Cam Fell Peatland Restoration Scheme, Ribblesdale, North Yorkshire

Landscape Survey and Conservation Management Assessment

Prepared for:	Aidan Foley Ribble Rivers Trust c/o Hanson Cement Ribblesdale Works Clitheroe Lancashire BB7 4QF
Prepared by:	Jim Brightman BA (Hons), MLitt, MCIfA Solstice Heritage Crabtree Hall Business Centre Little Holtby Northallerton North Yorkshire DL7 9LN
Checked by:	Chris Scott BA (Hons), MA, MCIfA
Project Ref:	SOL1617-32
Document Ref:	DOC1617-27
Dates of Fieldwork:	August 2016
Date of Report:	August 2016

© Solstice Heritage 2016

CONTENTS

List of Figures

List of Tables

ACKNOWLEDGEMENTS

Solstice Heritage would like to thank Aidan Foley of the Ribble Rivers Trust for commissioning this study and for his support through the course of the assessment. Thanks are also extended to Miles Johnson, Senior Historic Environment Officer at the Yorkshire Dales National Park Authority, who supplied the HER information as well as support and advice. We would also like to thank the landowner, the Ingleborough Estate, and the local commons graziers association led by Mr Pickles of Far Gearstones Farm. Where map data has been used in the preparation of the accompanying figures, this is derived from Ordnance Survey Opendata and is Crown copyright all rights reserved.

EXECUTIVE SUMMARY

This report documents the results of historic environment landscape survey and conservation management assessment in advance of peat restoration works on Cam Fell, Ribblesdale in the Yorkshire Dales National Park (YDNP), to be carried out under the management of the Ribble Rivers Trust. The survey area totals c. 336.41ha (centred at SD 80834 80288); the boundary encompasses two large areas, two smaller areas and the proposed access tracks between. The highest point of the survey area is at its northern extent at High Springs Head (c. 530m), and it descends to c. 350m in White Earth Gill.

Initial data was obtained from the Yorkshire Dales Historic Environment Record (YDHER) detailing known heritage assets within and around the survey area. The survey comprised walkover and GPS survey of historic environment features, with information about the feature entered directly into an attached data table and supplemented by written information on a pro-forma sheet and high-resolution digital photography. Following processing this digital data has been supplied to the Ribble Rivers Trust and the YDNPA Historic Environment Team to accompany this report, along with mapping of constraint areas abstracted from the survey data.

Given the scope of the intended works, the main potential physical impact is considered to derive from: blocking and reprofiling of modern drainage grips using machine-cut peat plugs; reprofiling of gullies and peat hags; re-vegetation of areas of bare peat; and vehicular access required for the above.

All identified features are of a low to medium significance, are considered to be relatively robust or are visually obvious; these have been assigned an 'amber' constraint area. The potential physical impact of the proposed work is generally considered to be low where the management recommendations within this report are applied:

- *Amber constraint areas – avoidance of such areas by vehicles or plant is recommended where practicable. Where unavoidable, work should proceed with caution, should avoid extant and visible remains and should avoid repetitive use of the same route.*

'Green' constraint areas include all other parts of the survey area. Whilst care should be taken to ensure minimal impact from plant, there are no specific restrictions on access in relation to known archaeological features. It should be noted that the proposed access route across moorland from the Pennine Way to the small central restoration area at Cam End contains no identified features but does cross an area of deep, wet bog. To facilitate access for plant, a second route between the two areas was also assessed; this is the preferred access route as it utilises drier high ground. In addition, the survey area contains a series of well-maintained access tracks which provide routes directly to or close to the restoration areas. During restoration work plant can use any metalled access tracks that are wide enough to accommodate the vehicle in question without impacting on heritage assets, regardless of the extent of constraint areas.

From the observed areas of peat exposure across the survey area it is considered that the overall palaeoenvironmental and archaeological potential of the peat is considered to be medium. The most significant peat development is on the higher ground to the north and south-east extent of the survey area, though deep peaty soils can be found across the site, as observed in grip sections.

Although no artefacts or significant ecofacts were recovered from the peat during this survey, the deposits have potential to contain palaeoenvironmental remains and some limited potential to seal archaeological artefacts and deposits within buried horizons. Caution should be exercised during the restoration work and, where possible, excavations should always aim to have a minimal impact on the peat in all parts of the survey area.

1. INTRODUCTION

1.1 PROJECT OUTLINE

This report documents the results of historic environment landscape survey and conservation management assessment in advance of peat restoration works on Cam Fell, Ribblesdale in the Yorkshire Dales National Park (YDNP), to be carried out under the management of the Ribble Rivers Trust (RRT); the location of the survey area is shown in Figure 1 below. The survey work was undertaken by Jim Brightman (MCIfA) of Solstice Heritage in August 2016.

1.2 SCOPE OF PROPOSED SCHEME

The proposed work comprises four separate elements which may impact upon archaeological remains within the survey area; these are:

- Blocking and reprofiling of modern drainage grips using machine-cut peat plugs
- Reprofiling of gullies and peat hags
- Re-vegetation of areas of bare peat
- Vehicular access required for the above.

1.3 AIMS AND OBJECTIVES

The overarching aim of the project was:

- To provide a pre-intervention record of archaeological and palaeoenvironmental remains in order to inform the peat restoration process.

Feeding into the successful delivery of the project aim were these specific objectives:

- To identify, locate, and provide a detailed record of the historic environment, and to assess the significance of historic features within the survey area
- To assess the palaeoenvironmental potential of the blanket peat within the survey area
- To indicate those historic environment remains which are vulnerable to the proposed work and provide recommendations for their conservation
- To provide an accurate, useable summary of this information in both report form (this document) and also in a digital form that can be integrated with the Yorkshire Dales National Park Historic Environment Record (YDHER).

1.4 PREVIOUS WORK

A search of the YDHER indicated a few scattered heritage assets within the survey area and more extensive remains in the valley bottoms close by.

The most prominent heritage asset within the survey area is the line of Cam High Road. This route is potentially prehistoric in origin, has been identified as a principal trans-Pennine Roman road, and was the main Lancaster to Richmond turnpike through the latter half of the 18th century (Martin and Pollington 2008, 1-2). Despite its antiquity, topographic survey and evaluation work to inform a scheme of repair and resurfacing in 2007 found no sub-surface remains of an earlier roadway within the areas of investigation. The report concluded that either the Roman road took a different route from that of the modern track, or post-medieval and modern activity and resurfacing has removed all trace of the earlier remains (*ibid*., 12).

The known sites in the immediate environs of the survey area include:

- The lines of several former or ruined field boundaries, most likely to be post-medieval in origin.
- Associated with these are a considerable number of sheepfolds, washfolds and field barns, as well as a few remote farmsteads.
- Evidence for post-medieval (and possibly earlier) stone extraction and limestone kilns.

In the wider area a number of walkover surveys have been undertaken in advance of peat restoration schemes. Four blocks to the north-east of Cam Woodlands at the head of Langstrothdale were surveyed in 2014 (Phelps 2014). The survey identified a number of features typical of post-medieval and industrial upland activity: limestone extraction and processing sites, areas of peat cutting, a remote field barn and a shooting stand. In addition, there were some features of ambiguous form and function, such as a platform or culverts, which are again typical of remote upland activity. Similar features, in terms of both type and density, were identified at Oughtershaw Moss in Langstrothdale *c.* 3.5km north-east of the Cam Fell survey area (Brightman 2015a) and at Park Fell, Ingleborough *c.* 3km south-west of the present survey (Brightman 2015b).

Figure 1 Location Plan

2. METHODOLOGY

2.1 PRE-FIELDWORK

Prior to commencement of field survey, contact was made with the Yorkshire Dales National Park Authority (YDNPA) Senior Historic Environment Officer with the following aims:

- To obtain digital HBSMR data in a suitable format for integration into the project GIS and upload to the GPS unit for field survey
- Examine additional datasets held within the HER for the survey area
- Discussion of any specific archaeological, palaeoenvironmental or logistical issues
- Agreement of required fields for data collection to allow ease of data concordance at post-fieldwork stage
- Final confirmation of working methodology

A project GIS was also compiled including the following:

- Supplied by the Ribble Rivers Trust:
  - Extent of survey areas and preferred access routes
  - Mapped grips, gullies and areas of exposed peat which will form the focus of the restoration work
- Supplied by Yorkshire Dales National Park Authority (YDNPA):
  - Data for all known historic environment sites within the overall survey area derived from the Yorkshire Dales Historic Environment Record (YDHER).
- From the National Heritage List for England (NHLE – available online):
  - Designated heritage assets.

2.2 GPS SURVEY

The walkover survey involved surface identification of surviving features followed by recording as lines, polygons and points using a mapping-grade GPS. Recording also included high-resolution digital photography of surviving remains and completion of a *pro-forma* sheet. The survey followed the standards and guidance given in *Understanding the Archaeology of Landscapes - A Guide to Good Recording Practice* (Ainsworth *et al.* 2007).

Basic information about each feature was recorded directly onto the GPS unit as an attached data table, using categories and data-types that allowed easy integration into the project GIS. This also allowed for direct daily download of field data without an extensive data entry exercise in the office. The GIS files and accompanying database recorded sites in accordance with the Thesaurus of Monument Types and core fields comprised (as a minimum) those necessary for records be to be compliant with MIDAS Heritage to Level 1 (Basic). The handheld DGPS unit used was a Magellan Mobilemapper 6, offering a post-processed accuracy of <1m. The GPS also had the capacity to contain relevant additional datasets, such as historic Ordnance Survey mapping and ortho-rectified aerial photography, all of which can be used in the field to aid location and interpretation of archaeological features.

To allow for an estimate of feature visibility, the level of peat and vegetation cover was recorded for each archaeological feature identified. The assessment of visibility is a score between 1-4 and the criteria used are outlined in the table below, though these were used as a guide and each feature was assessed on an individual basis. It should be noted that this score is not the equivalent of percentage of survival or monument condition.

Score	Criteria
1	No surface expression. Feature inferred from other sources or surrounding features.
2	Barely visible. Little surface expression and/or significant peat or plant cover.
3	Moderately visible. Some surface expression and/or only light peat or plant cover.
4	Prominently visible. Good surface expression/standing structure and or little to no peat or plant cover.

Table 1 Scoring and criteria for assessment of feature visibility.

In addition, an estimated percentage of different levels of vegetation cover was made per square kilometre surveyed. For each km grid square that the survey area covered, a percentage was assigned to each of four 'scores' or criteria, as set out in the table below. This percentage can then be turned into an estimate of real hectarage within the project GIS, and overall estimates can be made about the relative visibility of monuments across the survey area; this is a subjective system and is intended as an illustrative guide only. The capturing of this information is an addition to the standard method for landscape survey and was introduced by Solstice Heritage in August 2014; this followed discussion with the YDNPA Historic Environment Team about creating a metric for assessing the potential accuracy of the survey given the variability of plant and peat cover at different times.

Score	Criteria
1	Poor visibility – plant cover over 1m in height and/or deep peat units.
2	Low visibility – plant cover 0.5-1m in height and/or small-moderate peat units.
3	Moderate visibility – plant cover less than 0.5m in height and/or very shallow peat units.
4	Good visibility – little or no plant cover and/or peat.

Table 2 Scoring and criteria for peat and vegetation cover.

The directly recorded information was augmented by the *pro-forma* written record, including the following information for each feature:

- Form, dimensions and location
- Conditions at the time of survey
- Visibility of the feature
- Description and interpretation
- Current condition, threats and management recommendations.

A digital photographic record was compiled to augment the survey record. This included digital photography of all features surveyed. Digital photography was undertaken using a Canon EOS1200D DSLR (18-megapixel resolution), and all image files have been archived as unedited TIFF files with embedded metadata and a full image catalogue/register.

2.3 Palaeoenvironmental Assessment

Areas of exposed, hagged and bare peat were inspected and all archaeological features, small finds and also ecofacts within the peat were to be recorded and photographed, and where necessary and practicable, collected. A representative 20% of all grip sections to be blocked were examined to the same standard. Ecofacts were to be targeted to ensure that samples were suitably diagnostic, from a secure and recordable context and substantial enough to be identified and provide a radiocarbon determination.

Any large areas of tree remains preserved and exposed within peat sections were to be photographed and recorded within the GPS, as were small finds. Large lithic scatters or other small find concentrations were to be delimited within the GPS survey and a representative sample of the artefactual material was also to be recorded.

At two suitable locations, an area of exposed peat face was cleaned with hand tools to provide a standing section through the peat horizons. These sections were drawn and photographed, and sampled where suitable, to provide a record of the peat stratigraphy, particularly in relation to the presence/absence of *grenzhorizonts*, archaeological and palaeoenvironmental features and deposits, and evidence of peat cutting or other intrusions.

2.4 Assessment of Vulnerability

As part of the survey, features were to be assessed for their vulnerability to the moorland restoration. This is expressed as a simple 'traffic light' system relating to a buffer area around known heritage assets. Constraint areas were to be assigned either 'red', for those sites that meet one or more of a set of criteria relating to significance and threat, or 'amber', for those sites of a lower vulnerability but still of archaeological significance. Where HER sites recorded as points could not be located during the survey these were given a 10m buffer to offset any potential error in the original recording of their position, and any lithic scatters (whether identified

during this survey or previously) would be given a 50m buffer for point data or a 20m buffer for polygon data, in recognition of their specific characteristics. All other sites identified through survey were given a buffer with a minimum radius of 10m depending on their particular characteristics.

Features requiring a 'red' constraint area were to be those assessed to meet one or more of the following criteria:

- A potential or known significance that has been assessed as medium or high
- Remains which are fragile and therefore particularly at risk from the proposed restoration activities
- Remains that are not immediately visually obvious and could therefore be impacted upon by the proposed restoration works unnoticed.

2.5 Health and Safety

All archaeological work was undertaken in a safe manner in compliance with the *Health and Safety at Work Act 1974*. A full risk assessment was undertaken in advance of the commencement of work, a copy of which was carried for the duration of the fieldwork. Solstice Heritage has a full Safety, Health and Environment Policy. Solstice Heritage also has a Lone Working Policy and best practice system which was employed on this project. The policy and the records relating to its implementation on this project have been maintained and can be supplied on request.

2.6 Reporting

Following completion of fieldwork and any immediate assessment required, all information has been synthesised in a project report (this document), including as a minimum:

- Name of client
- A non-technical summary
- List of contents
- Project Outline
- Aims and Objectives of the project
- Plan(s) of the survey area(s) showing the position of all significant historic features and including the grips and hagged/bare peat areas supplied by YPP. All plans tied to OS grid at a suitable scale
- Themed constraint/risk plans in red/amber/green shades where there is an assessed vulnerability of historic features to the planned restoration work
- Descriptive gazetteer of all identified historic environment features
- Copies of any relevant documentary material
- Photographic catalogue and reproduced digital images of selected features, artefacts and ecofacts
- Catalogue of archive contents (where relevant)
- Notes and bibliography
- List and key to drawings and photographs
- List of staff involved in the survey work and dates of survey
- Assessment of significance of historic environment remains
- Palaeoenvironmental report, including an assessment of the significance of any palaeoecological remains and a characterisation of the palaeoenvironmental resource, with recommendations for any specialist analysis
- Acknowledgements

One bound paper copy and one digital copy has been supplied to the client and to the YDNPA. A further bound copy has also been provided to the client for submission to the landowner.

2.7 Data Transfer

During the pre-fieldwork stage a final agreement was reached on the data fields to be recorded during survey. These related to existing HER data fields and MIDAS Heritage standards, and information was recorded against these headings directly onto the GPS unit during field survey. This ensured that the downloaded information is

fully concordant with the YDHER with minimal post-processing. The survey processing has been undertaken in Quantum GIS.

In addition to the reporting and digital data transfer, all accompanying digital images and any drawn and written field records have been compiled into an orderly site archive. The archive has been compiled in accordance with the *Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives* (CIfA 2009), the *UKIC Guidelines for the Preparation of Excavation Archives for Long Term Storage* (Walker 1990), and *The Management of Research Projects in the Historic Environment* (HE 2006a) and the *MoRPHE Technical Guide 1 Digital Archiving and Data Dissemination* (HE 2006b).

It is intended that the archive will include:

- A copy of this report
- Primary field illustrations (peat sections where able to be accessioned)
- Digital versions of: all project reporting, digital photography, GIS files, survey data and Illustrative material.

2.8 Chronology

Where chronological and archaeological periods are referred to in the text, the relevant date ranges are broadly defined as follows:

- Palaeolithic (Old Stone Age): 1 million – 12,000 BP (Before present)
- Mesolithic (Middle Stone Age): 10000 – 4000 BC
- Neolithic (New Stone Age): 4000 – 2400 BC
- Chalcolithic/Beaker Period: 2400 – 2000 BC
- Bronze Age: 2000 – 700 BC
- Iron Age: 700 BC – AD 70
- Roman/Romano-British: AD 70 – 410
- Anglo-Saxon/Anglo-Scandinavian: AD 410 – 1066
- Medieval: AD 1066 – 1540
- Post-medieval: AD 1540 – 1750
- Industrial: AD 1750 – 1900
- Modern: AD 1900 – Present

2.9 Assumptions and Limitations

Data and information obtained and consulted in the compilation of this report has been derived from a number of secondary sources. Where it has not been practicable to verify the accuracy of secondary information, its accuracy has been assumed in good faith. Any information accessed from external databases (e.g. NLHE, HERs) represents a record of known assets and their discovery and further investigation. Such information is not complete and does not preclude the future discovery of additional assets and the amendment of information about known assets which may affect their significance and/or sensitivity to development effects. All statements and opinions arising from the works undertaken are provided in good faith and compiled according to professional standards. No responsibility can be accepted by the author/s of the report for any errors of fact or opinion resulting from data supplied by any third party, or for loss or other consequence arising from decisions or actions made upon the basis of facts or opinions expressed in any such report(s), howsoever such facts and opinions may have been derived.

2.10 Copyright

Solstice Heritage will retain the copyright of all documentary and photographic material under the Copyright, Designs and Patent Act (1988).

3. LANDSCAPE CHARACTER

3.1 LOCATION

The Cam Fell survey area totals *c.* 336.41ha (centred at SD 80834 80288); the boundary encompasses two large areas, two smaller areas and the proposed access tracks between. The survey area is grazed common land comprising rough and tussocky pasture cut by a series of gills and becks, most notably the Cam Beck which divides the larger of the survey sub-areas. The highest point of the survey area is at its northern extent at High Springs Head (*c.* 530m), and it descends to *c.* 350m in White Earth Gill.

3.2 GEOLOGY AND LAND-USE

The dominant geology of the survey area is the underlying Yoredale Series of interbedded limestone and sandstone members, the differential erosion of which gives the valley side its distinctive stepped appearance. The underlying bedrock results in less acidic conditions than would be found on the heather-clad Millstone Grit, though the sandstone members impede the natural permeability of the limestone and allow for the formation of extensive blanket peat, lowering the pH of the soil (BGS 2015). The survey area currently comprises rough and unimproved grassland grazed by sheep.

3.3 SURVEY CONDITIONS

The survey was undertaken between 23rd and 26th August 2016; conditions were bright and clear, and visibility was good. As noted in the methodology, an estimate of plant cover affecting potential visibility of archaeological remains was undertaken for each square kilometre. The results of this are shown in the table below:

Score	Criteria	Estimated % of survey area	Estimate area (ha)
1	Poor visibility – plant cover over 1m in height and/or deep peat units.	9.66	32.43
2	Low visibility – plant cover 0.5-1m in height and/or small-moderate peat units.	18.55	62.30
3	Moderate visibility – plant cover less than 0.5m in height and/or very shallow peat units.	45.99	154.46
4	Good visibility – little or no plant cover and/or peat.	25.81	86.69

Table 3 Estimate of feature visibility in relation to levels of peat and plant cover

By weighting and averaging the estimated percentage, this provides a potential visibility index for the survey area as a whole of 2.88, indicating a moderate to high potential visibility of monuments. This recognises the fact that the area has been relatively heavily grazed as common land, though with some areas of significant peat development or high, tussocky grass. The potential visibility index for this site is higher than most other recent landscape surveys, and it accords well with the survey work undertaken at Oughtershaw Moss and Raisgill, Langstrothdale (Brightman 2015a; 2016) and Park Fell, Ingleborough (Brightman 2015b) on a similar geology to Cam Fell and also lacking the deep heather cover common to more acid geologies. Given this, there is a high degree of confidence in the results of this survey. A comparison between recent moorland survey visibilities is given in the table below:

Survey	Date of Survey	Dominant Geology	Potential Visibility Index
Park Fell, Ingleborough, Yorkshire Dales	Feb 2015	Yoredale Series	3.03
Raisgill, Langstrothdale, Yorkshire Dales	May 2016	Great Scar Limestone	2.90
Cam Fell, Yorkshire Dales	August 2016	Yoredale Series	2.88
Oughtershaw Moss, Yorkshire Dales	Oct 2015	Yoredale Series	2.61
Rosedale, North York Moors	Oct 2014	Jurassic Sandstone	2.53
Dallowgill Moor, Nidderdale	Aug-Sept 2014	Millstone Grit	2.48
Woodale, Nidderdale	March 2015	Millstone Grit	2.45
Westerdale, North York Moors	Oct 2014	Jurassic Sandstone	2.40
Fleensop Moor, Yorkshire Dales	Feb 2015	Millstone Grit	2.33
Middlesmoor, Nidderdale	Mar-Apr 2015	Millstone Grit	2.31

Table 4 Comparison of potential visibility indices across recent moorland survey

Figure 2 Plan of survey area showing identified features and constraint areas

4. SURVEY RESULTS

4.1 CHRONOLOGICAL NOTE

With much upland survey there is little opportunity to refine the chronology of recorded sites until evaluation or excavation can provide diagnostic artefacts or material suitable for scientific dating. It is possible to assign rough periods to monuments by form, but further refinement without clear evidence is problematic at best and misleading at worst. For the Cam Fell survey area all sites recorded are likely to have their origin in either the late prehistoric/Romano-British period or between AD 1500 and the present day.

4.2 TRACKSIDE FEATURES

Four features are recorded in the YDHER adjacent to the track at the western limit of the survey area. The features include a row of 19th-century grouse butts, the ford across the Gayle Beck, a trackside culvert and a milestone. Given that this part of the survey area will only be used as access along the modern, well laid and consolidated track, these features have not been included in those recorded as part of this week; it is considered that they are not vulnerable to the proposed restoration scheme.

4.3 IDENTIFIED FEATURES

4.3.1 LATE PREHISTORIC OR ROMANO-BRITISH

The route of Cam High Road (**3**) runs through the centre of the survey area; it is now a modern surfaced track and will provide access for the intended restoration works. As is noted above, previous evaluation work did not find any surviving remains of earlier road structures at several points investigated (Martin and Pollington 2008). Despite this, the line of the Roman road – and the post-medieval turnpike which followed the same route – has been included in the gazetteer of sites given the potential for surviving remains in other parts of the survey area.

4.3.2 POST-MEDIEVAL TO MODERN

Two features were identified during the walkover survey, both associated with likely post-medieval to modern stone extraction or working. A small quarry scoop (**1**) (Figure 3) was recorded at the mouth of Labour Gill as it opens towards the Cam Beck. It comprised a small area (*c.* 9.5 m x 7 m) cut back into the hillside with a pile of waste limestone fragments to the front.

Figure 3 Small quarry scoop (1) with a pile of waste limestone piled to the front

A large spread of fragmented limestone pieces along with some small mounds (**2**) (Figure 4) was identified in the low ground between Deer Bank and News Head Hill. Whilst it may be an unusual natural formation derived from material being exposed and moved downhill through water run-off, the feature has been included as a potential area of limestone stone-getting and dressing dating to the post-medieval period.

Figure 4 Spread of possible quarrying or dressing waste with potential spoil heaps to the front right of shot

4.3.3 Uncertain

A single enclosure of indeterminate date is recorded in the YDHER close to the point where Hard Turf Gill flows into the Cam Beck (MYD41618). The site is derived from aerial photograph transcription, and no clear evidence of such a feature could be identified on the ground. It is considered most likely that the feature recorded on aerial photography is an unusually regular arrangement of natural peat formations.

4.4 Palaeoenvironmental Assessment

4.4.1 General Peat Cover

The BGS mapping (BGS 2015) shows almost the whole survey area to be covered with extensive blanket peat. The south-east-facing slope beneath Cam High Road is shown as having only a thin discontinuous drift cover above the – in that place – limestone bedrock. The outcropping limestone is visible in some of the deeply incised gills, most notably Labour Gill on the southern slope below Cam Fell proper or in the narrow cleft beneath the cave in Poverty Gill.

In terms of general character, the deepest areas of peat exposure are towards the higher parts of the survey area, with extensively eroded and hagged deep peat around High Springs Head in the north (Figure 5), and south of Round Hill along the south-east edge of the survey area. In addition, some of the gullies and larger grips reveal a significant depth of peat with a stable turf horizon in other parts of the survey area where there is less hagging or bare peat; examples include Poverty Gill in the south-east of the survey area and the grips which drain High Springs Head into White Earth Gill (Figure 6).

Figure 5 Exposed peat section C at the highest point of High Springs Head. The section shows a clear diplotelmic structure with a stable turf cap, though actively eroding from the sides. At the base of the ranging rod (1 m), the exposed bare peat surface can be seen.

Figure 6 Example of one of the deeply incised modern grips draining south-west from High Springs Head. The active and rapid erosion can be seen in the fallen blocks of peat in the base of the grip and in the cracking of the peat units above the grey clay substrate

No artefactual material was recovered from the peat sequences within the survey area, though the surviving depth in places suggests some potential for the preservation of artefacts or sealed deposits in or beneath the peat. Although there were no clearly identifiable ecofacts noted that could provide a secure and stratigraphically meaningful sample, some horizons of decayed plant material were noted low in the peat sequence. Given the depth of peat displayed in places across the survey area, the landform should be considered to be a location of potential palaeoenvironmental significance.

4.4.2 **Peat Section B (Figure 7)**

As per the agreed Project Design, two sections of standing stratigraphy including peat were cleaned, drawn and photographed.

Section B was recorded in the south-east of the survey area on an exposed edge at an altitude of 418.33 m aOD, fixed by mapping-grade GPS. The exposure at this point stands up to 1.22m in height with up to 1.02m of peat above the diamicton substrate (gleyed till). A relatively stable peaty soil turf horizon overlies a dark brown, organic-rich acrotelm. Both the acrotelm and catotelm beneath are notably homogenous with very little discernible plant material that has not been broken down into the fibrous mass. The acrotelm unusually retained more moisture than the catotelm at the time of observation, though it is assumed that this is related to recent precipitation percolating from the turf layer. Beneath the peat units the grey substrate is visible. A band at the base of the catotelm, at the interface with the clay substrate, is apparently similar in composition to the catotelm but is notably dried-out and cracked. It is possible that this represents a pre-peat land surface which has retained enough of its original structure and composition to dry differentially from the more fibrous peat units above even after gleying.

4.4.3 **Peat Section D (Error! Reference source not found.)**

Section D was recorded in a deeply incised and fast flowing grip draining from High Springs Head towards White Earth Gill at the north-western extent of the survey area and at a height of 494.43 m aOD. The exposure at the point recorded stands up to 1.04m in height with up to 0.73m of peat above the diamicton substrate. A relatively stable peaty soil turf horizon overlies a dark brown, organic-rich acrotelm with some plant matter still visible. A more homogenous dark brown to black catotelm lies beneath this. Beneath the peat units the diamicton substrate (gleyed till) is visible. A narrow and amorphous band of apparently less organic material is visible at the interface beneath the catotelm, and it is probably that this represents the gleyed remains of a pre-peat formation soil surface.

Figure 7 Peat sections B and D

5. CONCLUSIONS

5.1 CONSTRAINT AREAS

Based upon the presence/absence and potential significance of historic environment features identified during the survey, a series of constraint areas have been abstracted. The different levels of constraint area are detailed below. All features have been given a 10m buffer constraint area around either the mapped extent or, in the case of Cam High Road, the line of the route as mapped in the YDHER.

5.1.1 ACCESS TRACKS

The survey area contains a series of well-maintained access tracks which provide routes directly to or close to the restoration areas. During restoration work plant can use any metalled access tracks that are wide enough to accommodate the vehicle in question without impacting on heritage assets, regardless of the extent of constraint areas. This is particularly apposite in the case of the Cam High Road constraint area which covers most of the principal access route onto the fell. In practice, this means that there is no constraint on vehicles using the metalled track, but that access off the track onto the moor proper should be undertaken along specified 'green' corridors as shown in the mapping.

5.1.2 RED CONSTRAINT AREAS

Red constraint areas comprise a buffer around all those historic environment features that are considered to meet at least one of the following criteria:

- A potential or known significance that has been assessed as medium or high.
- Remains which are fragile and therefore particularly at risk from the restoration activities.
- Remains that are not immediately visually obvious and therefore could be impacted upon by the restoration works unnoticed.

No features within the survey area have been assigned a red constraint area.

5.1.3 AMBER CONSTRAINT AREAS

Amber constraint areas comprise a buffer around all other historic environment features that do not meet any of the 'red' constraint criteria outlined above. It therefore follows that features that are bounded by an amber constraint area have the following characteristics:

- Are of a likely lower level of significance.
- Are relatively robust.
- Are visually obvious or prominent.

Amber constraint areas are also used to delimit those sites which are recorded within the HER but could not be positively identified on the ground – most notably for this survey area the route of Cam High Road. Whilst such monuments meet the 'visibility' criteria for a red constraint area, it is possible that they have been previously truncated or misidentified. It is advised that, where possible, amber constraint areas are avoided, and where unavoidable, work or access should proceed with caution and necessary measures should be taken to avoid damage to extant earthworks or features. Potential mitigation may include bridging or sandbagging around or across features to prevent damage to extant earthworks.

5.1.4 GREEN CONSTRAINT AREAS

Green constraint areas include all other parts of the survey area outside 'red' and 'amber' constraint areas. Whilst care should be taken to ensure minimal impact from plant, there are no specific restrictions on access in relation to known archaeological features. It should be noted that the proposed access route across moorland from the Pennine Way to the small central restoration area at Cam End contains no identified features but does cross an area of deep, wet bog. To facilitate access for plant, a second route between the two areas was also assessed *c.* 125 m to the south; this is the preferred access route as it utilises drier high ground.

5.2 PALAEOENVIRONMENTAL RECOMMENDATIONS

From the observed peat exposure across the survey area it is considered that the overall palaeoenvironmental and archaeological potential of the peat is medium. The most significant peat development is on the higher ground to the north and south-east extent of the survey area, though deep peaty soils can be found across the site, as observed in grip sections.

The proposed peat restoration will, by necessity, impact on the peat resource, principally through re-profiling of vertical faces, cutting of plugs for grip blocking and damage associated with works vehicles tracking between areas of restoration. Whilst impact should be minimised, it is considered that minor impact in the course of the works is justified against the long-term benefits to the historic environment inherent in the preservation of a potentially significant palaeoenvironmental resource (see Gearey *et al*. 2010, 32).

Although no artefacts or significant ecofacts were recovered from the peat during this survey, the deposits have potential to contain palaeoenvironmental remains and some limited potential to seal archaeological artefacts and deposits within buried horizons. Caution should be exercised during the restoration work and, where possible, excavations should always aim to have a minimal impact on the peat in all parts of the survey area.

6. SOURCES

6.1 BIBLIOGRAPHY

Ainsworth, S., Bowden, M., McOmish, D. and Pearson, T. 2007. *Understanding the Archaeology of Landscapes – A Guide to Good Recording Practice*. Swindon, English Heritage.

Brightman, J. 2015a. *Oughtershaw Moss, Langstrothdale, North Yorkshire. Landscape Survey and Palaeoenvironmental Assessment*. Unpublished report prepared by Solstice Heritage.

Brightman, J. 2015b. *Peat Restoration Historic Environment Survey and Palaeoenvironmental Assessment: Park Fell Ingleborough. Final Report*. Unpublished report prepared by Solstice Heritage.

Brightman, J. 2016. *Raisgill Bracken Treatment Scheme, Langstrothdale, North Yorkshire. Landscape Survey and Conservation Management Assessment*. Unpublished report prepared by Solstice Heritage.

Chartered Institute for Archaeologists. 2014. *Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives*. Reading, Chartered Institute for Archaeologists.

Forum on Information Standards in Heritage (FISH). 2012. *MIDAS Heritage – The UK Historic Environment Data Standard v. 1.1*. London, English Heritage.

Gearey, B., Bermingham, N., Chapman, H., Charman, D., Fletcher, W., Fyfe, R., Quartermaine, J. and Van de Noort, R. 2010. *Peatlands and the Historic Environment*. Unpublished review commissioned by the IUCN UK Peatland Programme's Commission of Inquiry on Peatlands.

Historic England (HE). 2006a. *Management of Research Projects in the Historic Environment (MoRPHE).* London, English Heritage.

Historic England (HE). 2006b. *Management of Research Projects in the Historic Environment (MoRPHE) Technical Guide 1 Digital Archiving and Digital Dissemination.* London, English Heritage.

Martin, L. and Pollington, M. 2008. *Cam High Road, Cam Fell, North Yorkshire. Archaeological Topographic Survey, Evaluation and Watching Brief*. Unpublished report prepared by Archaeological Services WYAS.

Walker, K. 1990. *Guidelines for the Preparation of Excavation Archives for Long-Term Storage*. London, UKIC Archaeology Section.

6.2 WEB RESOURCES

British Geological Survey (BGS). 2015. *Geology of Britain Viewer*. Available from <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>. [30 August 2016].

Historic England (HE). 2014. Forum on Information Standards in Heritage (FISH) Thesauri. <http://thesaurus.historicengland.org.uk>. [24 October 2015].