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

SHADOW HABITAT REGULATIONS ASSESSMENT

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SHADOW HABITAT REGULATIONS ASSESSMENT

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

Signed:_____

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1. INTRODUCTION

Purpose of the Report

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 'Proposed 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 a number of 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 This shadow Habitat Regulation Assessment[2] relates primarily to the proposed permanent access track installation. It also considers the potential in-combination effects of the access track with the subsequent works in the interests of safety and other works at March Haigh Reservoir.

1.4 The proposed 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.

1.5 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 only is proposed along this section, to provide protection of the dam embankment from grazing cattle on the wider moorland.

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

1.7 The Site falls within the South Pennine Moors Site of Special Scientific Interest[3], as well as forming part of the South Pennine Moors Special Area for Conservation[4] and South Pennine Moors Phase 2 Special Protection Area[5] (see Figure 1).

1.8 Under the Conservation (Natural Habitats etc.) Regulations 2017 (as amended) any development that has the potential to result in a Likely Significant Effect[6] on a European site and is not directly connected with the management of the Site for nature conservation reasons, must be subject to a Habitat Regulation Assessment[7]. In this case, by virtue of the Proposed Development being partially located within the South Pennine Moors SAC and South Pennine Moors Phase 2 SPA, there will be a LSE on the qualifying features of these European Sites. An 'appropriate assessment' is required to assess the potential effects of the Proposed

[1] *MIOS*

[2] *HRA*

[3] *SSSI*

[4] *SAC*

[5] *SPA*

[6] *LSE*

[7] *HRA*

Development on the integrity of the South Pennine Moors SAC and South Pennine Moors Phase 2 SPA.

1.9 The purpose of this report is to set out the information needed to enable Kirklees Council, as competent authority, to undertake an 'appropriate assessment'.

1.10 It should be noted that the effects of the Proposed Development on the South Pennine Moors SSSI (unless where these are also qualifying features of the European Sites) and other, non-designated, ecological features are addressed in a separate Environmental Statement[8] which accompanies the planning application for the proposed access track installation.

1.11 This report has been produced by Penny Anderson Associates Ltd[9] to accompany the planning application prepared by the Trust and contains the following information:

- Details of the European Sites and their qualifying features (Chapter 2);
- Consideration of alternatives to the proposed track including 'do-nothing', decommissioning of the reservoir(s), alternative routes, construction methodology and programme (Chapter 3);
- A description of the selected route including habitat descriptions for each section of the route (Chapter 4);
- A summary of the results of a breeding bird survey undertaken in spring 2021 with particular reference to the SPA qualifying species (Chapter 5);
- A description of the possible direct and indirect effects on the qualifying features of the European Sites (Chapter 6);
- Proposed mitigation measures, compensation strategy and monitoring to address effects on the integrity of the European Sites (Chapter 7); and
- Concluding statement on the assessment of LSE, effects on integrity of European Sites and consideration of Imperative Reasons of Over-riding Public Interest[10] (Chapter 8).

1.12 In relation to the Site and its characteristics, and in consultation with Kirklees Council and Natural England[11], the key features that are addressed in this report are the vegetation/habitats and botany, the breeding bird assemblage and the hydrology of the peat resource (as it is fundamental to its quality). The report sets out this information as far as it is needed to understand the potential effects on the qualifying features of the European Sites.

1.13 Detailed baseline survey results which have been used to inform this assessment are as follows:

- Breeding Bird Survey Report (PAA 2022a);
- Phase 1 Habitat survey and National Vegetation Classification[12] Report (PAA 2022b); and
- Hydrology and Peat Report (PAA 2022c).

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[8] ES

[9] PAA

[10] IROPI

[11] NE

[12] NVC

2. THE EUROPEAN SITES AND QUALIFYING FEATURES

South Pennine Moors Special Area of Conservation

2.1 The following Annex I habitats are a primary reason for selection of the South Pennine Moors SAC:

- 4030 European Dry Heaths - The habitats within the South Pennine Moors SAC is representative of upland dry heath at the southern end of the Pennine range, the habitat's most south-easterly upland location in the UK. Dry heath covers extensive areas, occupies the lower slopes of the moors on mineral soils or where peat is thin, and occurs in transitions to acid grassland, wet heath and 7130 blanket bogs. The upland heath of the South Pennines is strongly dominated by heather (*Calluna vulgaris*[13]). Its main NVC types are H9 *Calluna vulgaris – Deschampsia flexuosa* heath and H12 *Calluna vulgaris – Vaccinium myrtillus* heath. More rarely H8 *Calluna vulgaris – Ulex gallii* heath and *H10 Calluna vulgaris – Erica cinerea* heath are found. On the higher, more exposed ground H18 *Vaccinium myrtillus – Deschampsia flexuosa* heath becomes more prominent. In the cloughs, or valleys, which extend into the heather moorlands, a greater mix of dwarf shrubs can be found, together with more lichens and mosses. The moors support a rich invertebrate fauna, especially moths, and important bird assemblages;
- 7130 Blanket Bogs (*if active bog) Priority feature - This habitat represents blanket bog in the south Pennines, the most south-easterly occurrence of the habitat in Europe. The bog vegetation communities are botanically poor. Hare's-tail cottongrass (*Eriophorum vaginatum*) is often overwhelmingly dominant and the usual bog-building *Sphagnum* mosses are scarce. Where the blanket peats are slightly drier, heather, crowberry (*Empetrum nigrum*) and bilberry (*Vaccinium myrtillus*) become more prominent. The uncommon cloudberry (*Rubus chamaemorus)* is locally abundant in bog vegetation. Bog pools provide diversity and are often characterised by common cottongrass (*Eriophorum angustifolium)*. Substantial areas of the bog surface are eroding, and there are extensive areas of bare peat. In some areas erosion may be a natural process reflecting the great age (9000 years) of the south Pennine peats; and
- 91A0 Old sessile oak (*Quercus petraea*) woods with *Ilex* and *Blechnum* in the British Isles - Around the fringes of the upland heath and bog of the south Pennines are blocks of old sessile oak woods, usually on slopes. These tend to be dryer than those further north and west, such that the bryophyte communities are less developed (although this lowered diversity may in some instances have been exaggerated by the effects of 19th century air pollution). Other components of the ground flora such as grasses, dwarf shrubs and ferns are common. Small areas of alder (*Alnus glutinosa*) woodland along stream-sides add to the overall richness of the woods.

2.2 The following Annex I habitats are present within the South Pennine Moors SAC as a qualifying feature, but not a primary reason for selection:

- 4010 Northern Atlantic wet heaths with *Erica tetralix*; and
- 7140 Transition mires and quaking bogs.

2.3 Of the qualifying features listed above, the only habitat which is impacted by the Proposed Development is the blanket bog feature. A summary of the habitat condition for the SSSI units at this location (and within which the selected route is located) is given in Table 1. Figure 2 shows the location of the SSSI units within which the selected route is located.

[13] *Botanical species names follow Stace (2019).*

2.4 All of the SSSI units were in Unfavourable - Recovering condition at the date of the most recent assessment.

Table 1 Summary of Site of Special Scientific Interest Unit Condition Assessment

SSSI	Date of Most Recent Condition Assessment	Status	Summary of Most Recent Condition Assessment
141	12/3/2015	Unfavourable - Recovering	Blanket bog surveyed; a large area of the unit consists of *Molinia*[14] on shallow peat and bracken, these features were not assessed. Blanket bog is undergoing restoration by Moors for the Future on the northern section of the unit above the road, these works have reduced bare peat and the nursery grasses have taken well. Dams and coir logs are working well to slow the flow of water and re-wet the bog. Restoration work needs ongoing monitoring to determine success.
142	14/10/2009	Unfavourable - Recovering	The grazing levels have been reduced through the Environmentally Sensitive Area agreement and the unit is no longer overgrazed. Treatment of *Molinia* has been agreed with the National Trust beginning with trial plots.
149	12/3/2015	Unfavourable - Recovering	Unit is predominantly made up of March Haigh Reservoir. Area of land around the reservoir is contiguous with Marsden Moor Common which is under Higher Level Stewardship - associated management should move this unit towards Recovering condition.

South Pennine Moors Phase 2 Special Protection Area

2.5 The South Pennine Moors Phase 2 SPA qualifies under article 4.1 of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain population of a species listed in Annex I, in any season:

- Merlin[15] (*Falco columbarius*) 28 breeding pairs in period 1990/1998 (4.3% of British population);
- Golden plover (*Pluvialis apricaria*) 292 breeding pairs in period 1990/1998 (1.2% of British population)

2.6 The site also qualifies under article 4.2 by supporting a diverse assemblage of breeding migratory birds or moorland and moorland fringe habitats, comprising: golden plover, lapwing (Vanellus vanellus), dunlin (Calidris alpina), snipe (Gallinago gallinago), curlew (Numenius arquata), redshank (Tringa totanus), common sandpiper (Actitis hypoleucos), short-eared owl (Asio flammeus), whinchat (Saxicola rubetra), wheatear (Oenanthe Oenanthe), ring ouzel (Turdus torquatus) and twite (Carduelis flavirostris).

2.7 A summary of the 2021 breeding bird survey results is given in Chapter 5 of this report. The only SPA-qualifying species under article 4.1 recorded during the survey is golden plover, however, the Site and wider area is considered to provide functional habitat for both golden

[14] *Moor-grass species*

[15] *Bird species names follow British Ornithologists' Union (2017)*

plover and merlin. Six of the species listed under article 4.2 (an internationally important breeding bird assemblage) are recorded within approx. 100m the Site during the 2021 surveys, namely common sandpiper, dunlin, golden plover, snipe, curlew and wheatear. Impacts on other non-qualifying bird species are addressed in detail in the Ecology Chapter of the ES.

3. SUMMARY OF ALTERNATIVES

Consideration of Alternatives

3.1 The Trust is legally required to provide a permanent access track to March Haigh Reservoir as it is required as a MIOS under Section 10 of The Reservoirs Act.

3.2 In order to operate March Haigh Reservoir, there is no legal alternative to the construction of a permanent access track. A permanent access track is considered by the Defra-appointed Inspecting Engineer to be an essential requirement to ensure the safety of the reservoir, and to enable the further 24 safety-critical works to be undertaken. A MIOS is a legally binding obligation; failure to provide the track is a criminal offence. Therefore, the only potential alternatives to be considered are:

- An alternative choice of route for the access track; or
- Reservoir discontinuance, if this were to be approved by the Environment Agency as the regulator, and all other necessary approvals were in place to enable works to be completed prior to the February 2024 MIOS deadline.

Do-Nothing

3.3 To 'do-nothing' would result in a failure to meet the legal requirement for the Applicant to have carried out these MIOS by February 2024.

Alternative Routes

3.4 A thorough assessment of alternative routes was completed for the temporary track constructed in 1999 and the proposed permanent track will largely follow the same alignment. The appropriateness of this route was considered in the assessment of the planning application for that temporary track. It was acknowledged in the planning assessment for the temporary track that the alternative routes would require longer tracks and the crossing of blanket bog areas adjacent to steep ravines. There are, therefore, no alternative routes which would provide appropriate access for the required vehicles and equipment needed during an emergency or for maintenance. Using the same alignment as the temporary track reduces the need to construct on undisturbed land.

Reservoir Discontinuance

3.5 If the reservoir was discontinued and drained, with the dam removed so that no substantive residual risk remained, this would preclude the practical need for a permanent access track. It should be noted that a substantial temporary access track would be required to facilitate the significant physical works associated with discontinuance. The Applicant has reviewed the need for March Haigh Reservoir and the high-level issues around discontinuance. The conclusion of this work is that discontinuance of the reservoir is not considered to be a viable or desirable alternative, for reasons explained in detail in Section 5.1.2. of the separate justification document (Canal & River Trust 2023) that accompanies the planning application.

Alternative Methods if the Track Were not a MIOS Requirement

3.6 Prior to the access track becoming a legal requirement, the Applicant investigated alternative options for access for maintenance works at the reservoir, all of which had been discounted as not feasible. None of these previously explored options are now available to the Canal & River Trust as an alternative way of overcoming the safety issues that have been identified.

3.7 Pursuant to the Section 10 report, the Trust is under a strict legal obligation to provide a permanent access track. The options considered, but no longer available, were:

- Use of low ground pressure all-terrain vehicles;

- Helicopter access; and
- Temporary access track for the planned major civil engineering works.

Required for Use of Low Ground Pressure All-Terrain Vehicles

3.8 Regular use of alternative vehicles such as a Hagglund/Softrack, would form informal, irregular tracks and impact on the moorland habitats, with informal tracks likely to evolve and widen over time in an unmanaged way as vehicles sought to avoid ruts and damaged areas, thereby likely causing greater damage over the long term than a well-designed access track. All-terrain vehicles do not satisfy all access requirements, nor can they carry the pumps and plant required to provide maintenance or emergency access.

Helicopter Access

3.9 It would not be possible to utilise helicopters in poor weather when access would be more likely to be required in an emergency. Helicopters have insufficient load capacity for the equipment required. In addition, the altitude and location of the reservoir can mean that helicopter access is prevented by wind or cloud and cannot be relied upon as the primary means of emergency response. The method is also not feasible for the regular small-scale maintenance that is necessary and does not resolve safety concerns with the surveillance visits require two times per week, as a minimum. It is also worth noting that the landing area required would need to be large and be sited within the SAC/SPA, which in itself may require work requiring a planning application, and/or an HRA. In addition, equipment required for use in an emergency would still need to be bought in by road, with helicopters being used to transport sandbags only, so this would not be acceptable from a reservoir safety emergency planning point of view.

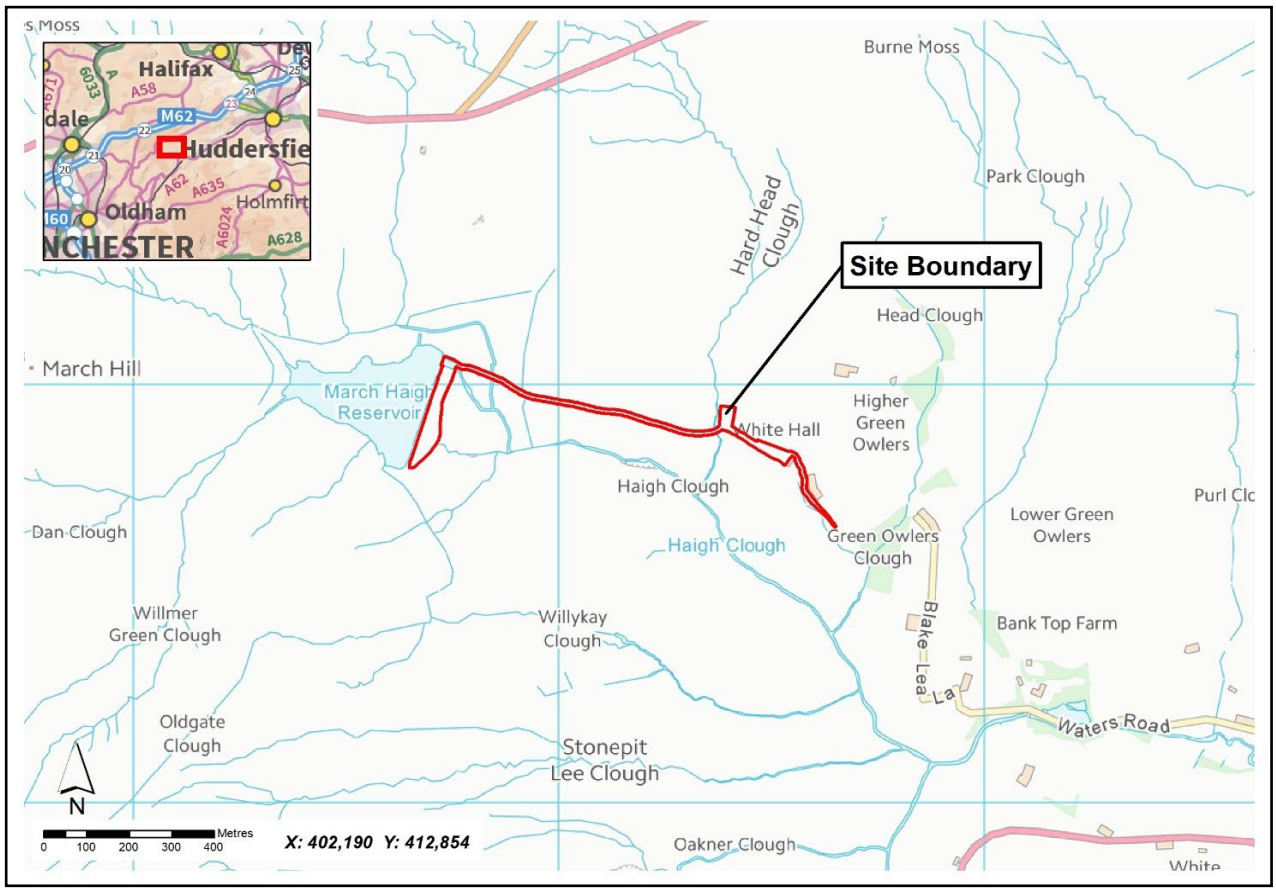
Temporary Access Track for Major Civil Engineering Works

3.10 A temporary access track has been used previously at March Haigh in order to complete major maintenance at the reservoir in 1999. Using a similar approach going forward would not address access requirements for regular inspection and maintenance and the failure to complete regular routine maintenance can lead to defects developing with an increased risk of dam failure. A temporary track would also not be a practicable means of access in case of an emergency.

4. HABITAT DESCRIPTIONS

4.1 The general location of the Proposed Development is illustrated in Figure 3 below. NVC maps for the wider survey area are presented at Figure 4a (east) and Figure 4b (west), with representative photograph locations shown on Figure 5 and illustrated in Appendix 1. A description of the route from east to west is provided below.

Figure 3 General Location Plan



Habitat Descriptions

Section A to C (Chainage 0 to 325m)

4.2 Although Section A to C is located outside the SPA/SAC, it is included below by virtue of containing potentially functional habitat for SPA qualifying bird species, namely merlin and golden plover.

4.3 This section runs from the existing rough-surfaced track at Blake Lea Lane, through White Hull Farm (Sections A to B) and up to the start of the moorland bog section of the route (Sections C to B). It is largely outside the SAC/SPA, with a small section of the designated area included in the red line boundary but not included in any active construction works.

4.4 The habitats include the acid grassland of the inbye fields, with abundant soft-rush (*Juncus effusus*) indicating wet soils. In addition, there are areas of tall herb along a well-used farm track. Other land use types include small areas of garden and farmyard associated with the farm complex.

4.5 The track construction at this point will be a permanent stone track over a geotextile membrane making use of the line of the existing track through the farm. Some minor reprofiling is required to create appropriate crossfalls.

Section C to D (Chainage 325m to 965m)

4.6 This part of the route falls within the SPA/SAC and follows the alignment of the previous temporary track, the stone of which remains under the peat surface and is now covered over and re-vegetated. It runs due east towards March Haigh reservoir and crosses four watercourses, three of which are currently culverted as part of the previous temporary track works in 1999.

4.7 The peat depth of the soils varies across this section, ranging from shallow to very occasional deeper peats in isolated locations, with the majority being found to be dominated by purple moor-grass (*Molinia caerulea*) and under Phase 1 Habitat classification is assessed as marshy grassland and modified wet bog, largely similar vegetation separated by the underlying depth of peat. The degraded bog habitat has a poor fit to any NVC community achieving a maximum correlation co-efficient of 29.7, which is very low. The interspersed acid grassland areas are best described as U5. There are localised areas of more distinct M6c acidic flushes and rush-dominated M25b around watercourses and flushed areas.

4.8 The purple moor-grass dominated areas of this moorland Site support very little else but occasionally have very low abundances of typical acid grassland species; wavy hair-grass (*Avenella flexuosa*), common bent, sweet vernal-grass (*Anthoxanthum odoratum*), mat-grass (*Nardus stricta*) and sheep's-fescue (*Festuca ovina*). These areas often have a cover of greater than 90% of purple moor-grass. They are generally south of the line of the proposed track, as the peat depth decreases closer to the edge of Haigh Clough.

4.9 The wet modified bog is generally found on drying degraded blanket bogs with a peat depth greater than 50cm. On this Site, the dominant vegetation on the degraded deeper peat is purple moor-grass with locally occasional patches of common cottongrass. Other typical species of this habitat such as heather, crowberry, and hare's-tail cottongrass were very rare within the survey area on the deeper areas of peat.

4.10 There were, however, small patches of *Sphagnum* moss, generally *S. fimbriatum*, *S. fallax* and *S. palustre* with rare patches of *S. papillosum*. Other mosses were generally sparse, with *Hypnum jutlandicum* the most common.

4.11 Other species recorded in this habitat included localised patches of soft-rush, rosebay willowherb (*Chamaenerion angustifolium*), and one area of bladder-sedge (*Carex vesicaria*).

4.12 Although within the SAC boundary, the habitats along this section of the route are not typical of the qualifying habitats of the SAC, i.e. dry heath or active blanket bog. They are categorised as degraded blanket bog habitat and have, in part, been previously disrupted by the creation of the former temporary track.

4.13 The track between C and D (end of the track) will comprise a permanent stone track over a geotextile membrane. The ground surface will be regulated with some limited cut and fill to provide a suitable crossfall for track construction.

5. SUMMARY OF BIRD SURVEY RESULTS

Summary of Breeding Bird Survey Results 2021

Breeding Bird Assemblage

5.1 A breeding bird survey was conducted by PAA in 2021, comprising four visits between April and June 2021 and encompassing the selected route and a zone extending approximately 50m either side of the route. A brief summary of the breeding bird survey results is presented below.

5.2 Although numbers of individuals were low, the species assemblage was diverse with a total of 31 species recorded over the four survey visits, reflecting the combination of moorland and moorland fringe habitats, including patchy trees and scrub present within and adjacent to the route. Passerines and waders are reasonably well represented, with the latter comprising common sandpiper, curlew, dunlin, golden plover and snipe. Raptor species were restricted to kestrel (*Falco tinnunculus*) and sparrowhawk (*Accipiter nisus*). Waterfowl comprised Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*) and tufted duck (*Aythya fuligula*). Wheatear was also recorded.

5.3 The section east of White Hall Farm comprised primarily hard-surfaced track and road with adjacent grass verges, grazed grassland and mature trees and scrub. Species recorded were mainly common and widespread, but also included birds of conservation concern such song thrush (*Turdus philomelos*), house sparrow (*Passer domesticus*) and bullfinch (*Pyrrhula pyrrhula*).

5.4 The route west of White Hall Farm comprises grazed rush pasture and purple moor-grass-dominated vegetation, much of it blanket bog. Birds were sparsely recorded along this section, however, the majority of Red and Amber listed species were recorded in this habitat/area.

5.5 Snipe were recorded from within the field immediately west of White Hall Farm on all but the first breeding visit. Records of chipping snipe were approximately 50 to 80m north of the proposed track route through this field. Whilst the record is outside the proposed route, it is sufficiently close to warrant consideration with regard to snipe, including timing of the works and potential impacts on breeding activity.

5.6 Reed bunting (*Emberiza schoeniclus*) and willow warbler (*Phylloscopus trochilus*) were both recorded regularly from the scrubby elements that have developed within the wet, rutted route of the existing track across the purple moor-grass-dominated vegetation.

5.7 A number of waders were recorded using or flying over the Site, including dunlin and common sandpiper on the reservoir margins and curlew and golden plover calling just beyond the route boundary or flying above the Site. Curlew were recorded regularly in suitable habitat and, thus, are categorised as probable breeders. The remaining three species are categorised as possible breeders due to infrequent records. It is, however, quite likely that these three species are breeding nearby but off-Site as the behaviour recorded did not show alarm or distress at the surveyor's presence.

Breeding Status

5.8 The species assemblage contained species typical of the habitats surveyed. Of the total assemblage of 31 species, seven were confirmed breeding with many of the other species also suspected as breeding within the survey area, although this could not be definitively confirmed. The breeding status is given below:

- Confirmed breeding (seven species) – carrion crow (*Corvus corone*), goldfinch (*Carduelis carduelis*), jackdaw (*Coloeus monedula*), meadow pipit (*Anthus pratensis*), pied wagtail (*Motacilla alba*), reed bunting and wren (*Troglodytes troglodytes*);

- Probable breeding (nine species) – Canada goose, common chaffinch (*Fringilla coelebs*), curlew, dunnock (*Prunella modularis*), house sparrow, robin (*Erithacus rubecula*), Eurasian skylark (*Alauda arvensis*), snipe and willow warbler; and
- Possible breeding (15 species) – Eurasian blackcap (*Sylvia atricapilla*), bullfinch, common blackbird (*Turdus merula*), common sandpiper, dunlin, golden plover, kestrel, magpie (*Pica pica*), mallard, pheasant (*Phasianus colchicus*), red grouse (*Lagopus lagopus*), sparrowhawk, song thrush, tufted duck and wheatear.

5.9 Confirmed and probable breeding species represent 51.6% of the total number of species recorded.

5.10 Determination of breeding status is dependent upon particular behaviour being observed. It is likely that a greater proportion of the recorded assemblage are breeding within the Site, but that the behaviour that would confirm this was not displayed or recorded during the survey period.

Birds of Conservation Concern

5.11 Of the 31 species recorded, 16 (51.6%) are in general decline and listed as Amber or Red Birds of Conservation Concern[16].

5.12 The Amber listed species include bullfinch, common reed bunting, common sandpiper, dunnock, kestrel, mallard, meadow pipit, snipe, song thrush, sparrowhawk, wheatear and willow warbler. Meadow pipit and common reed bunting are confirmed breeders on the Site, with dunnock, snipe and willow warbler as probable breeders and the remaining Amber listed species are possible breeding species.

5.13 The Red listed species include dunlin, curlew, Eurasian skylark and house sparrow. Curlew, Eurasian skylark and house sparrow are probable breeders and dunlin is a possible breeding species.

5.14 Eurasian bullfinch, curlew, dunnock, Eurasian skylark, house sparrow, red grouse, and song thrush are all BAP species recorded from the Site. A number of these species are also listed on the Kirklees Local Biodiversity Action Plan[17].

Conclusions

5.15 The survey area supports a breeding and non-breeding bird assemblage which is typical of the moorland and moorland fringe habitats A high proportion of species are Amber and Red listed BoCC. The assemblage includes a number of waders and other species associated with the South Pennine Moors SSSI.

5.16 The surveyed route comprises two distinctly different habitats. The section east of White Hall Farm is primarily hard surfaced track and road with adjacent grass verges, grazed grassland and mature trees and scrub. Species recorded were mainly common and widespread, but also included birds of conservation concern such as Red listed house sparrow and Amber listed Eurasian bullfinch and song thrush.

5.17 The route west of White Hall Farm comprises grazed rush pasture and purple moor-grass-dominated vegetation, much of it blanket bog. Birds were sparsely recorded along this section, however, the majority of Red and Amber listed species were recorded in this habitat/area.

5.18 Snipe were recorded from within the field immediately west of White Hall Farm on all but the first visit. Records of chipping snipe were all approximately 50 to 80m north of the proposed track route through this field. This area is close to the proposed construction compound area.

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[16] BoCC, Stanbury et al. 2021.

[17] BAP, https://www.kirklees.gov.uk/beta/delivering-services/pdf/biodiversity-species.pdf (Accessed 30.07.2020)

5.19 Common reed bunting and willow warbler were both recorded regularly from the scrubby elements that have developed within the wet, rutted route of the former temporary track across the purple moor-grass vegetation.

5.20 A number of waders were recorded using or flying over the Site, including dunlin and common sandpiper on the reservoir margins and curlew and golden plover calling just beyond the route boundary or flying above the Site. Curlew were recorded regularly in suitable habitat and so are categorised as probable breeders, the remaining three species are categorised as possible breeders due to infrequent records. It is, however, quite likely that these three species are breeding nearby but off-Site as the behaviour recorded did not show alarm or distress at the surveyor's presence.

5.21 Dunlin, common sandpiper, curlew and golden plover along with wheatear are all listed as features of interest on the South Pennine Moors (Phase 2) SPA citation (see Appendix 2). Snipe is also listed, and while snipe are only recorded on land outside of the protected site boundary (the inbye fields) it is likely these areas act as functional land in terms of the SPA designation, possibly also providing some foraging habitats for golden plover. This inbye field is within/close to the Site as the proposed construction compound for the Proposed Development is located here.

6. EFFECTS OF PROPOSED DEVELOPMENT

Proposed Design and Construction Methodology

Construction Design

6.1 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 stone has, therefore, been selected for its chemical makeup as well as strength characteristics in order to for it to be suitable within the environment in which it going to be used. It will also be suitable to maintain hydrological continuity across the peat and will comprise a granular stone of a suitable rock type e.g. gritstone to match with the locally occurring geology.

6.2 The track has been designed to be capable of transporting the vehicles required for the Applicant to ensure the safe operation of March Haigh Reservoir.

6.3 The width of the track is 4m, which is the minimum width to allow all vehicles to utilise the track without detriment to the edges. The track geometry has been designed to follow the alignment of the previously constructed temporary track where possible, and the natural ground profile as a best fit, without introducing what could appear to be an undulating track following the ground profile exactly. The design philosophy is to utilise the existing track as a capping layer and construct the proposed track on top of this. However, as the existing track is 3m wide and the proposed track is, by necessity, 4m wide, there will be a need to extend construction works onto land outside of the existing 3m wide track base.

6.4 The track has been designed for regular use by 7.5-tonne vehicles which is the anticipated requirement during routine reservoir operation and maintenance works. For emergencies, larger vehicles, up to 28-tonne, may be required to use the track, with any damage caused by additional wheel load being repaired immediately afterwards. Temporary road plates may be required at tight turns to protect the edges from damage due to overrun.

6.5 The depth of the stone track varies across the track length and is dependent on the condition of the existing stone, the strength of the sub-strata and the horizontal alignment. Broadly, the stone depths will be of minimum pavement depth 250mm between Points A and C (Chainage 0 to 325m).

6.6 Beyond Point C (Chainage 325m to 965m), the minimum pavement stone depth will be 530mm, although in some areas this may be deeper due to depressions, ruts and additional areas of build-up required beneath the pavement formation layer.

6.7 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.

6.8 The track surface will be unbound, with no kerb or edging, so that water is able to continue to flow through the track.

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

6.10 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.

6.11 Due to the number of construction vehicles using the track during proposed construction works, routine operation of the reservoir and planned maintenance or in an emergency, passing places have been located at strategic positions along the track which aim to give optimal sight distance between them. The topography of the land and alignment of the track dictate where they have been positioned, and the number of passing places has been minimised as far as practicable whilst maintaining appropriate levels of safety. In this case, there will be three passing places at

Chainages 340, 560 and 705m, though a degree of flexibility will be adopted to allow for exact positioning within +/- 5 to 10m of these locations

6.12 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.

Construction Methodology

6.13 The previous temporary track stone material was left in place and re-covered with approximately 200mm of excavated peat and vegetated turves on completion of the previous works during the late 1990s. The temporary track will be fully uncovered in the first instance to review condition. All soil materials, including any peat that was used to cover the previous temporary track or has subsequently been washed-in, will be stored for re-use within the Site as far as possible. The peat will be used to form a batter on the southern side of the track or spread on the proposed Site compound prior to habitat reinstatement.

6.14 The permanent track construction will incorporate the same alignment where possible, minimising impact to undisturbed land and will take advantage of any residual strength in the existing track. As previously mentioned, the track construction will be of a granular stone material incorporating a synthetic geotextile (geogrid) layer or layers (depending on stone depth) to provide reinforcement.

6.15 An additional geotextile layer will be added, to provide separation at the base of the track in areas where the depth of stone will exceed the minimum pavement depth, to satisfy ecological requirements for protecting the surface of any peat.

6.16 Construction will allow for a stone fill of depressions, ruts and minor drainage channels to build up the levels to pavement formation level. This will be undertaken using the same granular stone as for the pavement formation.

6.17 Stone will be delivered to the Site and unloaded at the proposed compound area before being loaded into a tracked dumper and transported to the working area where it will be tipped. Plant will not work ahead of the track.

6.18 Steel road plates (or similar) will be installed in areas along the access track where the geometry is unable to accommodate construction vehicles, to prevent vehicle over-run at the edge of the track.

Drainage Considerations

6.19 The overall philosophy beyond Point C is to provide an unbound track that allows water to flow through, ensuring that the peat either side of the track receives the necessary flow of water, and that natural water flow is maintained. Through drainage will be achieved by using a base layer of stone of sufficient granular size to allow water to flow through.

6.20 Between Points A and B there is an existing culvert of unknown size and condition taking a small watercourse through the farm. This will be retained and replaced as necessary subject to condition.

6.21 Between Points B and C, the drainage strategy will allow for flow of surface water over the track's surface.

6.22 From Point C onwards, the track will take an elevated position on top of the previous temporary track and will sit above the adjacent landform. Culverts will be required to carry the track over three larger watercourses located at Chainages 335m, 795m and 880m. The culverts, if they need to be replaced, will be pre-cast concrete, with any headwalls likely to be faced in re-used stone or other similar locally occurring gritstone, replacing the existing pipes at Chainages 335m and Ch 880m; details are presented in Table 3.1 below.

Table 2 Summary of Pipe and Culverts

Chainage (m)	Culvert and Pipe Details
90m	Existing culvert of unknown size and condition taking watercourse within the farm's land, assumed likely need to be replaced (to be confirmed).
335m	Replace existing single plastic culvert with 1no. pre-cast concrete culvert, 1050mm diameter and 4m length, pre-cast concrete headwalls and metal railings.
795m	If necessary, install pre-cast concrete pipes of 1050mm diameter.
880m	Replace existing twin plastic pipes and three overflow pipes (the latter not in current use) with twin pre-cast concrete culvert, each opening 1050mm diameter, pre-cast concrete headwalls and railings.

6.23 Crossings have been designed to accommodate 1:10 year return events. If exceeded, water will flow over the track and be directed towards the downstream watercourse. Heather bales and/or coir rolls will be positioned at the downstream end of the pipe crossings, held in place with hardwood stakes, to attenuate flow and reduce erosion risk downstream.

6.24 To minimise the potential for peat erosion along the upslope side of the track a number of measures will be incorporated comprising use of coir 'baffles' to attenuate and slow the flow of water and localised reprofiling, where required.

6.25 Water quality will be protected during construction with the stone to be used for the access track construction being a suitable rock type e.g. gritstone to match the locally occurring geology. Stone will, as far as practicable, be free of fine material that could wash into local watercourses or onto the moor in general. During construction, when some fines may be present, silt traps e.g. heather bales, coir rolls or straw bales will be used to contain any washout.

Site Compounds

6.26 The main Site compound location is a farmer's field immediately east of Hard Head Clough. This field was previously used to stockpile peat and soils during the earlier temporary track construction, until the material was used to cover over the track in 1999. It will be used to provide the main welfare, storage and parking facilities. The compound will need to be surfaced prior to the start of works to infill low spots and provide a suitable base for the installation of site offices, welfare and parking.

Vehicle Movements

6.27 Vehicle movements are summarised in Appendix 3.

Restoration Methodology for Temporary Sections

6.28 The majority of the Proposed Development comprises a permanent track that would remain *in-situ* for the operational phase of development, with minor earthworks only, which will result in some localised reseeding of bare re-deposited peats with an acid grassland/heather seed mix. The only significant area of restoration is the temporary site compound east of Hard Head Clough. This area of outside of the designated site boundary.

6.29 On completion of the 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. The seed mix will be supplemented with seed of additional plant species that

will support foraging twite, such as autumn hawkbit (*Scorzoneroides autumnalis*), cat's ear (*Hypochaeris radicata*), sheep's sorrel (*Rumex acetosella*) and common sorrel (*Rumex acetosa*). Twite are known to feed within 2.5km of their nesting locations and as such this enhanced inbye field could offer improved forage areas to nesting sites located further north of the Site.

Proposed Timetable

6.30 Subject to planning permission, the Proposed Development is anticipated to commence from September 2023 with completion by February 2024. Construction would progress from east to west.

Potential Effects – Construction Stage

6.31 The potential effects of the Proposed Development on the South Pennine Moors SAC and South Pennine Moors Phase 2 SPA at the construction stage of the Proposed Development are described below. It should be noted that all relevant mitigation measures required to avoid adverse effects on site integrity, as set out in this shadow HRA, will be documented and secured via an over-arching mitigation and management plan for the Proposed Development. It is anticipated that this could be secured via an appropriately worded planning condition.

South Pennine Moors Special Area of Conservation

Loss of Peat Resource and Hydrological Function

6.32 The peat resource and hydrology are, for much of the Site, already somewhat modified due to the previous temporary track along the same route. However, there has been substantial revegetation of the replaced peat within the former temporary track route over the intervening years and hydrological connectivity between the blanket bog area above the Site and the thinner peat soils and degraded blanket bog areas below the former track line have been retained.

6.33 The proposed track construction introduces the risk of changes to hydrology and water quality resulting from:

- Changes to existing flow regimes within the peat soils and watercourses;
- Accidental spillage/pollution of the water environment; and
- Increased/altered surface runoff increasing risk of localised erosion.

6.34 Without embedded mitigation being built into track design and construction approach, the Proposed Development would likely to lead to further disruption of peat hydrology and function along the route resulting from impeded drainage on the upstream (north) side of the permanent track leading to the retention of water within the peat mass and possible formation of ponded water along the trackside and/or potential washout of the track structure due to altered flowlines/regimes.

6.35 The extent of indirect effects on the peat resource below (on the south side) of the track is difficult to quantify precisely but impeded drainage following the Proposed Development could potentially result in drying of the peat in this area, with risk of peat loss through increased erosion and oxidation. To avoid these potential effects are far as possible, embedded mitigation has been designed in from the outset.

6.36 A number of alternative routes have been considered and the final route, which largely follows the same alignment along the previous temporary track, was selected as the least environmentally damaging. A temporary track solution with re-instatement of peat soils (as adopted for the earlier scheme) will not address the current needs of the Trust for permanent access for vital reservoir inspection and maintenance.

6.37 The track is the minimum width possible to accommodate the type of vehicles required for construction and operational purposes, with a running width of 4m plus additional width to allow

for earthworks, where needed, to site the track appropriately within the topography. Passing places and compounds have largely been located within the footprint of the earlier temporary track, where possible, to avoid impacting on new areas.

6.38 There will be minimal changes to ground levels only as required to ensure the track meets the required technical specification and to increase the stability of the adjacent peat thus reducing risk of erosion or collapse. All cutting into the peat or filling in of the existing levels on either side of the track will be overseen by and ecological clerk of works[18] to ensure the peat resource is appropriately handled. Bare peat areas created following the necessary earthworks will be carefully reseeded with a suitable acid grassland seed mix to stabilise these areas and reduce risk of erosion of exposed bare peat. A geotextile will be use if deemed necessary to further reduce erosion risk.

6.39 Construction within and close to the protected area will be closely supervised by an experienced ECoW with expertise in the peat environment. Best practice measures will be implemented throughout the Proposed Development to safeguard the peat resource from accidental spillage and pollution.

6.40 Best practice peat soil handling and storage measures will be incorporated into the Construction Environmental Management Plan[19] as an integral part of scheme implementation to minimise any impact on peat soils and their carbon stores during construction. Heather bales and coir rolls will be used as required, e.g. at stream crossing points, to prevent localised erosion.

6.41 Nevertheless, there will be a permanent loss of approximately 0.42ha of habitat(s) with underlying peat within the Proposed Development footprint and a risk of changes to peat hydrology which cannot be fully mitigated. The loss of peat has been calculated by overlaying the footprint of the road (see the General Arrangement drawings – Technical Appendices of the Environmental Statement, 3.1 to 3.1c) comprising the final stone track, any edges of the track (that will be made up of stone and covered with peat and resown with an acid grassland/heather mix) and any area of minor earthworks to enable the track design to be achieved (these areas will also sown with acid grassland/heather mix).

6.42 To satisfy the requirement to minimise the amount of peat taken off Site as waste material, the scheme proposes to re-use peat along the southern edge of the proposed track to form a 1:3 batter will result in disruption to a further 0.076ha of modified blanket bog and associated habitats on the protected area. This is due to the need to remove existing vegetation from the ‘peat re-use’ area to enable the batter to be formed from re-used peat material. The re-deposited peat will also be sown with an acid grassland/heather mix.

6.43 The areas sown with acid grassland/heather mix will likely, over time, become re-colonised by purple moor-grass and soft-rush, but they are assessed as largely losing their ‘degraded blanket bog’ character and will likely develop an acid grassland character. Habitat compensation will, therefore, be required to satisfy the requirements of the Habitat Regulations, and further details are given in Section 7 of this report.

Impacts on Water Chemistry

6.44 Water quality may be negatively affected if unsuitable material (e.g. limestone) is used within the scheme design and/or accidental pollution incidents occur. This would potentially impact negatively on the watercourses and the peat habitats reliant on hydrological inputs. However, to avoid the risk of any adverse effect on the peat resource the track will be constructed of stone of a suitable rock type e.g. gritstone to match with the locally occurring geology whilst maintaining structural stability and this will avoid any adverse impact on water quality, in

[18] *ECoW*

[19] *CEMP*

particular pH values. It is, therefore, concluded that there would be no adverse effect on water quality of the peat resource, taking embedded mitigation into account.

6.45 In addition a CEMP and ecological supervision will be adopted during construction to comprise best practice approaches to safeguarding the water environment and use of water quality protection measures such as spill kits and straw bales to contain run-off as standard.

A summary of the potential effects of construction on the qualifying features of the South Pennine Moors SAC is presented in Table 3.

Table 3 Summary of Potential Effects on Qualifying Features of the South Pennine Moors Special Area of Conservation – 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 measure 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

South Pennine Moors Phase 2 Special Protection Area

Disturbance to Qualifying Bird Species during Construction

6.46 The key effect on the moorland bird assemblage, and specifically those species which are qualifying species of South Pennine Moors Phase 2 SPA, is risk of disturbance to nest sites and associated foraging habitat during the construction phase, which may result in breeding failure and nests being abandoned with subsequent loss of chicks. This would only occur if the construction period extends beyond the anticipated end date of February 2024.

6.47 In order to calculate the extent to which SPA qualifying bird species could be affected during construction, a zone of potential disturbance along either side of the route has been defined. This zone of potential disturbance is informed by published information sources on disturbance distances for key species (Yalden 1992; Pearce-Higgins and Yalden 1997; Finney *et al*. 2004; Ruddock and Whitfield 2007; Yalden and Yalden 2009). Within this zone, it is assumed that birds could respond to noise and/or visual disturbance associated with construction activities.

6.48 The zone of potential disturbance used in this assessment are 300m for the SPA qualifying raptor species, for example; merlin, and 200m for golden plover, curlew, dunlin and snipe. A zone of 100m was used for wheatear and 75m was used for common sandpiper.

6.49 In both cases, the breeding bird survey did not extend fully into the zone of potential disturbance, covering only approximately the first 50 to 100m of this zone. It is, therefore, possible that merlin, golden plover and other species listed within the breeding bird assemblage are present as a breeding species at greater distances from the route. However, no evidence at all of merlin was observed during the breeding bird survey, suggesting that there is no nesting activity nearby. The Site is likely to be used for foraging and hunting by these species but as part of a larger territory, and disturbance during construction is unlikely to be significant.

6.50 For golden plover, which was recorded as a possible breeding species in the vicinity of the Proposed Development, records comprised a single adult calling from blanket bog habitat, approximately 100m north of the track, in June when it is possible that the adult would be defending chicks (assuming a successful nesting attempt). This location is within the zone of potential disturbance for golden plover and effects during construction could, therefore, comprise noise and visual disturbance, flushing adult birds from the nest and/or potential nest abandonment.

6.51 Assuming a single pair of golden plover could be present, this would represent 0.34% of the total number of estimated pairs in the South Pennine Moors Phase 2 SPA.

6.52 Curlew were recorded during the first three surveys in April, May and early June 2021, with calling adults indicating probable breeding behaviour. The records are located on the northern side of the proposed track within 100m of the scheme. Data suggests one pair of breeding curlew are within the zone of potential disturbance, likely to be on the north side of the proposed track where it crosses March Haigh Flats.

6.53 A single adult dunlin was recorded once in late April 2021 on the reservoir, just north of the spillway. This species is recorded as a possible breeding bird (no specific behaviour indicating active breeding was noted) and a pair may be present within the zone of potential disturbance, but nesting is likely to be associated with the area north of the reservoir away from the proposed track.

6.54 Common sandpiper was recorded on the reservoir, close to the northern end of the embankment, near to the spillway, on visits 1 and 3 (April and early June 2021). This species is recorded as a possible breeding species, with one pair likely within the zone of potential disturbance, but nesting is likely to be associated with the edges of the reservoir away from the proposed track.

6.55 Snipe were recorded on visits 2, 3 and 4 (May and June 2021) and each time a single bird was observed drumming in the same general location just on the edge of the proposed compound area in the inbye fields (off the protected area). This species is recorded as a probable breeding species, with one pair likely in this area, within the zone of potential disturbance.

6.56 Wheatear were recorded on visits 1 and 3 (April and early June 2021), The first record was close to Hard Head Clough just south of the proposed track, with the second being north of the track on March Haigh Flat. No specific breeding behaviour was recorded. Therefore, the species is noted as a possible breeding species at this location.

6.57 It is currently planned that construction activity will have ceased before the qualifying species at this location begin to establish nesting territories in spring 2024. However, if the construction period is delayed e.g. due to poor weather, that it is possible that construction plant and associated noise and visual disturbance will still be occurring in March or even April 2024. At this time, the risk of disturbance would be relatively high and may deter nesting attempts. If delayed later into May, the risk would be higher still, with parents vigorously defending the nest, though once the chicks have hatched, they can potentially be led by the parents to safety. Mitigation will be required, therefore, to avoid any adverse effect on the integrity of the breeding bird assemblage population should the construction period extend beyond February 2024.

6.58 Whilst every effort will be made to avoid works extending beyond February 2024 (it should be noted that the Applicant's clear aim is to complete the works by February 2024), the following steps should be taken if works do 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 2 to 3 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 *et al* 2022).

6.59 The effectiveness of the bird deterrent and mitigation measures will be subject to regular monitoring by the ECoW to record the location and activity of breeding bird species over this period, with deterrent and mitigation measures adjusted in response to observed bird behaviour. The ECoW monitoring will commence from February 2024, initially every 3 to 4 days increased to at least every 2 to 3 days during the core part of the breeding season, typically mid-April to mid/end-June, and reducing from mid/end-June once it becomes apparent that all nesting attempts have ceased. After this date, less frequent monitoring is likely to be necessary e.g. weekly through July to account for later nesting species with second or third broods e.g. skylark or meadow pipit. During each visit the ECoW will map bird species, location and behaviour.

6.60 The ECoW will be an appropriately experienced ornithologist with prior experience of working in the moorland environment and devising and implementing mitigation for moorland bird species.

6.61 A summary of potential effects on SPA qualifying species during construction is presented in Table 4 (below).

Table 4 Summary of Potential Effects on Qualifying Features of the South Pennine Moors – Construction Phase

Potential Effect	Qualifying Features	Predicted Impact
Disturbance during construction	Golden Plover	No – works to take place outside of breeding season. If works are delayed into start of breeding season, an EcoW will monitor golden plover activity and advise on measures to avoid disturbance.
	Merlin	No – no evidence of breeding site within zone of visual influence.
	Breeding bird assemblage (present on/near Site – Golden Plover, Curlew, Dunlin, Snipe, Common Sandpiper, Wheatear)	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.

Potential Effects – Operational Phase

6.62 The potential effects of the Proposed Development on the South Pennine Moors SAC and South Pennine Moors Phase 2 SPA at the operational stage of the Proposed Development are described below. It should be noted that all relevant mitigation measures required to avoid adverse effects on Site integrity as set out in this shadow HRA will be documented and secured via an over-arching mitigation and management plan for the Proposed Development. It is anticipated that this could be secured via an appropriately worded planning condition. This will include the management of the habitat restoration areas within the Proposed Development, comprising re-seeded bare peat adjacent to the track and the restored site compound. In addition, the Applicant will prepare an 'Operation and Maintenance[20] Plan' which details the operational track maintenance requirements (see below).

South Pennine Moors Special Area of Conservation

Changes to Peat Resource and Peat Hydrology

6.63 As outlined above, mitigation has been embedded into the track design and methodology from the outset to reduce the effect of the scheme on peat hydrology.

6.64 The stone track design across the protected area comprises free draining stone to minimise the long-term disruption of peat hydrology. Nevertheless, there is the potential for localised pooling of water on the upslope (north) side of the track, potentially increasing erosion over time, which would need to be addressed through a programme of monitoring and maintenance. On the downslope (southern) side of the track localised scour may occur at culvert and pipe outfalls, again requiring monitoring and maintenance to prevent erosion from occurring.

6.65 A programme of regular monitoring and maintenance would be implemented by the Applicant to be set out within the O&M Plan to identify and address localised issues to prevent any long-term disruption to the peat mass, in particular accelerated scour and erosion. Monitoring and

[20] *O&M*

maintenance activities to be included in the O&M plan will comprise frequent visual inspection of the track at least one a year, and more frequently as needed e.g. following storm events. Remedial measures will 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 topping up of the track surface. As a result of embedded mitigation, it is anticipated that there would be no long-term effect on the peat resource and peat hydrology during the operational phase of the development.

6.66 A summary of effects at the operational phase is presented in Table 5 (below).

Table 5 Summary of Potential Effects on Qualifying Features of the South Pennine Moors Special Area of Conservation – 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

South Pennine Moors Phase 2 Special Protection Area

Reduction in Extent of Supporting Habitat Within and Outside the Special Protection Area for Golden Plover and Internationally Important Breeding Bird Assemblage

6.67 At the operational phase of Proposed Development, the introduction of a permanent access track into the moorland environment will reduce the extent of available habitat for golden plover and certain species within the listed in the SPA breeding bird assemblage and found to be present on site during the breeding bird survey, namely curlew, snipe and wheatear. Dunlin and common sandpiper are also SPA qualifying species and are present on site but are unlikely to be adversely affected as they are primarily associated with the edges of March Haigh Reservoir which will not be subject to habitat loss.

6.68 The permanent habitat loss within both the SPA and adjoining functional habitat which could be used by golden plover and other breeding species for both nesting and foraging is approximately 0.5ha. Within the SPA, the permanent habitat loss comprises degraded blanket bog and small areas of acid grassland and acid flush. Outside of the SPA, the permanent habitat loss comprises very small areas of acid grassland, which are to be impacted along either side of the track. The majority of habitat that will be impacted outside of the SPA is a farmer's field, comprising acid grassland, that will be used as the temporary site compound but subsequently restored to agricultural use.

6.69 Despite the small extent of permanent habitat loss, mainly within the SPA, but also very small amounts of acid grassland immediately alongside the track outside of the SPA, the Conservation Objectives for golden plover and other qualifying breeding species known to be present within or adjacent to the site (curlew, snipe and wheatear) are to:

> *'Maintain the extent and distribution of habitat which supports the SPA assemblage feature during all necessary stages (breeding, moulting, roosting, loafing and feeding) of the breeding period'* (NE 2018).

6.70 Therefore, it will be necessary to compensate for the unavoidable permanent loss of habitat that may be used by these species both within and outside of the SPA.

6.71 It is proposed to compensate for the permanent loss of habitat for SPA qualifying breeding bird species by enhancing the proposed compensation area (see Section 7 of this shadow HRA) for target bird species.

6.72 In addition, the restoration of the site compound and other re-seeded areas of bare peat alongside the access track will include the addition of seed-rich plant species to provide a foraging resource for twite. These areas cover 0.093ha and 0.1369ha, respectively. Twite is not currently present on Site, but it is hoped that the addition of these potential feeding areas will help to support and increase the range of this SPA qualifying species

Increased Disturbance to Special Protection Area-Qualifying Bird Species During Operational Phase

6.73 At the operational phase of Proposed Development the introduction of a permanent access track into the moorland environment could result in the following activities, which may result in disturbance to or displacement of SPA qualifying species:

- Recreational use of the track by e.g. walkers and dog walkers to link up with existing Public Right(s) of Way[21] and informal paths;
- Unauthorised off-road vehicles use; and
- Authorised vehicle use for operational purposes with at least two visits per week.

6.74 To address the risk of increased disturbance, a number of mitigation measures will be adopted from the outset. Unauthorised vehicle use of the track is highly un-desirable for the Applicant as this could lead to erosion, fire damage, pollution and vandalism.

6.75 These built-in measures comprise the existing gate at White Hall Farm on Blake Lea Lane to be replaced with a new padlocked gate, and a second padlocked gate to replace the existing gate at Hard Head Clough (specification for the gates is provided in Appendix 4). The Applicants O&M Manual for the completed development sets out the requirement for twice weekly inspection of these gates by the Applicant's operatives, who will carry suitable equipment for on-the-spot repairs and maintenance of these gates as required.

6.76 It is understood that there is already an issue with unauthorised off-road vehicles leaving the A640 and entering the moorland from the north. The Proposed Development could potentially encourage greater access from the north and it is proposed to closely monitor this situation and to work with the National Trust to put additional management in place as outlined below.

6.77 The following additional measures will be employed to manage of potential increased recreational use, such as increased numbers of walkers, dog walkers and runners, etc.:

- Litter picks around March Haigh Reservoir and along access track by the Applicant (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 ProW (suitable locations to be confirmed);
- 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); and
- Access track to provide easier access for firefighting compared with current situation, should the need arise.

[21] *PRoW*

6.78 The Applicant will continue to monitor levels of recreational use and will commit to 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 bird monitoring in Year 1 and Year 3 after development, that can be directly attributable to the use of the track. 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.

6.79 The Applicant is highly motivated to prevent unauthorised use of the Proposed Development by off-road vehicles. In addition to the provision and maintenance of padlocked gates to prevent unauthorised vehicle access from the east, the Applicant is committed to working with the National Trust to put in place additional surveillance and management of unauthorised off-road use if there is a notable increase in this, such that there is a clear impact on breeding birds as observed during proposed bird monitoring surveys in Year 1 and Year 3 after completion of development. For example, this could include a reduction in bird species or nesting attempts, which is directly attributable to nest destruction from off-road vehicle use, or displacement of nest locations due to the presence of off-road vehicles, compared with the baseline bird survey results.

6.80 Potential additional remedial management measures would be devised jointly with the National Trust, with the Applicant contributing funding towards National Trust Ranger time to be used, for example, for visitor management, footpath repair or cutting of firebreaks, as well the additional surveillance and management of unauthorised off-road use as noted above.

6.81 The Applicant would also work with other stakeholders including the West Yorkshire Fire and Rescue Services and West Yorkshire Police to put any required measures in place to manage any notable increase relating to fire risk, vandalism or pollution. With the above mitigation measures in place, it is concluded that any potential adverse effects on SPA qualifying bird species can be avoided.

6.82 The potential effects of the Proposed Development on the qualifying features of the South Pennine Moors SPA at the operation phase are presented in Table 6 below.

Table 6 Summary of Potential Effects on Qualifying Features of the South Pennine Moors – 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.

7. COMPENSATION STRATEGY

Habitat Compensation – Holme Moor

7.1 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.

7.2 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. It is, therefore, proposed that the habitat compensation area is also managed to provide compensatory habitat for golden plover, curlew, snipe and wheatear.

7.3 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 *Molinia*-dominated moorland to provide habitat for SPA qualifying bird species.

7.4 The Applicant has agreed, in principle with the National Trust, that 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 Figure 6. 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 Applicant and secured in perpetuity.

7.5 Given the location of Holme Moor, outside any SSSI/SAC/SPA designation, it is not a priority for the National Trust to undertake habitat restoration works on this area. Therefore, a financial contribution from the application via a S106 agreement would enable these habitat enhancements to proceed, which would otherwise be unlikely to happen without the Proposed Development going ahead.

7.6 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. This ratio is considered suitable as it accounts for the direct and indirect impacts predicted to occur on the Site as a result of the Proposed Development, along with the fact that the compensation area is classed as an ‘upland heathland’ under MAGIC, indicating it is sited on generally thinner peats than might be expected for blanket bog habitat (see further details below).

7.7 It should be noted that, in time, the proposed 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 proposed 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).

7.8 There is little precedent for the design of compensation sites for impacts such as those predicted under the Proposed Development. However, the recent construction of a permanent access track at Swellands and Black Moss Reservoirs (also brought forward by the Applicant under MIOS) provided a similar ratio as part of the agreed compensation measures for that

scheme. This scheme was in a similarly sensitive highly protected moorland area and was also within the Peak District National Park.

7.9 The close proximity of the proposed compensation area to the nearby Dark Peak SSSI on the wider Holme Moor area would also add to the value of the habitat enhancement. In addition, the proposed compensation site is adjacent to an area of Holme Moor being enhanced in a similar way (as compensation for the scheme at Swellands and Black Moss Reservoirs, as noted above). The implementation of an additional area of enhancement measures at the Holme Moor (Round Hill) site would, therefore, provide a strategically beneficial location for enhancement measures as they would not be in isolation but link with adjacent moorland areas. Thus, providing added 'value' to the proposals.

7.10 Work has previously been undertaken by the National Trust to further understand the peat depth and vegetation composition across the moor. Areas of deep peat (which are limited), shallower peat and non-peat soils have been mapped and options for habitat enhancement have been considered. The potential use of peat bunding to restrict the flow of water is somewhat limited as the peats are shallow, but there is an outline proposal to reduce the dominance of purple moor-grass, a tussocky moorland species dominant on areas of the moor, which can shade out all other species in some conditions. Areas have been identified where tussock thinning or complete removal may result in a more diverse moorland vegetation.

7.11 The compensation area will be surveyed in more detail to identify the optimum locations for habitat enhancements to be funded by the Applicant. This will comprise a detailed vegetation survey (using NVC methodology) and a finer scale peat depth survey to target the 3.5ha of restoration within the most appropriate locations. Consideration will be given to any opportunities for additional re-wetting of the local area to improve ground conditions for the promotion of establishment of peatland species, and to provide additional habitat for SPA qualifying bird species which have a habitat preference for wet areas for feeding e.g. golden plover and snipe.

7.12 The further survey work will be undertaken in summer 2023 and 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, as explained above, will be no less than 3.5ha. A revised plan of the areas restored after treatment will be provided.

7.13 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.

7.14 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 Proposed Development scheme.

7.15 The works would be undertaken by the National Trust's specialist contractors and volunteers and can proceed within the appropriate window as required by the Proposed Development, with a suitable lead in time to allow for plug plants to be procured. Appendix 5 provides the Compensation Scheme proposal and is outlined below.

7.16 The proposed programme of restoration measures on the 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. Plug planting of all species and hand removal of tussocks as required.

7.17 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.

7.18 Cattle grazing is best to control the purple moor-grass, but it is recognised that this site is currently grazed by sheep[22] 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.

7.19 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).

7.20 Further details of habitat and bird monitoring at the compensation site are given below.

Monitoring

Habitat Monitoring – Proposed Development Site

7.21 Habitat monitoring of the Proposed Development Site, including the restored site compound and areas of bare peat to be re-seeded alongside the track, would be carried out in 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. Monitoring along the permanent track would comprise a visual inspection to check for evidence of erosion or any other hydrological impacts and vegetation monitoring. The vegetation monitoring will comprise a walkover of the re-seeded bare peat areas alongside the track and site compound to produce a full botanical species list and relative species abundance across each area, with track and site compound habitats recorded separately. In addition, a total of 5no. 1m x 1m quadrats will be taken within each area (track and site compound sampled separately) to record species, bare ground and percentage cover so that the habitat can be assessed in accordance with the Common Standards Monitoring[23] Guidance for Upland Habitats (Joint Nature Conservation Committee[24] 2009). Although the restored habitat will include a small percentage of heather seed and, in the restored compound additional forb species suitable for twite, the predominant habitat type will be acid grassland. Therefore, the CSM criteria for upland acid grassland will be used as the basis for monitoring.

7.22 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

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[22] *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.*

[23] *CSM*

[24] *JNCC*

available growing season with additional measures such as control of soft rush or the removal of other undesirable species implemented as required

Habitat Monitoring – Compensation Site

7.23 Monitoring methods for the habitat compensation area would be based on NE CSM adapted for the habitat present at Holme Moor (Round Hill) and will be dependent on the final agreed compensation proposals but are likely to comprise the following.

7.24 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.

7.25 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.*' 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 Joint Nature Conservation Committee's CSM for Blanket Bog;
    - Assessment against the CSM criteria for Blanket Bog (pp.44 to 47 of CSM Guidance for Upland Habitats 2009[25]) 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.

7.26 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;

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

- Year 3 = March 2028;
- Year 5 = March 2030; and
- Thereafter, every 3 years (2033, 2036, 2039, etc).

7.27 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 3 years thereafter unless an alternative frequency of monitoring is agreed with the relevant parties.

7.28 Should the criteria not be met, further intervention, to be agreed with the appropriate parties (Kirklees Council and NE), 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.

7.29 A Habitat Monitoring Report would be provided to Kirklees Council and NE after each year of monitoring.

Breeding Bird Monitoring – Proposed Development Site

7.30 A programme of ongoing bird monitoring will be implemented during construction, for any part of the works that take place during the 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.

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

7.32 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. The post-construction monitoring will comprise a repeat breeding bird survey with four visits between mid-April and end-June to provide comparable data with the baseline breeding bird survey. The monitoring visits will take place in Year 1, Year 3 and Year 5 after completion and every three years thereafter, for a total of 30 years. A Bird Monitoring Report will be submitted to Kirklees Council and NE after each of the monitoring events, including detailed survey methods and results and recommendations for any additional mitigation requirements if necessary.

Breeding Bird Monitoring – Compensation Site

7.33 To assess the efficacy of habitat enhancements for SPA-qualifying species at the compensation site, a baseline breeding bird survey will be completed in spring 2023 prior to any habitat enhancements commencing (anticipated to be September/October 2023). The baseline survey will follow the breeding bird survey methodology devised jointly by the British Trust for Ornithology[26], the Royal Society for the Protection of Birds[27] and the JNCC (Gilbert *et al.* 1998)

[26] *BTO*

[27] *RSPB*

comprising four survey visits between mid-April and end June. The survey will cover 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.

7.34 Subsequent monitoring visits 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 Proposed Development Site.

7.35 A report will be submitted to Kirklees Council and Natural England after each monitoring event, with recommendations for additional habitat interventions, if required, to support the requirements of SPA qualifying species.

8. IN-COMBINATION EFFECTS

8.1 This section considers the effect of the Proposed Development in-combination with other plans and projects within a 1km zone of the site.

Table 7 Summary of Projects Considered for In-Combination Effects

Type of Project and Location	Description of Project	Planning Reference, Status and Date Granted (Where Relevant)
March Haigh Reservoir	MIOS to be completed at the dam of March Haigh Reservoir.	Planning application to be submitted in 2023.
Proposed Tree Planting	Proposed by National Trust within Haigh Clough to the south of the proposed access track.	Works do not require planning consent
Moorland Restoration Programme, National Trust Marsden Moor Estate	Large scale programme of moorland restoration in partnership between National Trust and Yorkshire Water.	Ongoing

8.2 The potential in-combination effects of the plans and projects in Table 7 (above) are considered below.

8.3 The MIOS works to be carried out at March Haigh Reservoir are likely to be minimal and largely contained within the footprint of the existing built infrastructure. It is not anticipated that there would be any loss of active blanket bog habitat and only minor and temporary disturbance to other (non-SAC qualifying) habitats in the immediate vicinity of the works. This would not significantly alter the overall assessment of impacts in respect of the Proposed Development.

8.4 In terms of golden plover and merlin, the MIOS at March Haigh Reservoir are likely to coincide with the bird breeding season in 2024 but, given that none of the SPA qualifying species have been recorded breeding in close proximity to the reservoir, it is unlikely that there would be any additional risk of disturbance to these species during the breeding season.

8.5 Tree planting in Haigh Clough is unlikely to result in any adverse in-combination effects in respect of blanket bog habitat or SPA qualifying bird species. The planting would introduce trees into the landscape, but these would be contained within the clough and likely alter the attractiveness of the wider moorland for bird species or encourage perches for predators of ground nesting birds in proximity to golden plover nest sites.

8.6 The moorland restoration programme which is currently being implemented across the National Trust Marsden Moor Estate in partnership between the National Trust and Yorkshire Water is likely to result in a long-term change of the condition of blanket bog from Unfavourable to Favourable condition as the results of grip blocking, re-wetting and other measures take effect. It is not anticipated that the Proposed Development would impact in-combination with this ongoing programme of work.

9. SUMMARY AND CONCLUSIONS

9.1 This HRA considers the effects of the proposed Development on the South Pennine Moors SAC and South Pennine Moors Phase 2 SPA. Due to the location of the Proposed Development; partially within the SAC and SPA, there will be a LSE on relevant qualifying features, namely blanket bog within the SAC and golden plover and merlin within the SPA, and an 'appropriate assessment' is required.

9.2 This shadow HRA sets out the information necessary for Kirklees Council, as competent authority, to undertake the 'appropriate assessment'.

9.3 A suite of desk-based assessment and field surveys have been completed to provide a baseline for the Proposed Development. A section of the proposed track falls within the SAC and supports degraded blanket bog habitat, which is in Unfavourable Recovering condition. The proposed route is considered unlikely to support nest sites of merlin but does provide functioning habitat in the form of hunting/foraging grounds for this species. A single golden plover was observed on March Haigh Flat to the north of the proposed track during a breeding bird survey in 2021 and is considered as a 'possible' breeding species.

9.4 Briefly, the selected route comprises the construction of a 4m wide permanent stone track up to March Haigh Reservoir. The track route has been selected as the least environmentally damaging that fulfils the need to undertake the legally required Safety Measures identified in the most recent Reservoirs Act, Section 10 Inspectors report, by the required completion date of February 2024 as well as facilitating ongoing reservoir maintenance.

9.5 A number of alternatives to permanent track construction have been considered comprising:

- Do-nothing option;
- Alternative routes;
- Reservoir discontinuance;
- Use of low ground pressure all-terrain vehicles;
- Temporary access track for major civil engineering works; and
- Helicopter access.

9.6 The Proposed Development would result in the following potential effects on the SAC qualifying features, namely blanket bog:

- Loss of peat resource and indirect effects on peat hydrology;
- Accidental pollution and changes in peat or water chemistry; and
- Localised peat erosion.

9.7 Embedded mitigation has been built in from the outset to avoid these effects are far as possible and will comprise minimum possible track width, utilisation of a previous temporary track route, minimal changes to ground levels, use of a free draining granular stone to match local geology, best practice measures to avoid pollution/manage soils and erosion control at stream crossing points.

9.8 Nevertheless, there would be a permanent loss of a small amount of habitat overlying peat within the footprint (0.42ha), modification of a small amount of (0.076ha) peatland habitat where the peat would be re-used on site to minimise removal off Site and indirect effects on peat hydrology during construction which cannot be avoided. To meet the requirements of the Habitat Regulations it is necessary to demonstrate that there are IROPI for the Proposed Development to proceed and that compensatory measures will be provided. Habitat compensation will be delivered on land owned by the National Trust at Holme Moor (Round Hill), under a legally binding S106 agreement. The habitat compensation will be provided in perpetuity.

9.9 There will be an impact on blanket bog at the operational stage of development due to embedded mitigation that will allow for water to flow through the track, with no adverse effect on peat hydrology.

9.10 At the construction stage, the Proposed Development would be highly unlikely to impact on the SPA qualifying feature, merlin, which are not likely to be breeding in the vicinity. Golden plover and curlew are possible/probable breeding species within 100m to the north of the track, but construction is anticipated to take place outside of the bird breeding season. Similarly, snipe are a probable breeding species within 100m of the proposed compound area, but again would not be affected by disturbance in this area unless works went beyond the scheduled end of February 2024 completion date. Dunlin and common sandpiper are restricted to the reservoir edges away from any construction impacts. Wheatear are associated with Hard Head Clough and the open moorland as a possible breeding species and would similarly be potentially impacted only if the construction schedule did not meet its target completion date of end February 2024.

9.11 Should delays to construction extend the construction period beyond February 2024, then bird activity will be monitored by an EoW and additional deterrent measures and mitigation, comprising maintaining the construction footprint as stripped ground, use of controlled dog with handler, use of temporary screening and/or temporary cessation of works, will be implemented to avoid disturbance to nesting birds.

9.12 Measures to avoid long term disturbance to SPA qualifying species from increased recreational use have been embedded in the scheme design and will comprise use of locked gates to deter access. The Applicant is also committed to on-going monitoring of recreational use and the implementation of additional mitigation measures including extra signage and contribution of funding to the National Trust to assist with increased visitor management, footpath repairs and fire breaks, if required.

9.13 In terms of operational impacts on the SPA qualifying bird species, there would be an unavoidable and permanent loss of approximately 0.5ha of habitat of which the majority is in the SPA, with very small amounts of acid grassland lost along the edges of the access track outside of the SPA. The temporary site compound, which is also located outside the SPA and provides functional habitat for SPA qualifying species, would be re-instated on completion of works with no long-term adverse effect on site integrity. The addition of seed-rich plant species to the re-instated site compound (as well as along re-seeded bare peat along the edges of the new track within the SPA) may provide additional habitat for twite, which is not currently present on site, thereby possible increasing the range of this SPA qualifying species.

9.14 To compensate for the unavoidable permanent habitat loss of land within the SPA, which would primarily impact on the nesting and/or foraging habitat of golden plover, curlew, snipe and wheatear, it is proposed to provide compensation habitat at Holme Moor (Round Hill). Here, the proposed habitat compensation measures to compensate for the loss of blanket bog will also increase structural diversity of the for 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. Additional habitat interventions to re-wet the habitat could also be implemented if bird monitoring indicates that this would be of benefit for SPA qualifying species.

9.15 A 30-programme of habitat and bird monitoring at both the Proposed Development Site and the compensation area is proposed with reports provided to Kirklees Council and NE to provide evidence of the success of the proposed mitigation and habitat re-instatement measures at the Proposed Development site, and habitat compensation measures at Holme Moor (Round Hill). The reports will include recommendations for any remedial measures required.

9.16 In light of the above, it is concluded that the Proposed Development would meet the requirements of the Habitat Regulations.

10. REFERENCES

British Ornithologists' Union, 2017. *The British List: A Checklist of Birds of Britain (9th edition).* Ibis, 160, **190-240.**

Finney, S.K., Pearce-Higgins, J.W., and Yalden, D. W., 2005. *The effect of recreational disturbance on an upland breeding bird, the golden plover Pluvialis apricaria*. Biological Conservation 121 (2005) **53–63.**

Gilbert, O.L., and Anderson, P., 1998. *Habitat Creation and Repair*. Oxford University Press

Goodship, N.M. and Furness, R.W., 2022 *Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species*. NatureScot Research Report 1283.

JNCC, 2009. *Common Standards Monitoring Guidance for Upland Habitats.* JNCC.

Natural England, 2018. *European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features: date of publication 19 November 2018.*

PAA, 2022a. *March Haigh Track. Breeding Bird Survey Report*. Report to the Canal & River Trust.

PAA, 2022b. *March Haigh Track. Phase 1 and NVC Survey Report*. Report to the Canal & River Trust.

PAA, 2022c. *March Haigh Reservoir. Hydrology Assessment and Peat Depth Mapping.* Report to the Canal & River Trust.

Pearce-Higgins, J. W., Yalden, D. W., 1997. *The effect of resurfacing the Pennine Way on recreational use of blanket bog in the Peak District National Park, England*. Biological Conservation 82, **337– 343.**

Rodwell, J.S. (ed.), 1991. *British Plant Communities Volume 2: Mires and Heaths*. Cambridge University Press.

Ruddock, M., and Whitfield, D.P., 2007. *A Review of Disturbance Distances in Selected Bird Species*. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage.

Stace, C., 2019. *New Flora of the British Isles. Fourth Edition*. C & M Floristics.

Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. & Win, I. 2021. Birds of Conservation Concern 5: *The Status of All Regularly Occurring Birds in the UK, Channel Islands and Isle of Man.* British Birds. **114:** 723-747.

Yalden, D.W., 1992. *The influence of recreational disturbance on common sandpipers Actitis hypoleucos breeding by an upland reservoir, in England*. Biological Conservation 61, 41–49.

Yalden. D.W., and Yalden, P.E., 2009. *The Sensitivity of Breeding Golden Plovers Pluvialis apricaria to Human Intruders*. Bird Study, 36:1, 49-55.

Canal & River Trust, 2023. *March Haigh Reservoir Justification for a Permanent Access Track.* Canal & River Trust

FIGURES

401500 402000 402500 403000

413000 412500

March Haigh Reservoir

March Haigh Flat

Hard Head Clough

Head Clough

Higher Green Owlers

Lower Green Owlers

White Hall

Green Owlers Clough

South Pennine Moors SSSI

Haigh Clough

Haigh Clough

Willykay Clough

Park Clough SSSI

Bank Top Farm

BLAKE LEA LANE

Legend

- Works area red line
- Site of Special Scientific Interest (SSSI)
- South Pennine Moors Special Protection Area (SPA)
- South Pennine Moors Special Area of Conservation (SAC)

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

N

ISO A3

0 25 50 100 150 Metres

Canal & River Trust
Making life better by water

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Project Name: March Haigh Reservoir

Discipline: Ecology

Title:

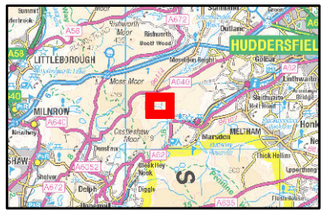
LOCATION MAP

Scale	Drawing No.	
1:5,000	Figure 1	
Drawn By: CC	Originator: KL	Date: 06/03/2023
PAA Ref.	Revision: 1.0	

Figure 1 - Site Location March Haig - CART02-1 CC 230306_.mxd

402000
402500
413000
412500

UNIT 141
UNIT 149
UNIT 142
UNIT 144
March Haigh Flat
Haigh Clough
Willykay Clough
Green Owlers Clough
White Hall
Bank Top Farm
BLAKE LEA LANE
Haigh Clough



Legend

- Boundary of proposed track works
- Red line application boundary
- South Pennine Moors SSSI Units

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

N

ISO A3

Metres

0 25 50 100 150

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Telephone 01298 27086

Project Name: March Haigh Reservoir

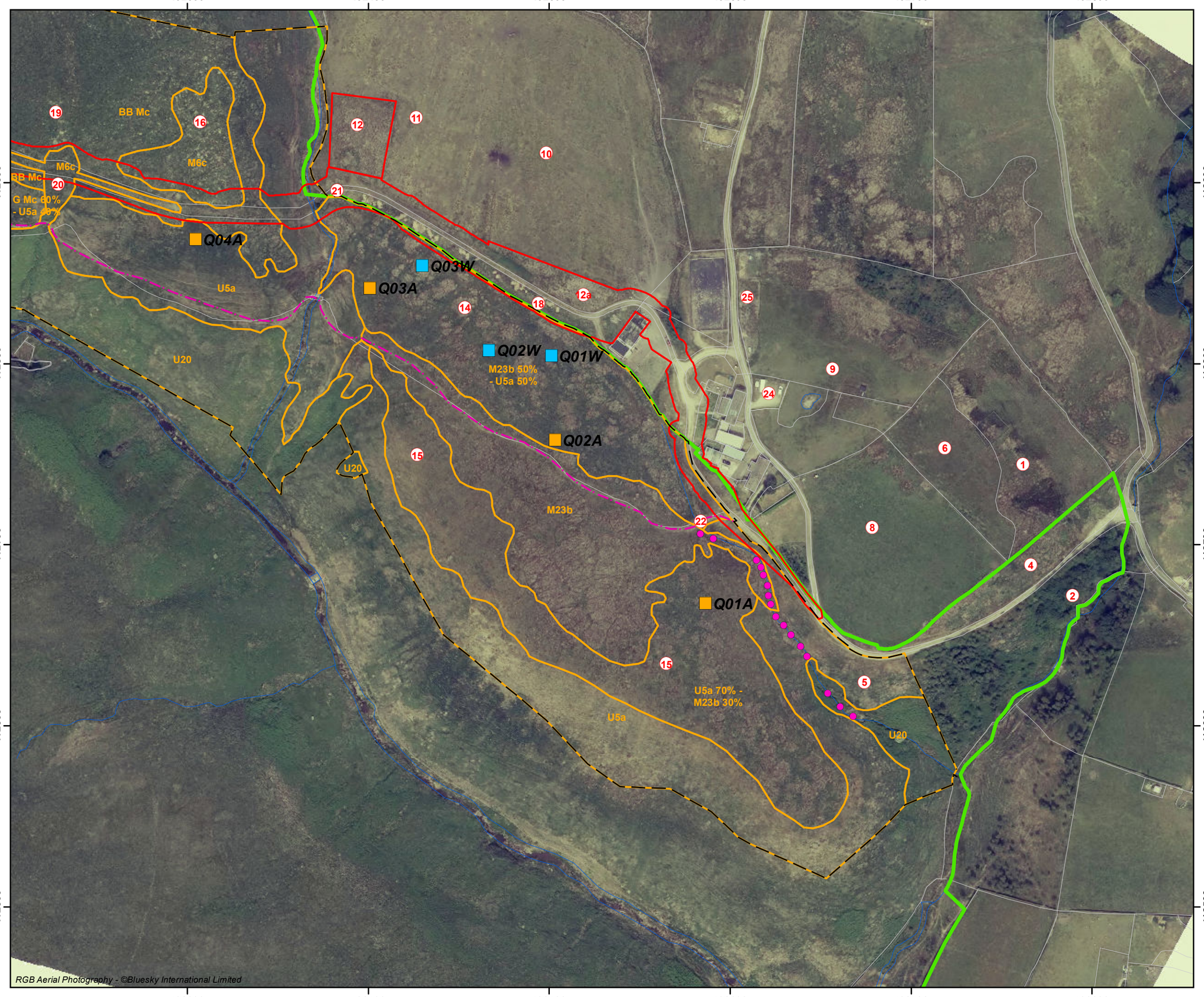
Discipline: Ecology

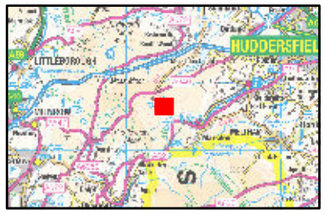
Title:

South Pennine Moors SSSI Units and Proposed Route

Scale	1:4,000	Drawing No.	Figure 1
Drawn By	CC	Originator: SRG	Date: 02/03/2023
PAA Ref.		Revision	1.0

Figure 1 - SSSI Units and Proposed Route - CART02-4 CC 230302.mxd





Legend

- Works area - red line
- South Pennine Moor SSSI, SAC and SPA
- NVC community
- Survey extent

Quadrats

- Acid grassland quadrat
- Purple moor-grass dominated quadrat
- Wet grassland quadrat
- Target notes
- Footpath
- Himalayan balsam

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

N

ISO A3

Metres

0 10 20 40 60 80

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Project Name: March Haigh Reservoir

Discipline: Ecology

Title:

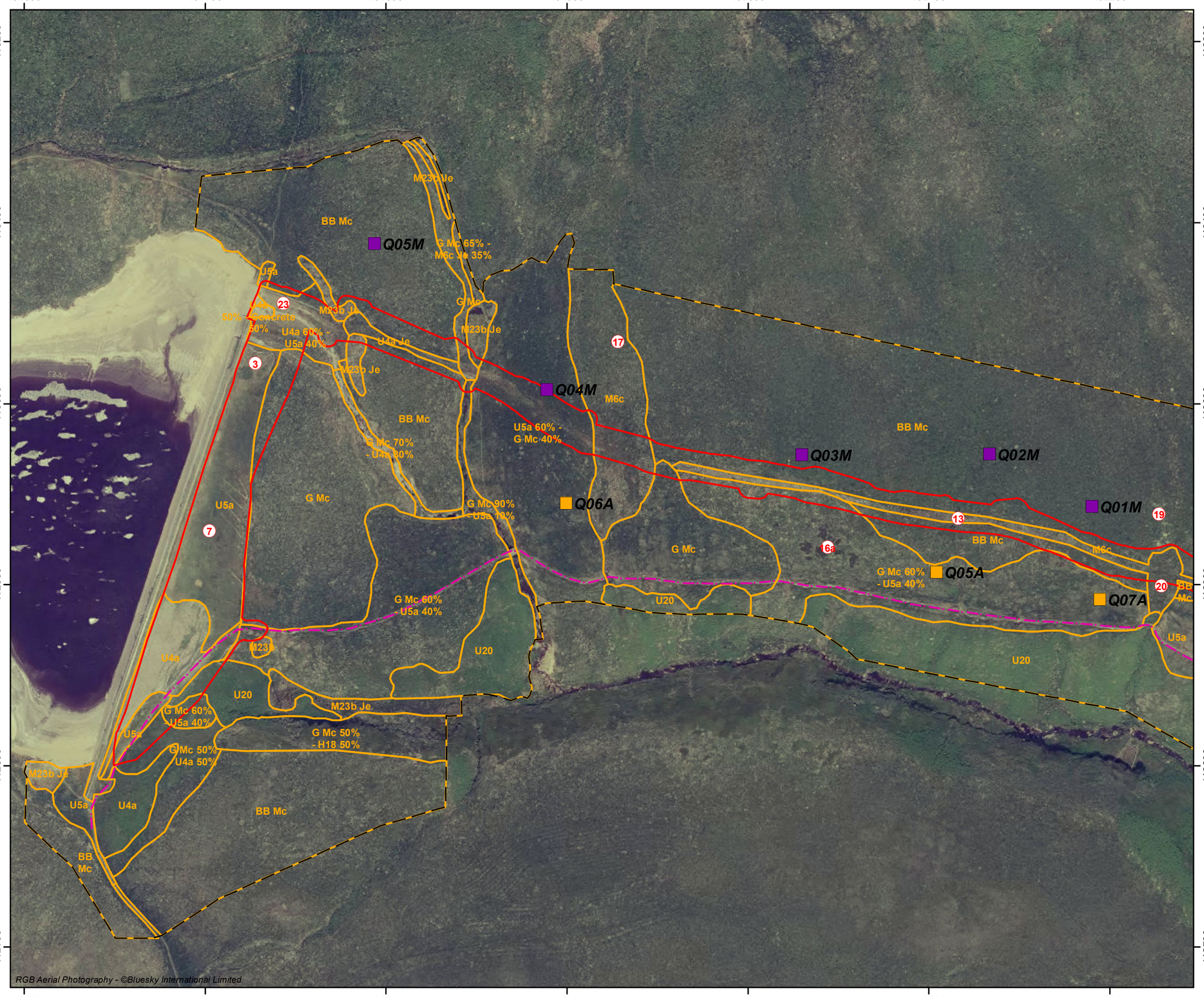
NATIONAL VEGETATION CLASSIFICATION (NVC) SURVEY EAST

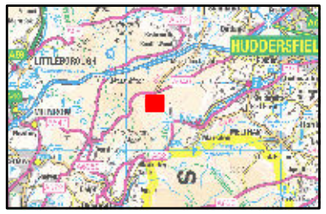
Scale	Drawing No.
1:2,000	Figure 4a

Drawn By	Originator	Date
CC	KL	06/03/2023

PAA Ref.	Revision
	1.0

Figure 3a - NVC East March Haig - CART02 CC 230123.mxd





Legend

- Works area - red line
- South Pennine Moor SSSI, SAC and SPA
- NVC community
- Survey extent

Quadrats

- Acid grassland quadrat
- Purple moor-grass dominated quadrat
- Wet grassland quadrat
- Target notes
- Footpath

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

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Project Name: March Haigh Reservoir

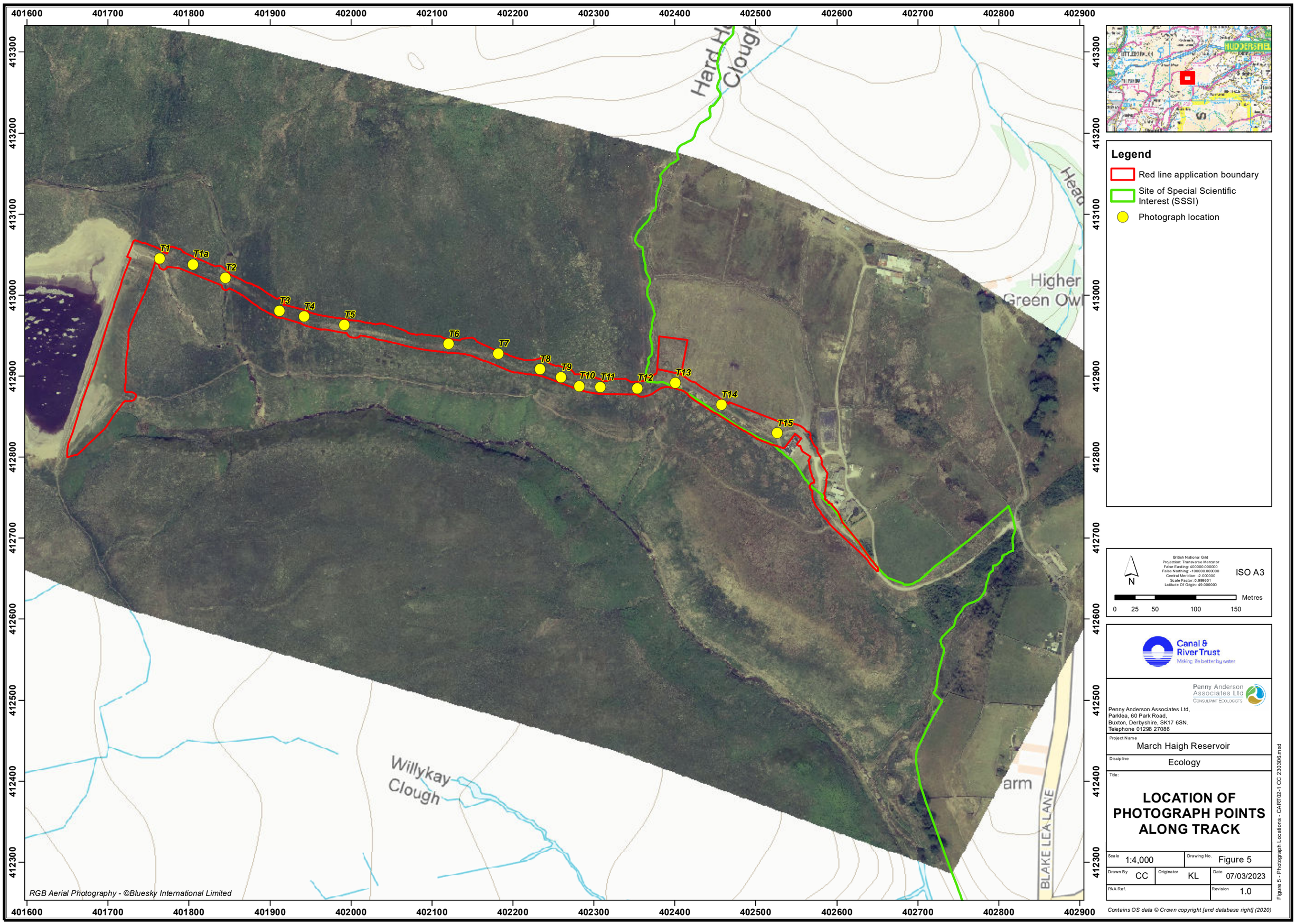
Discipline: Ecology

Title:

NATIONAL VEGETATION CLASSIFICATION (NVC) SURVEY WEST

Scale	1:2,000	Drawing No.	Figure 4b
Drawn By	CC	Originator CB	Date 06/03/2023
PAA Ref.		Revision	1.0

Figure 3b - NVC West March Haig - CART02 CC 230123.mxd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RGB Aerial Photography - ©Bluesky International Limited
HUDDERSFIELD
Legend
Red line application boundary
Site of Special Scientific Interest (SSSI)
Photograph location
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British National Grid
Projection: Transverse Mercator
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Latitude Of Origin: 49.000000
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Project Name
March Haigh Reservoir
Discipline
Ecology
Title:
LOCATION OF PHOTOGRAPH POINTS ALONG TRACK
Scale
1:4,000
Drawing No.
Figure 5
Drawn By
CC
Originator
KL
Date
07/03/2023
PAA Ref.
Revision
1.0
Figure 5 - Photograph Locations - CART02-1 CC 230306.mxd
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405000 405500 406000 406500

412000 411500 411000

Cellars Clough
Lower Chain Farm
B6107
Blackmoorfoot Conduit
Lingards Wood Moor
Range House
Holme Moor
Greyston Farm
Deer Hill Conduit
Ellen Clough
Upper Acre Head
River Colne
Marsden
MARSDEN LA
SPRING HEAD LANE
DIRKER BANK ROAD
DIRKER AVENUE
PLAINS LANE
BANK DIRKER ROAD
GRANGE AVENUE
MANCHESTER ROAD (MARSDEN)
STUBBIN ROAD
GATE HEAD
GATEHEAD BANK
MELTHAM ROAD
LANE INGS
WAREHOUSE HILL ROAD
PW
PO
Library
Education Facility
Education Facility
MARKET PLACE
BROUGHAM ROAD
A62
INNER HEY
CARRS STREET
CARRS ROAD
REEL STREET
DEER HILL CL
DEER HILL DR
DEER HILL DRIVE
OTTIWELLS TERRACE
ROYDS STREET
SPRING STREET
BINN ROAD

Legend

Proposed compensation area

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

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ISO A3

Metres

0 25 50 100 150

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Project Name: March Haigh Reservoir

Discipline: Ecology

Title:

Proposed Compensation Area

Scale	1:6,000	Drawing No.	Figure 6
Drawn By	CC	Originator SRS	Date 06/03/2023
PAA Ref.		Revision	1.0

Figure 6 - Proposed Compensation Area - CART02-1 CC 230306.mxd

APPENDICES

APPENDIX 1

Photographs

Appendix 1 Photographs

T1 looking west towards the reservoir, close to the western end

T1 looking east, dry narrow path used by public to access reservoir overflow/spillway.

T1a Route of track through blanket bog and deep peat.

Almost a double wheeled track, substrate hard but has been wet and rutted in the past. Some stone near the surface. Looking east

T2 River crossing closest to reservoir

A small rush dominated section of track by stream crossing, looking east

T3 Second stream crossing, wet

Wet patch on the line of the track, pipe probably blocked.

T4 Line of track visible as a line of rushes – looking east

T4 Line of track less visible looking back, west toward reservoir.

T5 Rushes, variable peat depth, some ruts in substrate, variable, looking east

T5 Rushes, looking west to reservoir

T6 Clear line of rushes, looking east, very wet substrate, surface c30cm below adjacent ground level.

T6 Route of track clear not the distance as line of rushes, looking west

T7 Looking east, slightly drier to the east than the last section and ground less variable.

T7 Looking west, back at wetter section

T8 looking east

T8 looking west, line clearly visible.

T9 Looking east, line visible, soft-rush and tufted hair-grass increasing again on the line

T9 Looking west, line visible

T10 Looking east, wide section of soft-rush, very wet, frequent *Sphagnum*

T10 Looking west

T11 Looking east, east of this point there are small amounts of common cottongrass on track line

T11 Looking west

T12. Gate is the boundary of the SSSI. Looking east out of the SSSI, East of here the vegetation is acid grassland and very thin soils.

T12 Looking west at the soft-rush and cottongrass

T13 East, outside SSSI, small flush in foreground

T13 West into the SSSI and first stream crossing

T14 Track looking west with disturbed fenced section to north (right)

T15 Eastern end of the track by the barn, looking west, dry surface but clearly gets muddy.

APPENDIX 2

South Pennine Moors Special Protection Area Citation

EC Directive 79/409 on the Conservation of Wild Birds: Special Protection Area

SOUTH PENNINE MOORS
(SOUTH PENNINE MOORS, PHASE 2)

The South Pennine Moors proposed Special Protection Area is an upland of international importance. It provides habitat for an important assemblage of breeding moorland and moorland fringe birds.

The South Pennine Moors (phase 2) qualifies under Article 4.1 of the EC Directive on the Conservation of Wild Birds (79/409) by supporting nationally important breeding populations of two species listed in Annex 1. The most recent count is of 28 pairs of merlin *Falco columbarius* (4.3% of the British breeding population) and 292 pairs of golden plover *Pluvialis apricaria* (1.2%). The density of breeding golden plover is high compared to other regional populations in northern England and Scotland.

The site qualifies under Article 4.2 by supporting, in summer, a diverse assemblage of breeding migratory birds of moorland and moorland fringe habitats including: golden plover, lapwing *Vanellus vanellus*, dunlin *Calidris alpina*, snipe *Gallinago gallinago*, curlew, redshank *Tringa totanus*, common sandpiper *Actitis hypoleucos*, short-eared owl *Asio flammeus*, whinchat *Saxicola rubetra*, wheatear *Oenanthe oenanthe*, ring ouzel *Turdus torquatus* and twite *Carduelis flavirostris*. The population of twite in the South Pennines is geographically distinct and isolated from others in northern Britain, Ireland and Europe.

The South Pennine Moors support the southernmost assemblage in Britain of breeding merlin, red grouse *Lagopus lagopus*, golden plover, dunlin, short-eared owl and twite. These species are either extremely local, rare or absent further south. Together with the scattered populations of merlin, golden plover, dunlin and twite in Ireland these are the most southwestern breeding populations in the world. The South Pennine Moors thus have an important role in maintaining the breeding range of these species.

CAR
January 1995

This citation / map relates to a site entered in the Register of European sites for Great Britain.
Register reference number UK9008022
Date of registration 03 SEP 1998
Signed .....
on behalf of the Secretary of State for the Environment

APPENDIX 3

Vehicle Movement Summary

Appendix 3 Proposed Vehicle Movements

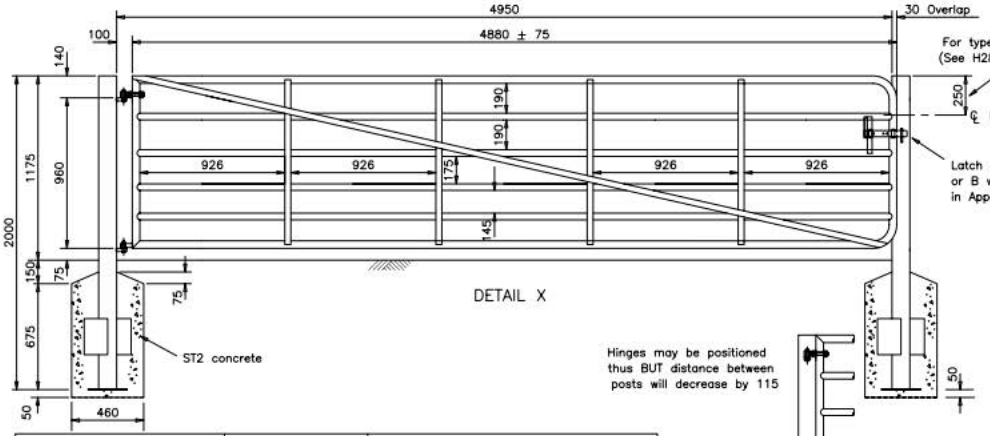
Activity	Frequency	Vehicle	People	Duration
Reservoir Surveillance Inspector[1]	3 times a week*	Welfare van (3-tonne)	2 people	4 Hours
Routine maintenance (Minor repairs) – i.e. repair vandalism damage, pitching repairs	Biannually	Tipper vehicle (7.5-tonne) and Welfare van (3 tonne)	2 to 4+ people	1 to 5 Days
Operation - Valve adjustment to set discharge rate	Weekly	Welfare vehicle	2 People	1 Hour
Grass cutting – General for embankments	4 times per year	Welfare van (3-tonne) plus 4WD (Land Rover and medium-sized trailer)	2 to 4 people	1 Day
Vegetation clearance and removal from structures	4 times per year	Welfare van (3-tonne) plus 4WD (Land Rover and medium-sized trailer)	2 to 4 people	1 Day
Planned Preventative Maintenance[2] within Confined spaces access to Bull Pit, chambers and tunnels– Mechanical cleaning, oiling and replacing	Annually	Welfare van (3-tonne), Tipper vehicle (7.5-tonne)	2 to 4 people	1 Day
Inspecting engineer inspections - Including annual S12 inspection (legal requirement)	Biannually	3 x Private vehicles (2-tonne), Welfare vehicle (3-tonne)	4 to 8 people	1 Day
S10 Inspection (legal requirement)	At least every 10 years	3 x Private vehicles (2-tonne), Welfare vehicle (3-tonne)	4 to 10 people	2 Days
Duty Officer (Access out of hours, all weather, any time, to operate valves)	Emergency	Private vehicle	1 to 2 people	As required
Major maintenance construction works	As a result of defect discovered during routine inspection	*See Liebherr – LTC-1050-3.1	In excess of 10 people	Expect 1 to 6 months
Major emergency	Defect requiring emergency drawdown	As above.	In excess of 10 people	Expect 1 to 6 months
*Note: Liebherr – LTC-1050-3.1 is omitted from turning analysis for the track design on instruction of the brief. It is assumed this vehicle will not exceed the design loads of a 28-tonne crane discussed in Section 5 of this document.				

[1] *RSI*

[2] *PPM*

APPENDIX 4

Gate Specification



DESCRIPTION OF MATERIAL	SIZE	FIXINGS AND FITTINGS
Hanging post (Tubular steel)	139.7 outer dia.x 4.5 thick	Top capping plate 4.8 thick Two 230x150x4.8 wing plates stitch welded to post Base plate 250x250x4.8 Cap and base plates to be continuously flush welded to tube
Shutting post (Tubular steel)	114.3 outer dia.x 3.6 thick	
Outer frames	48.3 outer dia.x 2.9 thick	
Infilling horizontal rails (All tubular steel)	42.4 outer dia.x 2.6 thick	
Vertical braces (steel flat)	Four 38x4.8	Fillet welded to each gate member crossed by braces
Diagonal braces (steel flat)	Two 38x4.8	

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. Gates shall comply with the appropriate Clauses in Series 300, any further requirements in Appendix 1/15 or 3/1, and with BS 3470. (Cattle yard).
3. For details of latches and fittings see Drawing Nos. H26,H27 & H28.
4. Gate stops to be provided in accordance with Drawing No. H33.
5. The gate shall open into the owner's property.
6. The corners of the main frame may be rounded, rounded and mitred (as drawn),mitred,saddled or crimped.
7. Protective treatment to be as described in Appendix 1/15 or 3/1.

HIGHWAY CONSTRUCTION DETAILS	FENCES, STILES & GATES	B	MAY 04	STEEL EXTRA WIDE SINGLE FIELD GATE	Drawing No.
		A	DEC 91		H19
		Issue	Date		

APPENDIX 5

Compensatory Scheme for March Haigh Reservoir Proposed Access Track

COMPENSATORY SCHEME FOR MARCH HAIGH RESERVOIR PROPOSED ACCESS TRACK

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

1. Proposed Scope of Works

The area of Holme Moor close to Round Hill 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 impacts of the proposed access track at March Haigh Reservoir.

Purple moor-grass is dominant over wide areas at Holme Moor resulting in an impoverished vegetation and low biodiversity. Restoration, 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 at least 3.5 ha of purple-moor-grass dominated vegetation of the plateau areas around Round Hill, part of Holme Moor. 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 managed in perpetuity.

2. Intervention Description

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

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.
- 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
- Hare's-tail cottongrass
- Sphagnum
- Crowberry
- 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.

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 barer 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 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

Year 1 = March 2026

Year 3 = March 2028

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 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 significant areas likely supporting less than 40cm peat (ie shallow peat).

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's) '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 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 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.

7. Management and Maintenance

Management and maintenance in perpetuity with a walkover report conducted 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.

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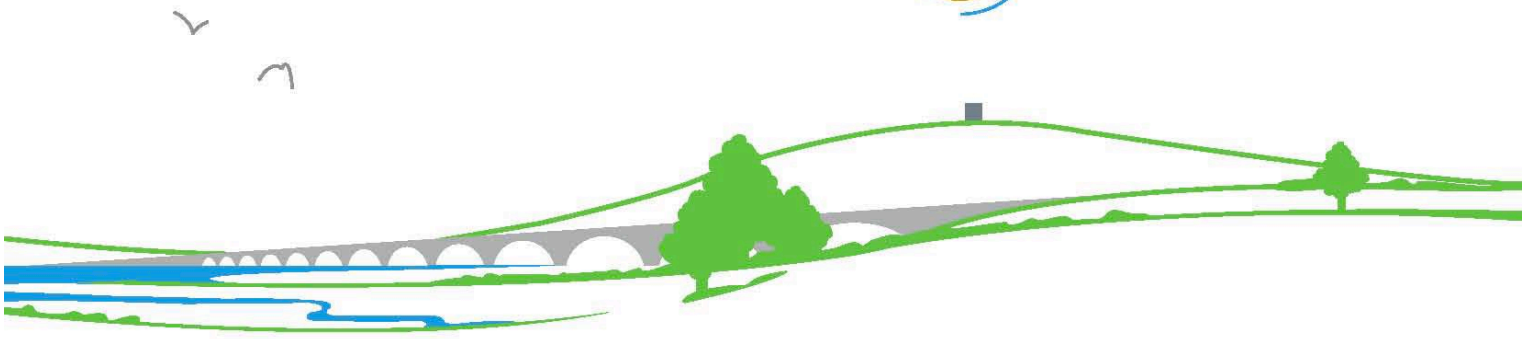

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