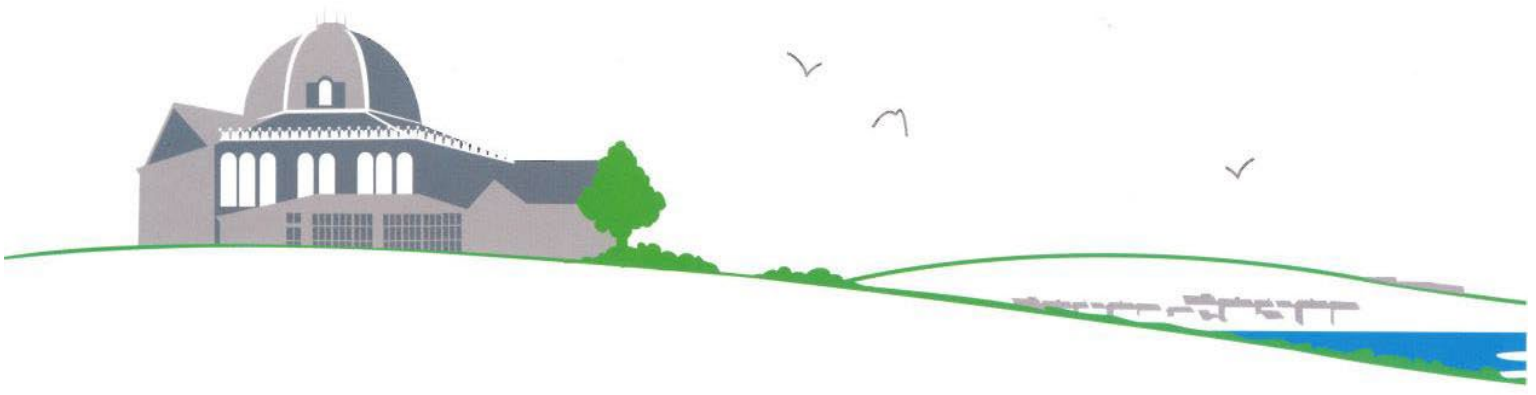
Penny Anderson Associates Ltd
CONSULTANT ECOLOGISTS

CANAL & RIVER TRUST

MARCH HAIGH RESERVOIR ACCESS TRACK

BIODIVERSITY NET GAIN ASSESSMENT



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BIODIVERSITY NET GAIN 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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APPENDICES

1. INTRODUCTION

1.1 Penny Anderson Associates (PAA) has been commissioned to complete a Biodiversity Net Gain (BNG) assessment of the proposed access track at March Haigh Reservoir, Marsden, Kirklees (hereafter referred to as the 'site').

1.2 The BNG assessment is based on ecological surveys of the site previously carried out and reported (PAA 2021), which comprised an extended Phase 1 habitat survey and National Vegetation Classification (NVC) survey.

1.3 The above survey provides an ecological baseline of the site and evaluates the ecological receptors prior to development, to enable an assessment of the longer-term effect of the development on features of ecological interest.

1.4 This BNG assessment report forms part of the evaluation of the effect of the proposed development on ecological features of the site. It uses a Biodiversity Impact Calculator that aims to quantify in value, habitats and features in 'biodiversity units' using a metric[1] to assess if the development is likely to result in no net loss, net loss or net gain to biodiversity.

Policy Context

1.5 The National Planning Policy Framework (NPPF 2021) provides guidance for local authorities on the content of the Local Plans and is a material consideration in determining planning applications. Briefly, with an overall focus on sustainable development, the NPPF states that developments should aim to engender positive outcomes for habitats and biodiversity, with a particular focus on the maintenance and creation of ecological networks.

1.6 The NPPF identifies the following principals that should be applied by local planning authorities when determining planning applications:

a. If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b. Development on land within or outside a Site of Special Scientific Interest (SSSI), and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSI;

c. Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and

d. Development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should

[1] *Metrics are surrogates, or combinations of measurements that provide an assessment of the biodiversity value of an area. It allows the biodiversity impact of a development to be quantified and if necessary, the compensatory action required to off-set the biodiversity loss (Defra 2012).*

be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.

1.7 The NPPF states that the planning system should contribute to and enhance the natural environment through a range of actions, including:

- Protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils;
- Recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services; and
- Minimising impacts on biodiversity and providing net gains for biodiversity including establishing coherent ecological networks that are more resilient to current and future pressures.

1.8 To protect and enhance biodiversity and geodiversity, plans should:

- Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and
- Promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.

1.9 Kirklees Local Plan[2] includes Policy LP30 Biodiversity and Geodiversity which requires development proposals to '*provide net biodiversity gains through good design by incorporating biodiversity enhancements and habitat creation'*.

1.10 In Addition, Kirklees Council's detailed Technical Note on Biodiversity Net Gain[3] provide further advice on applying the BNG Metric and how the approach fits within Kirklees wider biodiversity policies.

[2] https://www.kirklees.gov.uk/beta/planning-policy/local-plan.aspx

[3] https://consult.kirklees.gov.uk/portal/pp/spds/net_gain_note/biodiversity_net_gain?pointId=1602162128605&do=view

2. BIODIVERSITY NET GAIN METRIC APPROACH

2.1 The Calculator applied in this assessment is the Biodiversity Metric 3.1, which replaces the earlier Defra Metric versions. This Metric is used to calculate the biodiversity units of a site before and after the proposed development. The Calculator spreadsheet and associated guidance notes were available via the Natural England 'Access to Evidence' web pages[4].

2.2 The information required to complete the Calculator is:

- Area of each habitat (ha) and length of linear features (km), e.g. hedgerows;
- Habitat type;
- Habitat condition;
- Impact from development; and
- Proposed biodiversity mitigation/compensation measures.

Habitat and Linear Feature Assessment

2.3 The existing habitats, linear features and habitat condition calculations are based on a Phase 1 habitat survey (PAA 2021). The map was updated in 2022 to reflect some minor changes to application boundary extent. A River Condition Assessment (RCA) using the methodology[5] required for Metric 3.1 was employed to account for the presence of several small un-named streams running adjacent to and across the site. The habitat maps are provided in Appendix 1.

2.4 The current Landscape Plans for the scheme were used to identify the proposed habitats and post-development land use types (Appendix 2), along with input from the Design Team.

2.5 Existing habitats were digitised accurately to British National Grid using Ordnance Survey vector mapping as a base, along with high resolution aerial photography as a guide, as part of the previous habitat survey results preparation. These datasets were available for use in the BNG assessment process. The areas (ha) of the development proposal features were provided to PAA by the Design Team.

2.6 The Calculator requires that each habitat is given a 'distinctiveness' score that includes parameters such as species-richness, diversity, rarity and the degree to which habitats support species rarely found in other habitats. This is completed automatically by the Calculator when the habitat type is selected, and the categories comprise:

- Very High;
- High;
- Medium;
- Low; and
- Very Low.

2.7 The Calculator also requires a 'condition' assessment for each habitat and feature, and this is allocated to each habitat based on the guidelines and targets provided in the methodology (Panks *et al.* 2021a, 2021b) and the Phase 1 habitat survey results, along with ecological expertise and

[4] www.publications.naturalengland.org.uk/publication/6049804846366720 *(downloaded June 2022)*

[5] www./modularriversurvey.org/river-condition/

knowledge of the site where necessary. Condition categories available, which vary slightly depending on the habitat in question, within the Calculator are:

- Good;
- Fairly Good;
- Moderate;
- Fairly Poor;
- Poor; and
- Not Applicable.

2.8 Finally, the 'strategic significance' of the habitat is allocated depending on the identification of the habitat in that location being nationally or locally significant. This is evaluated from local plans, designations, etc. In the absence of any relevant strategic documentation indicating the habitat in that area is of strategic significance for biodiversity, then the area is given a value of 1.

2.9 The Calculator then requires the GIS[6]-generated data (ha or km) to be input for each of the habitats as classified under each of the following categories:

- Area of habitat retained – kept on site throughout any development of landscaping process and featuring in final site designs;
- Area of habitat enhanced - kept on site throughout any development or landscaping process but enhance (for wildlife) as part of the design;
- Area of habitat lost – this is calculated by the Calculator once other fields are completed; and
- Area of habitat created – this is calculated by the Calculator once other fields are completed.

2.10 The area of each habitat type created is then entered along with the same suite of associated characteristics (i.e. condition, strategic significance) and automatically generated data (e.g. distinctiveness).

2.11 As part of the proposed habitat creation and restoration, the Calculator takes into account 'risk factors'. These include:

- Temporal factors – time required to reach target condition (the creation of a habitat, e.g. woodland takes time to mature and reach target condition). The temporal factor is generated automatically for each proposed habitat type but additional data covering delays in habitat creation or advance habitat creation due to specific project schedules can be accommodated in the overall assessment; and
- Difficulty factors – risk of failure of achieving habitats through restoration and/or creation. Some restoration and enhancements measures are more difficult to achieve than others. The Calculator automatically selects the level of difficulty depending on the habitat chosen.

2.12 Linear features, such as hedgerows, ditches and streams are assessed separately within the methodology. The current length of the feature is entered, and the feature condition is selected based on the guidelines presented in the methodology. The lengths to be retained, removed or enhanced are added to the spreadsheet along with any new linear features to be created. The units calculated pre- and post-development are compared and the number of 'hedge biodiversity units' or 'river biodiversity units' delivered under the proposed scheme is automatically calculated.

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[6] *Geographic Information System*

3. PRE- AND POST-DEVELOPMENT HABITATS AND THEIR CONDITION

Overview

3.1 March Haigh Reservoir is located approximately 3.5 km northwest of Marsden in the Metropolitan District of Kirklees, West Yorkshire, within an area designated as part of the South Pennines SSSI, South Pennine Moors Special Area of Conservation (SAC) and South Pennine Moors (Phase 2) Special Protection Area (SPA).

3.2 The proposed development comprises 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 permanent fencing at March Haigh Reservoir.

3.3 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.

3.4 An arm of 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) to accommodate the installation of a permanent stock fencing to provide protection of the dam embankment from grazing cattle on the wider moorland.

3.5 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.

Existing Habitats

3.6 Habitats within and adjacent to the site comprise a range of moorland vegetation types including flushes and streams, modified blanket bog over deep peat, purple moor-grass (*Molinia caerulea*[7])-dominated marshy grassland over thinner peat, acid grassland, and rush (*Juncus* sp.)-dominated areas, the latter often associated with the line of the former temporary track. The peat depth varies across the site with the deepest peats occurring on the north side of the main track (>100cm deep).

3.7 The habitats, peat resource and hydrology are, for much of the site, already somewhat modified due to the previous temporary track. However, there has been substantial revegetation of the former track route over the intervening years and hydrological connectivity between the blanket bog area above the site and the thinner peats and remnant blanket bog areas below the former track line has been retained. The location of these habitats on the edge of the main blanket bog area makes them somewhat vulnerable to impacts such as drying, erosion, slumping which may be worsened by potential future climate change scenarios.

3.8 A summary of the baseline habitats on site and their condition in relation to the BNG assessment criteria are provided in Tables 1 and 2.

3.9 In terms of strategic significance, those habitats within the designated areas (SSSI, SAC, SPA) are allocated a High strategic significance while those just outside the designated areas are

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

allocated Medium to account for their potential to functionally support the designated features of interest. Non-habitat features, such as hardstanding, are allocated a Low strategic significance.

Woodland, Scrub and Isolated Trees

3.10 The woodland within the survey area is largely young plantation woodland with a few self-sown scattered willow (*Salix* sp.) species along the line of the temporary track and some natural regeneration of trees in the woodland adjacent to Haigh Clough.

3.11 At the western end of the site, on the reservoir embankment, there is a small patch of scrub, comprising five to six small goat willow (*Salix caprea*) bushes, 4 to 5m tall in a small, fenced area. The ground flora is damp acidic grassland dominated by soft-rush (*Juncus effusus*) with ferns, bilberry (*Vaccinium myrtillus*) and foxglove (*Digitalis purpurea*).

3.12 There are a small number of self-seeded native trees along the scheme, two at the east and then two further individual trees scattered along the proposed route. These trees are small specimens but do meet the criteria of 75mm diameter stem at 1.5m high. To account for their biodiversity value, these trees have been included as 'area' habitats using the Urban Tree Calculator. Although not in an urban environment, this approach can be used for individual trees within a rural settings where other tree categories (such as 'hedgerows with trees' or 'lines of trees') are not appropriate[8].

Degraded Blanket Bog

3.13 This habitat type covers a relatively large area of the site, and comprises vegetation largely dominated by purple moor-grass tussocks over variable depths of peat soils. The Phase 1 description defines purple moor-grass-dominated marshy grassland as 'vegetation with a greater than 25% cover of purple moor-grass, on less than 0.5m of peat'. Purple moor-grass-dominated vegetation on peat with a depth of greater than 0.5m is defined as 'wet modified bog'. For the purposes of the Metric, both these habitat types have been included as degraded blanket bog, following the definition of the UK Habitats Classification system[9].

3.14 On the degraded deeper peat, the purple moor-grass-dominated vegetation has locally occasional patches of common cottongrass (*Eriophorum angustifolium*). Other typical species of this habitat such as heather (*Calluna vulgaris*), crowberry (*Empetrum nigrum*), and hare's-tail cottongrass (*Eriophorum vaginatum*) were very rare. There were, however, small patches of *Sphagnum* moss, generally fringed bog-moss (*S. fimbriatum*), flat-topped bog-moss (*S. fallax*) and blunt-leaved bog-moss (*S. palustre*) with very few patches of papillose bog-moss (*S. papillosum*). Other mosses were generally sparse, with heath plait-moss (*Hypnum jutlandicum*) the most common.

3.15 Other species recorded in this habitat included localised patches of soft-rush, rosebay willowherb (*Chamaenerion angustifolium*), and one area of bladder-sedge (*Carex vesicaria,* TN[10]19).

3.16 The purple moor-grass-dominated areas of degraded blanket bog support few other plant species but occasionally have very low abundances of wavy hair-grass (*Avenella flexuosa*), common bent (*Agrostis capillaris*), sweet vernal-grass (*Anthoxanthum odoratum*), mat-grass (*Nardus stricta*)

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[8] *Panks et al. 2021b, para. 7.20*

[9] *https://ukhab.org/*

[10] *Target Note*

and sheep's-fescue (*Festuca ovina*). These areas typically have a cover of greater than 90% of purple moor-grass and are, therefore, very species-poor.

Upland Flushes

3.17 The site is crossed by a number of upland acid flushes dominated by rushes, the largest of which is dominated by soft-rush and purple moor-grass with locally occasional foxglove, marsh thistle (*Cirsium palustre*) and velvet bent (*Agrostis canina*), with occasional patches of flat-topped bog-moss.

Upland Acid Grassland

3.18 Areas of unimproved upland acid grassland form a major component of the site's vegetation and is generally a mixture of wavy hair-grass, common bent, sweet vernal-grass, mat-grass and sheep's-fescue with a very variable component of purple-moor-grass and heath wood-rush (*Luzula multiflora*). Heath bedstraw (*Galium saxatile*) is locally frequent as is tormentil (*Potentilla erecta*), but other forbs are localised in occurrence. There are also localised patches of oval sedge (*Carex leporina*) and common sedge (*Carex nigra*). There are very small, rare to occasional patches of heather and bilberry within the acid grasslands areas, increasing in frequency towards the west of the survey area. Some of the areas of unimproved acid grassland incorporate small areas of bracken (*Pteridium aquilinum*), areas of locally dominant purple moor-grass and patches of ferns.

3.19 Semi-improved acid grassland is more localised, restricted to enclosed areas and the reservoir embankment. In addition to the typical acid grassland grasses; common bent, sweet vernal-grass and mat-grass, there are other agricultural species such as perennial rye-grass (*Lolium perenne*) and crested dog's-tail (*Cynosurus cristatus*) indicating agricultural improvement as does the frequent occurrence of white clover (*Trifolium repens*). A key feature of this habitat is the high degree of very local variation of the dominant grass species and low diversity of the forbs.

Neutral Grassland

3.20 The narrow strip of approximately 5m width on top of the reservoir embankment is also classed as neutral semi-improved grassland. It is fenced from the dam bank and has frequent to locally abundant occurrences of perennial rye-grass, crested dog's-tail and white cover indicating agricultural improvement but also supports a range of typical neutral grassland species including; Yorkshire-fog (*Holcus lanatus*), sweet vernal-grass, red fescue and cat's ear (*Hypochaeris radicata*).

3.21 Some stands of tall perennial forbs such as rosebay willowherb, common nettle (*Urtica dioica*) and creeping thistle close to White Hall Farm also classify as this habitat type.

Bracken

3.22 Where bracken has been mapped, it is generally considered to be continuous and dense with little ground layer. Where there is a ground layer it is generally grass-dominated with a mix of acid grassland species and very species-poor. A Condition Assessment is not required for bracken-dominated habitats.

Other Land Use Types

3.23 Small areas of other land use types are also included in the site, mainly occurring in and around White Hull farm and Blake Lea Lane to the east:

- Small area of mown grassland mapped as amenity grassland – vegetated garden;

- Bare ground;
- Hardstanding – sealed surface; and
- Crushed rock – unsealed surface.

3.24 Of these land use types; only bare ground requires a Condition Assessment under the Metric and was allocated as 'Poor' condition.

Table 1 Summary of Baseline Habitats – Area Habitats

Pre-Development Habitat Area Feature	Value (Ha)	Distinctiveness	Condition
Other woodland; mixed	0.0211	Medium	Poor
Mixed scrub	0.0268	Medium	Poor
Blanket bog	1.2511	V.High	Moderate
Upland acid grassland	1.0846	Medium	Good
Other neutral grassland	0.1900	Medium	Poor
Bracken	0.0257	Low	N/A
Fens (upland and lowland)	0.0235	V.High	Good
Vegetated garden	0.0530	Low	N/A
Developed land; sealed surface	0.0074	V.Low	N/A
Vacant/derelict land/bare ground	0.0679	Low	Poor
Artificial unvegetated, unsealed surface	0.0766	V.Low	N/A
Native Tree (x4 self-seeded)	0.0163	Medium	Moderate
Upland acid grassland (proposed compound on purple moor-grass dominated inbye)	0.1369	Medium	Moderate

Watercourses

3.25 There are several watercourses within the March Haigh moorland area, with four streams (labelled Streams 1, 3, 4 and 5) being within the red line. The bank top of Stream 2 is more than 10m from the site boundary and is, therefore, not included in the Metric.

3.26 The streams are perpendicular to the proposed track alignment and are contained within rocky stream beds with a very narrow fringe of wetland vegetation. The vegetation on the banks of the streams is generally typical of the adjacent acid grassland/degraded blanket bog habitats, with a higher occurrence of soft-rush and cuckooflower (*Cardamine pratensis*).

3.27 At the eastern end of the site, a small ditch (Ditch 1) appears adjacent to the stone wall marking the north-eastern boundary of the protected area, just within 10m of the site boundary. This ditch then becomes a more natural stream as it runs further south. Additional wetland species within the ditch were limited with water figwort (*Scrophularia auriculata*), round-leaved crowfoot (*Ranunculus omiophyllus)*, blinks (*Montia fontana*) and floating sweet-grass (*Glyceria fluitans*) all recorded as locally occasional, with Himalayan balsam (*Impatiens glandulifera*) as rare.

3.28 In terms of Condition, all streams were evaluated as being in Moderate condition while the ditch was evaluated as being in Poor condition due to the presence of Himalayan balsam, low water levels (<50cm deep) and a limited range of aquatic plant species.

Table 2 Summary of Baseline Linear Features - Watercourses

Pre-Development Linear Feature	Length (km)	Distinctiveness	Condition
Streams 1, 3, 4 and 5 (on site)	0.123	High	Moderate
Ditch 1 (off site, but within 10m)	0.116	Medium	Poor

Post-development Habitats

3.29 Please refer to Appendix 2, which presents the scheme proposals available at the time of the assessment. The total area of the site is calculated as approx. 2.98ha.

3.30 All habitat types present currently on the site will be retained but many will be reduced in size due to the land take of the proposed new track. On site streams are expected to have only minor encroachment on their riparian zones due to installation of new culverts (detailed design to be developed), while the off site ditch is assessed as being unaffected by the scheme.

3.31 It is assumed that the track edges (minor earthworks and areas where peat is re-used on site) will be seeded as a suitable upland acid grassland habitat and that the Contractor's compound area will be re-instated as acid grassland. A suitable seed mix is proposed below (Table 4) with additional seed included to enhance the area as potential twite forage habitat. Both of these newly created acid grassland habitats are expected to achieve Good condition.

3.32 A bespoke off site compensation scheme has been developed for the loss of degraded blanket bog and associated acid upland flushes that are both classed as irreplaceable habitats. This is detailed below in paragraph 3.42 onwards.

3.33 Additional off site habitat compensation in respect of BNG losses of habitats other than the irreplaceable habitats, is also provided. These other habitats are largely acid grassland and neutral grassland types. The off site compensation scheme comprises habitat diversification and creation on land at Redbrook Reservoir (centred on NGR SE02651012). The area selected is currently degraded blanket bog dominated by species-poor purple moor-grass (in Poor condition) over deep peat and the proposals are for the enhancement of 2.01ha, to provide a more diverse sward (achieving Good condition). This is detailed in paragraphs 3.39 to 3.41 below.

3.34 The value (ha or km), distinctiveness and condition assigned to each post-development habitat feature is summarised in Table 3. The distinctiveness criterion is automatically selected by the Calculator. Habitat condition is retained as the same as the baseline habitat condition, with new habitats also expected to achieve the equivalent condition or (where enhanced) better.

Table 3 Summary of Habitats and Features Post-development

Post-Development Habitat Type	Value	Distinctiveness	Condition
Area Features – retained	***(ha)***		
Other woodland; mixed	0.0202	Medium	Poor
Mixed scrub	0.0268	Medium	Poor
Blanket bog	0.7495	V.High	Moderate
Upland acid grassland	1.0076	Medium	Good
Other neutral grassland	0.1157	Medium	Poor
Bracken	0.0257	Low	N/A
Fens (upland and lowland)	0.0102	V.High	Good
Vegetated garden	0.0460	Low	N/A
Developed land; sealed surface	0.0074	V.Low	N/A
Vacant/derelict land/bare ground	0.0178	Low	Poor
Artificial unvegetated, unsealed surface	0.0316	V.Low	N/A
Native Tree (x4 self-seeded)	0.0163	Medium	Moderate
Area Features – created on site	***(ha)***		
Artificial unvegetated, unsealed surface	0.1611	V.Low	N/A – Other
Upland acid grassland (track edges)	0.0930	Medium	Good
Upland acid grassland (re-instated compound inbye land)	0.1369	Medium	Good
Area Features – off site compensation (Redbrook Reservoir)			
Degraded blanket bog (enhanced)	2.0108	V.High	Good
Linear Features – retained	***(km)***		
Streams 1, 3, 4 and 5	0.123	High	Moderate
Ditch (off-site within 10m of site)	0.116	Moderate	Poor

Habitat Creation Proposals – On Site

3.35 On site habitat creation proposals comprise the creation of suitable acid grassland habitat on the areas adjacent to the new track that are impacted by the construction operations (i.e. where cut and fill has taken place). Please note, this excludes any areas that were previously identified under baseline surveys as irreplaceable habitats (degraded blanket bog and upland acid flushes) which is dealt with separately under a bespoke off site compensation package (see below).

3.36 This is calculated to be approx. 0.093ha of newly created upland acid grassland with occasional heather on the edges of the proposed track. In addition, a further 0.1369ha of re-instated upland acid grassland on the inbye field that will contain the Contractor's compound during construction.

3.37 The proposed acid grassland seed specification is shown in Table 4 and will be supplemented with seed from plant species suitable for foraging twite, such as autumn hawkbit, cat's-ear, sheep's sorrel and common sorrel.

3.38 Following establishment, the acid grassland areas will return to the wider grazing management of each area. Rushes and purple moor-grass are likely to re-establish on the acid grassland creation sites over time, however, these form part of the general character of the area and are not specified for any control other than that provided by general stock grazing on the site. Any maintenance/repair of these track edges into the future will be reseeded with the same mix as required.

Table 4 Upland Acid Grassland Seed Mix[11]

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

Habitat Compensation Proposals – Off Site

Scheme Excluding Irreplaceable Habitats

3.39 To achieve the desired BNG outcome of a 10% net gain plus satisfying the Trading Rules, an off site compensation scheme for enhancement of degraded blanket bog is proposed at Redbrook Reservoir. The land at Redbrook Reservoir is owned and managed by the Canal & River Trust and comprises 2.01ha of species-poor purple moor-grass-dominated degraded blanket bog currently assessed as being in Poor condition. The site is not within an SSSI/SPA/SAC notified area.

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

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

3.41 A detailed scheme will be developed, underpinned by a baseline survey (PAA 2023), to ensure management measures are applied within the most appropriate areas of the site and including a monitoring and maintenance programme for 30 years.

[11] *To be supplemented with autumn hawkbit (Scorzoneroides autumnalis), cat's-ear (Hypochaeris radicata), sheep's sorrel (Rumex acetosella) and common sorrel (Rumex acetosa)*

Bespoke Scheme for Irreplaceable Habitats

3.42 The bespoke off site habitat compensation proposals comprise the enhancement of existing degraded blanket bog and acid flushes through a programme of habitat enhancement works. The works are to be sited on the western side of Holme Moor (Round Hill), near Marsden, centred on NGR SE05891115. This moorland is not within any designated area and part of the site is already under restoration through *Molinia* reversion.

3.43 The proposal for the March Haigh habitat compensation package is to extend the area currently under restoration by at least 3.5ha to the west, encompassing suitable areas near to Round Hill and Hard Hill. The site is within the ownership of The National Trust and the Canal & River Trust would undertake a legal agreement with National Trust to enable the works.

3.44 The restoration works would be expected to move the habitat on Round Hill and Hard Hill from Poor to Moderate condition by undertaking the following:

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

3.45 Further details are provided in the Shadow Habitat Regulations Assessment report for the site (PAA 2023).

4. ASSESSMENT RESULTS

Results Summary

4.1 A summary of the results is presented in Table 5, and the complete BNG Metric outputs are presented in Appendix 3 (supplied separately to this report).

4.2 Please note, areas of irreplaceable habitat (degraded blanket bog and associated upland acid flushes) are removed from the net gain calculation and dealt with separately under a bespoke off site compensation scheme at Holme Moor (Round Hill),

4.3 Overall, the baseline habitats on site are calculated to provide 31.59 biodiversity units. The baseline habitat type is dominated by degraded blanket bog and upland acid grassland that contribute 13.72 and 14.97 habitat biodiversity units, respectively – by far the largest contributor for the site. There are smaller amounts of neutral grassland and upland acid flushes that contribute 0.87 and 0.28 habitat biodiversity units, respectively. Other smaller areas of habitat on site contribute the remainder of the biodiversity units.

4.4 Self-seeded native trees contribute 0.15 biodiversity units to the baseline habitats on site.

4.5 The existing watercourses running adjacent/through the site contribute 1.61 biodiversity units for on-site baseline streams and 0.53 biodiversity units for the offsite baseline ditch within 10m of the site.

4.6 The full range of habitat types are retained on site under the scheme, albeit with a smaller footprint due to the land take of the proposed track. Many habitats are retained in full under the scheme including the plantation woodland, small patches of bracken and self-seeded scrub, plus the self-seeded trees. The streams on site are predicted to have only minor encroachments to the riparian zone, while the off site ditch (within 10m of the site) remains unaffected.

4.7 Excluding the irreplaceable habitats, the total loss of land to the proposed track is 0.39ha and the largest habitat losses under the scheme are for upland acid grassland (approx. 0.08ha as shown on the Metric calculations) and neutral grassland (approx. 0.07ha) on the protected area plus the temporary loss of inbye acid grassland (approx. 0.14ha) on the proposed compound site. In total this equates to a loss of 2.62 area biodiversity units.

4.8 To balance this loss and achieved the desired +10% net gain in biodiversity units, an off site compensation scheme is proposed across 2.01ha of land at Redbrook Reservoir, near Marsden. The site is owned and managed by the Canal & River Trust and not included in any SSSI/SAC/SPA designation. The scheme allows for the enhancement of 2.01ha of purple moor-grass-dominated degraded blanket bog overlying deep peat. This is achieved through the use of flailing, heather seed sowing and plug planting.

4.9 As Table 5 (below) indicates, under the proposed scheme design, the net biodiversity balance for habitats (excluding irreplaceable habits) is assessed as:

- +10.14% area unit gain in terms of habitats;
- No change in linear unit gain for streams/ditch; and
- Trading rules are met.

Table 5 Summary of Metric Outputs

Total net unit change (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	3.20
	Hedgerow units	0.00
	River units	0.00
Total on-site net % change plus off-site surplus (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	10.14%
	Hedgerow units	0.00%
	River units	0.00%
Trading rules Satisfied?	Yes ✓	

Conclusions

4.10 The +10.14% increase in habitat biodiversity units (area-based) is largely achieved by the off site habitat compensation scheme, which is calculated to provide a 4.01 net gain in area biodiversity units (see Appendix 3, 'Headline Results'). In addition, creating new areas of upland acid grassland on site provides 1.81 biodiversity units (see Appendix 3 'Site Habitat Creation').

4.11 The streams and ditches are retained under the scheme with only minor encroachment to the riparian zone where replacement culverts are to be installed. Therefore, there is no overall change for watercourses under the Metric. There are no hedgerows on any of the areas included in the Metric.

4.12 The compensation scheme will have a suitable Habitat Management Plan to establish and maintain habitats over the required 30-year period.

5. REFERENCES

Defra, 2012. Biodiversity Offsetting Pilots, *Technical Paper: the metric for the biodiversity offsetting pilot in England*.

Panks, S., White, N., Newsome, A., Potter, J., Heydon, M., Mayhew, E., Alvares, M., Russell, T., Scott, S. J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B., Stone, D., 2021a. *The Biodiversity Metric 3.0: auditing and accounting for biodiversity value. Technical supplement (July 2021).* Natural England.

Panks, S., White, N., Newsome, A., Potter, J., Heydon, M., Mayhew, E., Alvares, M., Russell, T., Scott, S.J., Heaver, M., Scott, S.H., Treweek, J., Butcher, B., Stone, D., 2021b. *Biodiversity metric 3.0: Auditing and accounting for biodiversity – User Guide (July 2021).* Natural England.

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

PAA, 2021. *Canal & River Trust. March Haigh Track. Phase 1 And NVC Survey Report*. Report prepared for the Canal & River Trust.

PAA, 2023. 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. Report prepared for the Canal & River Trust.

NPPF, 2021. *National Planning Policy Framework, updated July 2021.* Ministry of Housing, Communities and Local Government.

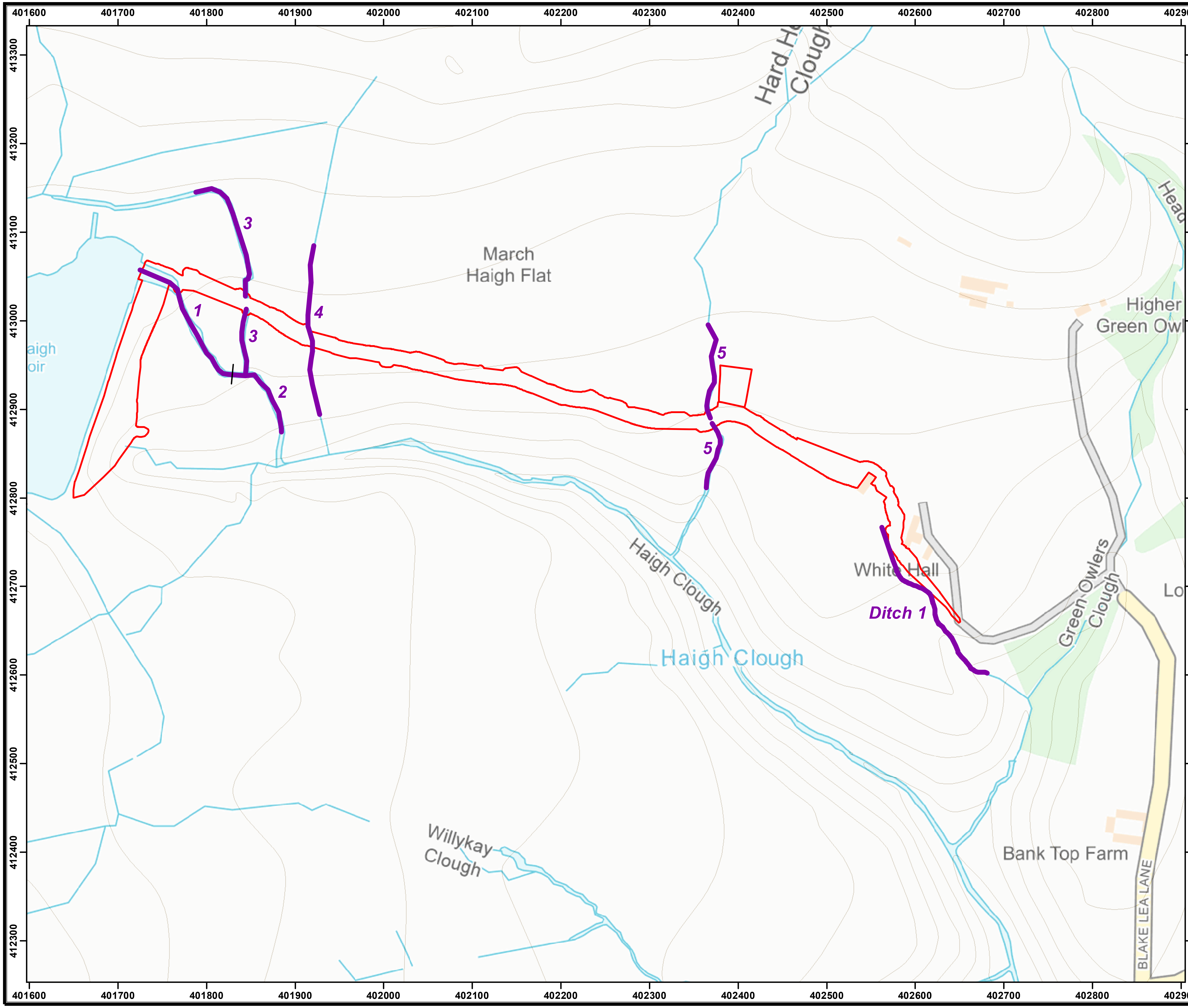
6. ABBREVIATIONS

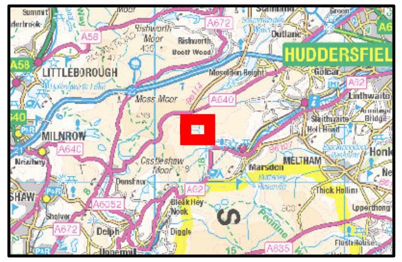
BNG	Biodiversity Net Gain
GIS	Geographic Information System
NPPF	National Planning Policy Framework
NVC	National Vegetation Classification
PAA	Penny Anderson Associates Ltd
RCA	River Condition Assessment
SAC	Special Area(s) of Conservation
SPA	Special Protection Area(s)
SSSI	Site(s) of Special Scientific Interest
TN	Target Note(s)

APPENDICES

APPENDIX 1

Baseline Figures – East and West





Legend

- Works area - red line
- Watercourses

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N

ISO A3

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Consultant Ecologists

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

Project Name	March Haigh Reservoir
Discipline	Ecology
Title:	**WATERCOURSES AT MARCH HAIGH**

Scale	1:4,000	Drawing No.	Figure 1
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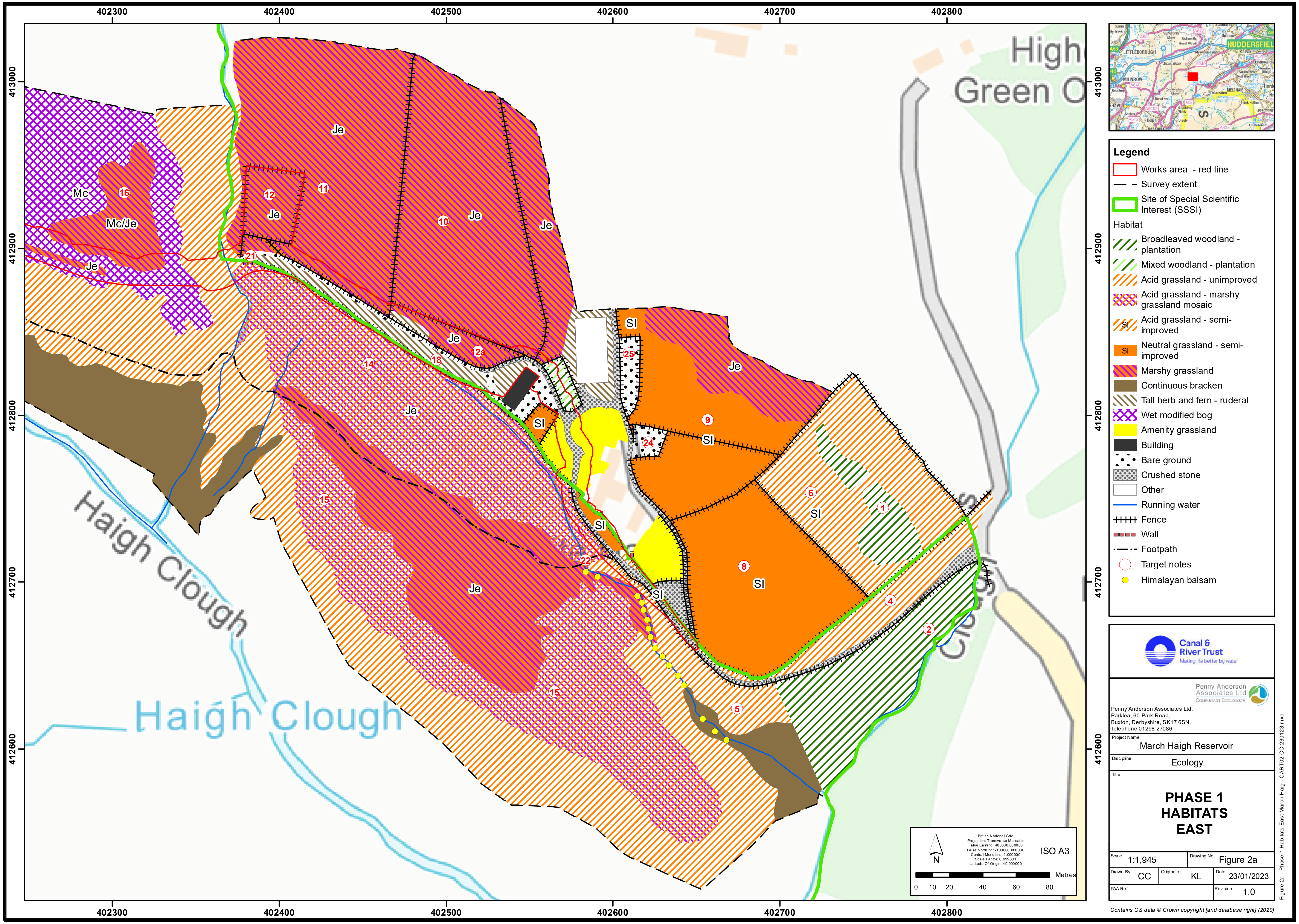
PAA Ref.		Revision	1.0

Figure 1 - March Haigh Watercourses - CART02-1 CC 230209.mxd



402300
402400
402500
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402700
402800
413000
412900
412800
412700
412600
Haigh Clough
Haigh Clough
Green O
Je
Mc
Mc/Je
SI
Legend
Works area - red line
Survey extent
Site of Special Scientific Interest (SSSI)
Habitat
Broadleaved woodland - plantation
Mixed woodland - plantation
Acid grassland - unimproved
Acid grassland - marshy grassland mosaic
Acid grassland - semi-improved
Neutral grassland - semi-improved
Marshy grassland
Continuous bracken
Tall herb and fern - ruderal
Wet modified bog
Amenity grassland
Building
Bare ground
Crushed stone
Other
Running water
Fence
Wall
Footpath
Target notes
Himalayan balsam
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Project Name
March Haigh Reservoir
Discipline
Ecology
Title:
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Drawing No.
Figure 2a
Drawn By
CC
Originator
KL
Date
23/01/2023
PAA Ref.
Revision
1.0
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Projection: Transverse Mercator
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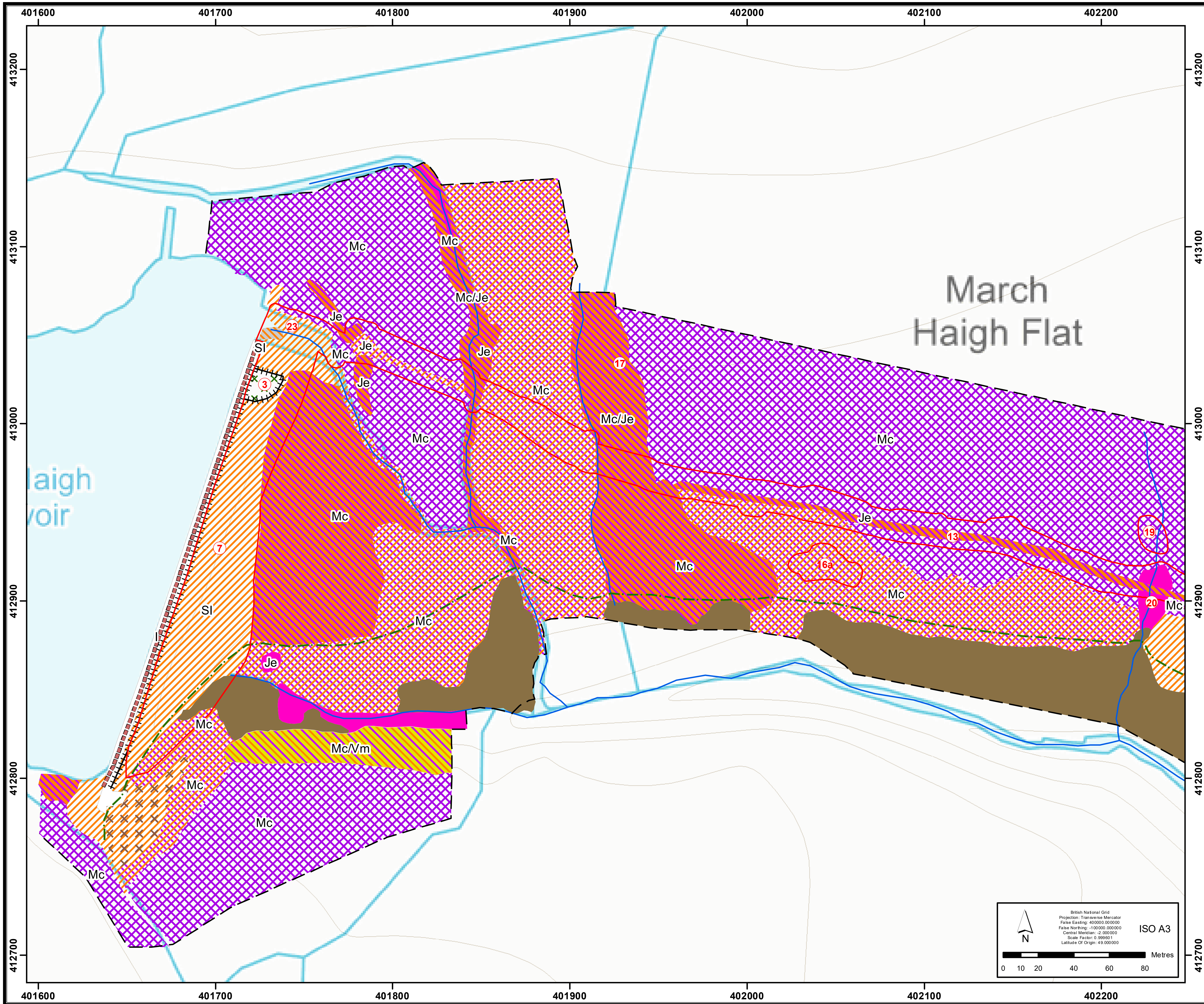

Legend

- Works area - red line
- Survey extent
- Site of Special Scientific Interest (SSSI)

Habitat

- Scattered scrub
- Acid grassland - marshy grassland mosaic
- Acid grassland - unimproved
- Acid grassland with scattered bracken
- Acid grassland/Hardstanding
- Acid grassland - semi-improved
- Improved grassland
- marshy grassland - dry dwarf shrub heath mosaic
- Marshy grassland
- Poor semi-improved grassland
- Continuous bracken
- Wet modified bog
- Acid/neutral flush
- Running water
- Fence
- Wall
- Footpath
- Target notes

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Discipline: Ecology

Title:

PHASE 1 HABITATS WEST

Scale	1:2,000	Drawing No.	Figure 2b
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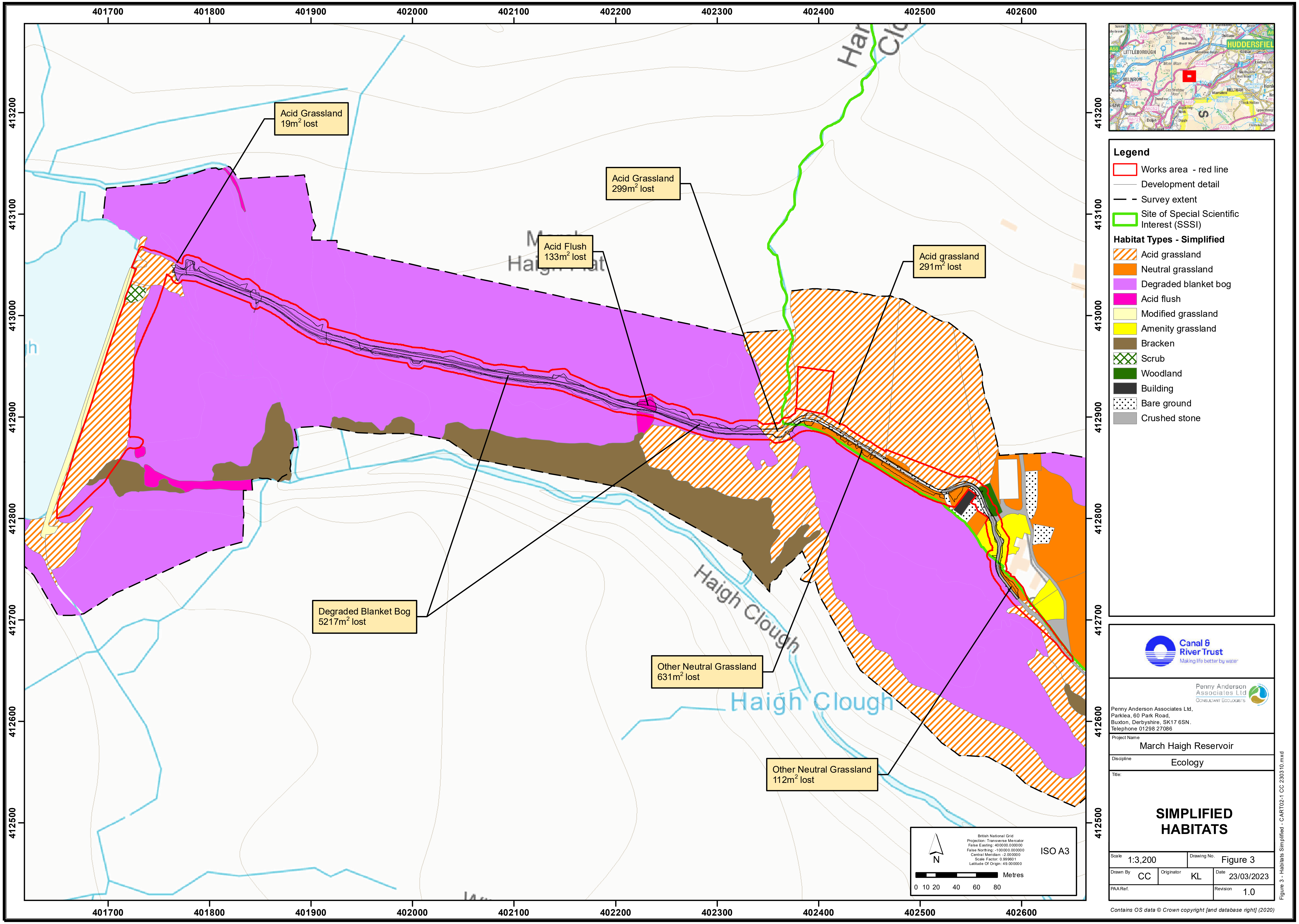
Date	23/01/2023		
PAA Ref.		Revision	1.0

Figure 2b - Phase 1 Habitats West March Haig - CART02 CC 230123.mxd



Acid Grassland 19m² lost
Acid Grassland 299m² lost
Acid Flush 133m² lost
Acid grassland 291m² lost
Degraded Blanket Bog 5217m² lost
Other Neutral Grassland 631m² lost
Other Neutral Grassland 112m² lost
Haigh Clough
Haigh Clough
401700
401800
401900
402000
402100
402200
402300
402400
402500
402600
413200
413100
413000
412900
412800
412700
412600
412500
HUDDERSFIELD
LITTLEBOROUGH
MILNROW
Legend
Works area - red line
Development detail
Survey extent
Site of Special Scientific Interest (SSSI)
Habitat Types - Simplified
Acid grassland
Neutral grassland
Degraded blanket bog
Acid flush
Modified grassland
Amenity grassland
Bracken
Scrub
Woodland
Building
Bare ground
Crushed stone
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Project Name
March Haigh Reservoir
Discipline
Ecology
Title:
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Drawing No. Figure 3
Drawn By CC
Originator KL
Date 23/03/2023
PAA Ref.
Revision 1.0
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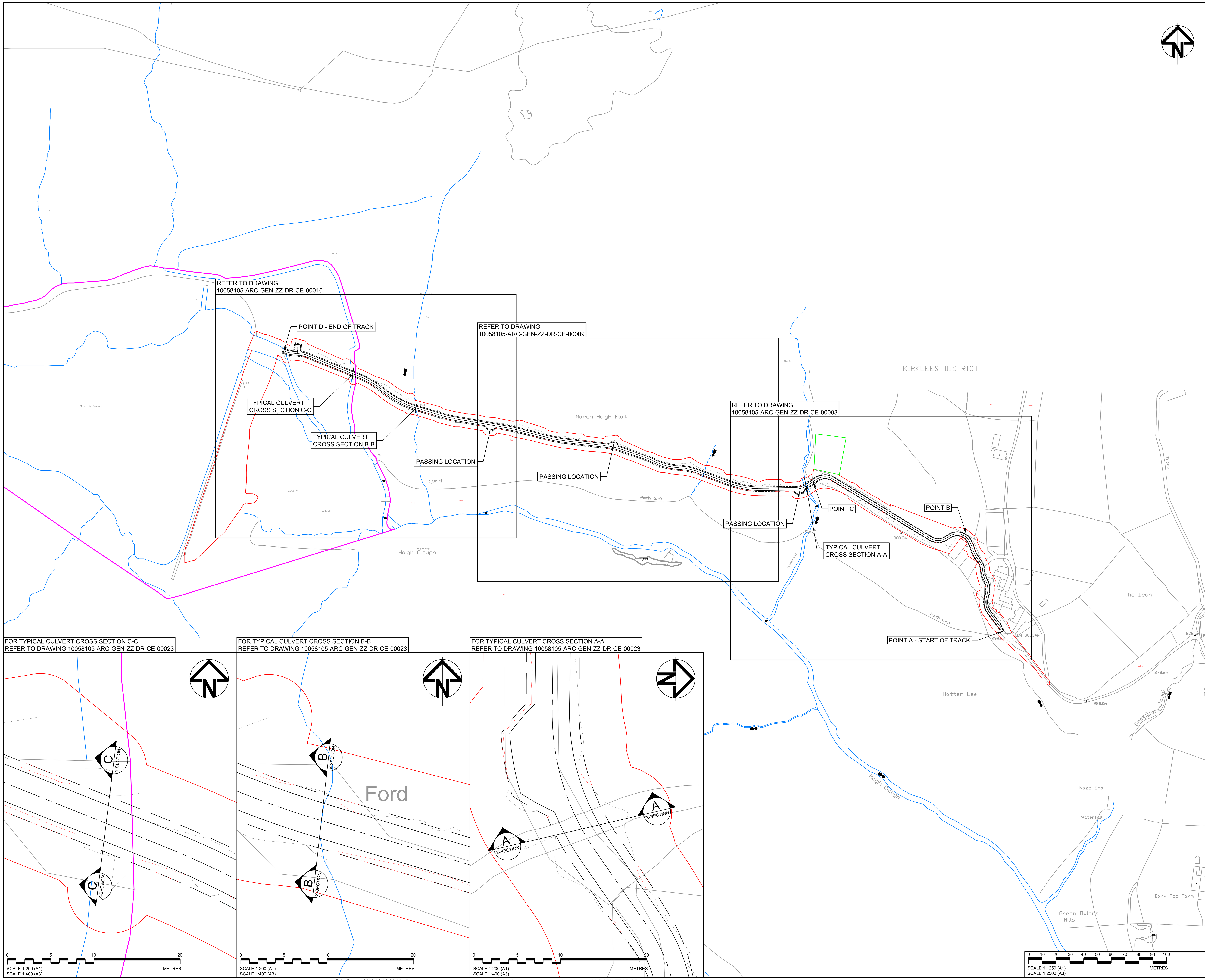
APPENDIX 2

Scheme Proposals



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LEGEND:

- PROPOSED RED LINE BOUNDARY
- TEMPORARY SITE COMPOUND
- C&RT OWNERSHIP BOUNDARY

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P02	24/02/23	MISSING NORTH SLOPE HATCHING ADDED	SS	RT	RT	AH
P03	27/02/23	Updated as per CRT Comments	SC	RT	RT	AH
P04	01/03/23	Updated as per CRT comments	SC	RT	RT	AH

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Site:
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Marsden, Huddersfield

Client:
Canal & River Trust
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Neptune Street, Leeds,
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Produced:	S.Chinnadurai	Digitally Signed	28/02/23
Checked:	R.Tyrer	Digitally Signed	28/02/23
Reviewed:	R.Tyrer	Digitally Signed	28/02/23
Approved:	A.Holt	Digitally Signed	01/03/23

Design Stage: Detailed Design

Original Size:	Grid:	Datum:
A1	OS	AOD

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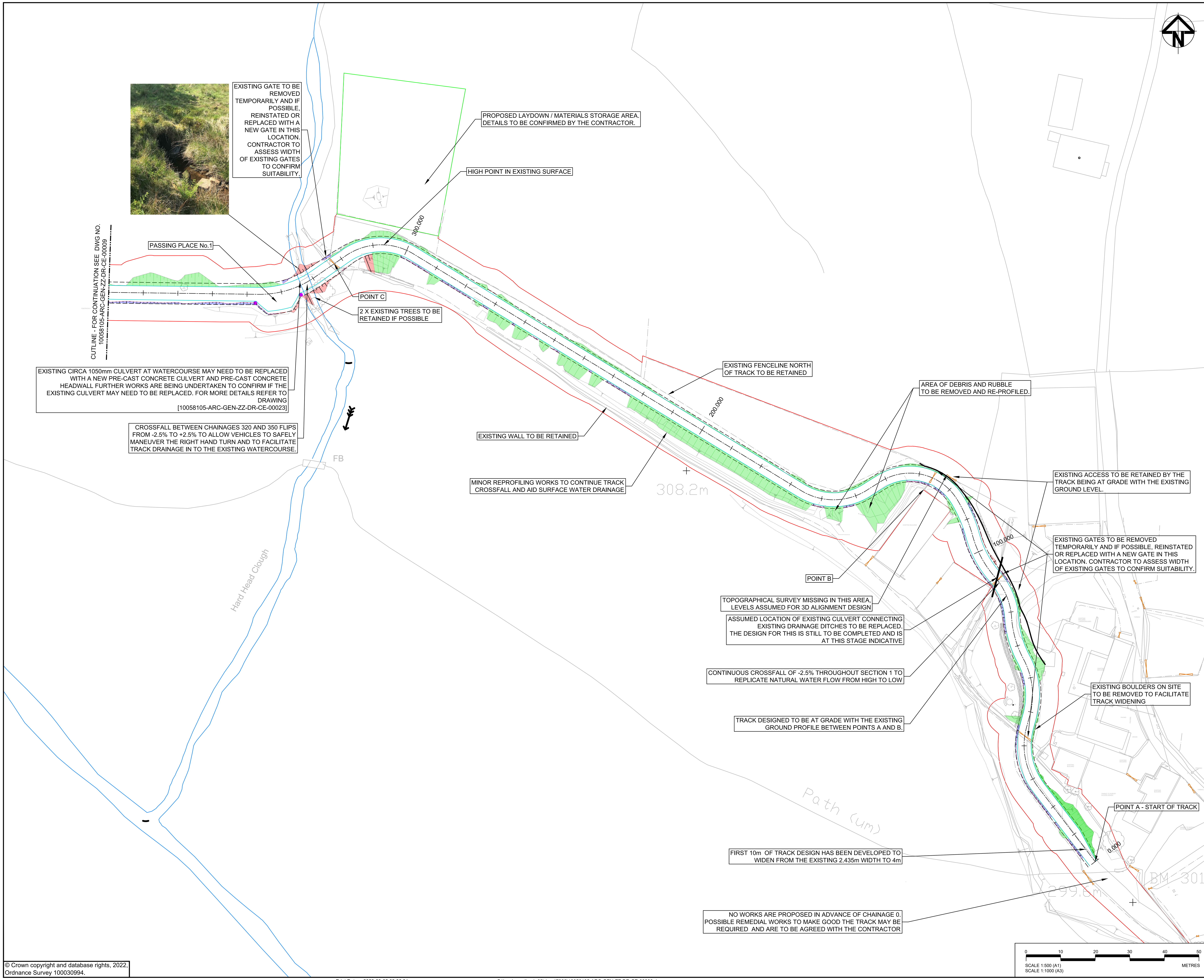

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8. POINT A TO B - SECTION 1.
   POINT B TO C - SECTION 2.
   POINT C TO D - SECTION 3.

Key

- EXISTING WATERCOURSE FROM OS MAPPING
- EXISTING GATE FROM TOPOGRAPHICAL SURVEY
- PROPOSED RED LINE BOUNDARY
- TEMPORARY SITE COMPOUND
- SNOW POLES
- INDICATIVE LINE OF DRAINAGE SYSTEM. DESIGN AND TYPE OF DRAINAGE TO BE CONFIRMED
- CAPPING LAYER
- GENERAL EARTHWORKS INFILL TO CONTINUE EXISTING GROUND PROFILE NORTH OF THE TRACK
- INFILL OF EXPOSED SIDE SLOPES BELOW EXISTING GROUND LEVEL
- EDGE OF TRACK RUNNING SURFACE
- BASE OF PROPOSED TRACK

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P01	27/01/23	SECOND ISSUE	PKA	AC	RT	AH
P02	24/02/23	MISSING NORTH SLOPE HATCHING ADDED	SS	RT	RT	AH
P03	27/02/23	Updated as per CRT Comments	SC	RT	RT	AH
P04	01/03/23	Updated as per CRT comments	SC	RT	RT	AH

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Checked: R.Tyrer	Digitally Signed	28/02/23
Reviewed: R.Tyrer	Digitally Signed	28/02/23
Approved: A.Holt	Digitally Signed	01/03/23

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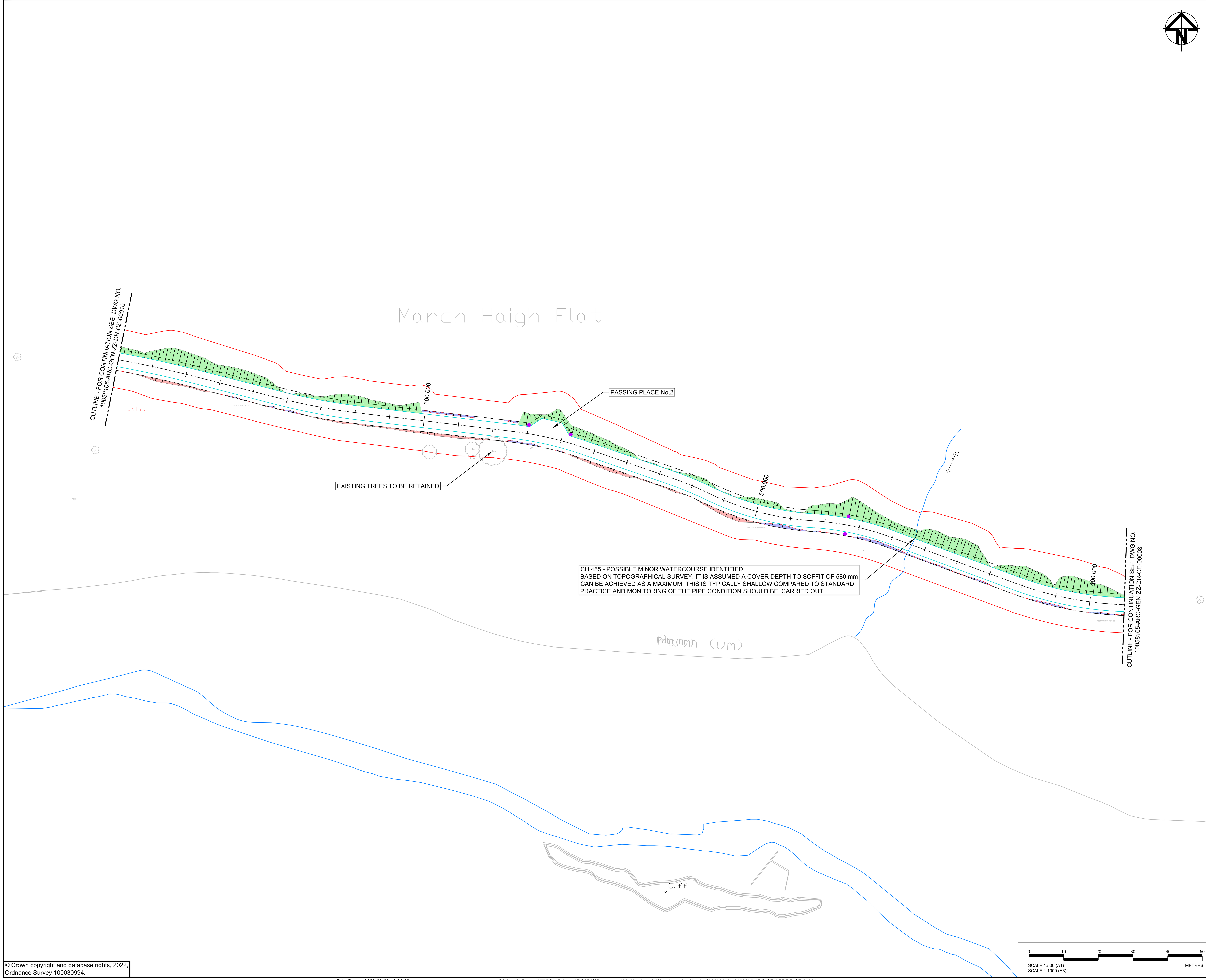

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   POINT C TO D - SECTION 3.

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- INFILL OF EXPOSED SIDE SLOPES BELOW EXISTING GROUND LEVEL
- EDGE OF TRACK RUNNING SURFACE
- BASE OF PROPOSED TRACK

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P02	24/02/23	ADDITIONAL ANNOTATION ADDED	SS	RT	RT	AH
P03	27/02/23	Updated as per CRT Comments	SC	RT	RT	AH

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Reviewed: R.Tyrer	Signed: Digitally Signed	Date: 27/02/23
Approved: A.Holt	Signed: Digitally Signed	Date: 27/02/23
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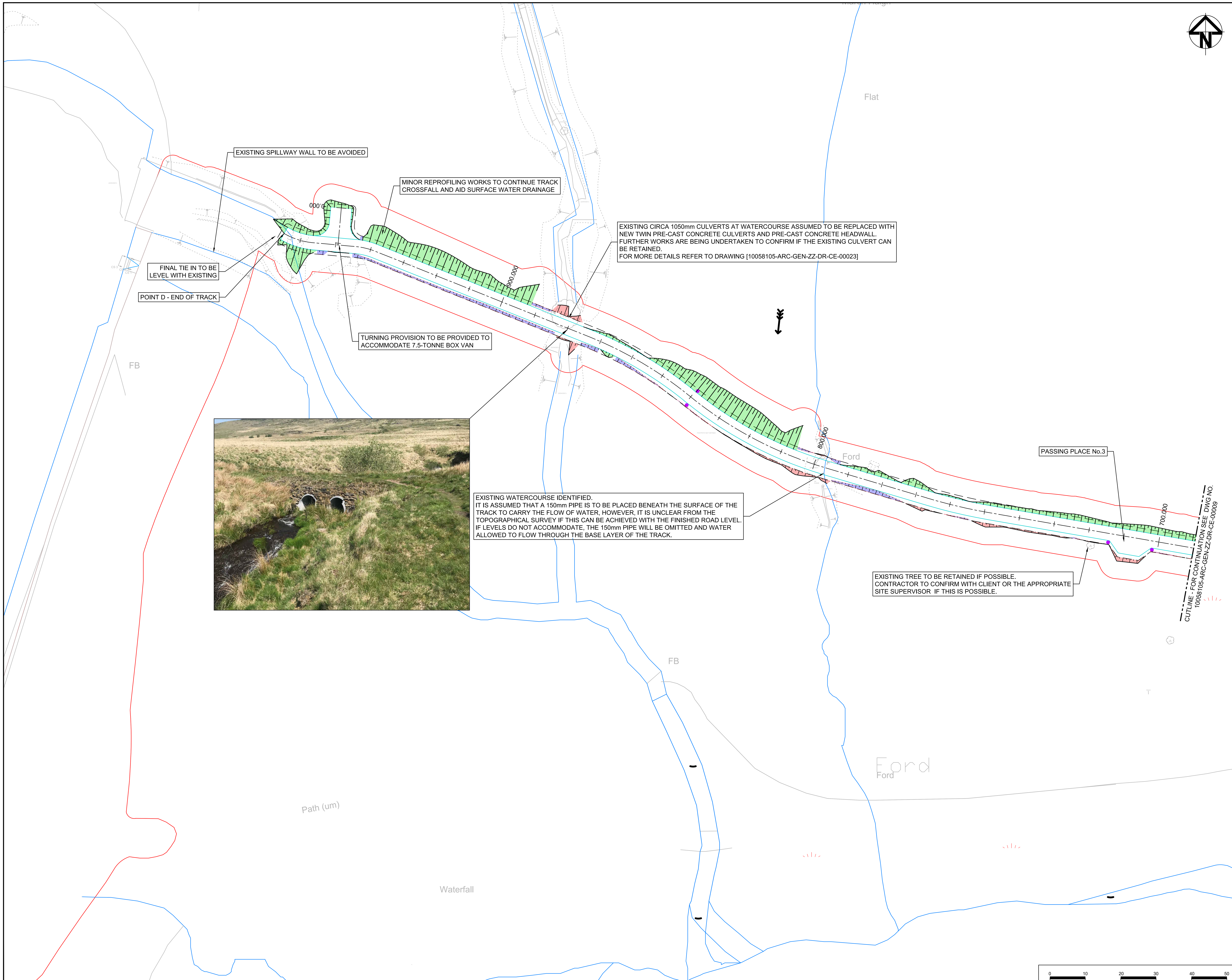

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   POINT C TO D - SECTION 3.

Key

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P03	27/02/23	Updated as per CRT Comments	SC	RT	RT	AH
P04	02/03/23	Updated as per CRT comments	SC	RT	RT	AH

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APPENDIX 3

Defra Metric 3.1 Outputs
(Supplied Separately from the Report)

APPENDIX 4

Compensatory Scheme for March Haigh Reservoir Proposed Access Track - Restoration and Enhancement of Habitat at Redbrook Reservoir (North)

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COMPENSATORY SCHEME FOR MARCH HAIGH RESERVOIR PROPOSED ACCESS TRACK

RESTORATION AND ENHANCEMENT OF HABITAT AT REDBROOK RESERVOIR (NORTH)

1. Proposed Scope of Works

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

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

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

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

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

2. Intervention Description

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

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

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

Purple moor-grass flailing

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

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

Seeding

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

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

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

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

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

Plug planting

Additional plug planting of the following species would be advantageous:

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

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

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

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

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

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

3. Location Plan

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

4. Maintenance

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

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

5. Programme

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

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

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

6. Monitoring and Evaluation

Post Enhancement Monitoring Programme

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

Year 0 = March 2026 (all enhancement measures completed)

Year 1 = March 2027

Year 3 = March 2029

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

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

Assessment of Success

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

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

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

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

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

Repeat of Baseline Survey

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

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

7. Management and Maintenance

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

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

8. Force Majeure

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

9. Reference

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

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