clearer.

It should be noted that bilberry is the prevalent dwarf shrub in this area. The clearance of purple moor-grass should allow more of the seed brought in by the birds to germinate and spread, and for this reason additional bilberry planting is not included.

3. Location Plan

The compensation works will be implemented on 2.01ha of the purple moor-grass dominated vegetation on Areas 1 and 6 of land at Redbrook Reservoir (North).

4. Maintenance

Maintenance of the vegetation will be through grazing and trampling by stock with grazing restricted to the spring, summer and autumn. It is important to graze the area

as hard as possible in the early spring prior to planting the plugs to reduce the vigour of the remaining purple moor-grass tussocks.

Grazing levels should be carefully monitored to understand the impact on the purple moor-grass and the planted plugs. The effects of grazing will be monitored in accordance with the criteria in Section 6 'Monitoring and Evaluation' and grazing regime adjusted as far as reasonably practicable (being subject to approval by the relevant parties).

5. Programme

September/early October 2024 – First mechanical flailing of purple moor-grass, after the bird breeding season and the peak fire risk season. Vehicles used for the machine mounted flail to be fitted with low ground pressure tyres, and route carefully chosen over firmer ground.

September/early October 2025 – Second mechanical flailing of purple moor-grass

October/November 2025 to March 2026 – Heather seeding and, if available, cross-leaved heath seeding. Plug planting of all species and hand removal of purple moor-grass tussocks as required.

6. Monitoring and Evaluation

Post Enhancement Monitoring Programme

The success of the interventions will be monitored in Years 1 and 3 following the addition of the plug plants.

Year 0 = March 2026 (all enhancement measures completed)

Year 1 = March 2027

Year 3 = March 2029

It is expected that by Year 3 of monitoring (2029) the desired plant species will be successfully establishing. Monitoring will be repeated in Year 5 (2031) and continued every 5 years thereafter, unless an alternative frequency of monitoring is agreed.

Should the criteria not be met, further intervention, to be agreed with the relevant parties, will be undertaken to fulfil the restoration objectives.

Assessment of Success

Two measures will be used to assess success/failure of the vegetation changes on the site, and both must be fulfilled.

Measure 1: Assessment guided by Moors for the Future's (MFF) 'Blanket bog Decision Making Toolkit.' The restoration principle is to move from a grass/sedge dominated vegetation (equivalent to State 4) to a mixed vegetation, with frequent to locally abundant *Sphagnum* on the deeper peat areas (equivalent to State 5).

- The interim monitoring should indicate that the restoration is on a trajectory to be compatible with the restoration objectives, as assessed by an appropriately experienced ecologist.
- That 2.01ha have been restored from a grass vegetation to a mixed cottongrass/dwarf shrub vegetation (similar to State 5 blanket bog vegetation) by March 2056.

Measure 2: Assessment based on JNCC's Common Standards Monitoring (CSM) for Blanket Bog.

- Assessment against the CSM criteria for Blanket Bog (pp.44-47 of CSM Guidance for Upland Habitats 2009) with the following variations, and noting that peat depth across the site is and will remain variable, with significant areas supporting less than 40cm peat:
- Frequency of Indicator Species – at least 4 (not 6) indicator species present at $4m^2$ scale;
- Cover of Indicator Species – on a trajectory for at least 35% (not 50%) of vegetation cover consisting of at least 3 indicator species at $4m^2$ scale by no later than 2054; and
- Cover of Other Species – in addition to existing criteria, the site should be on a trajectory for less than 65% of vegetation cover to consist of purple moor-grass by no later than 2054.

Repeat of Baseline Survey

The vegetation quadrats collected as part of the baseline habitat survey (PAA 2023a) will be repeated in Year 5 (2031). Ten 2m x 2m quadrats will be taken across the areas that have received the enhancement measures to record in more details any changes in vegetation composition.

Reports will be provided to the Local Planning Authority (LPA) after each monitoring period and include an assessment of the change over time in vegetation composition and an assessment of the effects of the enhancement measures on this.

7. Management and Maintenance

Management and maintenance will occur with a walkover and subsequent report conducted in Year 1 (2027) and then every 3 years to assess the general integrity of the site, observations on management and condition of habitats as assessed against the set monitoring targets.

The management and maintenance will be undertaken in accordance with recommendations arising from monitoring including any failures against the targets set. This may trigger the need for further intervention (to be agreed) so that the agreed compensatory habitat is delivered and maintained on the site.

8. Force Majeure

There will be no requirement to restore the compensatory habitat if it is destroyed or damaged due to any direction of government, pandemic, flood, fire, bomb or unexploded ordnance. In such circumstances a revised monitoring, management and maintenance process will be agreed with the appropriate parties.

9. Reference

PAA 2023. *Redbrook Reservoir (North). Baseline habitat and peat depth survey*. Unpublished report to Canal & River Trust.

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A62

MANCHESTER ROAD

Building B1

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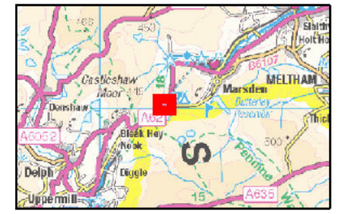

Legend

- Habitat survey area
- Habitat areas (1-8)
- Quadrat locations
- Track/footpath

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British National Grid
Projection: Transverse Mercator
False Easting: 400000.000000
False Northing: -100000.000000
Central Meridian: -2.000000
Scale Factor: 0.999601
Latitude Of Origin: 49.000000

ISO A3

Metres

0 10 20 40 60

Canal & River Trust
Making life better by water

Penny Anderson Associates Ltd
Consultant Ecologists

Penny Anderson Associates Ltd,
Parklea, 60 Park Road,
Buxton, Derbyshire, SK17 6SN.
Telephone 01298 27086

Project Name: March Haigh Reservoir

Discipline: Ecology

Title:

Redbrook Reservoir Habitat Areas

Scale	1:1,800	Drawing No.	Figure 1
Drawn By	CC	Originator	SRS
Date	19/06/2023		
Grid Ref.	402,609 410,153	Revision	1.0

G:\CART02_March_Haigh\Maps\CART02_4_Compensation\Redbrook_Habitats\Figure 1 - Habitat Areas Redbrook Reservoir - CART02-4 CC 230619.mxd

APPENDIX 3

Schedule for Post-Construction Biodiversity Monitoring

Appendix 3 Schedule for Post Construction Biodiversity Monitoring

NB March Haigh Construction period due to end 28/02/2024
NB Holme Moor (Round Hill) compensation measures to be applied Sept 2023 - March 2025 as
NB Redbrook Reservoir (North) compensation measures to be applied Sept 2024 - March 2026

Location	Item	2024												2025												2026													
		Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*
March Haigh	Survey of restored s te compound area - target habitat is upland acid grassland plus additional plant species for Twite foraging. Use methodology presented in Section 4 of BMMP. Assess against targets for CSM Guidance for Upland Hab tats (JNCC 2009) plus additional Twite plant species frequent in the sward. Undertake in 2024 and 2026.																																					
	Survey of restored acid grassland along track edges - target habitat is upland acid grassland plus additional plant species for Twite foraging. Use methodology identified in BMMP. Assess against targets for CSM Guidance for Upland Hab tats (JNCC 2009) plus additional Twite plant species preent in the sward. Undertake in 2024 and 2026.																																					
	Breeding Bird Survey - repeat of baseline survey methodology across s te. Undertake in 2024, 2025, 2026 and 2028 and thereafter repeat every three years.																																					
	Reporting - inluding any recommendations for management actions.																																					
Holme Moor (Round Hill)	Ongoing restoration measures over two winter seasons (September/October 2023 and September 2024 to March 2025).																																					
	Vegetation monitoring - wa kover assessment. Assess against modified CSM targets for Blanket Bog Habitats as per written compensation scheme. Undertake in 2026, 2028 and 2030, and thereafter **repeat every three years**.																																					
	Vegetation monitoring - repeat of baseline quadrat survey. **Undertake in 2030**.																																					
	Breeding Bird Survey - repeat of baseline survey methodology across s te. Undertake in 2026 2028 and 2030.																																					
	Reporting - inluding any recommendations for management actions.																																					
Redbrook Reservoir (North)	Ongoing restoration measures over two winter seasons (September/October 2024 and September 2025 to March 2026).																																					
	Vegetation monitoring - wa kover assessment. Assess against modified CSM targets for Blanket Bog Habitats as per written compensation scheme. Undertake in 2027, 2029 and 2031, and thereafter **repeat every five years**.																																					
	Vegetation monitoring - repeat of baseline quadrat survey. **Undertake in 2031**.																																					
	Reporting - inluding any recommendations for management actions.																																					

Appendix 3 Schedule for Post Construction Biodiversity Monitoring

NB March Haigh Construction period due to end 28/02/2024
NB Holme Moor (Round Hill) compensation measures to be applied Sept 2023 - March 2025 as
NB Redbrook Reservoir (North) compensation measures to be applied Sept 2024 - March 2026

Location	Item	2027										2028												2029															
		Mar	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*
March Haigh	Survey of restored s te compound area - target habitat is upland acid grassland plus additional plant species for Twite foraging. Use methodology presented in Section 4 of BMMP. Assess against targets for CSM Guidance for Upland Hab tats (JNCC 2009) plus additional Twite plant species frequent in the sward. Undertake in 2024 and 2026.																																					
	Survey of restored acid grassland along track edges - target habitat is upland acid grassland plus additional plant species for Twite foraging. Use methodology identified in BMMP. Assess against targets for CSM Guidance for Upland Hab tats (JNCC 2009) plus additional Twite plant species preent in the sward. Undertake in 2024 and 2026.																																					
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	Reporting - inluding any recommendations for management actions.																																						
Holme Moor (Round Hill)	Ongoing restoration measures over two winter seasons (September/October 2023 and September 2024 to March 2025).																																						
	Vegetation monitoring - wa kover assessment. Assess against modified CSM targets for Blanket Bog Habitats as per written compensation scheme. Undertake in 2026, 2028 and 2030, and thereafter **repeat every three years**.																																						
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	Breeding Bird Survey - repeat of baseline survey methodology across s te. Undertake in 2026 2028 and 2030.																																						
	Reporting - inluding any recommendations for management actions.																																						
Redbrook Reservoir (North)	Ongoing restoration measures over two winter seasons (September/October 2024 and September 2025 to March 2026).																																						
	Vegetation monitoring - wa kover assessment. Assess against modified CSM targets for Blanket Bog Habitats as per written compensation scheme. Undertake in 2027, 2029 and 2031, and thereafter **repeat every five years**.																																						
	Vegetation monitoring - repeat of baseline quadrat survey. **Undertake in 2031**.																																						
	Reporting - inluding any recommendations for management actions.																																						

Appendix 3 Schedule for Post Construction Biodiversity Monitoring

NB March Haigh Construction period due to end 28/02/2024
NB Holme Moor (Round Hill) compensation measures to be applied Sept 2023 - March 2025 as
NB Redbrook Reservoir (North) compensation measures to be applied Sept 2024 - March 2026

Location	Item	2030								2031											
		May	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
March Haigh	Survey of restored s te compound area - target habitat is upland acid grassland plus additional plant species for Twite foraging. Use methodology presented in Section 4 of BMMP. Assess against targets for CSM Guidance for Upland Hab tats (JNCC 2009) plus additional Twite plant species frequent in the sward. Undertake in 2024 and 2026.																				
	Survey of restored acid grassland along track edges - target habitat is upland acid grassland plus additional plant species for Twite foraging. Use methodology identified in BMMP. Assess against targets for CSM Guidance for Upland Hab tats (JNCC 2009) plus additional Twite plant species preent in the sward. Undertake in 2024 and 2026.																				
	Breeding Bird Survey - repeat of baseline survey methodology across s te. Undertake in 2024, 2025, 2026 and 2028 and thereafter repeat every three years.																				
	Reporting - inluding any recommendations for management actions.																				
Holme Moor (Round Hill)	Ongoing restoration measures over two winter seasons (September/October 2023 and September 2024 to March 2025).																				
	Vegetation monitoring - wa kover assessment. Assess against modified CSM targets for Blanket Bog Habitats as per written compensation scheme. Undertake in 2026, 2028 and 2030, and thereafter **repeat every three years**.																				
	Vegetation monitoring - repeat of baseline quadrat survey. **Undertake in 2030**.																				
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	Reporting - inluding any recommendations for management actions.																				
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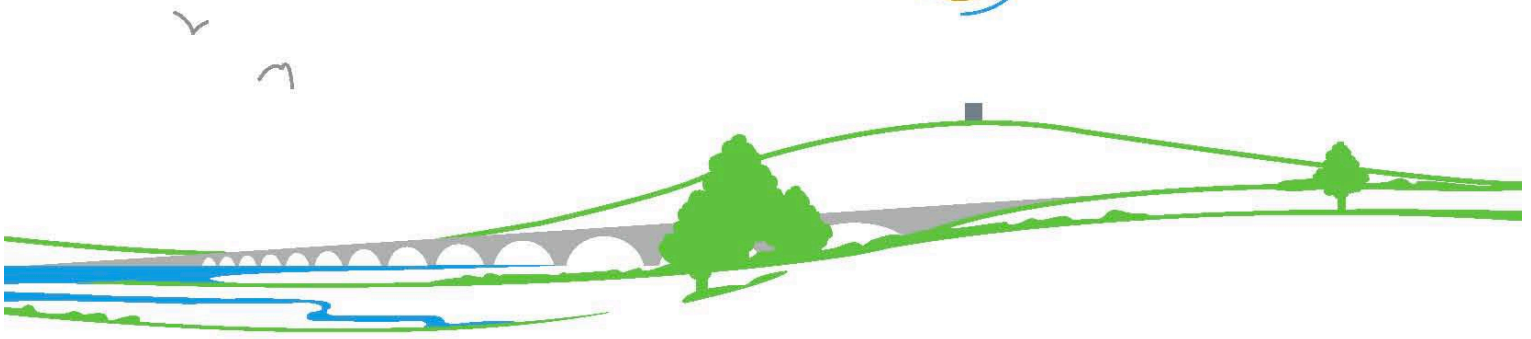
	Vegetation monitoring - repeat of baseline quadrat survey. **Undertake in 2031**.																				
	Reporting - inluding any recommendations for management actions.																				

Penny Anderson Associates Ltd

CONSULTANT ECOLOGISTS



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