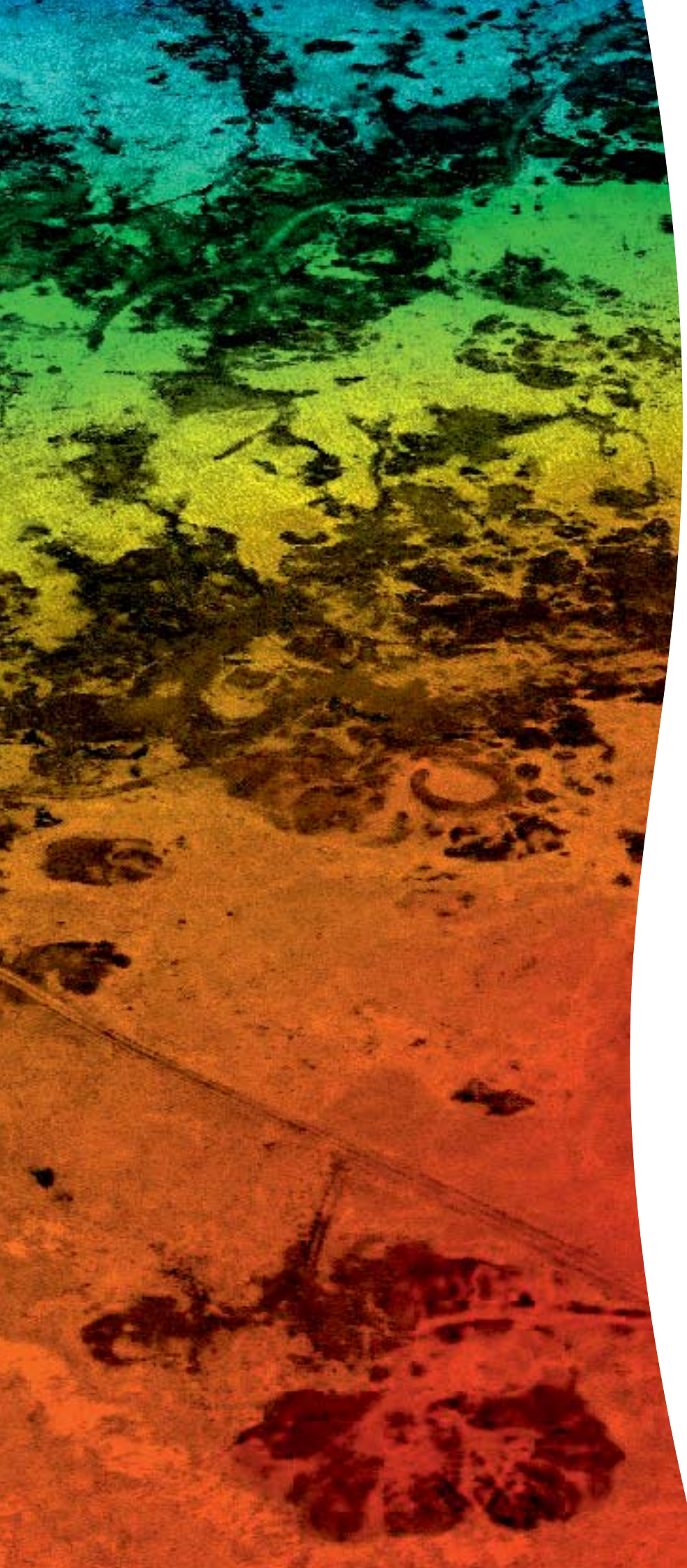

NAA

ARCHAEOLOGICAL

SURVEY

GRASSINGTON MOOR,

YORKSHIRE DALES NATIONAL PARK

on behalf of

YDNPA

November 2015

NAA

ARCHAEOLOGICAL SURVEY

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GRASSINGTON MOOR YORKSHIRE DALES NATIONAL PARK

on behalf of

YDNPA

Project No.: 1065
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NAA 13/129
November 2015

NAA Document Authorisation

Project name		Grassington Mines, Grassington Moor, Yorkshire Dales National Park			**Project number**
Report title		Grassington Mines, Grassington Moor, Yorkshire Dales National Park. Archaeological Survey Report			1065
Report No.		13/129			
Revision	**Date**	**Filename**	NAA_1065_Rpt_13-129.pdf		
v.1	Nov 2013	**Description**	Report on Archaeological Survey		
v.2	Feb 2014	**Description**	Edits to report		
v.3	Nov 2015	**Description**	Comments from YDNPA		
			Prepared by	**Edited by**	**Approved by**
		Name	Matthew Town	Richard Fraser	Tania Simpson

This document has been approved for release by: ..... TS .....

GRASSINGTON MOOR,
YORKSHIRE DALES NATIONAL PARK

ARCHAEOLOGICAL SURVEY

Summary

Northern Archaeological Associates Ltd (NAA), in conjunction with Blaise Vyner Associates, were commissioned by The Yorkshire Dales National Park Authority (YDNPA), with the support of English Heritage, to undertake a Management Plan on the lead mining complex at Grassington Moor, North Yorkshire (SM 31331, centred on SE 670 025). The Management Plan was underpinned by survey works undertaken by NAA, which comprised a detailed desk-based LiDAR transcription and topographic survey, which aimed at identifying and preserving the heritage significance of the site through archaeological record and to inform the plan, which looks at threats to the identified archaeological resource and establishes mitigation measures for its preservation.

The survey area, covering 5.6km², forms part of Grassington Moor, a registered common in the parish of Grassington, and comprises a part of the moor which has been heavily impacted by lead mining. Sections of the survey area form part of a Scheduled Monument, much of which lies outside the current investigation boundary. The project involved the digitisation of archaeological structural and earthwork features into MapInfo GIS from orthorectified photographic images and LiDAR derived DSMs (Digital Surface Models) and DTMs (Digital Terrain Models), and cross-referencing the digitised entries with existing documentary, cartographic and photographic sources to produce a definitive record for the mining remains. The study identified a total of 956 heritage assets within the study area (many in groups). An English Heritage Level 2 survey was subsequently carried out to validate the results of the digitising.

The survey has identified very limited prehistoric and medieval activity within the survey area, with the bulk of the archaeological remains identified being of post-medieval, industrial origin, and directly related to lead mining (in the 17th, 18th and 19th centuries), and the reprocessing of spoil heaps for barytes and fluorspar (in the 20th century).

Mining at Grassington dates from the 17th century or earlier, when the Earls of Cumberland began the systematic exploitation of the mineral resources on the family estates, including Grassington. Mining did not commence on the Out Moor, of which the survey area forms a part, until 1731, when extraction first commenced on the Ripley Vein, then rapidly expanded across the western side of the survey area. The earlier mining remains comprised shallow shafts or opencast trenches following a vein, in many cases with the mine shafts protected by 'coes', *small buildings built over the shafts. In most cases the dressing floors for the mines were intimately associated with the mine workings themselves, and included distinct and localised evidence for different processes: the breaking and sorting of ore-bearing stone, the sieving and subsequently the washing*

of the material to retrieve the maximum amount of lead. The moor was the location of several smelt mills from the 17th century where lead was smelted on commission.

From the mid 18th century, the mining at Grassington began to be the concern of larger and more organised companies, who developed winding for access and haulage from the mines, allowing deeper shafts to be sunk, and the dressing for the companies began to be more centralised to these shafts, with commission-dressing being undertaken for smaller less-organised concerns. Ownership of the interests in the Grassington industry changed again in the later decades of the 18th century when lead mining and processing in the area passed through inheritance to the Dukes of Devonshire. Though there remained rich unworked deposits on the moor, the accessible workings had become nearly exhausted by the 1790s, and this prompted the Devonshires to invest considerable sums into the industry. Improvements comprised: the excavation of the Duke's Level for drainage, which allowed deeper shafts to be sunk; a complex series of dams and watercourses to power waterwheels; the construction of a cupola mill and associated flues in 1793.

From 1818, the Duke of Devonshire began to exercise direct control of the mines, and formalised and developed pumping, winding, and deeper mining, as well as developing an extensive network of water management systems and roads to service the new works (in particular the construction of the Duke's New Road in 1830). Mining became even more centralised to a few deep shafts. The development of deeper mining allowed hitherto unexplored areas, primarily towards the eastern side of the moor, to be developed.

The area ceased to be worked for lead from 1882, following a general decline of the industry due primarily to the availability of cheaper foreign imports. In the 20th century, the moor was subject to a series of ventures which looked at the reprocessing of the waste heaps primarily for fluorspar and barytes, perhaps the most organised being the Dales Chemical Company, which operated between 1957 and 1964. The heaps and dressing floors of the larger mines were systematically plundered, and a great deal of damage was caused to the mining landscape in a few short years. Since the closure of the plant, the moor has remained largely untouched, other than the reuse of mining spoil for track construction. The moor has been used for sheep grazing, as access for shooting purposes, and as an open landscape which has been visited by numerous tourists and local residents over the years.

This report presents the results of this study and a summary of the threats to, and significance of the archaeology. This information provides the basis for management proposals for the site, which are being considered separately; however the report also provides recommendations for future survey and excavation work, based on the information gained from this project.

Acknowledgements

Northern Archaeological Associates would like to thank: Robert White and Miles Johnson, Yorkshire Dales National Park Authority; Blaise Vyner, Blaise Vyner Associates; Mike Gill, Northern Mines Research Society; Peter Jackson, Nenthead Mines Conservation Society; Peter Kempsey and Tracy Perfect-Reid, Countryside Consultants; Harvey Wiggins, Gamekeeper, Grassington Moor and Phil Scott-Priestley, GSC Grays. Tania Simpson, NAA, kindly commented on the flint find.

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GRASSINGTON MOOR, GRASSINGTON,
YORKSHIRE DALES NATIONAL PARK
ARCHAEOLOGICAL SURVEY

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1.0 INTRODUCTION

1.1 Northern Archaeological Associates Ltd (NAA), in conjunction with Blaise Vyner Associates, were commissioned by The Yorkshire Dales National Park Authority (YDNPA), with the support of English Heritage, to undertake a Management Plan on the lead mining complex at Grassington Moor, North Yorkshire, a large proportion of which is part of a Scheduled Monument (SM 31331, centred on SE 670 025). The Management Plan was underpinned by survey works undertaken by NAA, which comprised a detailed desk-based LiDAR transcription and topographic survey, aimed at identifying and preserving the heritage significance of the site through archaeological record, and intended to inform the development of a long-term management strategy, in accordance with a specification supplied by the YDNPA (White 2011), and a methods statement prepared by NAA (NAA 2012).

1.2 The mining affected landscape at Grassington is arguably the most highly organised and compact in the Yorkshire Dales (Gill 2004a, 59). The landscape reflects lead-mining and processing activities from at least the 17th century through to a peak in the mid 19th century, with widespread secondary re-working of spoil mounds, mainly for barytes and fluorspar, in the mid 20th century. The remains include extensive areas of shafts, built structures including mills, dressing floors and processing areas, waste mounds of varying size, water-management features and a network of roads (Ainsworth and Burn 2009).

Issues

1.3 The Scheduled areas of the lead mining remains at Grassington Moor are on English Heritage's Heritage at Risk Register. The principal threats to the monument are related to the erosion of, and damage to, key elements of the complex as a result of both natural processes and human intervention. The maintenance works periodically undertaken on the tracks and roadways of the site in order to facilitate vehicular access for shooting parties has led to the unfettered use of mining spoil for maintenance and construction. As a result of the latter, a survey and assessment of part of the complex was undertaken by English Heritage in 2008 (Ainsworth and Burn 2009), primarily to provide up-to-date information on the location, extent, and potential impact of such works on the monument to English Heritage's Regional Grants and Advice Team. The report of this assessment made 17 recommendations, amongst which were;

- the need to produce a Management Plan for the complex to be underpinned by a suitable survey which should aim to record archaeological threats along with environmental and land-management information as part of an integrated system within a single GIS environment;
- the need to develop a detailed water-management strategy integrating the need for vehicular access with monument preservation; and
- to undertake a suitable survey on which to base the resolution of these issues utilising a combination of orthorectified photography, mapping grade GPS survey and a suitable GIS to

build upon the assessments previously made.

1.4 The current survey was undertaken in order to address these issues, and to partially comply with a number of SHAPE (EH 2008) Sub-Programmes within EH Corporate Objectives 1A and 1D, with a special emphasis being placed on Research Programmes:

- A1, What's out There?: Defining, characterising and analysing the Historic Environment;
- A2, Spotting the Gaps: Analysing poorly understood landscapes and areas;
- D2, Measuring the Threat: Studying the reasons for risk and devising responses; and
- G1 Sharpening the Tools: Developing new techniques of analysing and understanding;

and to comply with YDNPA Historic Environment Objectives:

- HE3 Carry out surveys of historic buildings, landscapes and monuments and ensure that information on the condition of those that are designated is never more than five years old; and
- HE5 Conserve and enhance the most important archaeological sites and features, so that at least 95% of the Scheduled Monuments are in optimal condition by 2020.

Project Aims and Objectives

1.5 The ***principal aim*** of the project was to produce a Management Plan for the Historic Landscape of Grassington Moor. The formulation of the Management Plan is underpinned by this survey of the site, which aimed to record the threat to the archaeological remains on the moor along with providing information relating to environmental and land management issues.

1.6 In order to fulfil the formulation of the Management Plan, a series of ***objectives*** were identified by the YDNPA (White 2011);

- to address the water management and hydrological issues affecting the site;
- to address the management and maintenance of the trackways on the moor;
- to address the issues relating to the open shafts on the moor and to assess the options for dealing with these;
- to assess the options for enhancing access to the site; and
- to assess the options for improving the interpretation and presentation of the site.

1.7 In addition, the project would:

- seek to identify any remains which could potentially relate to early mining activity.

1.8 In order to achieve these objectives, the following evaluation tasks were undertaken:

- an analytical survey to Level 2 standards (EH 2007) in order to:
  - contribute to the understanding of the way in which geological and fluvial conditions influenced past (and present) activity patterns;
  - identify areas of principal erosion threat;
  - identify and record any sites with specific conservation and management issues;
  - identify action priorities within the survey area which might inform future monument and land management strategies;
  - assist in the continued development of the GIS recording structure used by EH in similar landscapes;
  - assist in the development of new methods of researching landscapes dominated by past extractive industries and review existing interpretations; and
  - assist in the development of compatible GIS data-sets capable of being used to exchange heritage information between interested parties.

1.9 The following document focuses on the surviving archaeological evidence of the mines, placing *in-situ* features within their functional context and discussing the potential preservation of any sub-surface material. This is intended to facilitate a better understanding of the nature, form, extent and significance of the site and inform an integrated strategy for the future management of the complex. A site inventory of all archaeological features can be found at the end of this report (Section 8). The results of the survey and evaluation will be used in the preparation of the Management Plan (Vyner 2013).

Scope of Work

1.10 The project area comprised a 5.6km area as shown in Figure 2 (NGR: SE 0311 6702). The scope of the fieldwork element of the project was restricted to the examination and recording of the structural and earthwork features within this survey area, and the identification and recording of threatened areas of the monument. As part of the analysis of the monument, all readily available documentary, cartographic and photographic sources were consulted, and other interested parties were also consulted. The examination of primary documentary sources was not required.

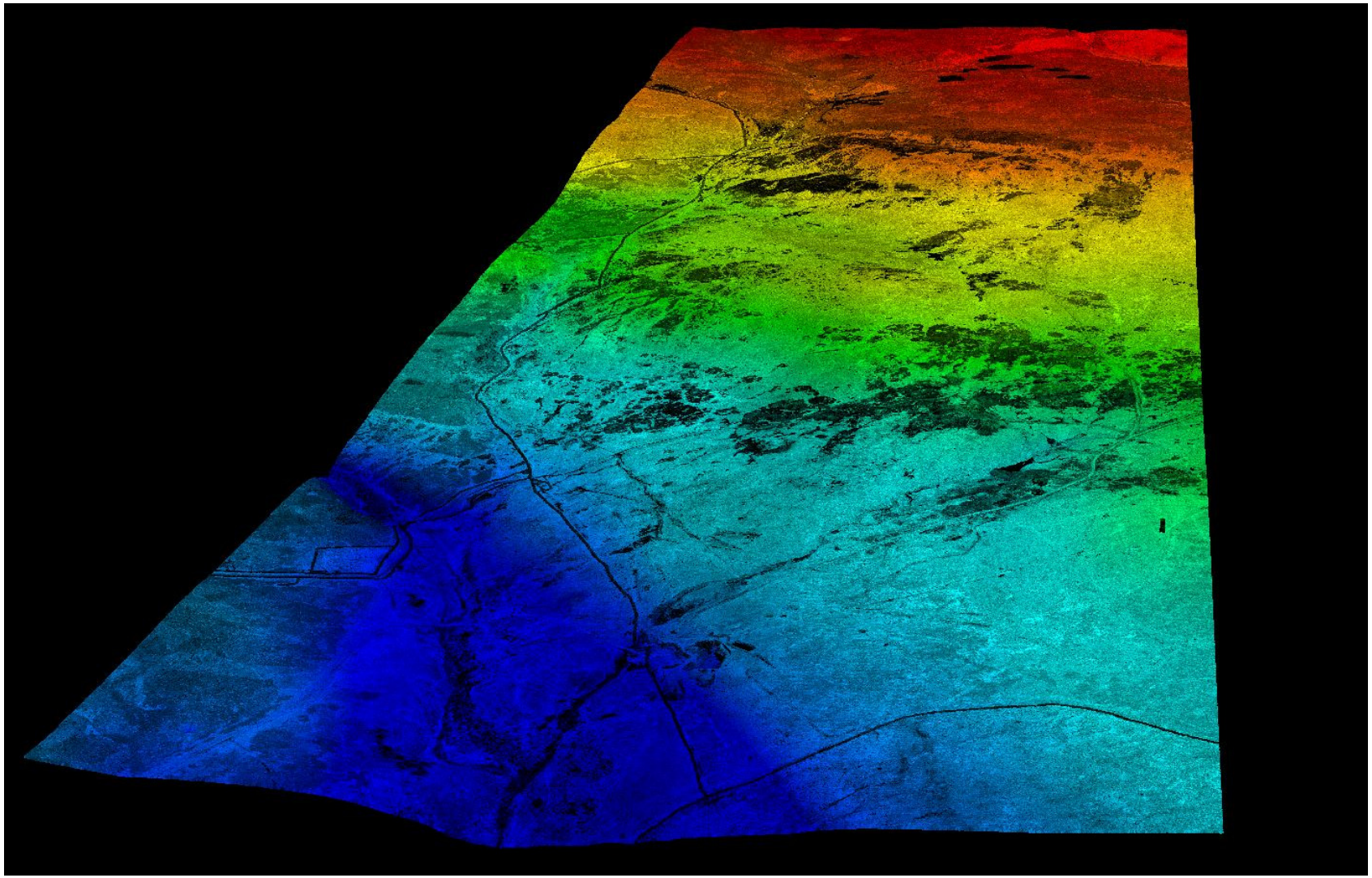

Plate 1: Grassington Moor LiDAR data (LAS), colour-shaded by height

2.0 METHODOLOGY

2.1 All aspects of the work were undertaken in accordance with the project design prepared by NAA in response to the project brief (NAA 2012) sent out by the YDNPA archaeologist (White 2011). All methodologies were in line with current standards and guidance published by English Heritage (1999, 2000, 2006a, 2006b, 2007, 2008a, 2008b, 2010) and the Institute for Archaeologists (2008 and 2009).

Documentary Survey

2.2 Research into the history of the Grassington Mines from primary sources was not required as part of this project and has been more than adequately covered by mining historians over the last century. Research on the mines was restricted to secondary sources. These included articles in British Mining, the Bulletin of the Peak District Mining History Society, the Transactions of the Newcomen Society and other sources. Books and unpublished documents by Arthur Raistrick, Mike Gill and Martin Roe were also examined in detail; particular credit must be given to Mike Gill for his exemplary book on the mine workings, from which so much information was gleaned (Gill 1993). Mike Gill also kindly commented on initial drafts of the survey data, and was consulted with regards the specific history of the mine workings and their wider significance in terms of understanding the development of mining across the Yorkshire Dales. Extensive use was also made of oblique aerial photographs, provided by English Heritage, which were taken as part of the survey on the trackways undertaken in 2009 (Ainsworth and Burn 2009).

Plate 2: digital Ordnance Survey data (1891, 2nd Edition 25" to 1 mile) overlain on digital orthorectified aerial imagery - High and Low Ringleton Shafts

GIS

2.3 A GIS (Geographical Information System) was created using MapInfo Professional 11, and formed the basis of the project work. The GIS was linked to a Microsoft Access database, based upon the

requirements of the YDNPA's Historic Environment Record, in order to manage the data generated in this process. The layers used in the creation of the GIS conformed to those used by Yorkshire Dales National Park Authority, and were created following guidelines issued by the Archaeology Data Service in *GIS: A Guide to Good Practice* (1998).

2.4 The survey made reference to a number of datasets, including:

- Yorkshire Dales National Park Historic Environment Record (HER) data;
- English Heritage National Monuments Record (NMR) data;
- Ordnance Survey Mapping (typically Second Edition 25" to 1 mile, 1891);
- high resolution scans of Mike Gill's plans of Grassington Moor (supplied by YDNPA);
- orthorectified aerial photographic data provided by the YDNPA (2008/9 Bluesky vertical digital imagery);
- information from the National Mapping Programme;
- information from the Yorkshire Moorlands Assessment Project (YMAP) (Fraser and Vyner 2012) (primarily relating to the position of modern grips, and blanket peat deposits); and
- Digital Surface Model (DSM) LIDAR, and Digital Terrain Model (DTM) LIDAR, produced by The Environment Agency Geomatics Group and specifically flown for this project (0.25m resolution, produced as ASCII files and light-enhanced by NAA).

2.5 The datasets were examined visually and archaeological structures and other features of importance in the formulation of the Management Plan were identified and transcribed. Each site or group of sites (where these occurred in definable clusters or structural groups) were allocated a Unique Identification Number (UIN). These numbers are referenced in **bold** throughout this report. A gazetteer summarising the recorded features and their locations can be found in Section 8 of this report .

Survey

2.6 On completion of the office-based transcription, the results were assessed by means of field survey, which comprised the systematic field walking of the survey area in transects. The on-site survey work was undertaken in accordance with the procedures set out in Understanding the Archaeology of Landscapes; A Guide to Good Recording Practice (EH 2007). Ground conditions and visibility for survey were generally good, though snow cover proved an issue during some of the earlier survey days.

2.7 All sites identified through the office-based transcription were subject to an English Heritage Level 2

Survey (English Heritage 2007), which involved the checking of the locations, extent, interpretation and condition of features on the ground. In addition, the survey identified and located 'new' archaeological sites and features which had been missed during the office-based transcription stage. Each new site was given a UIN from the main sequence and information was recorded regarding the form, function, material, dimensions and morphology of features identified, as well as notes on condition, significance and threat. Sites not identified on the LIDAR were recorded by means of a survey-quality GPS, which was used to provide a single point fix for the site. The archaeological sites were recorded as either points, lines or polygons: points were used for features of 5m diameter or less, lines for linear features such as leats or tracks, and polygons for features covering a larger area. The resulting survey data was integrated into the GIS in the office.

2.8 Digital photographs were taken of features of exceptional form, alongside a representative photographic record of features of repetitive form, using a high resolution digital camera. Each photograph included a graduated scale.

Nomenclature

2.9 A glossary of mining terms used in this report is included in Section 9, and all the monument terms used in the GIS have been taken from the National Monuments Record (NMR) Thesaurus of Monument Types (http://thesaurus.english-heritage.org.uk). For the purposes of this report, the term '*level*' has been used for a tunnel driven near-horizontally into the ground for access, and '*adit*' has mainly been used for a tunnel driven near-horizontally into the ground for drainage, but in essence they are the same thing. '*Shaft*' has been used for tunnels driven vertically from the surface, whether to access mineral deposits or for ventilation. These have been discussed as *'shallow shafts'* and *'deep shafts'*, the former relating to the depth a jack-roll could be used, whilst the latter was usually drawn by a horse whim or other mechanical device. *'Dressing Floors'* relate to the preliminary crushing and cleaning of lead ore in a specific area, whether by hand or by mechanical means.

3.0 BACKGROUND INFORMATION

Location

3.1 Grassington is located in Upper Wharfedale and is situated on the north bank of the River Wharfe (Figure 1). The uplands to the north-east of the town reach elevations of c.550m OD and the current works were undertaken in an area formerly known as the Out Moor which comprises some 800 ha of common enclosed by the Moor Wall (Gill 1993, 8). The Out Moor presently consists of rough pasture, heath and substantial areas of former lead mining remains, and is predominantly used for grazing, shooting and other recreational purposes.

Ownership

3.2 Grassington Moor is common land; a Commons Registration Act inquiry in 1987/8 determined that the moor was a common with no owner, and was therefore subject to protection under Section 9 of the 1965 Commons Registration Act (CRA 1965 268/U/302). The sole section of the survey area which lies in private ownership is the slag heap to the south of the Cupola Smelt Mill, which lies on private land. Shooting and grazing rights are held and exercised privately, with most shooting occurring north of the Bycliffe Vein. The Grassington Moor Management Association (GMMA) exists to bring together the rights holders and other stakeholders to help inform the management of the moor and reduce potential areas of conflict.

3.3 The mining area forms part of the Yorkshire Dales National Park and is designated Access Land, as defined by the Countryside and Rights of Way Act 2000 (Roe 2007, 1), meaning there is full public access to the site which raises a number of Health and Safety concerns.

Designations

Scheduled Monument

3.4 The Cupola Mill at Grassington Mines was first designated a Scheduled Monument in 1978, with extensive extraction remains in the surrounding landscape added in 1999 (31331; Figure 2) under the provisions of the Ancient Monuments and Archaeological Areas Act of 1979. Previously known as Scheduled Ancient Monuments (SAMs), these sites are monitored and identified by English Heritage but legislated by the Secretary of State for Culture, Media and Sport (DCMS). Scheduling is the highest form of legal protection applicable to archaeological sites and covers both above and below ground archaeology including any subterranean mine workings.

3.5 Roe (2009, 3) summarises the importance of the complex: *'each of the key stages in the development of the Grassington mining complex has left distinctive and often well preserved archaeological evidence. As well as shafts, spoil heaps and ore processing sites there is an extensive water management system; the remains of a complex power transmission and pumping systems and other features representing mining from the 17th to the 20th century. This combination of features, their condition and surviving level of documentation make the area a nationally important lead mining*

site and this has been acknowledged by designating a large part of the Grassington Mines complex as a Scheduled Ancient Monument. Additionally there are extensive peat workings, stone quarries producing different products, and small areas of coal mining all of which add to the importance of this historic landscape'.

Previous archaeological work

3.6 The earliest known work on Grassington Moor was undertaken by Arthur Raistrick from the late 1920s (some of which was discussed in summary form in Raistrick 1926). A survey of the Cupola smelt mill was carried out by Clough and Blackburn-Wells in 1947, and was published Clough's seminal book on lead smelting mills (Clough 1980).

3.7 In the 1960s, the moor was subject to a rapid programme of recording in advance of damage being caused by reprocessing, undertaken by the Northern Mines Research Society (then the Northern Cavern and Mine Research Society). The recording programme was revitalised as the Grassington Moor survey project by Mike Gill in the 1970s, and was subsequently published in the 1990s (Gill 1993).

3.8 Between 1988 and 1992, the RCHME carried out the Yorkshire Dales Mapping Project, mapping archaeological detail from aerial photographs. Further surveys were carried out by LUAU (1993), concentrating on the Cupola smelt mill and flue system to inform consolidation work organised by the YDNPA , and by the University of Bradford (1994) focussing on the Yarnbury mines (which lie outside the boundary of the present survey area). EDAS carried out surveys on two buildings and a dressing floor in 1997, which lie within the survey area (Dennison and Haigh 1997). Meerstone also carried out surveys in 2007 and 2009 (Roe 2007, 2009). Most of these projects have been at the instigation of the Yorkshire Dales National Park Authority.

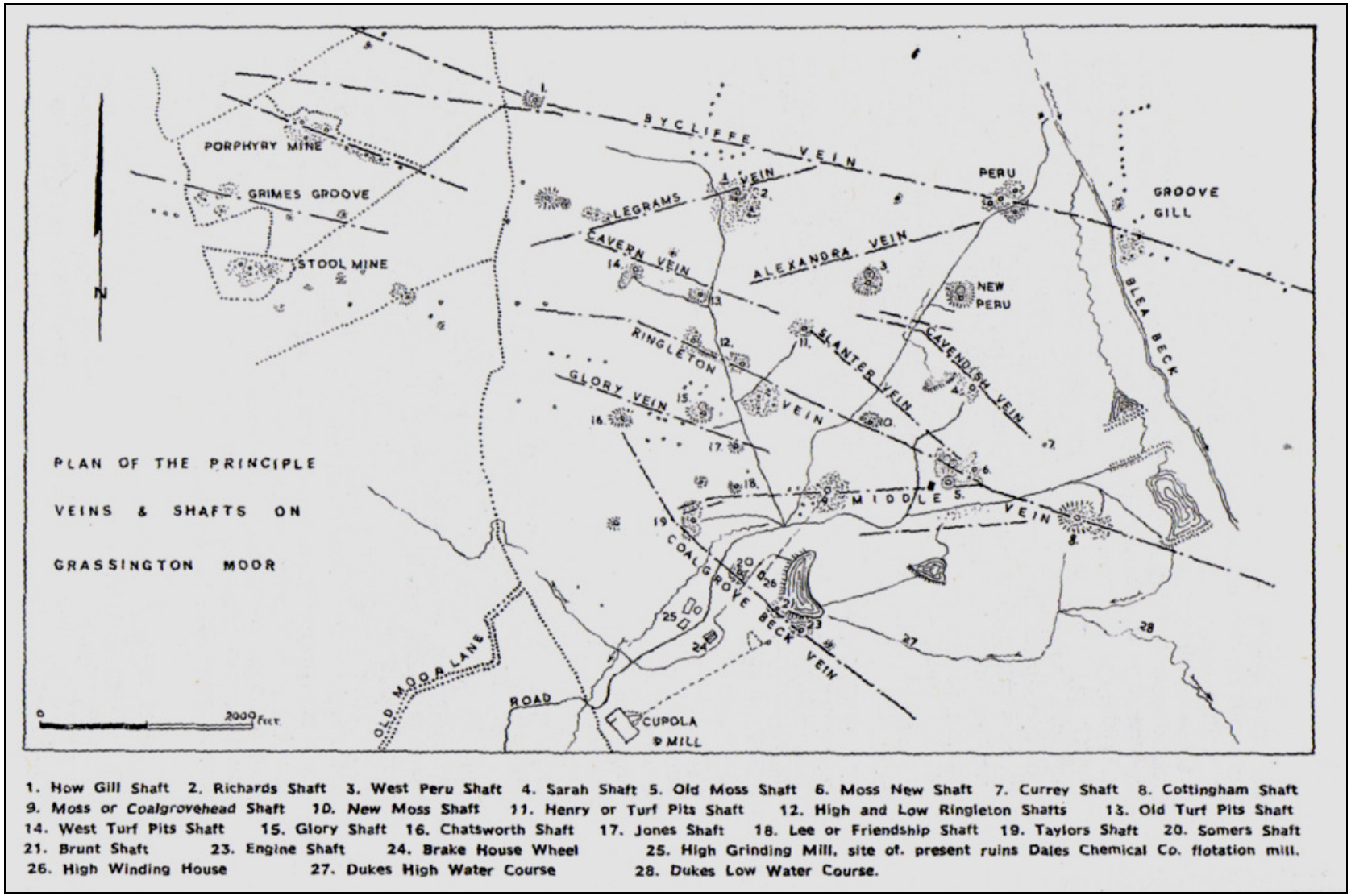

Plate 3: simplified plan of main veins on Grassington Out Moor (after Dickinson 1972, 18)

4.0 THE GEOLOGY OF THE SITE

4.1 The pattern of lead mining in Yorkshire is dictated by the unique geology of the Pennines. Virtually all lead mining in the county is confined to the Dales where a mix of mineral deposits - principally lead, calcite and barytes – are found in fissures, or veins, associated with faults in the sequence of Carboniferous rocks (Raistrick 1972, 3). This mineralisation occurs in pockets across the region but varies in density, with key concentrations being identified in Nidderdale, Wharfedale, Arkengarthdale and Swaledale. It is around these areas that the historic mining industry developed.

4.2 The solid geology of the Grassington area comprises rocks of the Carboniferous system, predominately the Yoredale Series - a rhythmic succession of limestone, shale and sandstone (the latter sometimes overlain by a thin coal seam), above which lie the shales and coarse sandstones (gritstones) of the Millstone Grit, forming the summit of the uplands (Raistrick 1975, 11). The bedrock at Grassington comprises millstone grits (Grassington Grit) overlying these rock formations, and it was from the lower levels of the Grassington Grits, the Bottom or Bearing Grit, that the majority of the lead ore mined at Grassington was won (Gill 1993, 11). The mineral rich veins, which carry a complex mixture of different minerals, including the lead ore, were formed towards the end of the Carboniferous period, when granite intruded up through the earth's crust resulting in the formation of the Pennine Range. The force of this action caused the surrounding limestone rocks to cleave, tilt and fold, the intruded granite forming a series of near vertical fault fissures. Through these, hot saline liquids were forced which eventually cooled and crystallized to form the veins, which ranged in width from a few centimetres to two or three metres. The veins at Grassington form two distinct groups, those at Grassington Low Moor or Yarnbury, and those at Grassington High or Out Moor. The latter forms the focus of this study. The veins on the Out Moor run broadly east-west and north-west to south-east, and dip gently eastwards, with the veins in the eastern side of the survey area being obscured by shale beds (Dickinson 1972, 12).

4.3 Most of the mineral deposits, known as gangue, comprised fluorspar, barytes and calcite and were historically commercially worthless. Lead ore (Galena) generally made up only a very small percentage of the vein, somewhere in the region of around 5-10% of the overall content, and was present either as distinct ribs, which ran through the vein, or was mixed intimately with the gangue. Mineralisation was not uniform, and the richest parts of the veins, called ore-shoots, occur where they cut the gritstone or limestone. In the Yorkshire Dales, these ore-shoots were restricted to short distances vertically but could be extensive laterally (Gill 2004a, 54).

4.4 The gangue, together with the waste rock – or deads - formed the vast majority of deposits along the vein - or vein-stuff. The unprocessed vein-stuff excavated from the mine was known as bouse and necessitated a lengthy process of dressing to separate the valuable ore from the associated waste material. This usually begun onsite with the crushing and washing of the bouse to extract the mineral, although smelting the ore - required to produce pure lead - took place offsite.

4.5 The drift geology of the area, where present, comprises a mixture of boulder clay and morainic drift,

peat, and glacial sands and gravels (IGS 1979). The soils of Grassington Moor largely consist of the raw oligo-fibrous peat soils of the Winter Hill association, and the strongly gleyed soils of the Wilcocks 1 association (SSEW 1980, Jarvis et al 1983, 312 and 307).

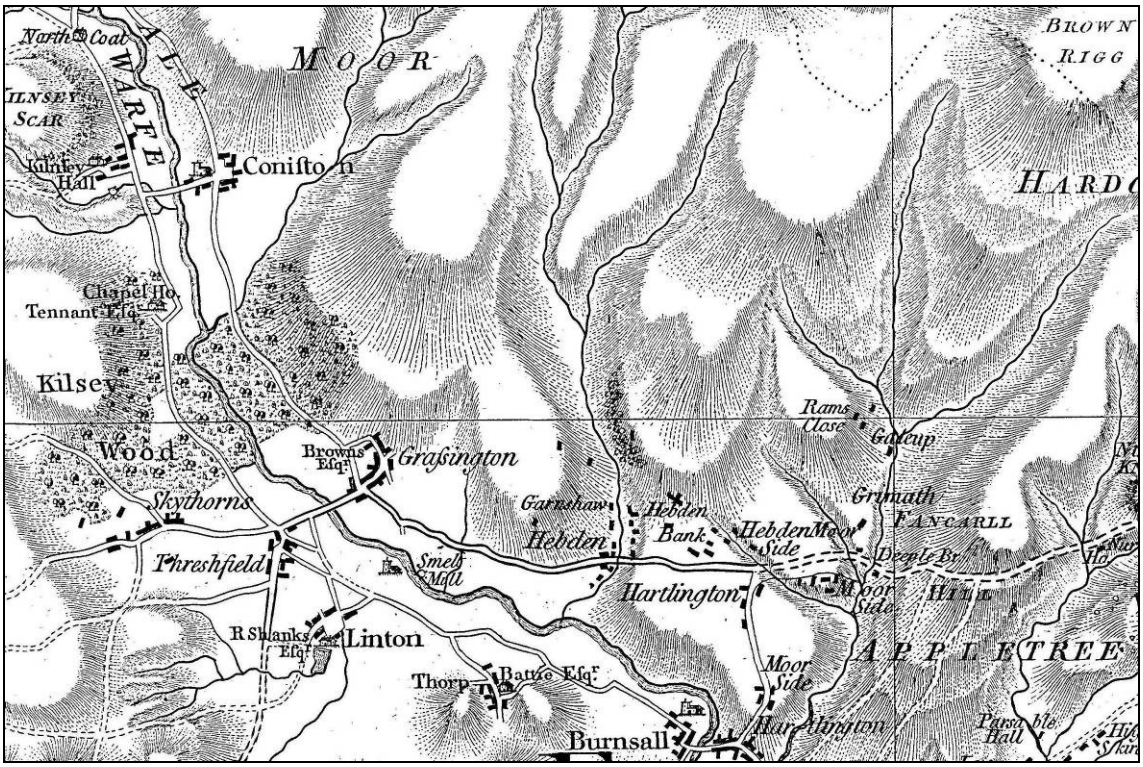

Plate 4: extract of Thomas Jeffrey's 1771 map of Yorkshire. The lead mines are not depicted, but the Low Mill smelt mill is shown

5.0 THE HISTORY OF GRASSINGTON MOOR

5.1 There is no evidence of lead mining prior to the medieval period, though it is reasonably certain that the Romans were mining for lead in the Dales (Gill 2004a, 52). Medieval mining was mostly controlled by the monasteries; a Royal mandate in 1219 confirmed the Crown Protection of Northern Miners received from Henry II and Richard II, and this was repeated in 1223, when Yorkshire is specifically mentioned (Gill 1988, 206). Apart from brief depressions (for example caused by the flood of lead onto the market following the dissolution of the monasteries), production rose steadily until the mid 18th century, when it increased exponentially (Gill 2004a, 52).

5.2 Grassington has been a privately owned liberty from the Norman Conquest onwards. The Manor of Grassington was originally part of the Percy Fee, later sold to the De Plumpton family who, in turn, sold half to the 2nd Earl of Cumberland, and half to his brother. The halves were reunited, through marriage, by George Clifford, the 3rd Earl of Cumberland.

5.3 The first record of a connection between early lead mining and Grassington is from place-name evidence related to smelting of lead in wind-blown furnaces, or 'bales', an early smelter comprising a shallow bowl cut into the ground, with a low circular retaining wall of stones. The bowl was loaded with wood or charcoal with the lead ore placed on top (Jones 1996, 38). Placenames *'Bayle Hill'* at Yarnbury, and '*Bale Hill'* in the Hebden Liberty (considered to be part of Grassington until the 18th century), suggest bale smelting in the area (Gill 1993, 12). If true, lead production in this period may have been a small-scale enterprise, undertaken to satisfy local needs, and up until about 1607 the veins of Lea Green pastures were only worked by about six to eight families (Spence 1992, 168).

5.4 By the early 1600s, the Earls of Cumberland, particularly Earl George Clifford and his brother Francis, the 4th Earl, began the systematic exploitation of the mineral resources on the family estates, including Grassington (Spence 1992, 157, 168). The antiquarian T.D. Whitaker established the orthodox model for the origin of mining at Grassington when he stated in 1812 that '*he could find no evidence of mining prior to the Reign of James I, when, from circumstances (one in particular, which I do not hold myself at liberty to disclose), I believe them to have been first undertaken, and principally by miners from Derbyshire'* (cited in Gill 1988, 206). Mining at Grassington is said to have commenced in 1604, and marked the introduction of the Customary Laws, which gave the miners small blocks of land to work (Gill 2004a, 59); the first known Barmoot was in May 1642, but this was unlikely to have been the first (Gill 1988, 206). The Customary Laws were twenty basic laws determining the rights, privileges and obligations of each other. Miners were free to explore for lead, and when a new vein was found the Barmaster would grant two meers to the miners (known as the Founder's Meer), each of 21 yards, on payment of one shilling and sixpence. Meerstones were used to mark the boundaries, on which were carved the initial of the miners and an 'F' for Founder (Dickinson 1972, 16). Mining at this time is likely to have been undertaken by small groups of miners working shallow shafts; the system worked well for small-scale exploitation, but discouraged larger scale capital projects. Drainage levels were required in order to allow deeper workings, but the topography was not suitable, being broadly gently sloping moorland with no valleys; the miners

could only rely on the porous limestone to assist the drainage of their workings, and could not work below the water table. The system was also limiting in that miners could only work one vein, and prevented cross-cutting (Gill 2004b, 16).

5.5 There has been considerable debate as to whether the introduction of Customary Laws indicated an influx of adventurers from Derbyshire to the area. In 1605, Derbyshire miners are recorded as working at Grassington, but records indicate that local families continued to be the primary workforce; a study of land holding in Grassington shows that most early miners were local, and mainly from the Greenhow, Grassington and Swaledale areas (Gill 1988, 206). The men who were arriving from Derbyshire are likely to have been miners, rather than managers (*ibid,* 210).

5.6 A new smelt mill, the Low Mill, was constructed by 1606 on the River Wharfe at Fletcher Brow, and was controlled by the Earl. The miners would dress the ore and carry it to the smelt mill, paying the Mineral Lord who took duty in pig lead, being one fifth of any smelted lead produced (Gill 1988, 206; Dickinson 1972, 16). By the 1630s, the mines of Grassington were well established and well regulated, and profitable. In 1630, a smelter was described as '*William Badger, a smelter of Darbishire* [sic], *but of late by me employed at the Earle of Cumberland his works in Yorkshire*' (France, quoted in Gill 1988, 206), which appears to be a reference to the smelt mill.

5.7 A second smelt mill was subsequently constructed, the High Mill, which was located beside Coalgrovebeck on the High Moor. This is first mentioned in 1637 (Spence 1992, 174), and its construction appears to have been the result of a need for continuity of production were the Low Mill to require maintenance.

5.8 A collapse in the profits of the lead industry occurred in the early 1650s, partly as a result of the English Civil War in the preceding decade, but mainly because of a two year stoppage in production resulting from the miners' objections to an increase in the price of timber for use in the mines, and a levy which amounted to one-third of all of the smelted lead placed upon them. The profitability of the enterprise was largely restored by the late 1650s due to further investment, and a change in the way the miners were regulated (Spence 1992, 181) under the ownership of the Earl of Burlington who inherited the liberty in the 1660s. The Customary Laws changed around 1680, probably as a result of his influence. A system whereby the first finder of a vein got the first two Meers, with the Mineral Lord receiving the third meer, was adopted, and the meer length was increased from 21 to 30 yards. Duty was also diminished, from one third to one fifth (Gill 1993, 207).

5.9 Output increased generally following this, but declined through the 1720s, and a series of disputes followed in the 1730s, until a new set of thirty-three laws were agreed in 1737, under the title *Rara Avis in Terris* (*op. cit.*). Production remained relatively constant and proceeded in an orderly fashion until the mid 1750s; rich finds were uncovered at Coalgrovehead and Coalgrovebeck, and this, as well as the high price of lead, increased pressure for a share of the grants. The problems continued until 1764, when the Marquis of Hartington became lord, and appointed a new Barmaster, George Bradley, who rapidly concluded that the moor was in disarray. A moratorium on new grants was

issued for 15 years, and plans were drawn up to rationalise the grants, with old ground to be given up by the adventurers in favour of fixed term leases. From 1774, the adventurers began to accept these new conditions, forming partnerships of local entrepreneurs (Gill 2004a, 52). These partnerships often included non-miners, such as publicans, wool staplers, gentlemen and small traders from towns like Ripon and Skipton, who acted as owners and provided finance. The companies employed additional miners at wage work, and provided capital to improve dressing floors and extend underground exploration (Raistrick 1955, 180).

5.10 The quarter-cord, or sideways limit, of the meers was also extended. The work undertaken by the Companies led to an increase in production in the mid-18th century, but these measures ultimately failed, not assisted by several long cold winters and dry summers, which hampered dressing operations (Raistrick 1955, 184). From 1770 to 1800 production declined and the mines became moribund (Raistrick 1955, 180). Ownership of the interests in the Grassington industry changed again in the later decades of the 18th century, when lead mining and processing in the area passed through inheritance to the Duke of Devonshire. The mines had become nearly exhausted by the 1790s, and this, as well as the extremely high price of lead in the Napoleonic War years (1796-1815), prompted the Duke of Devonshire to invest considerable sums into the industry. As mines became larger and more organised in the Yorkshire Dales, capital was required for the construction of large projects to keep production going. This included the excavation of drainage levels, horse gins or whims fitted to shafts for winding, and the construction of smelting mills near the mines (Gill 2004a, 52). A coal-fired smelt mill was also needed as a result of a dispute with the freeholders (who own the surface of the Moor) over the right to work peat for smelting (Gill *pers. comm.*).

5.11 A number of improvements were made at Grassington in order to improve the workings of the mines. In 1796, the Duke's Level was commenced at Hebden Gill and driven in a direct line towards the Beever Mine at Yarnbury, before being realigned towards Cockbur after 500m. The level, originally conceived to be nine feet high and five feet wide, was driven not only to facilitate drainage in the mines, and so allow deeper shafts to be sunk, but also so that it could be navigable, conveying material to the surface along its length; however, as with many such ventures, it was doomed to failure (Gill 2004b, 16). The level took twenty years to reach Yarnbury, and in the early 1820s the decision was made to reduce it to '*six feet above the rails*' (*ibid*).

5.12 The mines became a major source of employment for rural populations in the Yorkshire Dales, but from the 1820s onwards, British mines faced increased competition from imports of foreign lead, especially from Spain. In 1818, John Taylor, of Gwennap Consolidated Mines, Cornwall was appointed as the Duke of Devonshire's Mineral Agent, alongside John Barratt of St Austell, and formulated a dynamic approach towards the systematic exploitation of veins (Gill 1984, 45). Spurred by an injection of capital and expertise, Taylor set about on a programme of rationalisation in drainage, haulage and ore dressing techniques (Raistrick 1955, 184; Gill 1983, 59; Gill 1984, 45). A number of the mines had been standing idle due to the need for drainage; he constructed the Brake House in 1820 with a water-wheel measuring 50 feet in diameter, which was connected by rods to

pumps in the deep shafts; two of the mines treated were Coalgrovebeck Engine Shaft, and Old Moss, and in two to three years these were productive again (Gill 1983, 59).

5.13 From 1825, the price of lead fell again, but rose again by 1836 before declining slightly once more up to the mid 19th century. Production and price rose as a response to the Crimean war (1854-6) (Gill 1983, 59), but after that date the fall was catastrophic, with the mines suffering from depleting workable reserves and falling lead prices, with increasingly deeper trials and cross-cuts being made (Gill 1984, 46). By 1870, the mines were almost at a standstill. Lead mining on Grassington Moor ceased in May 1880 (Moss Mine being the last worked), with the smelt mill being closed in May 1882 (Gill *pers. comm.*).

5.14 Following the closure of the mines, there appears to have been little activity on the moor until 1915, when re-working of the spoil mounds for barytes and fluorspar began on a relatively small scale. However, this venture proved unsuccessful and production ceased in 1927. In 1955, the Dales Chemical Company opened a flotation mill on the site of the old High Grinding Mill, which had been partially demolished by the army when the moor was used as a tank artillery range between 1941 and 1944 (Raistrick 1955, 189). Large quantities of fluorspar and barytes were processed from the dumps located at the larger 19th century shafts; the material was loaded by diesel excavators into 5 ton Bedford tipping lorries, to be taken to the mill. The material was tipped into a large log-washer, where it washed, screened, and then passed to a Ball Mill for sorting into lead, fluorspar and barytes. The best material was exhausted by 1961; material was brought in from outside and processed at the plant, but this contained a large amount of clay and caused problems with effluent in the Wharfe. The company was bought out by Laporte Industries Ltd and immediately closed down (Dickinson 1972, 22). Following the closure, smaller concerns based at Beevor mine worked the Bycliffe dumps (Gill 1993, 139), and reprocessing finally ceased completely in the late 1970s (Roe 2007, 1). The impact of this reprocessing is clearly illustrated through comparison of vertical aerial photographs between 1955 and 1968 (Ainsworth and Burn 2009, 5), which show damage to most of the larger spoil tips associated with the 19th century mines. Further damage has since been caused by robbing of spoil for track surfacing, and the construction and the development of an interpretative trail in 1981 (*ibid;* White *pers. comm.*).

Plate 5: Grassington Moor (© English Heritage 2009)

6.0 THE ARCHAEOLOGY OF GRASSINGTON MOOR

6.1 The archaeological features identified and recorded during the desktop studies and field survey are summarily described in the accompanying site inventory (Section 8) and illustrated in Figures 3-11. These are cross-referenced where possible with existing HER and NMR numbers. The archaeological features are discussed thematically; the sheer quantity of field evidence recorded makes it undesirable to describe every single feature in detail in this report and omissions from the corpus of data will be inevitable and necessary in light of the large number of sites which were recorded during the survey (952, many of which are groups). The sheer quantity of archaeological features relating to industry on Grassington Moor bears witness to the centuries of industrial activity here, with the bulk interpreted as relating to industrial process and infrastructure. All the industrial remains were assigned a post-medieval or modern date, although some could easily be of late medieval date (e.g. the rakes at How Gill - **10058**). Although lead mining has clearly been the most extensive and intensive industry on Grassington Moor, the moor has also been exploited for its coal measures (giving the name to Coalgrovebeck). Reprocessing for barytes and fluorspar has also played a significant role. Quarrying, mostly for rough building stone, has evidently been closely allied to mining in some areas.

6.2 The following section provides an interpretation of the surviving archaeological remains in the light of the development of lead mining on Grassington Moor, which spans at least 275 years, as well as those earlier features identified, which are primarily of prehistoric date.

PREHISTORIC FEATURES

6.3 Evidence for prehistoric activity on Grassington Moor is sparse, and mostly in the form of unenclosed settlements of roundhouses (as 'hut circles' or 'hut-circle settlements'), an enclosure, and two find-spots of Neolithic flint (Simpson *pers. comm.*). As no excavation has been undertaken on any of these sites, dating them relies on morphological comparison with other upland sites of this period.

Enclosures

6.4 A large sub-rectangular enclosure **10943** was identified at the eastern end of a large area of hagged peat (Plate 6), on a sheltered, near-level limestone terrace overlooking the moor, at the foot of Bycliffe Hill (Figure 6). The enclosure is constructed of large orthostatic stone walls, with rounded edges, and a large central entrance in the southern wall, defined by two large stones which appear to mark the position of a gate. The north side is less clear, but probably extends up onto the edge of the hillside, though this is hard to clearly pick out from the natural stone. The interior does not appear have many (if any) features; the enclosure may be of two phases (an earlier, perhaps oval, enclosure, with a rectangular northern extension), and a possible cairn, **10946**, may in fact mark the position of an earlier wall alignment. A possible sheepfold, **10944**, may be associated with this earlier phase. The enclosure exhibits certain physical attributes that apply to probable prehistoric enclosures: low, orthostat or rubble banks; an irregular plan-form; and a sheltered location on a terrace. A prehistoric,

possibly late Bronze Age or Iron Age, date seems likely (Vyner *pers. comm.*).

*Plate 6: orthostat wall of enclosure **10943**, facing north*

Flints

6.5 The site lies approximately 300m south-west of a find spot of a single retouched flint flake, **10939**, which was recovered from an area of hagged and eroding peat just north of the dressing floors on the Bycliffe Vein (Figure 6). A further flint, **10953**, was recovered during a visit by YDNPA and Blaise Vyner, *ex-situ* and left on a large flat boulder. The flint was found adjacent and east of the enclosure, and has been identified as a retouched thumbnail scraper (White *pers. comm.*). Detailed searches did not uncover any further flakes, and so the presence of a working floor at either site seems unlikely. The flints probably result from casual discard and are presumed of Neolithic date.

Hut Circles

6.6 The remains of five hut circles, first recorded by Raistrick in the 1950s, were identified to the west of

Coalgrovebeck, on gently sloping land above New Pasture Beck (**10273**, **10320**, **10327**, **10375**; Figure 9). The settlement is unenclosed, and comprises hut circles visible as low turfed-over stone banks surrounding circular flattened platforms, c.8.5m in diameter. Settlements with earthen platforms and/or low stony ring banks, without large associated deposits of stone, imply that construction was primarily in organic materials, with stone foundations. The hut circles are likely to have been constructed with low stone walls, or perhaps stone foundations supporting turf walling, in turn supporting a timber roof structure.

6.7 An Iron Age date for these seems probable, though a late Bronze Age date is equally possible. No associated field systems were identified during the survey, but the absence of earthwork traces relating to field systems in this area does not imply that no farming was taking place; rather, the absence of clearance cairns and boundaries may be due to the nature of the topography (perhaps stone-free) at that time.

*Plate 7: hut circle **10273**, facing east*

Discussion

6.8 The enclosure is reminiscent of the extensive Iron Age or Romano-British fields systems and settlements at High Close, just north of Grassington and approximately 3km to the south-west (Martlew 2011, 63), though these appear more extensive and planned, in comparison to this enclosure, which could be earlier, or if contemporary, perhaps served a different function. A probable late Bronze Age or Iron Age date seems probable (Vyner *pers. comm.*), but should be used

with caution. The hut circles, which lie 1.1km to the south and are unenclosed, are probably of Iron Age or late Bronze Age date, and could be precursors to the High Close activity, though again, some note of caution needs to be exercised here. The flint find, of probable Neolithic date, points to evidence of use of the landscape some time prior to these settlements being established, and suggests the landscape was being traversed by hunter-gatherers at this time, albeit leaving little in the way of a footprint. Without further in-depth survey or excavation, little can be definitively said on the prehistoric archaeology identified at Grassington, based on the slight evidence recovered; nevertheless, the identification of these sites is important for the future understanding of prehistoric activity in Upper Wharfedale.

*Plate 8: settlement **10758**, and the road cutting through it (Ordnance Survey Mapping 1:10,000, 1978, overlain on 2008 aerial photography; extent of damage depicted)*

EARLY PHASES (up to 1731)

Settlement

6.9 An enclosed settlement **10758**, recorded in the HER as a medieval settlement, lies just west of Blow Beck, and is visible on earlier Ordnance Survey mapping as two conjoined sub-rectangular enclosures with four buildings along the west and north sides. However, more recent Ordnance

Survey mapping depicts a road driven through the centre of the settlement. This was confirmed during the survey, which identified this as completely obliterated by a new track and drainage driven through the centre, though the western and north-eastern buildings may survive.

*Plate 9: extraction **10130**, facing north*

6.10 A similar settlement was recorded during the English Heritage survey at Scordale (Hunt and Ainsworth 2010, 41), which comprised a small nucleated settlement of six closely-spaced ruined buildings, with at least three conjoined structures arranged around yards, located on a terrace in an isolated and sheltered position. The tumble associated with the wall lines suggested the walls were of stone, and with thatched roofs. The surveyors concluded that the buildings were probably agricultural. However, they also indicated that the structures lay close to an area of lead mining, though not directly adjacent it, and were connected to it by a network of footpaths; the surveyors therefore postulated that these could be medieval miner's huts (*ibid,* 43): *'it may be that this settlement was occupied by lead-miners and their families working within the valley, and their families, possibly throughout the year and perhaps over a long period of time. If so, it would seem that the inhabitants were mixing mining as a source of income with subsistence farming, largely pastoral but perhaps with some small arable component.'* This is interesting, and could provide an origin for this settlement also.

Extraction

6.11 A possible early block of extraction, **10130**, was identified, and comprises an extensive sub-oval area of low and irregular mounds, possible surface workings, and multiple turfed spoil heaps. The area measures 230m by 110m, and is cut through by a line of shafts working the Standfast Vein, historically likely to be dated to 1760 or later (see below). The exact nature of the extraction is difficult to ascertain. The heaps comprise mostly broken stone, and the surface workings were thought initially to be possible quarries for stone, perhaps flagstone and building stone. However, the extraction does not look like quarrying, as there are no wide and deep hollows typical of the removal of large quantities of stone. Rather, the workings appear to be drifts, with sloping ramps leading down into hollows, which have been subsequently infilled or part infilled by stone from adjacent workings. Some of the side walls of the ramps appear revetted with low and crude stone walls. There is no evidence of localised working on a vein, as is typical of lead mining, and certainly no evidence of ore dressing adjacent which would be expected of lead mining of a post-medieval date.

ADVENTURERS (1731-1774)

Prospection pits and trenches

6.12 Mining is first recorded on the Out Moor in 1731, working the Ripley and Castaway veins, and then exploration developed through the 1740s with mines opened at Bycliffe, Legerins, Piper Plet and Burnt Ling (Gill 1993, 71). The survey identified fifty-five examples of prospection pits and trenches across the survey area, primarily associated with these earlier workings on the moor and the veins first worked. Some of these were visible as small *'pre-shafts'*, usually little more than a small excavated pit with a low spoil collar, with very little evidence of extensive working or dressing adjacent (**10056**, **10065**, **10067**, **10072**, **10083**, **10084**, **10154**, **10197**, **10328**, **10473**, **10474**, **10493**, **10596**, **10611**, **10631**, **10660**, **10688**, **10797**). These were often isolated on the moor, or sometimes occur in clusters often associated with larger shafts, and appear to almost have been a very short, speculative attempt to examine a particular spot, perhaps due to the presence of an indicator of a possible lead vein, or based on a hunch or hearsay. Some, such as **10899**, work the edges of natural hollows or watercourses.

6.13 Other prospecting appears to have been more systematic, and consisted of long, usually north-south aligned, trenches up to 1m deep (but originally deeper), with embanked spoil heaps on each side (**10073**, **10099**, **10100**, **10107**, **10108**, **10156**, **10158**, **10166**, **10174**, **10175**, **10180**, **10185**, **10188**, **10189**, **10198**, **10199**, **10203**, **10215**, **10216**, **10217**, **10219**, **10239**, **10240**, **10257**, **10466**, **10469**, **10470**, **10471**, **10478**, **10479**, **10600**, **10781**). The orientation of the trenches indicates that the prospectors were well-aware of the east-west inclination of the veins, and were trying to pick up evidence of these near surface; the trenches are sometimes located close to small clusters of prospecting pits. Some of these lead directly towards a shaft, which has been subsequently been sunk on its length, indicating the prospection has been successful; quite often these are subsequently

truncated by later features (**10605**). Others remain unworked.

Plate 10: prospection trenches around the western end of Burnt Ling vein (digital surface model generated from LiDAR data) - centred on NGR 402285 467140.

Access routes

6.14 Prior to the development of the road system at Grassington by the Duke of Devonshire from the 1820s (see below), access onto the moor was via the Old Moor Lane and John Young Gate. From the gate, a complex network of braided hollow ways, **10266**, was identified, picking its way up the hill from the steep slopes on the side of New Pasture Beck to the more level mining areas to the north-east. At least three separate hollow way complexes were identified, now overlain by a modern trackway; the earthworks were cut by the Duke's Low Water Course (**10229**) which suggest they were probably out of use by this time, with the Duke's New Road presumably a more favoured access route, though the trackway probably continued in use as a minor access route, as it does today. The water course is currently carried in a partly blocked stone capped culvert under the track (**10954**).

6.15 From the main hollow way complex, the tracks fan out to the north and north-east, as single broad unsurfaced tracks. Trackway **10321** is depicted on the Ordnance Survey mapping, heading towards the shafts on New Ripon and Beckwith veins, as a low broad flattened area with slight banking on

the western side. The track continues north-eastwards as **10267** (either heading towards Worsley Shaft **10258**, or truncated by it and its associated dressing floor) and as **10256**, a mainly broad and flat earthwork with some occasional deeper more pronounced rutted sections. This track appears to head towards the workings on Fourteen Meers, via a short spur **10475**, and Sun and North Gregory Veins. A further spur, **10261**, runs on a more northerly route, before being bisected by a line of shafts on the Ripley Vein. It continues northwards for a further short distance as **10476** and is seemingly again truncated by the workings on New Glory Vein, before continuing as **10574** and **10575**. The track terminates at a causeway **10551**, possibly a waggonway, between High Ringleton (**10571**) and Low Ringleton (**10552**) Shafts, which is visible at Low Ringleton as a stone revetted embanked causeway leading down from the shaft top. A shallow branch, **10577**, also leads off this road to the Derbyshire Founder Mine (**10580** c.1778).

*Plate 11: the hollow way network **10266**, and Duke's Low Water Course **10229** (© English Heritage 2009)*

6.16 Also leading from John Young Gate was a series of further hollow ways (**10281**, **10282**, **10297**), cutting in a broad south-easterly arc towards the site of the smelt mills (**10312** and **10309**), and still in use as trackways for quad bikes, though these are almost certainly of a much earlier date. The tracks also cut through a large group of coal mining shafts, so must have served to allow the movement of coal and lead ore, as well as the smelted lead out and off the moor. The date of these hollow ways is hard to accurately pin down. Gill (1993, 71) suggests that the mining spread onto the Out Moor in 1731, and, while some of these hollow ways undoubtedly relate to this expansion of mining on the Out Moor, some may be even earlier and relate to undocumented activity and access.

6.17 The hollow ways were clearly in use throughout the 18th century, and probably continued to be the main arterial routes onto the moor until the construction of the Duke's New Road changed the access arrangements.

*Plate 12: meerstone **10541**, with High Moor Feeder Leat crossing behind*

Meerstones

6.18 Meerstones were used to mark the corners and limits of meers, measured out by the Barmaster, who would grant two meers to the miners who discovered a vein (known as the Founder's Meer), on payment of one shilling and sixpence. In 1642, the meers were each of 21 yards, but these were extended to 30 yards in 1737 (Gill 1993, 154, 157). Meerstones were carved with the initial of the miners and an 'F' for Founder. There are numerous examples across the moor, some of which have been removed since first documented by Raistrick in 1930s, either stolen or removed for safe-keeping to museums (Roe 2007, 2). As such, stones which were recorded in the HER were provided

an entry automatically, and were visited where practical, though a number were not seen, either due to ground conditions or poor location.

*Plate 13: meerstone **10548**, plan view*

6.19 A number of stones, **10535**, **10541** and **10938**, were recorded during the survey marked *'F.A.W. & Co. F'* (Plate 12). This stands for Francis A. Wardle and Company, Founder, who was working a number of shafts around Old Moss between 1764 and 1792 (Raistrick 1955, 184). The stones measured 0.6m in height and 0.4m in width. Other examples are only marked with numbers, such as **10505** ('*134*'), **10518** (two stones, marked '*108*' and *'11 E.S.*' respectively - the latter firmly attributed to Elizabeth Shackleton, c.1771-1802), or **10536** (*'9'*). Others may have been marked with symbols, such as **10527** (a fish or shears symbol?). A new stone **10548** was uncovered from a heap of dressing waste close to Bycliffe House. The stone, recumbent and part-buried, measured 1.2m in length and 0.3m in width, and was marked '*ADM & Co*' (Plate 13). The meerstone did not appear in the online gazetteer *'Meerstones of Grassington Moor'* (accessed 6/12/13).

Shallow shafts and Dispersed Dressing Floors

6.20 On Grassington Moor, shallow shafts were sunk at close intervals along a vein in the 18th century. A shaft is defined as 'shallow' by being less than a nominal depth of 30m, which was about as deep as could be wound by one person using a jack-roll. However, the weight of the hemp rope used must have resulted in smaller loads being lifted (Gill 2004a, 57). Before the 19th century, ore was usually

dressed near the top of the shaft from which it had been drawn, and at Grassington, the shafts are intimately associated with their dressing floors. After extraction, the mined lead ore was divided into: clean or pure ore, which required no further dressing and could be sent to the smelt mill; rock containing the lead ore, known as '*bouse*', which had to be cleaned and separated, and the '*deads*', waste rock with little or no ore content which was rejected into the dead heap. The bouse was initially broken using a large hammer to pieces about 2 or 3" in size, and the larger pieces of ore were hand picked out. The remainder was then broken on a knock-stone, a large stone serving as an anvil on which the pieces of bouse were smashed further where boys or women broke it down further to the size of small peas. The crushed ore was then placed in a hand sieve and shaken in a tub of water, or a suitable pool in a stream. The bouse gradually stratified into three layers: pure ore at the bottom, a mixture of ore and stone known as '*chats*' in the middle and stone on the top. The top layer of stone was swept off, the ore was put aside, and the chats were crushed again and sieved. The process continued until all the ore had been extracted. The '*smiddum*', the fine particle which fell through the sieve to the bottom of the tub, was then washed in a buddle, which in its simplest form was a few planks of wood laid at a slight angle on the hillside. Water was run down the buddle in a continuous stream and the fragments of smiddum were dropped in the flow and stirred with a rake. This process again separated it into three layers with pure ore at the top of the buddle, while the mixed stuff and waste was swept further down, or washed off altogether. Roe (2007, 31) provides a useful categorisation of ore dressing waste types usually found on a dressing floor. For the purposes of this report, shafts and dressing floors have been grouped according to the veins being worked, but where multiple veins converge, or where cross-veins are being worked, a 'best guess' approach has been adopted.

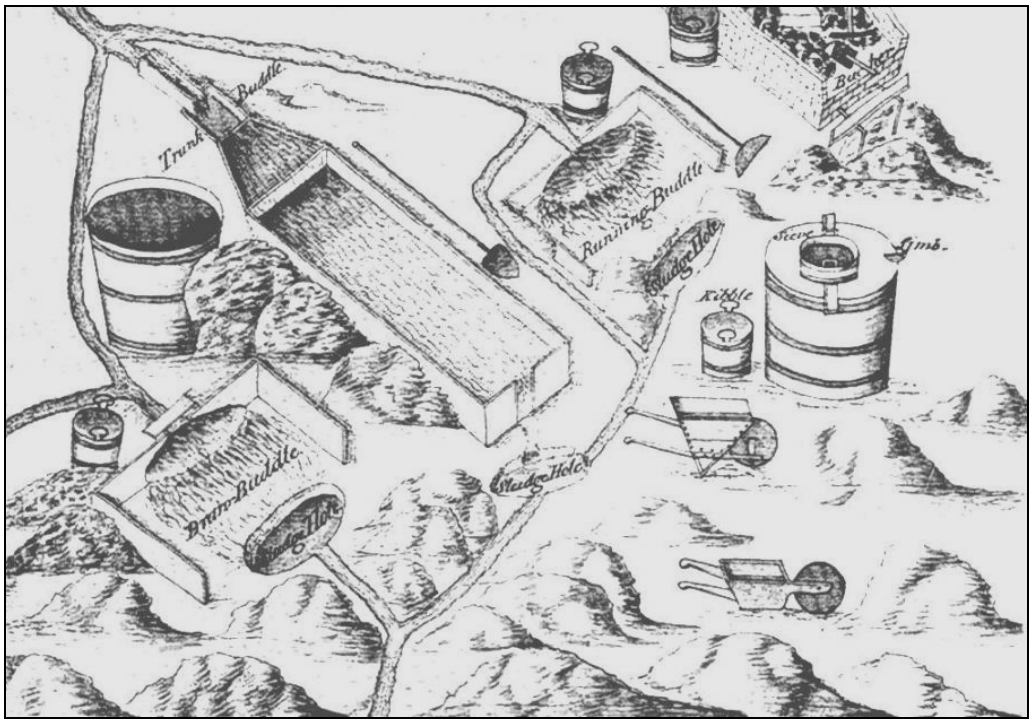

Plate 14: equipment used for washing lead ore at the end of the 18th century (after Hunt 1970)

Bycliffe Vein

6.21 Bycliffe is one of the earliest worked veins, which was worked from East and West Ten Meers, granted to Mr Windle and Freeman respectively in the late 1730s (Gill 1993, 72). From the New Pasture, the vein crosses eastwards at How Gill, before passing into the Top Grit, which forms the hillside at Brown Bycliffe, West Ten Meers corresponds with the western bank of this hillside leading up onto the top of the hill, which corresponds with East Ten Meers. From 1759, two large grants were made between the New Pasture Wall and Blow Beck, with 13 meers to Summers Readshaw and Company, and 22 meers to Dawson, Alcock and Company. The grants raised little ore (*ibid.*).

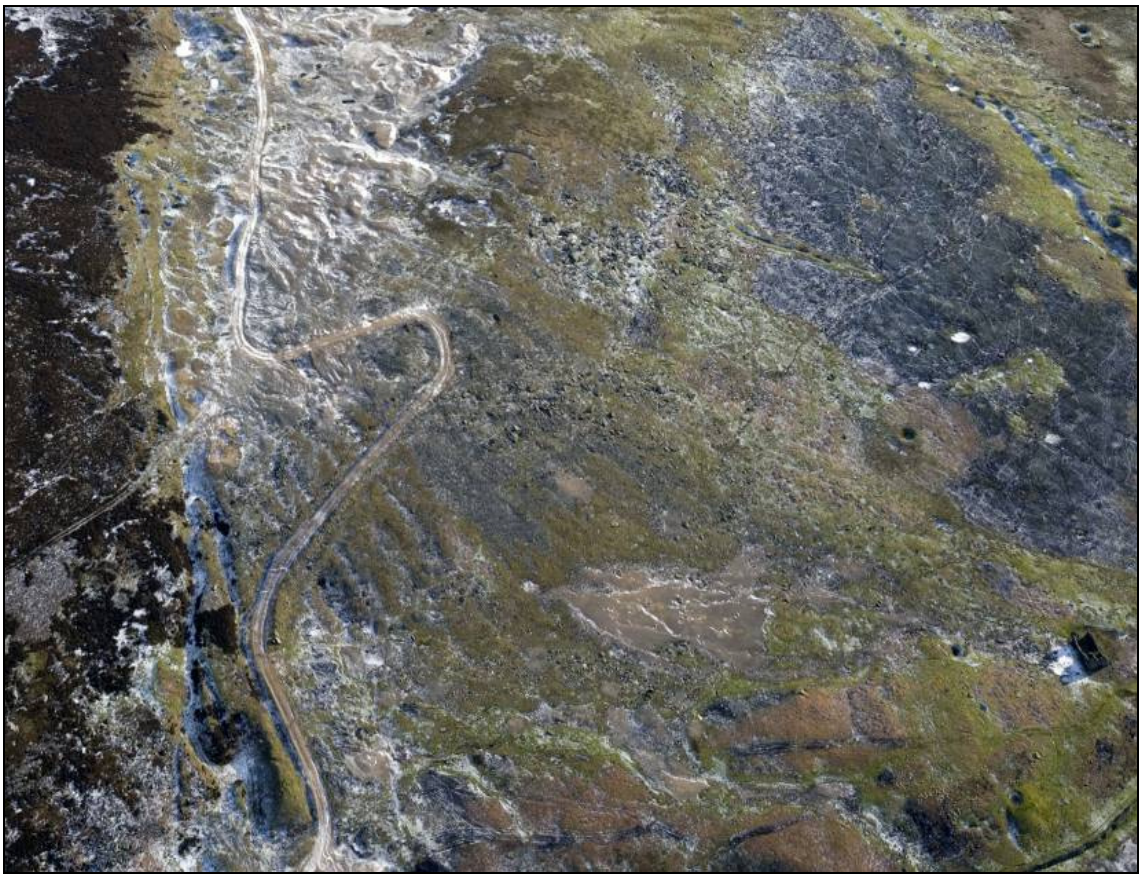

Plate 15: opencast workings on the Bycliffe Vein, cut by modern track; Bycliffe House lies bottom right. Howgill Level, ***10047****, driven in 1877, lies on the left of the opencast workings (© English Heritage 2009).*

6.22 The workings on West Ten Meers appear to mostly have been extracted by means of the '*opencast*' process of mining, where the line of a vein has been mined downwards vertically from the surface or in an outcrop, creating an open working of variable width and depth. These are sometimes known as '*rakes*' where working an outcrop in a rock-cut cleft. Opencast works are often associated with hushing, though there is no evidence of hushing at Grassington as the area was not suitable (Gill 2004a, 59). The majority of rake workings are believed to be of 16th-18th century date, but earlier examples are likely to exist. A series of east-west aligned grooves for extraction was identified along the western flank of the hill (**10057**, **10058**), with evidence of dressing at the base (**10049**, **10055**),

perhaps along the course of a natural stream. More regular groups of shafts were located around the base of the hill (**10052**, **10053**) and at the top of the hill **(10048**, **10719**). The upper shafts were associated with an expanse of dressing waste, physically cut by the modern track (**10720** and **10721**); an ore chute and knock stone were identified just east of the shafts (**10549**). The opencast trenches were obscured by dumps of deads which appear to have been tipped from the upper workings at West Ten Meers (**10059-62**). A small group of shafts just north of Bycliffe House (**10063**, **10066**, **10070**) may be associated with Freeman, who is recorded as having built the house before 1753. The opencast workings could relate to an earlier phase of workings, perhaps pre-1730s, but without more in-depth survey or excavation this would be hard to be sure of, and it is perhaps more likely that the technique was being used due to the steepness of the slope and the relative proximity of the ore to the surface.

*Plate 16: opencast **10749**, facing north*

6.23 East Ten Meers was worked by a series of shafts (**10708**, **10709**, **10710**, **10711**, **10713**, **10714**),

clearly associated with an area of crushed and sorted material **10712**, and several wash-ponds (**10715**, **10716**, **10717**); further south, a large expansive area of finer dressing waste and slimes, associated with leats and further ponds, probably marks a washing area (**10722**). This appears to be associated with a small area known as Mexico, at the eastern end of East Ten Meers, which was mined by Robert Waterhouse from 1745; a single infilled shaft with a coe was recorded in this area, associated with an extensive area of dressing (**10706**), and a large C-shaped bouse-team (**10550**).

6.24 At the eastern end of the Bycliffe Vein, a series of small nucleated groups of shafts was recorded, immediately west of Old Peru (**10802**, c.1844), which may correspond with a group of shafts named '*Peru*' worked from 1759 to around 1791, and for a short time between 1807 and 1812. The shafts raised little ore. **10791** is a group of at least eleven shafts, all with collars to a maximum 3.6m in height and 18m diameter. **10799** is a line of five shafts running north-south, with a maximum width of 5m wide and depth of 1.5m deep; the southernmost examples have large and rounded spoil collars up to 16.5m diameter. There are other small outlying shafts within this group (**10798**, **10800**, **10801**) but no evidence of dressing near the shafts, which was presumably done elsewhere.

6.25 Gill (1993, 78) states that *'at the east end of the Bycliffe ridge, a vein, for which there is no record, runs due north out of Bycliffe Vein and was tried from shafts and an opencast'*. Seventeen shafts were recorded running south to north from the line of the Bycliffe Vein (**10739-43**, **10750-5**, **10794-7**), immediately west of leat **10737**. A single brass button **10940** was found within rabbit burrowing in **10750**. The opencast trench discussed by Gill is a long, north-south aligned cut, 90m in length, and 2m wide, with a non-consecutive *'string of sausages'* appearance, with occasional deeper pits along its length, and upcast on both sides (**10749**, Plate 16).

Blow Beck Vein

6.26 On the east side of Blow Beck, a series of twenty-four shaft mounds was identified, aligned broadly north-south (**10759-10776**, **10778-10785**). Gill (1993, 78) records these as working the Blow Beck, Bycliffe and Sleightmoor veins, the latter aligned north-south and presumably the focus for most of the shafts in this area. The shafts were worked mainly between the 1760s and 1770s, before production dropped until they were abandoned around 1845. The shafts were worked by Brown and Company, who held 20 meers towards the beck-side, and Alcock and Company and Minikin and Company, who both held 10 meers further up the hill. Shafts **10756**, **10757** and **10788**, west of Blow Beck, are also likely to relate to the Brown and Company allotment. Further north, a small nucleated group of shafts (**10742**, **10744-8**) were part of 10 meers worked by Summers and Company, presumably J. Summers and Company who were working Turf Pits in 1774 (Raistrick 1955, 184).

6.27 Evidence of dressing was visible along the east side of Blow Beck (**10786**, **10787**), made up of a series of small and discrete areas of dressing (crushing/washing), which appear to have been cut by the Duke's Deep Cut (**10914**, c.1826). The mine workings may be associated with a mine building **10806**, possibly a mine shop, which lies just east of the '*High Moor Feeder*', **10934**. The building is depicted by Gill (1993, 74) and survives as a roughly rectangular building platform 8.5m by 2.25m,

with possible demolition rubble along edges.

Legerin's Vein

6.28 Legerin's Vein had been followed onto the Out Moor from the New Pasture by 1732, but no production is recorded until 1741. A grant of 5 meers 25 yards of ground was made by the Barmaster in 1753, at the west end of Bycliffe House and running east. When the grants were given up and retaken as leases in 1774, there were 29 meers on the vein, the largest of which, at ten meers, was worked by Brailsford and Company, at the eastern end of the vein. George Fletcher and Company held 9 meers (George Fletcher is recorded to have stood in as Barmaster for his grandfather, George Bradley, from March 1799 to 19/9/1800 - Gill *pers. comm.*). In 1778, their shaft was recorded as standing due to flooding, and though work progressed through to 1780, uncovering a strong vein, there were continuing problems with water and also ventilation. After some additional work the mine was abandoned around 1781. Other grants are recorded as producing small amounts of ore until 1820, with one parcel recorded in 1838, though it is probable little further mining was undertaken after the first date (Gill 1993, 77).

Plate 17: Legerin's Vein shafts, facing west

6.29 Immediately south of Bycliffe House, a group of up to ten shafts with low spoil collars (**10075**) was recorded; this seems to correspond with four meers held by Tennant and Company. From Legerin's Shaft (see below), further workings extend east into Fletcher and Company ground. The shafts in this

area and just east of Legerin's Shaft along Legerin's Vein are erroneously marked as *'area of shake holes'* by the Ordnance Survey, but this is perhaps not wholly wrong, and it appeared during the survey that some of the shafts were working an extensive area of solution hollows, running east-west along base of hill (**10080**). The shaft mounds (**10077-9**), some of which had double-shafts, all had low spoil collars and appear to use some of the more level parts of the hill as platforms. One open shaft was recorded, **10502**, and was approximately 0.7m square, and stone-lined. The shaft is quite narrow, and may originally have been a climbing shaft, rather than one used for lifting ore. The top is recessed and may originally have held a trapdoor.

6.30 East of **10080**, the shafts turn slightly northwards; a line of eighteen shafts was recorded, typically 5m in diameter, with the spoil heap on the downslope side, and heaps of deads evident within line of shafts, in discrete patches. A large area of dressing waste lies just south of this (**10670** and **10671**), but this may be material washed off the hill-top from **10722**, the large dressing floor on the Bycliffe Vein to the north. At the very eastern end of the vein is a large shaft **10697**, and smaller possible trial pit (**10694**) each side of Bycliffe Top Level, which could be later (19th century) workings.

*Plate 18: open shaft **10502**, facing west; probable trapdoor recess on left*

Turf Pits

6.31 The area known as Turf Pits, which lies to the south of Legerin's Vein at the base of the hill (also known as Legerin's Moss, or Sun Legerin), was being worked in 1744, but trials were short-lived due to the depth the veins lie at, covered by a shale cap, which made them hard to reach. From 1774,

ten meers on the vein were being worked by Josia Morley and Company of Giggleswick (Raistrick 1955, 184), and despite some early success, the veins were generally poor and the leases were given up by 1823 (Gill 1993, 78-9).

6.32 The survey identified four distinct groupings of shafts along the vein (**10087, 10091-3**), with a number of smaller outliers, primarily to the north (**10081-6**), which may have been following a crosscut. The shafts varied in size, with generally larger examples forming the focus of each grouping, with smaller examples around the edges. All the shafts are turfed over, with little dressing evident along the edges.

Plate 19: Ripley and Castaway Veins, with Standfast Vein intersecting from bottom right (© English Heritage 2009); Chatsworth lies bottom left.

Piper Plet

6.33 Piper Plet was one of the earliest veins worked on the moor. From 1732, miners working Fiddler Plet in the New Pasture followed the vein onto the Out Moor, and began working it under that name. In 1757, William Bagshaw and Partners had a shaft 17 fathoms deep, but along with most of the shafts along this vein it had problems with water. The vein was never particularly significant, and output was generally low; it was not worked beyond 1813 (Gill 1993, 85).

6.34 Piper Plet is visible as a group of approximately 36 shafts (**10095**), all broadly low with turfed spoil collars though some large and obviously extensively worked (particularly the shaft associated with **10116**, a coe - see below). Extensive, isolated and episodic evidence of dressing was identified, mainly in centre and south of the group, **10098**, associated with a small reservoir **10103**. A small group of seven shafts extends south from Piper Plet towards Burnt Ling Head (**10104-6**, **10119-22**); little can be said about these, other than that they are probably contemporary. The shafts are very small and not extensively worked, and may have been prospection pits.

6.35 East of Piper Plet, a group of eight shaft mounds, all large with low spoil collars, corresponds with the approximate position of North Vein worked from about 1774 (**10102**). The shaft mounds have low mounds, all turfed over, with no evidence of platforms adjacent. Further shafts to the south-east, **10101** and **10591**, appear to correspond to the same phase of works, and, further east, potentially **10637** and **10648**.

Ripley and Castaway Veins

6.36 The Ripley and Castaway Veins were the first recorded workings on the Out Moor. In October 1731,

John Ripley discovered ore on the moor and began working two meers, followed in April 1732 by a man called Harker, who found a further vein 900 yards to the north-west, which eventually became known as Castaway Vein. There were many and significant disputes regarding these first claims, which are not worth repeating here, but are well-covered by Gill (1990, 25-28). Ripley seldom produced more than three or four tons per year, and neither vein is likely to have been significantly worked beyond the later 18th century.

*Plate 20: open shaft **10145**, facing south-east*

6.37 The Ripley and Castaway Veins appear as an almost continuous line of shafts and opencast workings between the modern track just north-west of Taylor's Shaft, and the New Pasture Wall, covering 700m and orientated north-west to south-east; a further line of eight shafts south-east of Taylor's Shaft (**10436**) were also probably working the Ripley Vein, though these are quite ephemeral in comparison. The junction between the two veins lies roughly west of Chatsworth Shaft, but the difference is not all that discernible on the ground. At the south-eastern end, the Ripley workings comprise a cluster of six large shafts at least 6m in diameter, with spoil collars 2m in height (**10457-9**, **100481-2**), with a large associated dressing floor **10460**, which appears to have been partially damaged by reworking. North-west of **10481**, a line of approximately sixteen much smaller shaft mounds (**10480**, **10612**, **10614**), all visible as low turfed over mounds, extends up the western side of Chatsworth. The larger shafts are probably later, perhaps post-1774, as they are more sizeable, but there is no documentary evidence for this.

*Plate 21: knock-stone **10507** south of Castaway Vein, facing north*

6.38 Castaway continues the alignment of Ripley, initially as a run of sixteen small shafts (**10146-7**) before giving way to a near-continuous opencast trench (**10135**), approximately 250m in length. The trench is actually segmented, with variable depths and widths, comprising surface workings and shafts, with occasional deeper shafts (**10137**, **10508**), some just off the line of the main trench, one of which (**10145**) is open, unfenced and very deep (Plate 20). South of the Castaway Mine main trench is a large dressing floor **10140**, comprising multiple heaps of bouse and finer material, including occasional small shaft mounds and small outcrops of rock, as well as occasional stone settings, probably the remains of buddles and knock-stones (Plate 21). At the western end of the trench is a well-preserved dressing floor **10118**, comprising a long north-south aligned embankment wall 10m by 2m, incorporating a knock-stone, a probable sub-circular buddle 3m in diameter to the east and a trunk buddle to the north, with a flagged surface in front. The structure is surrounded by well-defined and small discrete heaps of dressed material **10223**, mainly at the base of slope. These appear to continue west of the Moor Wall so presumably predate it.

*Plate 22: dressing floor **10118**, facing east*

Standfast Vein

6.39 The Standfast Vein was worked in the 1760s, and in 1805, but little ore was raised. A deeper shaft was sunk near the junction with Castaway, but again little success was recorded (Gill 1993, 85). The vein extends eastwards from Castaway **10135**, roughly aligned with capped shaft **10508**. The workings are visible as a line of small shafts **10139**, around six to eight in total, perhaps initial prospection on the line of the vein. East of these are two well-defined shaft mounds, **10123** and **10125**, which have low well-defined spoil collars 12m in diameter, and little obvious dressing. Further shafts, more widely spaced, are visible further east, on the line of the vein in a rough linear alignment, but these were clearly not significantly worked, and very little if any dressing is visible associated with them (**10124**, **10126**, **10128**, **10590**, **10594**).

Six and Three Meers Vein

6.40 The vein, a western continuation of the Middle Vein, takes its name from three meers granted to John Barker and Partners in November 1756. A share of the meers was sold to John Shackleton in 1757, who already held six meers at the west end of this allotment, and the name comes from this. The vein was moderately productive until the mid-1780s, and the leases were not renewed (Gill 1993, 96-7). The shafts working this vein seem to lie within the fork of the road to the west of

Coalgrovehead (**10850**), and comprise a group of three east-west aligned shafts with well-defined spoil collars (**10870**, **10872**), and a large dressing floor to the south (**10876**), which appears heavily damaged by reprocessing. West of the track, a run of shafts heading west to Lee's Vein Secondary Shaft (**10449**), and now mostly subsumed into later workings, are also likely to be part of this allotment (**10446**, **10447**).

Plate 23: radiating lines of shafts on (from the bottom) Ripley, Burnt Ling, New Ripon, Beckwith, and York Veins. Taylor's Shaft lies bottom left. (© English Heritage 2009)

Burnt Ling

6.41 Burnt Ling Vein was followed onto the Old Moor from New Pasture in 1747, with most of the ore raised from the eastern 19 meers. Of these, ten were worked by William Kilvington and Company in 1749, and passed to William Brown and Company in 1754 (William Brown, a gentleman of Grassington, was principal partner). The mine lost money between 1786 and 1789, and was forfeited in 1796. The remaining 9 meers were consolidated and worked by William Bagshaw and Company from 1774 (Gill 1993, 95).

6.42 The Burnt Ling shafts comprise seven distinct groupings, on a broadly north-west south-east alignment, between New Ripon Vein and Castaway/Ripley Veins. Immediately east of the modern track, are two capped shafts (**10453-4**), with 20m diameter turfed-over spoil collars, which mark the junction between Burnt Ling and New Ripon veins. These are associated with a dressing floor to the south (**10455**), which continues westwards as **10259**, but is bisected by the modern track.

Plate 24: ***10190*** *Burnt Ling Vein shaft, with ring of deads (© English Heritage 2009).*

Plate 25: dressing floor ***10205****, facing south; possible circular buddle in the foreground*

6.43 North-west of the track, two further large shaft mounds (**10214**, **10260**) were recorded, with small heaps of localised dressing along the southern edge of the spoil collars, and capped shafts. The shafts along Burnt Ling are also notable for having rings of deads around the main spoil collars, though the function of these is not clear. North-west of these shafts is a long, near continuous, run of sixteen small shaft mounds with conjoined spoil collars **10190**; the shafts at the centre and both ends of this group having rings of deads. West of a small leat **10202** is a further group of nine shafts and associated workings, the largest shaft lies in the centre of the group at 12m in diameter, with the others much smaller. A bouse team **10509** was recorded built into the bank of the westernmost shaft. The final shaft on the vein is a large shaft **10177**, comprising a large pudding bowl-shaped spoil heap 16m wide and 3m in height. A very large dressing floor extends south between Burnt Ling and Beckwith Veins, and enclosing the New Ripon Vein shafts (**10205** - see below). The floor comprises an extensive area of small heaps of spoil, dressed material and working platforms.

New Ripon

6.44 New Ripon mine worked the Old and New Ripon veins and Tobacco Rake. John Shackleton is recorded as working the latter in 1755, and taking ground on New Ripon in 1765; following his death in 1771, his wife Elizabeth Shackleton took on the leases in 1776. Mining stopped around 1792, and the Shackleton lease was forfeited in May 1802 (see Meerstones). After this only waste dressers worked the area until 1823.

6.45 The New Ripon Shafts comprise two distinct groups of broadly east-west aligned shaft mounds (**10200** and **10201**), surrounded by the dressing floor discussed above. The eastern group, **10200**, comprises six or more shafts with extensive mounds of deads around south and south-east extents. The western group, **10201**, comprises a group of fifteen shafts, with the shafts deepest to the east, all with well defined collars of deads.

Beckwith Vein and York Veins

6.46 Little is known of the Beckwith and York Veins, other than that they were worked between 1750 and 1820, but probably not extensively after 1800. The Beckwith Vein was worked by a grouping of approximately twenty-three shaft mounds (**10218**), mostly with low spoil collars c2m in height or less, in a north-west to south-east alignment, curving southwards at south-eastern end. The shafts may also include cross-vein shafts, and shafts working Old Ripon and London Veins, of which several were identified immediately east (**10207-9**, **10224-5**), amongst an expansive area of dead heaps (**10204**). The York Vein was worked by an east-aligned grouping of shaft mounds, cut through the Duke's Low Water Course **10229** in 1821. South of the leat, a group of ten shaft mounds (**10230**) was identified, worked to the east as **10248-51**. The shaft mounds in the main group are conjoined, and all have low spoil collars, with the central shafts in the group being the deepest and largest. Dressing is visible to the south as **10243**, comprising small turfed-over heaps of waste.

Wash Vein

6.47 The Wash or Wash House Vein was worked on and off from 1739, and from 1748 to 1750 by William Wrathall, and from 1762 by Henry Wrathall and Partners. The latter was still working the area from December 1775, but the grant was given up by 1794.

6.48 The precise position of this vein is difficult to ascertain, but a series of shafts lying east of the main network of hollow ways seem to correspond to its rough position. The shafts comprise low turfed over spoil collars with infilled shafts, in two broadly north-south aligned groups (**10265**, **10270-2**, **10274-7**). There is little evidence of dressing, though small isolated heaps of crushed material and slimes are visible to the north and east of the shafts (**10279**, **10517**, **10947**).

*Plate 26: coe **10117**, facing south*

Coes

6.49 A number of probable coes were identified during the survey. A coe, from the old German *Kove* for hut or cage, is a small building, usually of stone, built over or near to an early lead mine shaft. The building served to protect the shaft, and was also used as a tool or ore store, and as a clothes changing room for the miners. The shaft often lay under a trapdoor in the floor (Jones 1996, 76).

6.50 Most of the coes identified were in a very ruinous state, and often only survived as low drystone walls. Probable coes associated or above mine shafts were identified on Piper Plet (**10116** and

possibly **10094**) and on Castaway Vein (**10138**). Small buildings north of Castaway Vein (**10117**), on Beckwith Vein (**10247**), and near Lee's Shaft (**10491**) could also be classified as a coes, and other possible examples (**10236**) only survived as building platforms.

*Plate 27: retaining wall and outlet for wheel pit, smelt mill **10302** (reproduced from NAA 2011, 15)*

Smelt Mill

The High Mill

6.51 The High Mill was constructed on the Out Moor in 1637 by the Earl of Cumberland, next to the Moor Gate (**10312**). No details of the mill are known, but it is likely to have housed ore hearths with air-blast provided by water-powered bellows (Raistrick 1933, 98, depicts a comparable, though later, example). The position of the smelt mill was more convenient for the smelting of lead than the Low Mill, as it was closer to the mines, though it suffered from droughts in the summer, and frosts in the winter, which caused it issues with water-power. The mill was closed in c.1650 (Gill 1993, 117).

6.52 Gill (1993, 118) reports only the outfall culvert from the wheel pit surviving, and a scatter of slags marking its position. The site is barely visible on LiDAR, though does show as a spread of material on a dried out river braid to the east of Coalgrovebeck. English Heritage (2009) reported the presence of walls and buildings; the latter was not identified during the landscape survey, but the retaining wall which houses the outlet for the wheel-pit survives, and has been recently consolidated and fully recorded (NAA 2013, 13 - Plate 26).

6.53 Above the location of the smelt mill, a large possible reservoir was identified (**10519**), which may have been constructed to assist with the problems of water-power identified by Gill. The reservoir measures approximately 20m by 25m, and is visible as a large flattened marshy area to the south of

Coalgrovebeck, and north-east of the site of the smelt mill. The south edge of Coalgrovebeck above the reservoir is defined by a broadly NESW aligned drystone retaining wall, 16m in length, with the north-east end including a section of (possibly deliberately levelled) bedrock which looks to have acted as a sluice into the reservoir. If this feature is contemporary with the mill, it must be 17th century in date.

*Plate 28: retaining wall and reservoir **10519**, facing north*

COMPANIES (1774-1820)

Deep Shafts and Centralised Dressing Floors

6.54 Only a few mines had reached 70m by the mid 18th century, but had become flooded out (Gill 2004a, 59). In 1755, the Coalgrovebeck Company asked William Brown, a colliery viewer from Newcastle, to build a horse whim for pumping their mine (Gill 2004b, 16). Horse whims are visible as circular paths walked by the horses, often surrounded by a wall which was used as a wind-break, and the central bearing blocks for the post and drum often survive; lifting the ore to the surface was done in large buckets called kibbles (Gill 2004a, 57). The Coalgrovebeck Engine Shaft, as it became known, reached a depth of 58 fathoms (106 metres) before its pumps were overwhelmed and abandoned. The site of the shaft, **10406**, lies just south of Coalgrovebeck Dam, with a low spoil collar, and a 4m high finger of spoil running east from the location of the shaft. Further small turfed dressing heaps are visible to the south-east.

*Plate 29: New Glory Shaft (left) and horse whim, **10582**, facing north*

6.55 Further deep shafts were sunk between 1774 and 1818, when lease areas were increased. The shafts were aided by the excavation of the Duke's Level in 1796, which assisted drainage at Yarnbury, but did little for the Out Moor which it did not reach it until 1830 (Gill 2004b, 16). Despite the use of deeper shafts, smaller scale mining ventures continued on the moor throughout this period, and indeed into the Duke of Devonshire's period of direct control, so a neat separation between mining features is not always possible. The deeper shafts became the focus for larger, more centralised dressing floors, which were introduced as the processes for dressing were mechanised in the early 19th century, as a response to threats from foreign imports. The owners centralised and mechanised labour-intensive processes such as dressing, in order to reduce production costs. Crushing, which was done by men wielding buckers was replaced by water-powered grinding rollers in specifically designed grinding mills. This led to an increase in the fine material produced, which in turn required the improvement of other processes to maintain the flow of production. The improvements meant an increase in the yield of ore from every ton of veinstuff mined, and meant lower grade ores could be worked at a profit. The smelting process was also improved and long flues with condensers were added to aid the recovery of lead which had been volatilised in the furnaces (Gill 2004a, 53 - see below).

6.56 The dressing floors had bouse teams, where ore was stored prior to dressing, water-powered roller

crushers, platforms or flat areas for hotching tubs, buddles and dolly tubs, and sometimes settling pits for the muddy water which was produced (Gill 2004a, 56). The development of larger dressing floors led to *'commission dressing'*, where smaller groups of miners delivered bouse to the dressing floors to be worked by skilled dressers with more abundant water.

New Moss

6.57 A grant called Weather Gleam was developed on the line of Pit Moss Vein, with two shafts sunk in 1778 (probably **10820**), and later an engine shaft developed in the same year, which was later known as New Moss (**10828**). The shaft was completed by 1788, and was equipped with a horse-whim, but little work was done and by 1794 the engine was reported as decaying. The shaft was revitalised in the early 19th century, and then stood idle until 1834, before being worked again for five years. It was decommissioned in March 1839 (Gill 1993, 104). The shaft is run in (collapsed) and survives 12m in diameter and 3m in depth, set within large flat-topped heap of deads up to 3m high, and 45m by 30m. A sub-rectangular bouse team **10540** is cut into the south bank, and a large dressing floor **10829** lies to the south of this, broadly oval and containing evidence of small heaps, leats and ponds. Disturbance by reprocessing is apparent.

Coalgrovehead

6.58 Mining commenced at Coalgrovehead at the end of 1737, initially as three blocks of six meers, worked by Mr Hardesty and Isaac Thornhill, who had two blocks in partnership, working at either end of a block allotted to William Drake and Partners. In 1751 these were consolidated into one company, with the meers split into North and South Allotments. A rich ore shoot was discovered in 1760, and the mine became one of the richest in the area. The mine was worked by the Thornhill family, and in 1807 the mine passed to Christopher Thornhill, who ran the mine badly. The mine was forfeited in 1817 and passed to Robert Fell, a lead merchant from Skipton, whose interests lay more with Pit Moss Mine; the production remained steady until 1841, when the mine passed to the Dukes of Devonshire (Gill 1993, 99 - see below).

6.59 Most of the evident earlier workings in the South Allotment have now been subsumed into the massive spoil heaps which surround Coalgrovehead shaft. Some small earlier shaft mounds are evident in the area shown as the North Allotment, around the north side of the main shaft (**10847**, **10848**), as low turfed of spoil collars approximately 1m high, with further shafts to the west also likely to be of the same phase (**10860**, **10862**, **10866**, **10871**).

Glory Mine

6.60 Glory Mine was worked from the 1770s to around 1820 by William Bagshaw of Derbyshire, and formed the core of his holdings on the moor. The workings on the Bagshaw allotment are visible as a clear block of shaft mounds, with collars of deads, extending east from Chatsworth shaft in two broad east-west aligned groupings, and appears to converge adjacent to New Glory Mine. The northern extent of shafts (**10610**, **10620**, **10621**, **10624**) is clearly working the New Glory Vein, whilst the

southern line (**10617**, **10619**) is clearly focussing on the Fourteen Meers Vein, which runs parallel and south of New Glory. The shafts are associated with extensive and undisturbed dressing floors (**10612**, **10623**). West of Chatsworth Shaft, the line of the Fourteen Meers Vein appears to have been traced (and tested) westwards, again in land controlled by Bagshaw, by a series of small shafts and prospection trenches or pits, which have not been extensively worked (**10151-3**, **10155**, **10157**), which suggest a short-lived but inconclusive trial of the veins in this area, probably in the 18th century.

6.61 The Bagshaw lease had expired in 1795, and as an agreement of extension in 1818, the Duke of Devonshire required him to erect a horse whim and sink his shaft, New Glory Mine (**10582**), to the same level as the Duke's Level. The mine was worked through to 1842, but raised little ore (Gill 1993, 87). The shaft is capped, with a 14m diameter horse whim on its north-east side, and sits on top of a large heap of deads c.45m by 25m and 2m in height. The capping consists of a heap of soil and stone, obscuring a presumed cap of wooden sleepers. A large dressing floor, **10626**, extends south from this shaft, parts of which have been damaged by later reprocessing (**10499**). At least some of this dressing activity must relate to the 18th century activity.

Fourteen Meers Mine

6.62 The allotment named as Fourteen Meers Mine, covered Fourteen Meers Vein and the Gregory Veins. The Fourteen Meers Vein is shown extending from a point south of Chatsworth Mine (see below) eastwards to Jones' Shaft; North and Sun Gregory Veins lies to the south-east of Jones' Shaft, and were worked as part of the same allotment. Fourteen Meers was worked from at least 1737 until 1750 by William Kilvington of York, and was productive. In 1754, Kilvington's shares in the mine were purchased by James Swale, and it was worked until the late 18th century, but was then idle up to 1820. In 1775 the Gregory Veins were allotted to Jacob Bailey and Company, but produced nothing until 1784. The mine was not very productive and was forfeited by 1798.

6.63 The Fourteen Meers Mine worked two blocks of east-west aligned shaft mounds. The southern line (**10485-7**, **10629**) is visible as an arcing line of low spoil collars, mainly unturfed deads, whilst the northern line extends west from Jones' Shaft. Two shafts are visible immediately west of the shaft (**10497-8**), and others can be discerned running eastwards, but the whole area has been badly disturbed by reprocessing (**10499**, **10626**). The Bailey allotment appears to correspond with a block of shaft mounds (**10866-8**, **10874**, **10888-10890**), all fairly large (c.8m-15m) with well-defined spoil collars and heaps of deads adjacent. The shafts are associated with a large dressing floor (**10442** and **10875**), which extends west to Coalgrovebeck, and appears to include ponds along its eastern edge, and mainly elongated heaps of crushed material up to 1m high with localised smaller heaps of finer deposits. The dressing floor is cut by the modern track, and appears to have been at least partially damaged by reprocessing activity.

6.64 Jones' Shaft (**10496**) was sunk by John Barratt onto Fourteen Meers Vein in May 1825, in an area which had been worked from 1775, but had been idle from 1798. A dressing floor was built in 1826,

but the works were abandoned in 1834, apart from a brief burst of activity in 1851 (Gill 1993, 98). The shaft mound is 8m in diameter and is blocked at 3m depth, with large spoil heaps 3m high, and two finger dumps to the west. The spoil heaps support a horse whim with rammed stone floor, and substantial walled bouse teams to the south, partially still visible as **10542**. Extensive dressing was undertaken to the south, but this has been damaged by reprocessing, and little now survives.

*Plate 30: Jones' shaft **10496** (left), with damaged dressing floor. The small ruined structure (bottom centre) is coe **10491**. The shaft immediately to the right, **10444**, is open (© English Heritage 2009).*

*Plate 31: bouse teams **10542**, at Jones' shaft, facing north*

Derbyshire Founder Vein

6.65 The Derbyshire Founder Mine (**10580**) was sunk around 1779, after the discovery of the Founder Vein the previous year by miners working through from Glory. The mine was reasonably productive until August 1783, when it was given up (Gill 1993, 88). The mine is visible as a small nucleated group of three shafts, the largest of which lies in the centre, and is open to c.2.5m depth. Dead heaps extend south-west and west, with dressing presumably undertaken to the south at Glory.

*Plate 32: Chatsworth Mine **10609**, with whim and coe, facing south*

Chatsworth

6.66 Chatsworth Mine (**10609**) was owned and worked by the Duke of Devonshire between 1808 and 1815, prior to the development of direct control of the whole moor from 1820, and was quite productive, being well-suited to work Castaway, Ripley, and Ten Meers veins. It was leased in 1820, but produced little, and was eventually given up in 1843 (Gill 1993, 88). The spoil heap is sizeable and flattened, approximately 22m by 15m, and 3.5m in height, with at least three infilled shafts, the central of which has a walled whim and a coe.

Friendship Mine

6.67 In August 1820, Joseph Constantine sunk Lee's Shaft (**10443**), an engine shaft down onto Lee's Vein, and a dressing floor was developed at the shaft. The shaft is now capped with sleepers, with a horse

whim, 12m diameter, on the north side and retaining walls for a bouse team on the south side, with a large and heavily disturbed dressing floor **10448** to the south.

Smelt Mills

The Moor Mill

6.68 The Coalgrovebeck Company built their own smelt mill on the Out Moor by arrangement with the Mineral Lord. The Moor Mill was constructed in 1756, after the quantity of ore uncovered from the ore shoot at Coalgrovebeck had swamped the available smelting capacity; it appears the mill only had one hearth. The Moor Mill burnt peat in comparison to previous mills, which only burnt wood (see below), and peat was stored in two adjacent peat houses. The mill was subsequently bought by the Duke of Devonshire, who extended it so that it was capable of smelting all the ore from the moor as well as ore from Lord Ribblesdale's mines at Malham, and other small parcels from other areas (Raistrick 1955, 180). The continued use of peat resulted in a dispute with the freeholders, mentioned above, in which the Duke's agents rapidly agreed that it was not within their rights to cut the large amounts of peat needed for constant smelting. In 1792, the Cupola Mill, which used coal, was built adjacent to it by the Duke of Devonshire, and the two smelt mills eventually merged into one complex (Gill 1993, 118).

*Plate 33: the Cupola Smelt Mill **10309**, facing north*

The Cupola Mill

6.69 The Cupola Mill, so-named because it had two reverberatory furnaces or cupolas, was more convenient for the mines and had room for expansion. The mill burnt imported coal, despite the proximity of a number of coal-workings (see below), because the local seams were too thin and of too poor quality to supply the amount needed. The mill began working on October 2nd 1792, when it smelted a parcel of ore from the New Pasture, and became the main mill handling all the mined ore from the companies and individuals working on the moor.

6.70 From the 1820s, when the Duke of Devonshire assumed direct control of mining on the moor, the

mill was expanded. The mill is depicted on the First Edition Ordnance Survey mapping (1848) but no internal layout survives. Gill (1993, 119) states that based on its size it is probable that it had two reverberatory furnaces by this time (the third furnace was probably added in 1826), and a slag hearth (built in 1840). The mill eventually closed in May 1882 (a full history of the mill and the processes in the mill is published in Gill 1993, 118-135).

6.71 The smelt mill **10309** now survives as a sub-rectangular arrangement of outer walls, up to 3m in height, with several collapses evident on the north-east side. The south-west side has now subsumed into a 2m high field wall. The plan form of internal buildings is just discernible on LiDAR and aerial photographs, but any internal buildings are now robbed down to foundation level, and the interior now only exists as a flattened well-grazed turfed area. The current structure was the subject of a Conservation Management Plan in 2011 (Countryside Consultants and Blackett Ord Engineering 2011).

6.72 On the south side of the field wall is a massive sub-oval slag heap (**10308**), 3m in height and extending west from the smelt mill into Coalgrovebeck. The heap relates to use of Cupola Mill over 89 years, with repeated dumps of material into the beck side having formed a large compacted and concreted dump. The dump is visibly breaking up, and may cause long-term issues with pollution of the water course if not controlled. The slag heap supports a stone bridge on its west side, **10307**, which was presumably built to facilitate access to the mill from the Duke's New Road, built in 1825-6. The bridge may have been built following the expansion of the mill around this time. The bridge is flat-topped with an arched culvert and no parapet walls, and appears well-built.

*Plate 34: slag heap **10308**, with bridge **10307** to rear*

Peat Cutting

6.73 A number of areas of peat cutting were identified, particularly towards the eastern side of the survey area. Peat represented a key resource for local communities, particularly in areas with limited access

to timber as it was used for fuel. The rights to cut peat within a particular area, or turbary, were often closely guarded with disputes frequently appearing in the documentary records. It is possible that the peat cut in the survey area was used for domestic fuel. However, peat was also used as fuel in the smelt mills (Gill 2004a, 53), and it seems perhaps more likely that this is the origin for the cuttings. The Moor Mill, which was built by the Coalgrovebeck Company in 1756, is acknowledged to have burned peat as its main fuel, with the peat stored in adjacent peat stores (Gill 1993, 118). However, problems with freeholders meant that the use of peat as a fuel was discontinued from the Spring of 1768, so it was only cut, dried and burned for 12 years.

6.74 The peat cuttings were visible on the LiDAR as sharp angular, cut and weathered faces up to 1.5m in height within the blanket bogs towards the east side of the road leading from Coalgrovehead to Old Peru, and immediately north-east of the smelt mill (**10804**, **10817**, **10819**, **10824, 10929**). Both **10817** and **10819** are of interest as they form part of the same phase of peat cutting, but have been cut through in the centre by a reservoir bank **10818**, which is presumed to date to the 1820s and the '*High Moor Feeder'* water management system (see below). The reservoir is subsequently bisected by road between New Moss and Old Peru, which dates to 1844 (Roe 2009). This implies an 18th century date for the peat cuttings, which would fit with their use in the smelt mill.

6.75 Extraction Pit **10834**, which lies immediately north of Cottingham's Shaft, is a modern peat cutting undertaken in the 1960s (Gill *pers. comm.*), which partially truncates the spoil collar for Currey's Shaft **10937**, a small shaft mound associated with the Duke of Devonshire's works on the Cavendish Vein. The peat cutting is now filled with water and used as a pond to attract ducks for shooting.

Coal

6.76 Coal was known on Grassington Out Moor before the lead was worked. Coalgrovebeck takes its name from a coal seam on the Out Moor, in a bed of shale in the Top Grit, just north of the moor wall, and it is presumed that coal was being exploited prior to the 18th century. A grant covering an area including the smelt mill was granted to George Bradley and Simon Alderson in 1774, and was drained by means of an adit near the smelt mill. The same area was let to Joseph Lambert in 1819 (Gill 1993, 94). Coal workings were visible as a well-defined band of shafts extending north from the southern corner of the survey area through the position of the smelt mill up towards John Young Gate; twenty-two shafts were recorded, all around 12m diameter and 2m high, dug into the hillslope, with partially-infilled shafts broadly 1.5m deep (**10264**, **10280**, **10283-10291**, **10294-6**, **10299**, **10300**, **10326**, **10332**, **10334-6**).

DUKE OF DEVONSHIRE (1818-1882)

Water Management

6.77 Water management systems were massively important to lead mining landscapes, and were utilised for prospecting, powering a range of equipment by means of waterwheels, and for washing and processing the ore. The systems often extend for miles beyond the immediate mining areas. On

Grassington Moor, a complex system of dams, reservoirs and gravity-fed leats have been recorded, serving a number of motive and dressing functions (Gill 2004a, 56). Prior to the development of extensive water management systems, each dressing floor was served by a leat '*collecting any water it could from the surface, plus the tail water from its neighbour'* (Raistrick 1953, 182). Water was a major issue for the miners, however; the geology of the moor, particularly the porous limestone, meant that most of the surface water quickly drained away, meaning that *'the water was used over and over again until at the lower mines it must have been received as thick mud, diluted with what small trickle of water could be obtained locally'* (*ibid*). This also caused issues of drainage within the mines, particularly as the moor has no convenient valleys from which to drive in adits (see above).

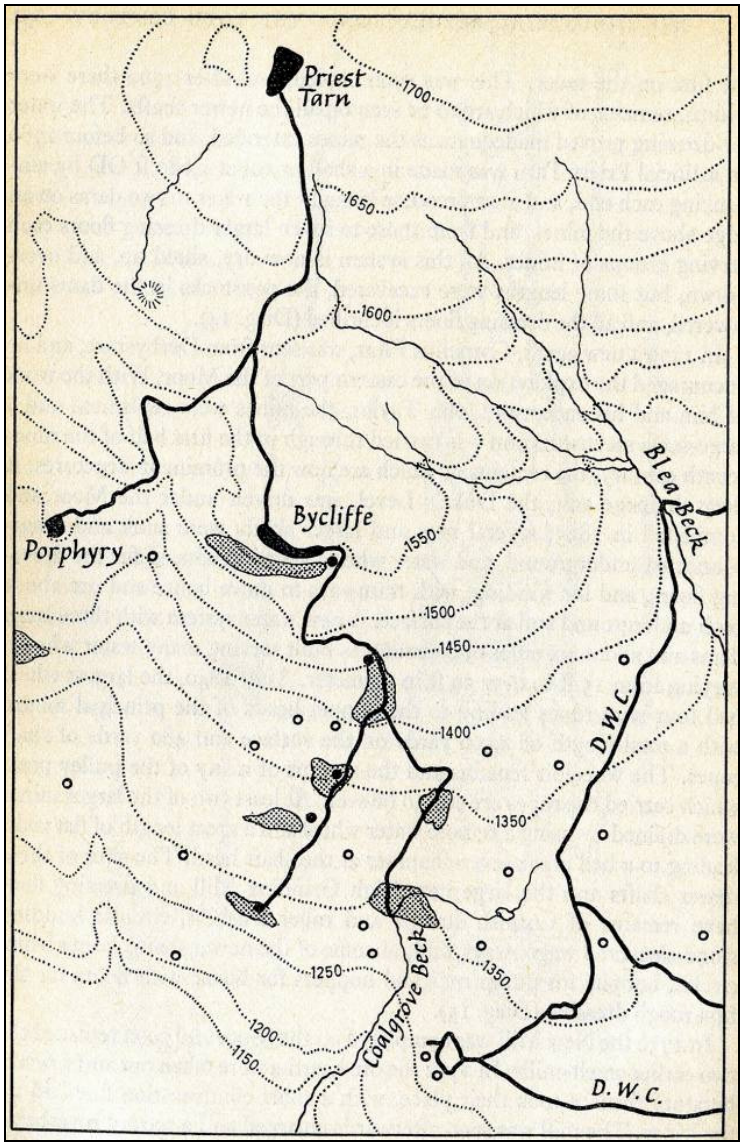

Plate 35: Priest Tarn Water Course, as depicted by Raistrick (1973, 252)

6.78 Most of the more extensive and planned water management systems are likely to originate in the early 19th century, when the Duke of Devonshire invested significant capital in improving the workings of the moor; however, some may have originated earlier, in the mid to late 18th century,

when the companies on the moor were increasingly developing centralised dressing floors serving a number of shafts. As will be discussed below, the exact origin of some of these systems is complex, and it is possible that they may have developed in a piecemeal fashion throughout that period.

*Plate 36: leat **10734**, visible as a shallow earthwork to the left of the figure, has been damaged by a re-use as a grip, a localised burst of which has removed a section of the leat*

Priest Tarn Water Course, and Porphyry and Bycliffe Dams

6.79 Raistrick (1973, 251) states that '*before 1780 an artificial Priest Tarn was made in a shallow col at 1,680 ft OD by embanking each end, and a water course brought the water to two dams* [Porphyry and Bycliffe Dams] *on an edge above the mines, and from those to seven larger dressing floors each serving a group of mines. All the system is now dry, silted up, and overgrown, but some lengths were excavated, the penstocks* [sluice gates] *in the dam uncovered, and all the dressing floors identified*'. This simple summary, which draws on the information previously published by Raistrick (1953, 182-4), argues for a date of around 1780 for the system, based on the dates of the mine workings and dressing floors it was serving. However, Gill (1993, 41) questions the origin of this date, arguing that the system was established in August 1820: '*let Jno Smith three dams to make at Priest's Tarn...for the sum of £5.00* (*ibid*, Note 37, 150).

6.80 Nevertheless, the system established in 1820 may have utilised earlier elements. Porphyry Dam, for example, served the dressing floors at Porphyry mine, outside the survey area in New Pasture, which

is one of the oldest mines on Grassington; Raistrick (1953, 182) states that the reservoir was '*mainly supplemental to local supplies*'. The mine worked from at least the early 18th century until 1815, and was not particularly productive, though production increased substantially between 1833 and 1853, and it was *'the third most productive mine in the New Pasture*' (Gill 1993, 69). The water management system may, therefore, have been established *either* as part of the original 18th century works, *or* relied on local supplies until the 1820s, when the establishment of the leat and reservoir led to increased productivity, *or* may have had an existing water management system which was improved by the Duke of Devonshire in the 1820s, including the development of Priests Tarn as a natural reservoir. The latter is perhaps the most likely.

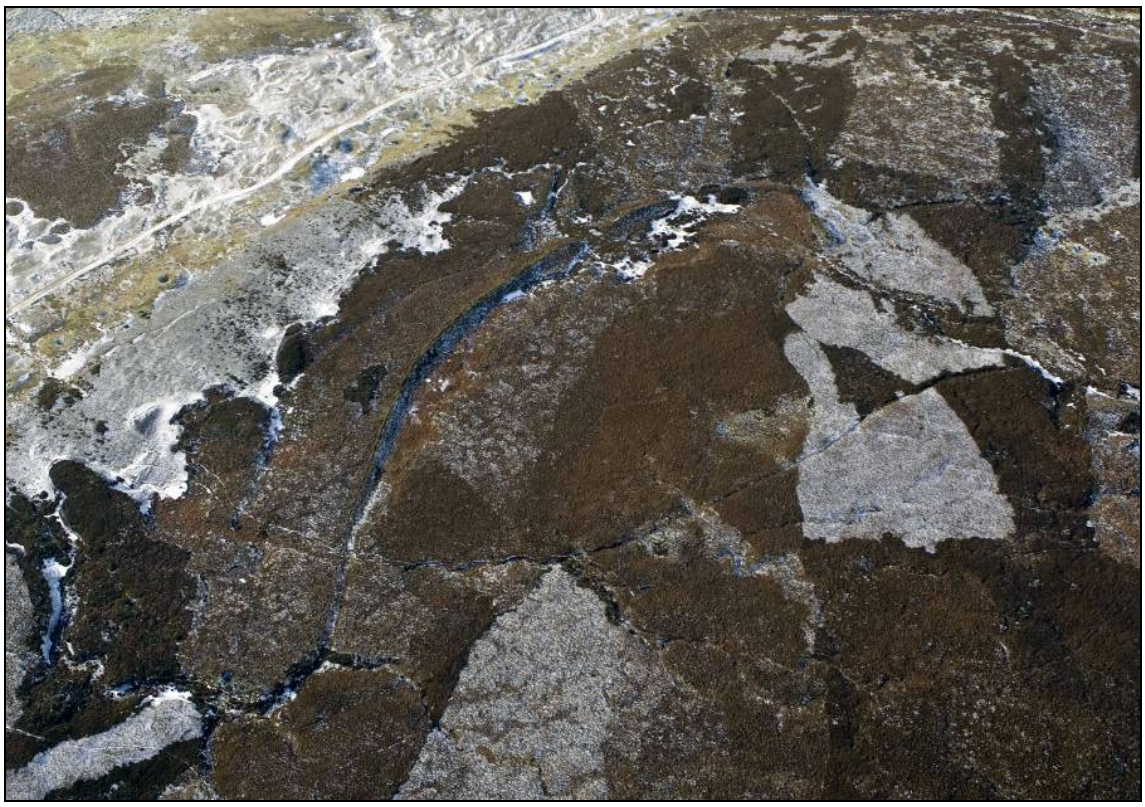

*Plate 37: Bycliffe Dam **10728**, facing east (© English Heritage 2009)*

6.81 From the north, a leat **10734** was identified running south into the survey area from Priests Tarn for 250m before turning south-westwards for a further 250m, after which the course is lost to erosion. Sections of this leat, which is still active in places, have been severely damaged by excessive water flow (in part caused by 20th century grips) which has scoured out a deep channel along its course, and has burst its banks in sections (see Plate 36).

6.82 The leat is depicted on Ordnance Survey mapping as splitting into two just east of Black Hill, with the western fork heading south-west towards Porphyry Dam, and the eastern fork taking a southerly line directly to Bycliffe Dam. The junction and the upper sections of the two spurs have been entirely destroyed by water courses cut through the peat, but their courses are just about discernible. The west spur, **10037**, reappears as a narrow earthwork leat to the rear of the buildings at How Gill Nick

Head (**10025**) before crossing How Gill, probably on a launder, and joining a long contour leat **10005**, which follows the edge of the hill above Black Edge Dike, itself spurring off from two further leats, **10000** and **10003**.

6.83 These two contour leats **10000** and **10003**, combine just above Black Edge Dyke before heading westwards towards the workings on Green Bycliffe. The south-eastern spur, **10005**, which runs off from the junction between the two contour leats, turns south and west before emptying into Porphyry Dam **10004**, just outside the survey area, which is also associated with the workings along Green Bycliffe vein. A small group of shafts **10016-10022** lies just inside the boundary defined by the New Pasture Wall, and probably also relate to these workings.

6.84 The south spur of the feed from **10734** reappears to the south of an area of hagging as **10733**, which heads directly towards Bycliffe Dam **10728**, a large reservoir which served the dressing floors at Bycliffe (**10722**) Turf Pits (**10645**) Ringleton (**10552**) and Chatsworth (**10609**). The system was of relatively small storage volume and could only operate intermittently when the dams had filled, at which time the dressing floors would have to dress their accumulated stocks of bouse (Raistrick 1953, 182). The dam comprises a large reservoir with banks 5m wide and 2m high, constructed along the edge of the hill. There is some silting evident, and it is possible that after it was decommissioned, further leats were cut through a breach in its bank (**10693**), and just above it (**10732**) in order to collect any water which originally accumulated in it, diverting it to other workings further east. A further small D-shaped reservoir to the south-west of the dam, **10041**, probably dates to a similar period, though could be earlier. The reservoir comprises low earth banks, turfed over, on all sides, with rounded profiles. The reservoir is fed by **10731**, which cuts downslope from **10730**, a feeder leat for Bycliffe Dam; the exit leat **10042** takes the water towards Howgill Level (**10047**, c.1877) or perhaps connecting to leat **10051**, which may have provided an impetus for its construction.

6.85 The course of the network of leats from Bycliffe Dam southwards is harder to follow, in part due to damage caused by later workings and reprocessing of spoil. Raistrick (1973, 252) depicts a leat running south and east, before skirting the edge of the workings associated with Richard's Shaft (**10675**) but this was not clearly identified in the survey (though **10672** which was identified as a trackway, could be part of this system). From Richard's Shaft, the leat takes a south-easterly course as **10680** before joining two east-west aligned leats. The first, **10655**, runs between West Peru (**10810**) and the dressing floor at West Turf Pits (**10662**), physically cut by the modern track but continuing as **10650**, which lies within a wide V-shaped cut through the spoil from Footway **10653**. This leat is also fed by a further short leat **10658**.

6.86 The second east-west aligned leat **10681** appears to run eastwards from a reservoir **10630**, depicted on Ordnance Survey mapping to the south of West Turf Pits as a sub-rectangular earthwork with a bank on its east side, and probably collecting water from the dressing floor, as well as surface water from the more boggy area to the west. The reservoir feeds the three dressing floors at High Ringleton (**10571**), Low Ringleton (**10552**) and Henry's Shaft (**10821**), which are connected to it via the east-

west aligned leat. Further ephemeral leats (such as **10633**) carry water westwards to a small catch-pit **10602**, a small low crescent-shaped earthwork approximately 20m in length. From this reservoir, the water course connected to Chatsworth Mine (**10609**).

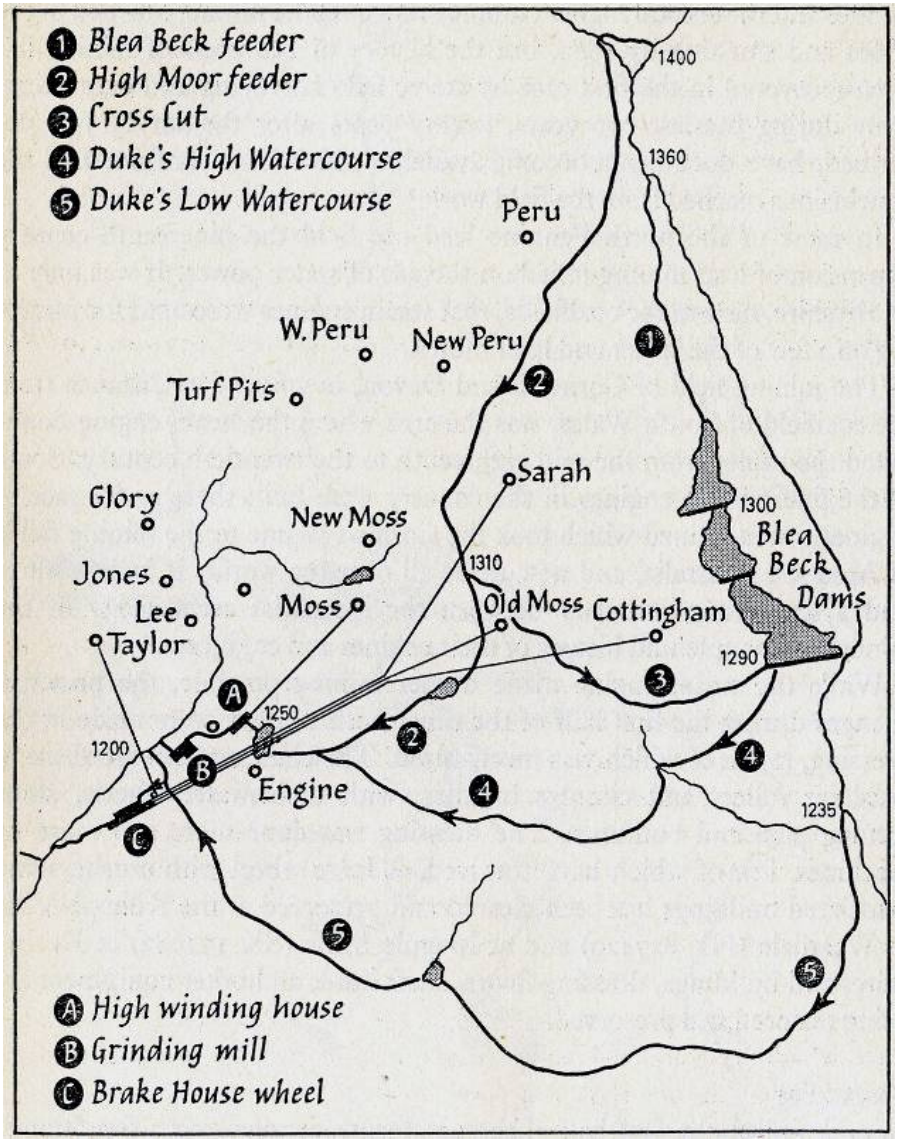

Plate 38: the water-management systems, as depicted by Raistrick (1973, 254)

High Moor Feeder and Associated Reservoirs

6.87 Raistrick (1955, 186) discusses the course of a leat, described as the *'High Moor Feeder'* (Plate 38), which may mark one of these earlier (late 18th century) systems, though Raistrick ascribes this particular example to the Duke of Devonshire (and as such post-1820). The leat, **10934**, which commences at Sleet Moor Dike, follows the contour at 425m, and crosses Blea Beck before heading directly south. The course of the leat, which is now silted, has been cut through by the modern trackway, but continues as **10807**, a visible earthwork to the west of the track, before being cut again by the same track. The leat then continues south past Old Peru (**10802**) and New Moss (**10813**) shafts, as an active watercourse. South of New Moss, the leat appears to have been fed by a spur

from a leat feeding West Peru (**10810**) shaft, and collects in two reservoirs, **10818** and **10933**. Dam **10818**, which is visible as a long east-west aligned earthwork, 60m in length and 9m in width, is now largely silted up, and cut through by the modern trackway. Reservoir **10933** is a sub-square reservoir, and was connected to Sarah's Shaft (**10822**, c1855) by an embanked leat, as part of a later phase of activity. The mine shafts in the vicinity of this section of the water management system are all mid 19th century, and are unlikely to have provided the impetus for the establishment of these two reservoirs. It seems likely that these reservoirs were collection points, and from this point the leat splits into two, with one spur heading south-west towards the workings on the west side of the moor, and another spur heading south, towards Coalgrovehead and Coalgrovebeck.

Plate 39: the south-western spur of the 'High Moor Feeder'*, arrowed between reservoir* ***10818*** *(just out the picture, bottom left) and Taylor's Shaft* ***10450*** *(top right) (© English Heritage 2009)*

6.88 The south-western spur, which is not depicted by Raistrick, follows the west side of the modern track as **10858**. This has now been recut to 1.5m width as a modern drain but originally would have taken water off reservoir **10818**. At a point west of New Moss Shaft (**10828**), a further two leats (**10827** and **10857**) converge and head westwards; the dressing floor at New Moss was probably connected to this leat. The leat cuts a line through a complex area of dressing floors and shafts related to the workings on North Gregory, Sun Gregory and Six And Three Meers veins. The workings all date to the 1730s at the earliest, but most appear to have been worked from 1775, and are not worked after 1820; it is possible the leat post-dates these. The course west of the modern track, which clips the western edge of these workings, is not clear, but it is possible that it extends westwards to a further reservoir (**10463**) west of Lee's Shaft (**10443**, c. 1820) and then south-westwards via a leat **10468** to

a reservoir dam (**10515**) identified on the west side of Taylor's Shaft (**10450**, c. 1820).

*Plate 40: reservoir dam **10463**, facing east*

6.89 The southern spur would originally followed the course of a leat southwards to reservoir **10839**, which lies just west of, and related to, the workings at Old Moss (**10837**, c 1764); however, the course of this leat appears to have been entirely obliterated by flood damage, which has burst and destroyed its banks. Nevertheless it is clearly depicted on Ordnance Survey mapping. The reservoir is a large D-shaped earthwork, with rounded stone and turf banks c.3.5m wide, which is connected by an embanked leat **10532** to the dressing floor at Old Moss Shaft, now cut by a modern trackway to Sarah's Shaft, excavated in the late 1950s as part of the reprocessing works on the moor. The reservoir is also connected by a short leat **10840** to a further reservoir **10932**. This reservoir, which appears likely to be contemporary, is associated with the workings at Coalgrovehead (**10850**, c.1738). The reservoir is large, rectangular, and measures 45m by 25m, with banks on the south, west and east sides up to 1m high. It is now visible as a large flat area, and appears fully silted up. A further leat **10835** appears to run south from the dressing floor at Sarah's Shaft to New Moss shaft (**10836**, c.1845)

6.90 From Coalgrovehead, a feeder leat (**10845**) extends southwards to a further reservoir (**10846**), a large diamond shaped earthwork, which follows the contour of the hill, and appears to have side walls on the west and north-east sides. The maximum height of the bank is 1.5m and it extends to 2.5m in width. On the south-west side is the location of a sluice-gate, and this connects to **10902**, a further leat which takes an irregular but direct course downslope to empty into Coalgrovebeck Dam **10405** (see Duke's High Water Course).

The Brake House and the Duke's Low Water Course

6.91 John Taylor, the Mineral Agent, realised that if he fixed pumps to the Coalgrovebeck Engine Shaft (**10406**) he could extend the workings to 72 fathoms (c.132m) and adit level, and increase the life of the mine by 10 years. In February 1820 cast iron pumps were carried up to Grassington from the canal wharf at Skipton. A wheel house and pit (the Brake House **10388**), housing a fifty-two foot diameter wheel, was built in 1821, fixed to a rodway, which ran upslope to power the pumps at the shaft head (see Plate 40). In 1823, the workings at Old or Pit Moss **10837** were also connected by a rodway which powered pumps at the shaft (Gill 2004b, 17). The axle and bearing blocks of the Brake House wheel-pit were still *in situ* in 1953 (Gill 2004b, 17). Only the north and south walls of the wheel pit now survive to any height. The wheel-pit is stone-built, with walls backed with clay (Gill 2004b, 16) and the foundations of a further building abutting the north side elevation probably represent the housing for the gearing for the rods. The wheel-pit measures 20m by 2m and is 3.5m deep. A short arched tunnel led the water from the wheel-pit out to Coalgrovebeck (**10432**). This has now collapsed but is visible as a low earthwork depression, west of the modern track.

Plate 41: Brake House wheel-pit, facing north-east; the rodway tracks are visible heading uphill

6.92 The rodway tracks (**10389**, **10399**) survive as earthworks, comprising three irregular grooves with alternating low banks of spoil inbetween, which were probably cut to allow the movement of the rods across the ground surface, keeping them on an even gradient and reducing friction which would have made the system inefficient (Gill *pers. comm.*). At the north-eastern end the rodways disappear,

possibly buried by activity at the east end of the track or destroyed by later reprocessing. Most of the archaeological remains around Coalgrovebeck have also been damaged by this activity.

6.93 The Brake House was fed by a launder, for which no evidence survives, attached to the Duke's Low Water Course, a long sinuous contour leat approximately 3km in length, which was excavated at around the same time as the construction of the Brake House. Raistrick (1955, 192) identifies that upper section was lined with puddled clay, and the lower (Yarnbury) section was lined with flags, with some sections also covered over; no evidence of the linings was visible during the survey. The leat was recorded in two sections. The eastern section, **10927**, is shown on the Ordnance Survey mapping as connecting to a sluice gate on Blea Beck, then curving south and then west up to Sand Haw Reservoir, **10928**. This section of the leat has now silted up, but is visible as an earthwork with a low bank on the south side. The field wall forming the survey boundary follows it closely in this section.

*Plate 42: aerial photograph showing the complex system of recuts to the west of Coalgrovebeck, and the dam, **10521**, within the straightened section of **10229** (© English Heritage 2009)*

6.94 Sand Haw Reservoir is now almost entirely silted up, and comprises an east-west aligned bank, 4m wide and 62m in length, and now only 0.5m high. The bank has spurs at each end; on the west running northwards for 30m, and on the east side running to the north-east for 33m. The reservoir also appears to have been positioned to be fed by Swarth Sike, which lies immediately north. From the reservoir, a sluice gate (now no longer extant) would have fed water into the second section of contour leat, **10381**. This section follows the contour at c.367m AOD, and has upcast on its south

side, and is still active. The leat is culverted under the flue **10348**, and continues as **10386** up to the Brake House. An overflow from this leat forms a sinuous downhill curve as a natural water-course, to join leat **10382**. This leat seems to be a later, second contour leat extending from the field wall to the south-east and following a similar lower contour heading north-west, and is also culverted under the flue, continuing as **10372**. Both the exit race for the wheel-pit and this leat appear to conjoin approximately at Coalgrovebeck, and it would appear that a launder at one time was in place across the beck, but this is no longer extant. A stone-built sluice gate **10520** on the west side of the beck probably marks a point just south of the launder, and would have allowed excess water to be released back into the water-course as required.

*Plate 43: 'small streams of water', the Duke's Low Water Course, **10229***

6.95 From Coalgrovebeck, the Duke's Low Water Course follows a near continuous line north-westwards, and eventually out of the survey area, where it continued down to Yarnbury. The course in Yarnbury has not been mapped as part of this study; water was scarce in this area and was needed for dressing, so the water course was extended for a distance of 3.3 Km around the Folds Valley to the new Wash Dam, which stored water for the Low Grinding Mill, built in 1824, and equipped with a crushing machine (Gill 1993, 39, 42).

6.96 The course of the leat immediately west of Coalgrovebeck is extremely complex, and appears to have had several phases of recut, and redesign, throughout the 19th century (see Plate 41). The probable original course, **10301**, is a long straight flat-based culvert, with slightly banked edges,

perhaps also related to **10313**, an easterly fork, and possibly a further recut. These both seem the most probable original courses of the leat, though are not those depicted on the Ordnance Survey mapping, which show the water-course following a more southerly course as a curved arc, here recorded as two leats **10292** and **10304**. All of these leats are cut through by a wide recut, **10229**, measuring 170m in length, but forming the south-eastern end of the (currently active) watercourse, which will be discussed in further depth below. North-west of this point, the leat becomes a more regular earthwork leat (also recorded as **10229**), generally a shallow earthwork leat c1.5m wide and 1m deep, with a bank on its west side, which follows its sinuous path north-westwards towards Yarnbury. Sections of this leat have clearly been recut (e.g. at **10253** and **10315**), but for the most part it remains unaltered. From the modern trackway north-westwards, the leat continues to flow towards Yarnbury.

Plate 44: the Blea Beck Dams and Deep Cut (foreground). Price's Shaft is to the left of the picture, the Duke's High Water Course extends out top left (© English Heritage 2009)

6.97 The straightened section at the south-east end of the leat is interesting, and appears to mark a change of use for the leat, and a change of course for the flow. This section, cut deeper and straighter, has now altered the flow of water south-eastwards, at least locally, and this appears to have been undertaken to carry the water back towards the settling ponds at **10343**, which are connected to the condenser house **10361** (see section on the flue). The water was presumably carried across the beck on a launder, no longer extant, and then perhaps on a raised aqueduct back to the settling ponds. There is an earthwork bank **10374** which appears to be the base for a launder support, and heads towards a point where a culvert runs under the flue **10348**. The date for this change is uncertain, but

probably occurred in the early 1850s, with the installation of the Stokoe condensers, and with a decline in production at Yarnbury at the same time (Gill 1993, 39). A later dam across the straightened section, **10521**, marks a further, uncertain, phase in this complex water-course.

The Blea Beck Dams, The Duke's High Water Course and Coalgrovebeck Reservoir

6.98 As part of the improvements to the workings on Grassington Moor undertaken by the Duke of Devonshire (and supervised by John Taylor, his Mineral Agent on the moor), a system of dams were erected across the Blea or Blow Beck, at the very eastern end of the survey area. The southernmost dam was the first of three dams erected in 1821; Gill (1993, 35) indicates that this dam was linked to the Duke's Low Water Course originally, and this was its reason for construction. There is no physical connection between the two; the Duke's Low Water Course took its water from Blow Beck, above the point where the parish boundary crosses it (or about 425m below dam), and the dam served to regulate the flow in the beck (Gill *pers. comm.*). All three dams, however, fed the Duke's High Water Course, and this will be discussed further in this section.

Plate 45: the base of Deep Cut; Price's Shaft lies in the centre of the photograph, under the field wall (arrowed)

6.99 The southern dam, **10833**, measures 181m in length, approximately 15m wide at its base, and has a 7m wide flattened top, which served as a trackway not only to access the sluices, but also to serve as access across to Price's Shaft, **10930**, which was sunk in 1838 (though this was short lived - Gill

1993, 108). The dam is badly breached on its western side, the western section beyond the breach is recorded as **10931**. The north side of the dam includes stepped stonework of even courses of squared rubble down to the waterline, which survive particularly well on the east side, but are more damaged on the west side. The stonework incorporates a sluice gate **10949**, 1.2m wide, set above a stepped stone structure, possibly a support for a launder or intake for the sluice. The housing for the sluice is concrete, and incorporates reused iron rails in its construction, which suggests it has been remodelled in the later 19th century. The sluice may connect to a pipe; a retaining wall **10950** was noted at the base of dam on the south side, built of rough round cobbles. This area is quite overgrown and damaged, but appears to incorporate an opening which may mark the exit race. West of the dam is a small area c35m by 45m (**10909**) shown as stippled on the 25" Second Edition Ordnance Survey mapping of 1891, and perhaps marking the position of a filter bed for the reservoir. This is probably a later modification. The filter bed connects back into the Duke's High Water Course by means of a series of leats (**10908**, **10910**), with possibly overflows (**10906/7**) on the west side.

6.100 The dam does not have a bypass channel as part of its design (as the other two do, see below), and it was perhaps this that led to the excavation of the Deep Cut (**10914)** in 1826, a massive bypass channel 1.1km in length, 40m wide, and 8m deep, which was cut from Groove Gill and ending just south of the first dam (Plate 44). The channel has a wide flat base, with steep sides, and was excavated to divert off any massive surges in flow which were possible on the Blow Beck (Gill 1993, 35), and which would have damaged the structures (as they have now done).

6.101 The second and third Blea Beck Dams (**10831/2** and **10825**, respectively) were both constructed in 1826, at the same time and as part of the same contract as the Deep Cut (Gill 1993, 35). The main section of the middle dam, **10831**, measures 80m in length, 5m in width and up to 4m in height, with a smaller section, **10832**, measuring 30m by 5m and cut from the main section by a modern and active erosion channel (this possibly depicted on the 25" Ordnance Survey map of 1910). An overflow channel, recorded as part of **10831**, cuts around the east side of the dam and is 30m in length and 10m in width, with a large earthen bank on its west side. A further shorter earthen bank abuts the south side of the dam, just west of this bank, and this may mark the position of an earlier overflow, perhaps controlled by a sluice-gate.

6.102 The third dam, **10825**, measures 135m in length and 4.5m in height, and is almost triangular in profile, with a c.2m wide top sloping down to a wider (c.10m) base. The dam retains a lot of silt on its north side, and a water channel is cutting around the west side of the structure; this is likely to damage it further in the future. A small hollow within the dam structure probably equates to the position of a sluice gate, now destroyed. On the east side, a deliberately cut channel **10826** runs broadly north-west south-east, curving in westwards at its southern end. This marks the position of the overflow for the reservoir; the earthwork measures 10m in width and is 2m deep.

6.103 The Duke's High Water Course, **10915**, was excavated in 1821, and measures 1.29km in length; Gill (1993, 38) records it as having a gradient of 1:185. An extensive leat, the earthwork extends from the

west side of the first Blea Beck dam **10833** westwards, following the 388m contour, and measures approximately 1.5m in width, with a low embankment on the south side. Raistrick (1955, 192) records it as having been lined with puddled clay. The leat is still active, fed in part by later grips (e.g. **10917**), which cut down to it, and also by a small network of leats **10912/3** which extend south from the dressing floor at Cottinghams Shaft (**10841**, c1855) to meet it. The leat empties into Coalgrovebeck Dam **10405**, a large D-shaped reservoir built in 1823, and measuring c.100m by 50m. The reservoir is formed by a large rounded bank c.2m in height, with a flattened top, and was built to power the dressing floors, and in particular the High Grinding Mill (located at **10421**, but now destroyed - see below) which was built in 1825.

Plate 46: Coalgrovebeck Reservoir, facing south-west

Other Leats

6.104 A further long contour leat **10737** was identified extending for approximately 2km southwards from Straight Grainings (a tributary of Blow Beck) to the workings along the Bycliffe Vein. The leat is clearly visible following the contour around Grainings Hill, before crossing Crag Grainings and a further unnamed water course (perhaps originally on a launder). East of the opencast **10749**, the leat forks, with the eastern spur **10738** running southwards to Old Peru (**10802**, c. 1844), and the western fork heading south-westwards to Bycliffe.

6.105 On Coalgrovebeck, a possible further series of dams was identified, similar in construction to the

Bycliffe Dams. The south-westernmost dam, **10425** and **10426**, is breached at the centre, but may originally have measured 45m in width. The dam has a broad flat top, 6m wide, and stands to approximately 4m in height. A further dam was probably located 130m to the north-east, but this has been subsumed into the massive heaps of waste from the Dales Chemical Works (**10423**), though water is obviously still being retained by it. The water from the dams appears to have been drawn off from a leat, sections of which include a metal pipe, which runs along the north side of the beck **10429**, and which ultimately empties into the Duke's Low Water Course via **10302**. The exact date of this system is not known, but an 1820s date seems likely.

*Plate 47: junction between leats **10737** and **10738**, facing south*

Winding

The Brake House

6.106 After the Duke's Level reached the Moor in May 1830, the free drainage provided by the level made the pumps powered by the Brake House wheel-pit redundant. A slump in the price of lead in the 1830s slowed expansion, but by 1835, Stephen Eddy, the Duke's agent, drove the Duke's Level eastwards to Taylor's Shaft (**10450**), which was fixed by a ropeway to a winding drum at the Brake House, with the winding drum in an annexe to the main building (Gill 1984, 45). The ropes were used to raise kibbles in favour of the horse whim (though this was probably still in use as backup). Wire ropes were reliable, and could cover great distances on sheaves fixed to posts, over the head

frame pulley and down the shaft. Once the kibble was on the surface, its weight, even when empty, was enough to pull the rope back to the bottom (Gill 2004b, 18). Between the late 1830s and early 1840s, a ropeway was also connected to Coalgrovehead (**10850**). There is now no physical evidence of the ropeway between the Brake House and Taylor's Shaft. The line of the ropeway to Coalgrovehead is still visible. Adjacent to the Brake House are three piles of stone **10390**, on the north side of the beck, corresponding to the position of supports for the ropes. The course of the ropeway is visible just north-east of this, and runs beneath a trackway within a tunnel (**10524**), before continuing up the hill as shallow straight scars from the ropes **(10400**).

*Plate 48: stone supports **10390**, facing east*

6.107 In 1853 the Brake House was converted wholly to winding, with wire ropes fitted to the drum running across the moor to Old Moss (**10837**) and Sarah's Shaft (**10822**) (up to 1862), in 1855 to Cottingham's Shaft (**10841**) and from 1862, Coalgrovebeck Engine Shaft (**10406**), which used the rope from Sarah's Shaft after it was wound up. The wheel turned four wire ropes, two on each side of the wheel, with the centre rope following a direct line to Old Moss shaft, whilst the other three ropes were deflected by means of turn-wheels to Cottinghams, Sarah's and Coalgrovebeck. Only three shafts were worked at a time, and a system of signalling was used to control the winding, with each shaft having a properly arranged period of winding in each shift; the more distant shafts used light signal wire connected to a knocker. The rope was calibrated each morning, and a depth marker on the rope was used by the wheelman (Gill 2004b, 18).

The High Winding House

6.108 The High Winding House **10407** operated a winding rope and pump rods to the shaft at Coalgrovehead, and was constructed in 1857, in order to facilitate deeper workings, at a time of depleting resources at the start of the 1860s. The winding house housed a 45 foot diameter wheel, powered by Coalgrovebeck reservoir, with the tail-water being returned to the High Grinding Mill, perhaps via level **10413**. The water feed for the wheel (**10409**) is visible as a rectangular cut with embanked spoil heaps on both sides, and corresponds with the position of a sluice gate in the reservoir.

*Plate 49: The High Winding House **10407**, facing north-east, with Coalgrovehead Shaft in the distance*

6.109 The wheel-pit, which has recently been subject to conservation works, survives as a long thin rectangular stone structure, c2m deep, with shorter rectangular recesses on each side for the bearings and gearing, and a small recessed rectangular structure to the south-west for the balance bob. North - east of the building, a series of north-east to south-west aligned, very irregular and apparently intercutting grooves (10412) cut into bank of Low Beck, deliberately excavated to keep the rods and ropes on an even gradient, and to stop them rubbing on the ground, which would have increased friction and made the system inefficient (Gill *pers. comm.*). From this point, the ropeway/rodway crosses open moorland before being diverted beneath a recently rebuilt causeway (NAA 2013, 9). The causeway was a fairly simple structure and was built solely to provide some level of protection

for a pair of underlying rod tunnels, used to allow the movement of the ropes and rods. The tunnels were formed by sidewalls capped with sandstone lintels. The overlying causeway was constructed from sandstone rubble surfaced by crushed stone and was retained by a crude wall to either side capped by a kerb of dressed boulders. Some evidence for the secondary use of the rod tunnels as water channels was identified during NAA's excavations (*ibid*). North of the causeway are timber uprights (**10539**) and the line of the ropeway and rodway can be discerned up the side of the dead heaps to an arched pump lobby **10537**, a large arched structure on the south-west side of shaft, which stands c3.5m high internally, and c 1m high externally. Revetting walls are visible adjacent to the south-west entry point.

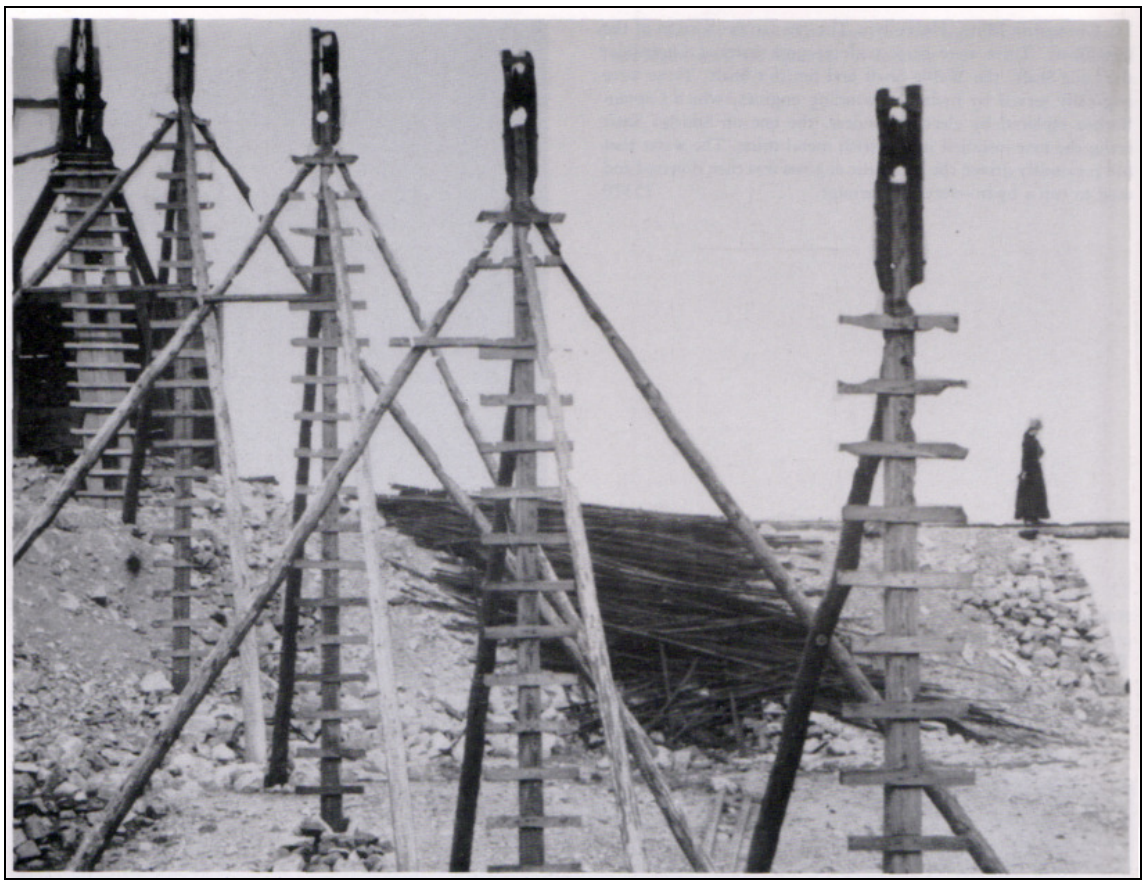

Plate 50: sheaves at Coalgrovehead Shaft, early 20th century (reproduced from Raistrick and Roberts 1990, 48)

Other Structures

6.110 The bob-pit **10843**, recorded to the south-west of Old Moss shaft **10837**, was part of a system of pump spears at Coalgrovebeck Engine Shaft **10406** powered by workings at Old Moss, and was depicted on an old mine plan (Raistrick 1955, 185). This survives as a broadly oval hollow, approximately 1m deep, with banks up to 1m high on the south side, and may have been robbed out.

Deep Shafts

6.111 Deep shafts (beyond the nominal 30m depth) were sunk or reused during the period of direct working by the Dukes of Devonshire (1818 to 1882), when both shafts and crosscuts were used to explore the western part of the moor at depth (Gill 2004a, 59). The development of pumping, winding and dressing led to the concentration of mining at a number of deeper shafts, rather than multiple small shaft mounds along a vein, which are remarkable for their very large dumps, often so large that the shaft head was raised and tipping began again (*ibid*). This allowed the development of further shafts on areas previously inaccessible due to the depths of shale masking the ore-bearing rock, primarily in the eastern half of the moor.

*Plate 51: bouse teams at Taylor's Shaft **10450**, facing west*

Coalgrovebeck Vein

6.112 Between 1821 and 1823, work focussed on four shafts on the Coalgrovebeck Vein, which were drained by rodways linked to the Brake House (see above). From the east, these were: Coalgrovebeck Engine Shaft (**10406**), Brunt's Shaft (**10404**), Summers' Shaft (**10414**) and Taylor's Shaft (**10450**). The Engine Shaft was fitted with a pump powered by the water-wheel at the Brake House (see above) and haulage was by means of horse whim at each shaft. Brunt's Shaft was abandoned in 1856 (Gill 1984, 46). The Engine Shaft was idle from the 1840s, but in 1861 was repaired, and was connected to the ropeway from the Brake House in November 1862, to exploit a wedge of virgin ground south of

Hartington Vein. The workings were abandoned at Christmas, 1865 (Gill 2004b, 18).

6.113 Most of the features relating to the workings at these shafts have been damaged by later reprocessing, though slight evidence survives in places. Both the Engine Shaft **10406** and Brunt's Shaft **10404** had little surviving evidence of whims or other structures associated with the shafts, and seem to now mainly survive as fingers of spoil radiating off from large shafts, though more detailed examination would pay dividends. Summers' Shaft **10414**, named after John Summers, is now mostly run in, but ephemeral evidence for the position of the horse whim survives to the east, and there appears to be dressing evidence to the south-east of the shaft, probably relating to its earlier 18th century phase, and on the opposite side of the track (**10465**, perhaps also related to the High Grinding Mill). An arrangement of possible waggonways **10417** appear to lead from this shaft towards a large dressing floor **10894**, also presumably relating to the earlier phases. A horse level, **10413**, was presumably used as haulage from the shafts to the High Grinding Mill (**10421**) and dates to this period. The spoil heaps of all three shafts, being close to the Dales Chemical Works, appear to have suffered from reprocessing activity.

*Plate 52: Old Moss **10837**, facing east*

6.114 The best surviving example of these four initial shafts is Taylor's Shaft (**10450**), which survives as a large L-shaped spoil heap, c.60m by 60m, with fingers of spoil radiating to the south-west and south-east, the latter cut by a later road (**10322**, see below). The spoil heaps are approximately 5m in height, and support a large well-defined horse whim on north-east side with low encircling wall, and central mound, approximately 17m diameter. The shaft was the first to be wound by wire rope in 1838; the horse whim was either original or was added later after the rope had been swapped to another shaft (Gill *pers. comm.*).

6.115 The shaft is now open and fenced. The south side of the spoil-heaps include large stone bouse-teams, and south-west of these is a large and extensive dressing floor. English Heritage (2009) recorded a large number of ponds and leats on this dressing floor. The presence of the teams and dressing floor

suggest that dressing must have been occurring adjacent to the shafts as well as at the High Grinding Mill. The shaft was abandoned in 1857.

Burnt Ling

6.116 To the south-west, the Old Ripon Shaft was cleaned out and sunk as the Worsley Shaft (**10258**) in 1824. The shaft was fitted with a horse-whim and cross-cuts were driven to Burnt Ling and Beckwith Veins, but little ore was raised. The shaft was abandoned in 1826. The shaft sits on top of a large and pronounced heap of deads c.4m in height, which measures 50m by 35m. Dressing is evident along the south side, with multiple small mounds of hand dressed stone visible within this complex, and stone settings identified during the survey (**10510**). The dressing floor appears partly damaged by reprocessing. A possible drainage adit was identified to the south (**10948**).

*Plate 53: pump lobby **10537** at Coalgrovehead, facing west*

Middle Vein

6.117 In 1823, the rodways at the Brake House were extended up to Old Moss (**10837**), which worked the Middle Vein (Raistrick 1955, 184). The works date to at least 1764, but were not seriously exploited until the improvement of drainage allowed the shaft to be deepened. The spoil heaps, which comprise multiple radiating fingers of deads, measure 130m by 75m, and stand to 7m high, which shows the extent of their workings. A large shaft, 9m wide and now surviving to c.2m depth, with a rounded profile, lies off-centre. Further later heaps are raised up above main heaps, also as pronounced fingers of spoil, to north-west of the shaft, and a series of walls **10533**, probably reflecting the positions of bouse teams. To the north-east, and lower down, is Moss New Shaft (**10836**), an old shaft cleaned out by Stephen Eddy in 1845. The shaft has a conical profile and is 7m in diameter, survives to 1.5m in depth, set within a broad low spread of deads, c.1.5m high and measuring 60m by 40m.

6.118 The workings are associated with a reservoir **10839** and embanked leat **10532**, which powered processes on the dressing floor to the south-west, **10838**. English Heritage records the area in detail, with leats, ponds, slimes, and other evidence of dressing. The floor appears to have been reworked in 1957-63 in places, but intact tailing dumps are visible extending to the south-east up to 3m in height. Sections of flagged surfaces **10534** exposed within the track which runs through the floor may form part of a dressing floor or building.

6.119 Coalgrovehead Shaft (**10850**) was being worked under private lease up to 1841 (see above), but after the lease expired, Stephen Eddy repaired the horse whim and shaft, and began working the mine again. There were problems with the original shaft, so in March 1849 a further shaft was sunk down to the 40 and 60 fathom levels (73m and 110m deep respectively), with crosscuts driven off from the shaft. The rodways for the original pumps at Coalgrovehead were repositioned to Old Moss and Sarah's shafts, so a new water-wheel, the High Winding House (**10407**), was built in 1855 (completed in 1857) and was used for pumping and winding. However, after extensive trials little ore was raised, most of the major ore having been won in the 18th century. The mine was abandoned in 1879 (Gill 1993, 102-3).

6.120 The whole workings now comprise a massive heap of deads approximately 95m by 80m and 8m in height, on which the shaft is located. The shaft has now run in, but survives as a massive crater 17m in diameter and 5.25m deep, with extensive finger dumps radiating out from the shaft, some preserving the lines of waggonways. The dumps to the west appear earlier. A pump rod lobby **10537** survives on the south side of the shaft (Plate 53), and ore bins **10538** were also recorded to the east of the shaft. An extensive dressing floor **10854** lies to the south of the main dumps, and this has been visibly damaged by reprocessing, with lines and heaps cut by machines very evident. The processes on the dressing floor were probably fed by a reservoir **10932**, which lies just north of the complex, and appears to have been connected to the High Moor Feeder (see above). The reservoir measures 45m by 25m and appears fully silted up.

6.121 Cottingham's Shaft (**10841**) was sunk in September 1855, working the Middle Vein. A poppet headgear at the shaft head was connected to the Brake House ropeway in August 1857, using the ropes from Taylor's Shaft. The shaft was still being worked in 1878, but was largely abandoned by the following year (Gill 2004b, 18). The shaft, which has run in, is very large, up to 20m in diameter, and 3.5m deep at the head, and is entirely filled with water. The shaft worked the Middle Vein, and finger dumps extend north and south, up to 5m high. There is a possible waggonway on the east side. A large dressing floor (**10842**) lies to the south, connected to two leats **10912/3**, draining into the Duke's High Water Course. The dressing floor appears heavily disturbed by reprocessing from 1957-63.

*Plate 54: Cottingham's Shaft **10841**, facing north*

Turf Pits

6.122 In 1829, Old Turf Pits Shaft (**10652**) was sunk as part of the Duke of Devonshire's exploration programme, which resulted in the discovery of the Grassington Moor Cavern and the Cavern Vein. The mine survives as large shaft, 14m diameter, and an oval mound of deads, 45m by 30m, with some evidence of dressing around edges, possibly reworking from the 20th century. Whim Shaft (**10666**) was sunk to the Cavern Vein, and was equipped with a whim (hence the name), but was little used initially, until it was revitalised in 1863-4. The whim sits on the south side of a c.2m high mound of deads, with a blocked shaft visible to the north. Work on the Cavern Vein was also begun at Henry's or Turf Pits Shaft (**10821**) in 1831 (see below). Other shafts sunk in the vicinity, for

example those on North Cavern Vein (**10654**, **10663**, **10664, 10665**), and South Vein (**10646**), are likely to be of a similar date.

6.123 In 1863, West Turf Pits (**10662**) was developed, working a block of ore-bearing ground in the Main Grit, and a renewed period of activity saw the working of a number of shafts in this area. The shaft is large at 17m, and now run in to 5m depth, with the remains of an unwalled horse whim on the north side. A waggonway leads to a well-built, stone lined bouse team, **10661**, 2m diameter, and an arched walled entrance to the south-west, with an encircling heap of deads. Set into this is a south-west facing wall, which shows evidence of dressing adjacent. A large north-east south-west aligned tongue of crusher/dressing waste **10641**, extends out from this point. The heap measures 60m in length, 22m in width and is 3.5m high, with a slightly flattened top which probably supported a waggonway. This overlies a very wide area of slimes and dressing waste **10645** and **10649**. An in-depth study of the ore-dressing waste in this area was carried out by Roe (2007, 23-42). Work ceased at West Turf Pits in 1877.

*Plate 55: West Turf Pits (**10662**) (© English Heritage 2009)*

Slanter Vein

6.124 In 1831, Henry's or Turf Pits Shaft (**10821**) was sunk on the Slanter and Cavern Veins, with ore raised by a whim, which lay to the north-east of the shaft. The shaft has now run in and removed about half the whim, which still exhibits its encircling wall and central mound. Of all the later workings, this is perhaps the most damaged by reprocessing.

6.125 Sarah's Shaft (**10822**) was developed from 1852 to work the Slanter Vein, and was named after Sarah

Noble Eddy, Stephen Eddy's wife. The workings are set out in a similar fashion to those at Old Moss, with an embanked leat drawing water from a reservoir (**10933**), to a dressing floor south-east of the main workings; the leat has been cut by the high pressure ethylene pipeline (**10805**). A large shaft is visible, with fingers of spoil fanning north-eastwards, and bouse teams along the south-east edge of the shaft, now mostly buried under debris, though a series of steps **10530** was identified, within this debris. English Heritage (2009) suggested the steps could lead down into a building or small wheel-pit, though this was not verified in the survey. The dressing floor appears to have been largely destroyed by reprocessing between 1957 and 1963.

*Plate 56: bouse team **10661**, with heap **10641** extending beyond the truck, and overlying **10645***

Bycliffe Vein

6.126 How Gill shaft (**10040**), originally an old shaft at the western end of the Bycliffe Vein, was enlarged and sunk around 1835. The present shaft has now run in and is holding water, but appears to sit on

two north-south aligned finger dumps. This shaft has been extensively damaged by recent vehicle activity. A probable dressing floor, visible as a retaining wall and flagged area, lies immediately to the south-east (**10500**).

6.127 To the north-east of Richard's Shaft (see below) a series of shafts was sunk onto the Bycliffe Vein, and worked between 1837 and 1840 (Gill 1993, 73); one of these is named Shaw's on Gill's plan (*ibid*, 76). The workings are visible as a series of four groups of shaft mounds (**10690**, **10691**, **10699**, **10700**), seemingly working along the edges of solution hollows, but with pronounced spoil collars in contrast to the latter, some with ephemeral dressing evidence along the southern side. There are further more isolated shafts to the north (**10698**, **10703**). A large dressing floor, **10701** and **10705,** and wash-pond **10704**, probably corresponds with these shafts and the workings on the eastern end of Legerin's Vein.

*Plate 57: horse whim at Richard's Shaft **10936**, facing south*

Legerin's Vein

6.128 Richard's Shaft (**10936**) lies at the eastern end of Legerin's Vein, and was sunk around the same time as How Gill. It was worked until 1877. The shaft is large at c.4.5m diameter and survives to 4m depth. It was served by a horse whim to the north-east, which is defined by low stone banks and a low mound in the centre. A further mound immediately south may mark an infilled shaft. The shafts sit at the northern end of a very large area of dressing evidence. Around the shaft on the northern end

are large dumps of mainly deads (**10675**), up to 5m in height, with a large stone retaining wall **10547** marking the position of bouse teams. South of this, the material (**10674**, **10676-7**) is much finer, and associated with an elliptical pond **10678** related to washing of ore. This material has been extensively reprocessed, and has been cut through by the modern trackway.

6.129 At the western end of the vein is Legerin's Shaft (**10076**), which had been worked between 1753 and 1781, but had been little worked subsequently due to bad ventilation and flooding. In 1843, the shaft was cleaned out by the Duke of Devonshire, and was worked sporadically until 1878, when it was abandoned (Gill 1993, 77). The mine shaft, which has run in and is now 3m deep, sits above a large and well-defined spoil heap, with access via a causeway from the north-east; a horse whim, partially collapsed, lies north of the shaft, with a surviving central bearing block (**10501**).

*Plate 58: bouse team **10529**, facing west*

Peru

6.130 Stephen Eddy developed further shafts to the north, in an area historically called Peru. Old Peru (**10802**) was sunk in June 1844, on the Bycliffe Vein, which was found to be largely barren. The shaft mound survives, 7m in diameter and now 2m deep, with a large rounded spoil collar 2m high. The surrounding area is highly disturbed by the 1957-63 reprocessing, but probably held a horse-whim and dressing floor. A large 5m high finger dump extends to the south-west of track. In June 1848, New Peru (**10813**) was sunk by Eddy. The mine is now visible as a substantial heap of deads and waste, 65m by 35m, with finger-dumps conjoined to form a plateau, 4m in height. This supports a

ruined horse whim and a shaft, now capped with rotten railway sleepers, and to the east, the foundations of a small building **10856**. A waggonway or embanked causeway, **10816**, leads to the main track to the west. The dressing floor on the south side has been badly damaged by reprocessing. West Peru (**10810**) was the final shaft developed in 1861. The spoil heaps measure 72m by 55m, are up to 4.5m high, and support a ruined horse whim, with a shaft capped with a stone cairn just south. An embanked leat leads southwards to a dressing floor, directly in front of a well-constructed bouse team **10529**.

*Plate 59: pivot stone **10545**, facing south*

Ringleton

6.131 High Ringleton (**10571**) and Low Ringleton (**10552**) Shafts worked the Ringleton Vein from April 1853 to Summer 1864 (Gill 1993, 85); a possible line of earlier shafts (perhaps 18th century in date) extends north-westwards from High Ringleton, clearly working the same vein, but no information is available on these (**10566**, **10567**, **10593**). Both the Ringleton Shafts are well developed mine shafts, served by horse whims and seemingly connected by means of a stone-embanked waggonway or trackway **10551**. Low Ringleton sits on substantial, 2m high spoil heaps, with finger dumps visible heading north-east, mostly turfed over. There appear to have been dressing floors on the south-east side (**10554**), fed by leat **10555**, but these have been damaged by reprocessing. High Ringleton is set lower, and is in fact two shafts, covering an area approximately 14m by 9m. The eastern shaft now has a maximum depth of 2.5m, the west shaft retains water. There are extensive heaps of deads

around the shafts, cut through by later reprocessing activity, which has also heavily damaged the dressing floor on the eastern side of the monument (**10572**). A horse whim, possibly for powering a crusher, lies just south of **10571**, visible as a circular turfed platform 10m in diameter, with a central stone setting and pivot stone (**10545**). The pivot stone is c1m by 1m, with central socket c0.4m, with a rectangular recess on edge, and is set within a circular setting of irregular stones packed in end on, c3m in diameter (Plate 59). Heap **10570** to the east may be output from the crusher. The dressing floor was served by a reservoir, **10630**, which lies west of the shaft, and now only appears as a very slight earthwork within a boggy area, though it is clearly depicted by the 25" Second Edition Ordnance Survey mapping of 1891.

Dressing

6.132 The High Grinding Mill, built in 1825 at Coalgrovebeck, was powered by a water wheel, 30 feet in diameter, and fed by the tailrace from the High Winding House and Coalgrovebeck Dam, when constructed in 1833. The wheel powered Cornish Stamps, and later crushing rollers, buddles and other mechanical dressing plant (Raistrick 1955, 185), with the development of hotching tubs (sieves suspended on levers, sometimes operated by water wheels) and mechanical circular buddles, added in December 1832 (Gill 2004b, 17). Raistrick (1955, 189) notes the presence of these at the High Grinding Mill, though the wheel-pit and buddles are said to have been buried under the plant after the development of the Dales Chemical Company in 1957.

Levels/Adits

6.133 In the Yorkshire Dales, some adits were used solely for drainage, but most also served as horse levels. The latter were large enough and straight enough to be fitted with narrow gauge railways on which horses pulled small waggons. This system allowed a number of veins to be worked from one place and led to a concentration of dressing floors at level entrances. There are few horse levels on the Out Moor at Grassington, as the topography is generally not suited to them, but a small number were identified during the survey.

6.134 At How Gill, a level **10047** was driven east in 1877 on the Bycliffe Vein, but found little ore and was abandoned in May 1879 (Gill, 1993, 77). The level is now run in, but is visible as two or three large east-west aligned cuttings just north of the modern track. A waggonway **10718**, visible as a terrace up to 3m wide in places, runs up the north side of the cuttings, and was probably used to haul material from the level up the hill to the dressing floors on top. A further level, **10726**, was driven north from Bycliffe Vein in 1833, probably to drain a series of short-lived shafts being worked northwards in 1836 south-east of Bycliffe Dam (**10723**, **10724**, **10725**, **10727**). A further level, known as Bycliffe Top Level (**10696**), was also driven northwards off the vein between April 1834 and June 1835. The level was 70m long, and may have collapsed; it is associated with a bank of spoil, **10695**, at its southern end.

6.135 At the foot of Coalgrovebeck, the probable position of an 18th century level (**10464**) was identified,

which is recorded as being associated with the shafts to the east (Summers, Brunts, Coalgrovebeck). The level, which has run in, is visible as a low depression 3.5m by 3.5m in side of hill, with a 20m finger of spoil against the beck edge. The level may also be related to a further series of earthworks at **10514**, which include the remains of structures and retaining walls, and a further possible level.

Flue System and Chimney

6.136 The flue system for the smelt mill at Grassington is extensive and complex, comprising about 2km of cut-and-cover tunnel system rising 150m between the Cupola Mill and the surviving chimney. The development of the flue on lead-smelting sites appears to have arisen as a result of two specific needs: the desire to minimise the damage to the environment and the health of those within the vicinity of the smoke of the lead-smelting mills; and, perhaps more saliently, to recover the particles of lead which were being lost up the chimney.

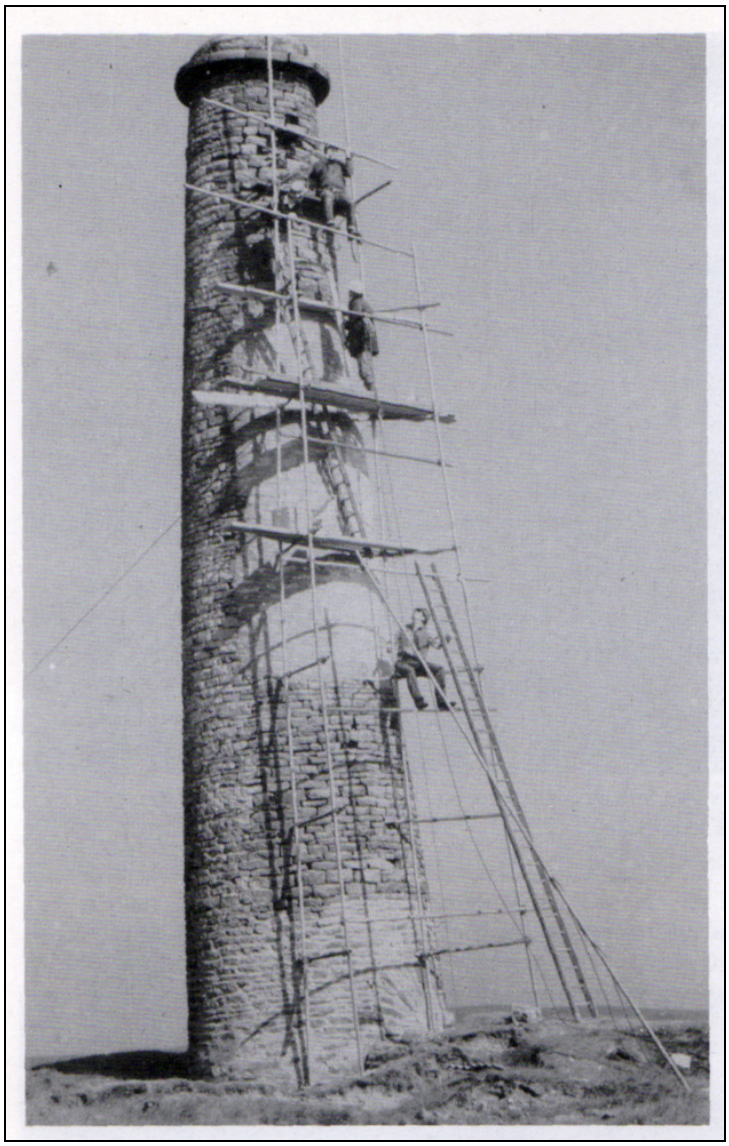

*Plate 60: the chimney **10350** under restoration (after Raistrick and Roberts 1990, 80)*

6.137 Lead smelting produces considerable quantities of fine-grained materials which are passed away with the waste gases through the chimney. These materials comprise dust (fine particles of ores, fluxes from the charge and so on) and fume (volatilised substances such as lead, zinc, and their sulphides and oxides, which form a powder). The two forms of material are almost indistinguishable in practice, and as such are commonly described under the catch-all description of '*fume*'.

6.138 Prior to the development of the flue, little effort was made to retain the fume. The poisonous smoke from the smelt mill was carried directly up the chimney, causing undesirable damage to the surrounding countryside, through the release of substances such as lead, antimony arsenic and sulphur dioxide (which in turn could form sulphuric acid and acid rain). The damaged vegetation, in turn, could poison sheep and cattle. Gill (1993, 129) records incidents of cattle poisoning at Grassington Low Mill in 1781, and in 1774 the freeholders claimed the Moor Mill was also causing the same damage to their cattle (*ibid,* 118).

Plate 61: Stokoe condensers on the flue, photographed by Raistrick (Raistrick and Roberts 1990, 79)

6.139 By the later 18th and early 19th century, flues were being constructed to draw the gases away from the pasture land around the smelt mill, up to a point some distance away where the toxic sulphur dioxide fumes could be released without causing significant harm. The construction of flues was not fully altruistic, however. John Robinson, the agent of the Derwent Lead Company writing at that time, records that: '*to save the surface of the land from injury, we carry from the smelting hearths a tunnel arched a mile long, and let the smoke up by a chimney. At the end of the year we clean the chimney, and smelt the matter obtained, called fume, and get from this a great quantity of lead, sufficient to remunerate our expenses of making the tunnel, and yield a profit besides*' (cited in Turnbull 2006, 70). Mulcaster, writing in the late 18th century, stated that a single year's profit from the reclamation of material from a horizontal flue could account for 70% of the original cost of building the flue (Tylecote 1971, 11).

6.140 Construction methods vary, but typically the flue had a flagged base and was constructed within a wide trench, with the arching commencing at about ground level. The earliest flue at Grassington was quite short, and even when extended in 1840 was only 49m in length, and incorporated two condensers. Part of this shorter flue probably is incorporated in **10341**, a short section of Y-shaped flue, running east from the back wall of the mill and merging just before the modern track. The flue now appears mostly collapsed and partly overlain by later quarried stone (the quarry **10339** is also nipping the edge of the flue on the south side). Both these flues served the reverberatory furnaces.

*Plate 62: condenser house **10357**, facing north-east*

6.141 In 1849, the flue **10348** was extended to its current length of 435m, terminating at a chimney **10350**. The flue is mostly intact, with some collapsed sections. Excavations on the line of flue by NAA (2013) identified that the flue, where examined, comprised a horseshoe profile with battered side-walls and a semi-circular barrel vault. The intrados of the vault was reasonably well finished with the individual stones being roughly flush with one another. The extrados was unfinished and was designed to be covered beneath an earthen bank which provided integrity to the structure and prevented gases from prematurely escaping the flue. The masonry of the vault was formed without springers, as a result of its horseshoe shape, and no keystones were used. The flue was constructed using larger square cut blocks for the majority of the structure with the masonry of the barrel vault being formed by a series of thinner stone slabs, presumably erected over wooden centring. Smaller fragments of sandstone had been wedged between these on the outer face to maintain the curve of

the arch. Lime mortar was also noted in places, however its use appeared to be quite selective. The flue seems to have been constructed in sections, possibly by different gangs of workmen, with each section being finished in an arched face, which was butt jointed to a counterpart face in the succeeding section. The chimney **10350** is stone built, 15m high and approximately 5m diameter at base, and was restored in the 1960s and 1970s (Plate 60).

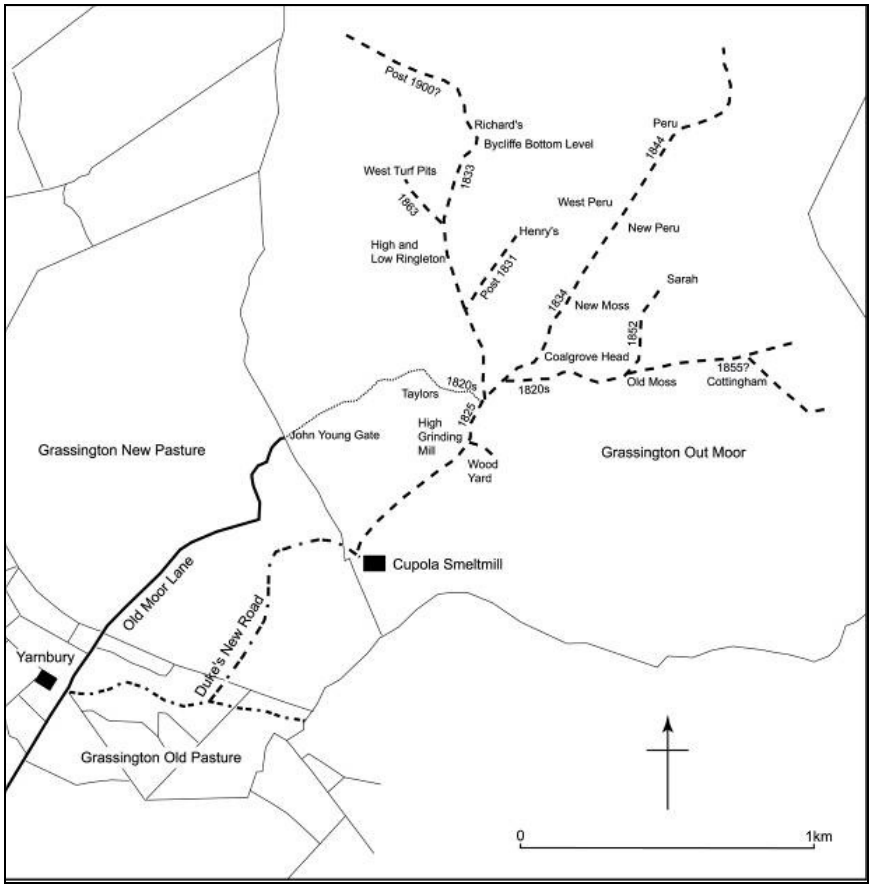

Plate 63: the road system (reproduced from Roe 2009)

6.142 The collection of fume was of paramount importance, and Stokoe condensers were incorporated into the flue system. The lead fumes were driven by a fan blast through a series of ascending and descending columns, partially filled with brushwood on pebble stones, down which a stream of water fell, to condense the lead fumes. The water collected in tanks at the bottom of the columns, and the fume was allowed to condense. A complex system of leats flushed the flues into a series of settlement ponds (LUAU 1993). One such condenser, added in 1849, was positioned at **10355**, but is now no longer extant (see Plate 61). To the north, the condenser connected to a large rectangular settling tank **10384**, which in term fed a series of catch-pits **10385** which drained into the Duke's Low Water Course.

6.143 In 1852, a 550m loop **10349** was added at the north-eastern end of the flue, which survives as turfed-over arched structures. This was connected to an additional condenser **10351**, for which some standing walls still survive. A further condenser (**10357**) was added in 1855, connected to a flue to

the north of **10341** (**10342**, **10360-1**) which served the slag hearth which lay at the north-western end of the smelt mill. The structure now survives as a deep recessed stone-built construction, 6.5m by 3.3m and 1.5m deep, with embanked material around the edges, and a single division wall (Plate 62). The water for the condenser was fed by means of a leat **10359**, with the contaminated water taken off under the flue by leats **10362** and **10347** to two rectangular settling ponds **10343** and **10344**. The fume was allowed to settle and was eventually re-smelted in the mill.

6.144 In 1855, a 680m long loop of flue (**10353**) was also built at the junction with **10361** to allow cooling of gasses exiting from the condenser **10357**, and the condensation of further fume, before they rejoined the main flue **10348**. This section of flue appears mostly to be an upstanding structure, rather than constructed within a cut, and is arched with a turf cap. Sections of the flue have collapsed, more so than the main flue, so perhaps it was constructed less well. Large stone slabs were used at the junction here, and elsewhere along the line of the flue, to seal sections of the flues when gas diversion was required, and perhaps this section was also used when the main section was being cleaned. The slabs could be moved vertically, and appear to have been linked to some mechanism to raise and lower the slab to permit or restrict gas flow. Access points were also included within the design of the main flue, to allow the periodic cleaning of the flue to recover the lead; at these points, large slabs were propped into an inspection aperture, and removed when required for access.

*Plate 64: track bed **10952,** facing east, with Blea Beck Dam **10831** in the middle distance*

Roads

6.145 With the concentration of mining at specific deep shafts, new roads were constructed to facilitate the movement of ore from the shafts to the High Grinding Mill, and from the mill to the smelt mill (Raistrick 1955, 184). A chronology for the development of the road system has been established by Roe (2009, 2) which indicates that the road system developed after 1818 over a period of 40 years, as a result of John Taylor taking over the Duke of Devonshire's mineral royalty at Grassington. The Duke's New Road onto the moor was built in 1825-6, with the embankment across Pasture Beck built in 1828 (*ibid*). Roads to the High Grinding Mill (1825) and the wood yard (1826) were probably established around the same time. Most of the roads as depicted in Plate 63 are now modern trackways, surfaced with dressing waste quarried out from spoil heaps; these have been assessed in depth by Roe (2009) and English Heritage (2009), and it is not proposed to repeat their results here. Little of the original surface survives, though this may be present beneath the modern track-bed. East of Cottingham's Shaft, a section of original track bed **10952** survives on the short section of track leading to the central Blea Beck Dam. The bed comprises two rows of stone sets, flat stones c.0.50m square, with six visible on each side of the track. This may mark a localised repair to the track but other stones (part-buried) are visible along the length of the track heading westwards, and it is probably part of the original (?1820s) road.

*Plate 65: road **10484**, facing north-west*

6.146 Further tracks and small roads were identified during the survey, mainly cutting westwards from the

network depicted in Plate 63, towards individual shafts working veins on that side. A track **10322** cuts westwards through the fingers of spoil from Taylor's Shaft (**10450**, c.1820) which have been revetted by a stone wall. This track is depicted on the Ordnance Survey mapping and clearly was established after the shaft had been worked, probably in the mid-19th century, to allow a more direct route to the ore bins and dressing floor south of the shaft. The road crosses a culvert **10516**, which is contemporary, and appears to be bridging a leat within the dressing floor. The road continues west and appears to terminate at the dressing floor to Worsley Shaft (**10258**, c.1823).

6.147 Two further tracks, **10483** and **10484** were identified cutting north-westwards from Taylor's, and Lee's Secondary Shaft (**10449**, c.1820), towards Chatsworth Mine (**10609**, c.1808). Both tracks comprise broad flat turfed features, often little more than a vague alignment where they cross dressing floors, though **10484** has stone revetment on its western side (see Plate 65). The dressing floors at Lee's Shaft (**10443**, c.1820) and Lee's Secondary Shaft are also accessed by a further east-west aligned road off from the main trackway, and possibly connecting to **10483**.

*Plate 66: Cupola Quarry **10339**, panorama*

Quarries

6.148 Small piecemeal quarries were located along the roadside, often getting stone where convenient or where it had been exposed by earlier workings (**10702**, **10707**). The dating of these is problematic, and they probably were being dug from at least the 18th century onwards, and were perhaps being re-excavated sporadically.

6.149 Other quarries were excavated according to the immediate needs of the mines. For example, quarry **10356** was probably excavated to provide stone for the construction of the Condenser House **10357** which lies immediately adjacent to it, whilst **10352** may have been dug to provide stone for the chimney.

6.150 A very large quarry, known as Bank Head or Cupola Quarry (**10339**), lies immediately east of the Cupola Mill. The quarry is very deep (approximately 10m), and is marked on the Second Edition Ordnance Survey mapping as '*old*'. The quarry cuts the position of Cupola Shaft, and has large spoil-heaps to the south (**10338**) and south-west (**10333**), the latter connected to the quarry by a waggonway (**10337**), which is depicted on Ordnance Survey mapping but is no longer extant.

Other Structures

Saw-Mill

6.151 The new mines needed wood for props, planks and waggonways, and mainly used larch and Scotch fir, which was cut in a purpose-built saw mill (**10395**). A plan of 1823 shows a Count House and Carpenter's House, just south-west of the Engine Shaft, and these were enclosed in a high-walled compound built in the summer of 1826. The timber was cut by means of a saw driven by a ten foot diameter water-wheel, with the carpentry work let in six month contracts (Gill 2004b, 16). The whole complex was demolished in 1968. Little now survives of the saw mill, though earthworks and remnants of wall, standing to 1m, are still visible.

*Plate 67: blacksmiths shop **10311**, facing north*

Blacksmiths

6.152 A small building **10311** just north of the Cupola Smelt Mill is identified by Gill (1980, 39) as a blacksmiths workshop. The building measures 4.5m by 3.5m, and has an entrance to the south, and a probable chimney flue on the east side (but no evidence of a hearth). Only low courses survive on the outside, but the structure has been excavated into the embanked deposits of spoil along the roadside, and survives better internally.

Mine Shops

6.153 There are few mine shops on the moor, and it seems probable that they were not needed, in view of the proximity to the villages of Grassington and Hebden, and the local labour which worked the mines. Mine shops generally developed from around 1820, though some date back to the late 18th century.

*Plate 68: Bycliffe House **10068**, facing north*

6.154 Bycliffe House (**10068**), also known as Legerin's Mine Shop, is documented as having been built in the mid-18th century by Mr Freeman, who was mining West Ten Meers in the late 1730s, and had died by 1753 (Gill 1993, 73). The building was not presumably originally a mine shop, and has more of the appearance of a house; it is recorded as having been repaired in August 1834, which is perhaps when its use changed. The current structure comprises a stone building, 10m by 6m, with a door to the south, and an internal sub-division in north-east corner (possibly a later addition). The walls have now mostly now fallen in, and the floor and roof are absent. It is in poor condition (Dennison and Haigh 1997, 136-147).

6.155 At Old Moss Shaft (**10837**) a mine shop **10531** was recorded adjacent to the track leading to Sarah's Shaft. The mine shop, which is roofless, measures c10m by 5m, with a central door on the east elevation, with windows to each side. The west elevation has a door off centre to the south, and a further blocked door is visible in the south elevation. The building is coursed rubble, with well-

dressed quoins and a chimney in the north wall. A concrete machine base was visible in the interior. The shop is probably of post-1820 date, and is in poor condition.

6.156 Just south of Richard's Shaft, the foundations of a small single cell building **10546** were recorded, measuring 5m by 4m and broadly east-west aligned. The building lies away from mine workings and may be a powder store. The powder houses at Beever and New Mill, Arkengarthdale are of similar dimensions.

*Plate 69: mine shop **10531**, facing west*

'The Dog Kennel'

6.157 A small building **10522**, measuring 9m by 5m, is named as *'the Dog Kennel'* on a mine plan of 1863 (Gill 1993) and survives as a two celled rectangular stone structure. The north-east corner only stands to c1.5m, and the rest of the building has collapsed to its foundations. There appears to be an entrance on the south-west side. Gill (1993, 90) surmises that it is possible this was used to house guard-dogs, but that it was strange to keep dogs so remote from the works they were guarding, and indeed theft of lead was rare. It is likely that this is a powder store, and other two-celled examples are known (for example, the powder houses at New Mill). There is a suggestion that the name might be ironic, with whoever staffed it considering themselves to be isolated – in the dog-house (R. White *pers.comm.*).

*Plate 70: the Dog Kennel, **10522**, facing north*

Farmsteads

6.158 A small possible farmstead **10025** was recorded at How Gill Nick Head, but is now a ruin. The farmstead was a three-celled building, only surviving as foundations, with little standing fabric remaining. The HER suggests the building is possibly associated with mine workings but there are no discernible workings adjacent. The farmstead appears to be associated with stock enclosure **10026**, and may also have served as a shelter for early shooting parties utilising the butts to the north-west. A possible area of lazy bedding **10043**, lies just west of the farm, on the opposite side of the beck. The date of the farmstead is unknown.

FINAL EPISODE (1882-PRESENT)

Lead Mining

6.159 Little if any significant lead mining occurred in the 20th century, though some ore was raised from Murgatroyd's Shaft (**10079**) on Legerin's Vein by Grassington Lead Mines Ltd in 1917 (Gill 1993, 77).

Plate 71: the Dales Chemical Works (© English Heritage 2009)

Reprocessing

6.160 The Dales Chemical Works (1957-1964) were the largest and perhaps most organised of a series of small independent concerns which worked the spoil-heaps between the 1940s and 1960s (detailed in Gill 1993, 136-141). The main buildings of the chemical works **10420** now only comprise the flattened concrete bases of buildings, with low walls, parts of which are still standing, built mostly of a mix of breeze block, stone and brick. A circular storage tank **10418** lies adjacent to the track, and a large concrete structure **10421**, comprising a ramp, built to feed concrete hopper at its west end, was constructed using remains of earlier High Grinding Mill, earlier elements of which still survive within it. The latter structure is part buried in embanked dumps, and most visible remains are of 20th century date.

6.161 Around the buildings is a massive area of slimes, pea-sized granular material and compacted waste (**10423**) from the chemical works, extending 60m out from buildings and 150m in length. The heap extends to 4m in height into Coalgrovebeck, and parts have been flattened for circulation around buildings; there is rabbit damage to these heaps. A large sub-rectangular settling pit (**10422**), with

rounded corners and flattish base, lies just west of the works, and measures 65m by 20m, and is up to 2m deep. The pit was probably excavated in the early 1960s when a dragline being used to excavate it uncovered a coal seam. The pit has been infilled by later dumping from the south.

6.162 It is clear from the recorded evidence that the impact of the reprocessing has been considerable, particularly on the large and discrete 19th century deep shafts, and on the extensive dressing floors of all periods mainly in the immediate vicinity of the modern tracks.

Sheepfolds and Huts

6.163 Few sheepfolds were identified within the survey area. Sheepfold **10777** is of drystone construction, and located along the edge of Sleet Moor Dike, where the topography allowed for some shelter from the elements, and provided access to fresh water for the sheep. The fold is actually technically a washfold, with the main structure comprising a large rectangular fold, with a smaller rectangular fold abutting it on its south-west end. There appear to be openings on the beck side. Jennings (1992, 138) provides a detailed description of sheep washing being carried out early in the 20th century. Sheep held in the fold were thrown over the walls into the beck, where three men, up to their waists in water, would wash them. The washing area presumably lies west of the smaller structure, where it the respective becks converge.

6.164 A further possible sheepfold, **10026**, was also identified, at the base of the valley close to How Gill Nick farmhouse. There is some doubt concerning this structure being a sheepfold, as it has very high stone walls and two internal buildings, and may have served a different (unknown) function, perhaps as a stock enclosure or corral.

6.165 A small pent-roofed building **10002** was recorded on Black Edge, with an entrance to the south-west and opposing window, with a small internal fire-place. The hut is largely in ruins and collapsing. This may be a shepherd's hut, or may have been used as a shelter for peat-cutters or beaters.

Recreation

6.166 The development of grouse shooting as a recreational pursuit in the later 19th century led to the development of shooting on the moor, mainly to the north of the Bycliffe Vein. Early grouse shooting didn't require butts; grouse were raised by the guns walking over land rather than driven towards guns standing in butts, which were a later development. A line of modern stone-built shooting butts **10028-36** was recorded at How Gill Nick, associated with a ruined shooting lodge **10027**. A small group of presumably earlier ruined butts **10024**, **10038** and **10039** lie further up the valley, just west How Gill Nick Farmhouse **10025**.

7.0 STATEMENT OF SIGNIFICANCE

7.1 The national significance of the Grassington Moor lead mines is reflected in its status as a Scheduled Monument. The site is an important example of a well preserved, multi-phase, dispersed lead mine complex, retaining evidence of virtually all processes relating to the excavation and processing of ore. However, scheduling is based on a broad set of criteria, applicable on a country wide basis and, while aiming to protect the nation's historic monuments, does not take into account smaller details which contribute to a site's specific significance. Sites like Grassington have a unique cultural significance derived from a wide range of varying values and perspectives encompassing not just the physical fabric of the site but also its setting, use, history, ecology, traditions, local distinctiveness and community value (Kerr 2012, 4). A successful management policy is dependent on the protection and balancing of all these various elements, while resolving any potential areas of conflict and future threats and issues.

7.2 The following section aims to consider what contributes to Grassington's specific site significance and 'sense of place'. To do this, it considers five high level themes as set out in Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage, 2008b):

- **Evidential Values** - the potential capacity of the mine complex to yield primary evidence about past human activity (potential archaeological remains, levels of preservation, structural evidence etc).
- **Historical Values** - the potential of the mine complex to offer a connection between the present and the past through association with people, events and aspects of life.
- **Aesthetic Values** - the potential for people to derive sensory and intellectual stimulation from a place, through design, art, character and setting.
- **Community Values** - the potential for the mine complex to hold meaning for people to relate to it or whose collective experience or memory it holds (often closely related to Historical and Aesthetic values).
- **Ecological Values** - the potential for the mine complex to provide habitat for native flora and fauna; in particular protected species.

7.3 The overall significance of Grassington Moor lead mines, based on these themes, is summarised in the table below. An assessment of significance on a site-by-site basis is included in the site inventory at the end of this report.

Table 1: Summary of heritage significance – in order of importance

Evidential	*1) The site is one of the principal lead-mining centres in the Yorkshire Dales National Park, covering all stages of processing from extraction and dressing to smelting. Lead mining on Grassington Moor is first recorded in 1731, and the*

	moor has also been the location of coal mining which probably pre-dates the main period of lead mining. The principal lead-mining activity developed from the mid 18th century, with larger and more organised companies working the moor, and from 1818 came under the direct control of the Duke of Devonshire, who developed mining across the moor. The exploitation of lead continued episodically until 1882, when lead mining declined. In the 20th century, the moor was subject a series of ventures which looked at the reprocessing of the waste heaps primarily for fluorspar and barytes. The in-situ elements associated with these processes are, therefore, of exceptional significance. *2) The site is a prime example of a large 18th to late 19th century lead mine and contains features relating to all stages of lead mining, lead processing and water-management systems. It includes features associated with: gaining the ore (levels, shafts, horse whims, winding houses), drainage (leats, culverts, dams, rodways), water management (leats, reservoirs, culverts), power transmission (wheel-pits, horse whims), transport (roads, waggonways), dressing the ore (dressing floors, mills), storage (bouse teams), smelting of lead ore (hearths and furnaces, flue systems, chimney), reclamation of fume (flue, settling tanks, condenser) and waste management (spoil tips and tailings). The survival of coes and walled horse whims on the site is also considered to be significant, and provides localised foci of interest and a material link to the past activities at the mines.* *3) The layout and arrangement of the various elements clearly illustrates process flow across the moor and the way in which the local topography was utilised to minimise the transportation of heavier material around the site and channel water to facilitate the dressing process.* *4) The mining field was used for several phases of lead mining (1731 – 1882), and, finally, for the reprocessing of heaps (c1940s-c1960s). The complex is therefore a multi-phase palimpsest of archaeological features relating to these main periods, and, as such, provides an excellent opportunity to study the layout and nature of a mining landscape of this size and scale.* *5) The Cupola Mill complex and its associated flues, chimney and condensers are the focal point of the mining field, and are of exceptional significance in terms of both understanding the operation of the complex and contributing to the unique sense of place, though the interior of the mill exhibits little evidence of former workings. An additional focal point is formed by the buildings associated with the Dales Chemical Works, which provide a focus for*

	reprocessing activity which took place on the moor, and which is also significant in terms of completing the story of the activity at Grassington. *6) In addition to the standing remains as mentioned above, there is a high potential for the survival of good sub-surface archaeological remains associated with the dressing floors immediately on the western side of the moor, associated primarily with the earlier 18th century workings. There is the potential for the survival of archaeology associated with the underground working of the mine but this has not been assessed.* *7) There are also important archaeological remains dating to the prehistoric period, in the form of hut circles, enclosures and flint finds. Potential medieval remains may also be present, in the form of settlement and possible early extraction.*
Historical	*1) There is a considerable corpus of published material relating to lead mining and subsequent phases of extraction at Grassington, and there are several overarching publications on the site. The documentary material is quite comprehensive when compared with other mines in the district.* *2) There is some potential for further evidence to be gleaned from the documentary material in the light of information uncovered by the archaeological survey and future archaeological work.* *3) The site is important within the broader context of the development of mining across the Yorkshire Dales National Park.* *4) The connection of the mine with the Duke of Devonshire is of some significance, as they operated one of the largest and most significant lead mining complexes operating in the country at that time.*
Aesthetic	*1) In terms of historic setting, the site is foremost in a group of industrial sites in the area (the Wharfedale Mines), and as such has group value as one of these, as well as being a significant mining landscape within the Yorkshire Dales National Park.* *2) The industrial remains, set as they are within the wide expanse of the surrounding moorland, evoke a strong feeling of the passing of time and the transitory nature of human endeavour: a sense which echoes across some of the country's greatest and most popular archaeological sites.*

	3) Onsite, the smelt mill complex is intriguing to visitors. Visitors enjoy spending time walking around the edges of the complex and along the flue, and examining the detail of the workings as interpreted on boards. The wider moor affords more adventurous visitors an opportunity to look at more dispersed mine buildings and dressing floors, which also carry interpretation boards in places. Both areas provide a rare opportunity to explore the 'workings' of a mine and have considerable appeal to those with a sense of discovery. *4) The movement of water in and around the complex is another prominent feature of the landscape. Coalgrovebeck tumbles through the middle of the monument, dividing the mine complex in two, with most of the earlier archaeological features lying on the western side of the beck. This beck, as well as New Pasture Beck and Blea Beck, has been extensively tapped for water to feed reservoirs by means of an extensive network of leats and launders. These in turn serve a number of complex motive and dressing functions.* *5) Views both from and around the site are key to the setting of the monument.*
Community	*1) There continues to be great interest in the above-ground and underground workings of the mines by mine explorers and mining historians.* *2) The site remains an important focus for the local community and is accessed on a daily basis by local dog-walkers and residents.*
Ecology	*The value of metalliferous sites is recognised at local and national levels, with their distinctive flora which includes uncommon species. This is being covered in the Management Plan (Vyner 2013).*

8.0 SUMMARY OF THREATS

8.1 The principal threats to the archaeological resource are being dealt with in a separate Management Plan, produced by Blaise Vyner Consultancy (Blaise Vyner 2013), which also deals with mitigation measures to limit some of the damage in the future. The following section therefore represents a summary of known issues affecting the archaeology on Grassington Moor, and is divided into natural threats (which are hard to mitigate against) and man-made threats (which can be mitigated against through changes in behaviour of those using the moor).

Natural Threats

Climate Change

8.2 A summary of the impacts of climate change on the upland moorland environment was provided in the Yorkshire Dales National Park publication on climate change (YDNPA 2011), which indicates a trend in the Yorkshire Dales towards hotter, drier summers, and warmer wetter winters, with episodic extreme weather events (*ibid*, 10). The effects on the historic environment, relevant to Grassington Moor, are summarised as follows:

- warmer wetter conditions exacerbating damage to structures and features, with wind and rain damage to historic buildings after storm events, and erosion of archaeological deposits and sediments by water action;
- damage or destruction of features as the result of wildfires in hotter drier summers;
- loss of palaeoenvironmental potential through drying out of moorland peat deposits (shrinkage);

8.3 The effects were classed as being Low Risk up to the 2020s, rising to Medium Risk by the 2050s. A side-effect of the first point is the use of mining spoil to mend tracks, damaged by water erosion, which is classed as Medium Risk now (*ibid,* 18).

Water Damage

8.4 One of the principal areas of concern on the moor is from water damage being caused to the archaeology through unregulated water-courses and streams cutting tracks through sensitive archaeological areas. Grassington Moor received 533mm of rainfall for the year up to the 16th of December 2013, with the maximum rainfall of 130mm in one hour being recorded on the 7th of September 2013 (The Local Weather website). Increased rainfall and spring melts mean an escalated risk of flooding at certain times of the year. In addition, changes in climate may mean that this will becomes a growing problem in the future. The principal areas of concern above ground relate to attrition to the dressing floors and along the banks of historic water-courses.

8.5 Grassington Moor has a wide variety of ground conditions across the survey area, from blanket peat deposits in the north and east of the survey area, and wide expanses of barren lead mining related

deposits across the centre. Water damage can occur for a wide and varied number of reasons, but simplistically relates mainly to the ability of the ground to absorb the rainfall which falls upon the ground surface. During dry conditions, particularly in the summer, the ground can be baked-hard forming a crust, which halts the absorption of water, leading to surface run-off, particularly during short and intense downpours. Frozen conditions in winter can cause the same effect. In extremely wet and damp conditions, water runoff also occurs where the ground has become so saturated that no further water can be absorbed. The exposed nature of Grassington Moor, and the continual movement of water across the site, means that there is a general problem with erosion, although this appears to have been recently accentuated by flood damage.

8.6 The natural water-courses, comprising the Coalgrovebeck, its tributary New Pasture Beck, and Blea Beck, all indicate periods of extreme flow, where attrition along the edges of the water-course is affecting the archaeological deposits, and structures built within the water-course (most particularly dams and reservoirs) are being affected; this is equally compounded by the number of small tributary streams feeding these becks, which also have localised attrition points. The survey area therefore presents a wide number of issues concerning the control of water to stop it damaging the archaeology.

8.7 Water flow in the survey area has been historically modified in a number of different ways. Within areas of blanket peat, the presence of gripping, mainly undertaken in the 1950s, has altered the flow paths of water-courses, with, in some cases, disastrous consequences where heavy water-flow has caused bursts which have removed large sections of peat moorland (particularly visible to the north of Bycliffe Dam). Within the dressing floors, leats and water courses were used by lead miners for sorting and washing the ore and it is therefore inevitable that water is widely associated with mining remains. Many leats have become blocked, causing their flow-paths to be altered and exacerbating damage to fragile deposits, particularly on dressing floors. The reuse of leats and the excavation of modern drains have also served to drain waterlogged deposits and focus water onto particularly sensitive areas.

Animal Erosion

8.8 Rabbits are a particular problem across the site and are a threat to sub-surface archaeology, predominantly in association with the finer materials in the dressing floors, which they seem to favour. This is particularly evident on the dressing floors at Bycliffe **10049**, and West Turf Pits **10641**, and the 20th century spoil tips along Coalgrove Beck **10423**, though rabbit damage is evident to some degree across wide parts of the moor – for example, across the banks to the south of Bycliffe House **10068**.

Vegetation

8.9 The archaeological survey was conducted in the winter when vegetation coverage was low. It was therefore not possible to make a good assessment of damage being caused by vegetation, such as the

encroachment of bracken, whose root systems can cause extensive damage to any buried archaeological remains and low-lying extant features. There did not appear to be an issue with gorse or shrub on the moor, and overall vegetation coverage seems quite sparse; although again the time of year may have been a key factor in this. The lead content of the soil around the dressing floors may also be a factor restricting the growth of some species.

Peat

8.10 Peat deposits are present within the northern half of the survey area, broadly corresponding to higher ground north of the Bycliffe Vein and the northern boundary of the survey area. The peat has been previously gripped in the 20th century; there are extensive areas where the peat is starting to break down, perhaps as a result of frost action, forming haggs, large areas of bare peat, and areas where natural drainage gullies have been cut through to the mineral soil beneath. Few archaeological sites were identified within the upper moor areas, though on the lower slopes there are clearly areas where the breaking up of the peat is causing issues to the archaeology (for example, immediately south of Bycliffe Dam **10728**), particularly leats and dressing floors, though even more substantive earthworks (such as shaft mounds around **10743**) are being affected. The breaking down of the peat has also allowed the exposure of prehistoric archaeology in the form of a large probable late Bronze Age or Iron Age enclosure **10943**, and isolated flint finds, and this will need to be carefully monitored in the future. There are a number of initiatives currently to restore peatland, primarily through the Yorkshire Peat Partnership, and it would be beneficial if the processes of degradation could be identified and halted.

Standing Buildings

8.11 The majority of the structures on the moor have been abandoned for over 100 years, and are in a semi-ruinous state. As with a number of industrial sites, this is part of their intrinsic character – decaying structures within the wildness of the landscape and re-assertion of nature over industry – as such any recommendations for consolidation need to strike a careful balance between preservation and natural attrition. It is important to conserve the monument for future generations but the guiding principle should always be stabilisation rather than any form of extensive re-construction.

8.12 It is notable now that even the more recent buildings related to the activities of the Dales Chemical Works **10420** are now suffering from attrition from the freeze-thaw action of the frosts, and heavy wind and rain. There are numerous fragmentary buildings scattered across the moor, some of which, particularly the coes, are likely to be related to the earliest phases of mining.

Anthropogenic Threats

Tracks

8.13 There is an extensive network of trackways providing access onto the moor, most of which have their origins in the 19th century (see section 6.145), and are now used by gamekeepers for access to

manage the grouse, and freeholders who need to access onto the moor to tend sheep. There is little obvious evidence of use of these tracks by recreational off-roaders such as trail bikes, quad bikes or off road vehicles and the gates which give access to the moor are locked. However, this could potentially be a threat in the future if public awareness of the site increases.

8.14 Use of the existing tracks is clearly having some impact on the archaeology, however, as a number of these run across sensitive remains such as ore dressing floors or waste spreads, with no evidence of metalling to halt any damage to the archaeology; this is perhaps most evident on the section of track to the south of Old Moss, where vehicles are driving across paved areas, potentially the floors of buildings. Whilst vehicle damage is generally confined to the corridor of the track, the phenomenon of 'track migration' was noted in a number of places, where the original track has become boggy or less passable, and the track widens where vehicles are driving along the margins to avoid getting caught in the difficult areas. Both the English Heritage and Meerstone surveys identified that use of mine upcast for road resurfacing was causing a major issue for the archaeological resource. There are permitted development rights under Part 23 Class B of the General Permitted Development Order to remove material of any description from a mineral working deposit other than a stockpile. However, the rights to remove any lead mining spoil are subject to a number of statutory limitations and conditions (not all planning-related) that, in theory, provide an opportunity to control damaging activity. Discussions between the relevant parties and the Yorkshire Dales National Park Authority mean that material for tracks cannot now be gained from the moor but has to be obtained from appropriate sources outside. Nevertheless there remain issues with the installation of drainage channels and deflector drains along the line of the road, which are causing issues to the adjacent archaeology from water run-off. Damage is also evident, particularly along the western side of the survey area, from the use of tractors and quad bikes, probably used by the gamekeeper to manage the game birds.

Grouse Shooting

8.15 Grouse are reared on the moor, and grit trays are positioned across the moor, often on dressing floors. There is little impact from these though quad bikes are used to drive up and replenish them, which can have an impact on fragile dressing floor deposits. Ladder traps, for the management of crows and other corvids, are also frequently located on these sensitive areas.

Grazing

8.16 The moor has provided grazing for sheep, probably since the Iron Age, and this continues to the present day. The former lead mining areas on the enclosed southern fringes of the moor are now rough grazing. Current grazing regimes do not cause any measurable impact on the archaeology of the site, although sheltering sheep could potentially exacerbate erosion problems in some areas.

Visitors

8.17 Grassington Moor is open access land under the terms of the CROW Act and much of it is common

land. The area is well frequented by walkers. Visitors seen on the moor during the survey appear to primarily follow the tracks, and there does not appear to be a significant problem from footfall erosion, apart from along the line of the flue associated with the Cupola Smelt Mill. The chimney forms a focus for walkers, who subsequently follow the line of the flue down to the point where it forms a junction with the track. This has been addressed through the creation of an adjacent flagged path, though walkers still walk along the top of the flue. However, the unofficial path is not extensively used and there is no sign of any major associated damage or erosion. Other footpaths leading across the moor, mainly as desire trails, are generally in good condition.

Open Shafts

8.18 The survey identified 797 shafts on the Out Moor at Grassington. The bulk of these comprise shaft mounds; the stability of these, and their methods of blocking, are generally untested, and could not be assessed without excavation or coring. Some of these, particularly in large groupings of shafts, appear to have been completely infilled with waste from adjacent mine-workings. Others, particularly the more isolated examples, appear to have collapsed in or become choked at the shaft-head. In the absence of any indication to the contrary, it is prudent to assume that all these shafts are dangerous.

8.19 A total of 26 shafts were identified which had been deliberately capped as a safety precaution. The Meerstone survey (Roe 2007) draws particular attention to the dangers associated with capped shafts on the moor. The report highlights that a number of shafts have been capped with unstable materials, which could cause major problems in the future. Capping seems to have been mainly undertaken using a range of materials, including: (now rotten) railway sleepers, which in places have been covered with mounds of spoil (mainly undertaken in 1969 – Gill *pers. comm.*); large stones built as a cairn over the shaft; or plugs and mounds of spoil. The number of shafts capped in this fashion may indeed be higher; it is largely impossible to be certain of the position of shafts sealed by heaps of spoil over timber capping, and those that were identified were mainly located due to associated features, such as horse whims, giving their position. Further shafts appear to have been obscured by the movement of spoil during reprocessing, or by contemporary mining/dressing activity. The survey has established that the condition of the shafts cannot be assessed through visual inspection alone. In many cases, the precise location of the shaft, and the condition of its capping, can only be established with certainty through invasive excavation works.

8.20 Open shafts perhaps represent the most serious threat to public safety, and 6 were identified, two of which were fenced off (though inadequately). Currently there are few signs indicating the presence of open shafts. The fencing of shafts would be visually intrusive due to the large number of shafts, and risks detracting from the appreciation of the site. Consideration needs to be given to safe ways to deal with this issue without causing substantial visual impact.

9.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

9.1 The digitisation of archaeological features off LiDAR-derived DSMs and DTMs has allowed the rapid and accurate recording of large sections of landscape at Grassington. This survey data, when cross-referenced with previous surveys and historical information, has also allowed some limited interpretation and time-depth to be applied to the data, which has been allowed for an improvement in terms of combined multiple datasets (for example Gill 1993, but also the RCHME surveys of 1988) and an enhancement of the HER data for the moor.

9.2 Roe (2007, 10) correctly identifies that the size and complexity of Grassington Moor has led to a preference for the use of remote methods in preference to ground based survey (primarily the use of aerial photographs plotted onto Ordnance Survey mapping, cf. Gill 1993). This to a certain extent has also been the approach undertaken by the current survey, albeit using more sophisticated and accurate techniques.

9.3 Survey using LiDAR-based DTMs and DSMs is demonstrably quicker and more accurate than other remote survey methods, and it has enabled the recording of many earthworks, which, when checked in the field, have not required any additional detail to be added. Primary amongst these are individual shaft mounds, which can be accurately identified and plotted, and through a closer examination of the point-cloud data, sizes and depths of the shafts can be given. Leats could also be rapidly traced across long distances, and there was generally little difficulty in distinguishing leats from later grips and drainage channels, though this remains a concern.

9.4 The technique does clearly have its limitations, however. There are few buildings or structures on Grassington Moor, and whilst it is reasonably easy to identify these from the signatures they give in the data, it is very hard to make any real sense of their form or function without direct survey. Most buildings were picked up, but some of the smaller coes or bouse teams were not seen until the landscape survey, mainly due to the fact that they lie low to the ground and are constructed of the same material as that which surrounds them (for example teams constructed into banks of deads). The prehistoric enclosure was also not identified, as it looked identical to the exposed natural stone within the hagged peat. Meerstones and any feature less than 1m in size were invisible to the survey. Shafts covered with mounds, without spoil collars, were generally invisible to remote survey, as the mounds give the same signatures as small heaps of dressing waste or dead heaps (Roe 2007, 15-16, highlights this issue clearly). These were picked up during the survey work instead.

9.5 Perhaps the most complex features within the landscape were the dressing floors; these include a plethora of small structural components, knock-stones, and heaps of crushed and sorted materials, as well as small catch pits and ponds. The desk-based LiDAR survey was primarily concerned with the grouping of features, and the elements forming the dressing floors were therefore provided a group number only. The survey succeeded in picking out individual features within the dressing floors, and these were added to the survey database. Nevertheless dressing floors are complex, and as Roe

(2007, 10) points out *'the zoning of ore dressing waste can provide considerable useful information about the type of activity and types of equipment used on a particular site, which could in turn could be used to suggest when that activity took place'*.

9.6 There were also problems clearly differentiating between leats, partially obscured by vegetation, and other linears such as sheep-tracks, and a number of 'false positives' were removed following ground truthing. More ephemeral spade-dug leats, showing as an earthwork less than 0.5m in depth, are unlikely to show up, and the position of launders can only be inferred from the courses of leats identified, as many did not have any supporting bases.

Recommendations

Extension of LiDAR survey

9.7 It would desirable to extend the techniques used as part of this project to other sections of the lead-mining landscapes at Grassington, most notably the New Pasture and Yarnbury areas; the flown area currently equates to some 60km², covering both areas of mining. The New Pasture became CROW land in 2000, but as yet no detailed survey has been carried in this area, beyond that included in Gill (1993), and the improved access to the public may have had an impact which cannot at present be measured. Yarnbury and the New Pasture include some of the earliest recorded mine workings, perhaps dating back to the early years of the 17th century (Roe 2007, 12). The location of shafts in the New Pasture, particularly around Stool and Green Bycliffe, is considered a priority (Gill *pers. comm.*)

Detailed survey - pilot study

9.8 The current project has clearly identified the need for a higher level of survey (Level 3 – English Heritage 2007) primarily on dressing floors (for example **10118**), where the level of complexity has been demonstrated, particularly towards the western side of the moor. This is particularly true in this area where the dressing heaps have been relatively unaffected by later reprocessing works, and are arguably some of the earliest on the moor; the workings at the junction between Castaway and Ripley Veins are historically important as this is the point at which mining on the Out Moor started (Roe 2007, 21). Roe (2007, 31-2) has devised a methodology for recording the five different types of ore dressing waste linked to the different processes being undertaken on a dressing floor, and has linked this to areas of potential for buried archaeology. This approach should be applied in any future surveys, particularly on the western side of the moor. Structural remains, comprising knock-stones, buddles, coes and bins within these dressing areas are mostly of drystone construction, are very fragile and could be susceptible to future damage.

9.9 A more in-depth assessment and survey of the impact of the 20th century reprocessing would also be useful. There have been previous debates regarding the use of different areas of the moor for the quarrying of material for road make-up, under archaeological supervision, following in-depth survey and/or excavation. This was discussed by English Heritage in 2009, and it was felt that disturbance to

archaeological deposits should be avoided, with importation of material being preferable (Ainsworth and Burn 2009, 75).

9.10 An in-depth and detailed (Level 3) survey of one section of the current core area (suggested at 350m by 150m between Jones' Shaft and Chatsworth Shaft, taking in the junction between Ripley and Castaway Veins, and following New Glory Vein) would be beneficial to the understanding of the survival of archaeology on the moor, looking at a range of mining evidence from 18th century to 19th century mine workings and associated dressing, as well as the impact of reprocessing, which is part of a long history of this activity from early times, and which increased in scale and extent in the 20th century.

Emergency Recording

9.11 Within the wider moor area, whilst many of the structures relating to the smelt mill and flue system, and also the Brake House and High Winding House wheel-pits, have recently been consolidated, other larger structures such as the pump-lobby at Coalgrovehead, early mine buildings such as Bycliffe House and the buildings related to the Dales Chemical Company are all suffering from weather erosion and are in danger of continued degradation and collapse. The course of leats, whilst better understood, would still benefit from much more detailed and intensive survey, as many are being damaged by water erosion.

9.12 The site of the earliest 17th century smelt mill could also be affected by future flooding events. Price's Shaft is also in danger of being completely removed by future flooding events in the Deep Cut. Evidence of a possible medieval settlement **10758**, now badly damaged by road-building, should be examined by means of additional survey and excavation.

10.0 GRASSINGTON MOOR LIDAR SURVEY SITE INVENTORY

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10000		18th c	1893	Post Medieval	LEAT	402007	468801	Moderate	High
10001	MYD41762			Prehistoric	CAIRN	401923	468803	N/A	N/A
10002				Post Medieval	SHEPHERDS HUT	401904	468830	Low	Low
10003		18th c	1893	Post Medieval	LEAT	402038	469002	Moderate	Low
10004		early c18	1815, 1833-1853	Post Medieval	DAM	402003	468261	High	Low
10005				Post Medieval	LEAT	402267	468561	Moderate	Low
10006		c18	1893	Post Medieval	LEAT	402164	468338	Moderate	Low
10007		c18	1893	Post Medieval	LEAT	402146	468324	Moderate	Low
10008		c18	1893	Post Medieval	LEAT	402075	468329	Moderate	Low
10009		c18	1893	Post Medieval	LEAT	402142	468317	Moderate	Low
10010				Post Medieval	LEAT	402195	468346	Moderate	Low
10011		c18		Post Medieval	LEAT	402105	468308	Moderate	Low
10012		c18	1893	Post Medieval	LEAT	402055	468316	Moderate	Low
10013		c18	1893	Post Medieval	LEAT	402191	468329	Moderate	Low
10014			1893	Post Medieval	SHAFT MOUND	402270	468424	Moderate	Low
10015			1893	Post Medieval	SHAFT MOUND	402161	468419	Moderate	Low
10016			1893	Post Medieval	SHAFT MOUND	402187	468418	Moderate	Low
10017			1893	Post Medieval	SHAFT MOUND	402160	468447	Moderate	Low
10018			1893	Post Medieval	SHAFT MOUND	402133	468434	Moderate	Low
10019			1893	Post Medieval	SHAFT MOUND	402125	468462	Moderate	Low
10020			1893	Post Medieval	BUILDING COMPONENT	402100	468491	Low	Low
10021			1893	Post Medieval	SHAFT MOUND	402017	468516	Moderate	Low
10022			1893	Post Medieval	SHAFT MOUND	402255	468490	Moderate	Low
10023				Uncertain	FEATURE	402038	468692	Low	Low
10024				20th Century	SHOOTING STAND	402195	468690	Low	Low
10025	MYD15072	1852	1893	Post Medieval	FARMSTEAD	402339	468560	Moderate	High
10026	MYD15072	1852	1893	Post Medieval	SHEEP FOLD	402303	468592	Low	Low
10027			1893	Post Medieval	HUNTING LODGE	402353	468362	Low	Medium
10028				20th Century	SHOOTING STAND	402363	468406	Low	Low
10029				20th Century	SHOOTING STAND	402381	468454	Low	Low
10030				20th Century	SHOOTING STAND	402397	468500	Low	Low
10031				20th Century	SHOOTING STAND	402415	468553	Low	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10032				20th Century	SHOOTING STAND	402433	468601	Low	Low
10033				20th Century	SHOOTING STAND	402448	468644	Low	Low
10034				20th Century	SHOOTING STAND	402463	468689	Low	Low
10035				20th Century	SHOOTING STAND	402481	468739	Low	Low
10036				20th Century	SHOOTING STAND	402498	468783	Low	Low
10037	MYD15072	C18	1893	Post Medieval	WATER CHANNEL	402335	468580	Moderate	Low
10038				20th Century	SHOOTING STAND	402206	468710	Low	Low
10039				20th Century	SHOOTING STAND	402220	468673	Low	Low
10040	MYD43029	1841	1877	Post Medieval	LEAD MINE	402270	468150	Moderate	Medium
10041		C18		Post Medieval	RESERVOIR	402484	468182	Moderate	Low
10042		C18		Post Medieval	LEAT	402451	468158	Moderate	Low
10043			1893	Post Medieval	LAZY BEDS	402222	468617	Low	Low
10044			1893	Uncertain	NATURAL FEATURE	402357	468252	N/A	N/A
10045		C18	1893	Post Medieval	LEAT	402288	468311	Moderate	Low
10046			1893	Post Medieval	TRACKWAY	402452	468146	Moderate	Low
10047	MYD43028	1877	1899	Victorian	ADIT	402357	468155	Low	Low
10048			1893	Post Medieval	SHAFT MOUND	402417	468118	Moderate	Low
10049		C18		Post Medieval	DRESSING FLOOR	402315	468032	High	Medium
10050				Post Medieval	DRESSING FLOOR	402366	468043	High	Medium
10051				Post Medieval	LEAT	402299	468133	Moderate	Low
10052				Post Medieval	SHAFT MOUND	402340	468105	Moderate	Low
10053			1893	Post Medieval	SHAFT MOUND	402304	468125	Moderate	Low
10054			1893	Post Medieval	SHAFT MOUND	402338	468067	Moderate	Low
10055			1893	Post Medieval	DRESSING FLOOR	402299	468071	High	Medium
10056			1893	Post Medieval	PROSPECTING PIT	402311	468108	Moderate	Low
10057			1893	Post Medieval	LEAD WORKINGS	402342	468063	Moderate	Medium
10058			1893	Post Medieval	LEAD WORKINGS	402392	468106	Moderate	Medium
10059			1893	Post Medieval	LEAD WORKINGS	402402	468024	Moderate	Medium
10060			1893	Post Medieval	LEAD WORKINGS	402417	468064	Moderate	Medium
10061			1893	Post Medieval	SPOIL HEAP	402437	467946	Moderate	Low
10062			1893	Post Medieval	SPOIL HEAP	402392	468031	Moderate	Low
10063				Post Medieval	SHAFT MOUND	402225	467988	Moderate	Low
10064			1893	Post Medieval	WINDING CIRCLE	402237	467987	High	High
10065			1893	Post Medieval	PROSPECTING PIT	402255	467979	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10066			1893	Post Medieval	SHAFT MOUND	402277	467981	Moderate	Low
10067			1893	Post Medieval	PROSPECTING PIT	402269	468001	Moderate	Low
10068	MYD42461	1734	1900	Post Medieval	HOUSE	402254	467937	High	High
10069			1893	Post Medieval	SHAFT MOUND	402334	467936	Moderate	Low
10070			1893	Post Medieval	SHAFT MOUND	402362	467897	Moderate	Low
10071			1893	Post Medieval	LEAD WORKINGS	402338	467893	Moderate	Medium
10072			1893	Post Medieval	PROSPECTING PIT	402363	467913	Moderate	Low
10073			1893	Post Medieval	PROSPECTING PIT	402307	467950	Moderate	Low
10074			1893	Post Medieval	LEAD WORKINGS	402417	467922	Moderate	Medium
10075			1893	Post Medieval	LEAD WORKINGS	402261	467859	Moderate	Medium
10076	MYD43159	1753	1878	Post Medieval	SHAFT MOUND	402339	467813	Moderate	Low
10077			1893	Post Medieval	SHAFT MOUND	402376	467804	Moderate	Low
10078			1893	Post Medieval	SHAFT MOUND	402549	467812	Moderate	Low
10079	MYD43339		1917	20th Century	SHAFT MOUND	402464	467807	Moderate	Low
10080			1893	Uncertain	MINE SHAFTS / NATURAL FEATURE	402502	467810	Low	Low
10081			1893	Post Medieval	SHAFT MOUND	402474	467732	Moderate	Low
10082			1893	Post Medieval	PROSPECTING PIT	402431	467776	Moderate	Low
10083			1893	Post Medieval	PROSPECTING PIT	402402	467716	Moderate	Low
10084			1893	Post Medieval	PROSPECTING PIT	402393	467747	Moderate	Low
10085			1893	Post Medieval	SHAFT MOUND	402399	467734	Moderate	Low
10086			1893	Post Medieval	SHAFT MOUND	402416	467763	Moderate	Low
10087	MYD43158		1893	Post Medieval	SHAFT MOUND	402211	467771	Moderate	Low
10089			1893	Post Medieval	LEAT	402304	467653	Moderate	Low
10090			1893	Post Medieval	LEAT	402329	467781	Moderate	Low
10091	MYD43320	1772	1823	Georgian	MINE SHAFTS	402493	467646	Moderate	Low
10092	MYD43320	1772	1823	Georgian	MINE SHAFTS	402419	467673	Moderate	Low
10093	MYD43320	1772	1823	Georgian	MINE SHAFTS	402324	467712	Moderate	Low
10094		1736	1830	Georgian	MINE BUILDING	402340	467527	High	High
10095	MYD43524	1736	1830	Georgian	SHAFT MOUND	402306	467538	Moderate	Low
10096		1736	1830	Georgian	SHAFT MOUND	402345	467563	Moderate	Low
10097		1736	1830	Georgian	SHAFT MOUND	402247	467523	Moderate	Low
10098		1736	1830	Georgian	DRESSING FLOOR	402275	467509	High	Medium
10099		1736	1830	Georgian	LEAD WORKINGS	402332	467479	High	Medium
10100		1736	1830	Georgian	LEAD WORKINGS	402312	467439	High	Medium

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10101		1776	1830	Georgian	SHAFT MOUND	402591	467466	Moderate	Low
10102		1776	1830	Georgian	SHAFT MOUND	402506	467513	Moderate	Low
10103		1736	1830	Georgian	RESERVOIR	402387	467564	Moderate	Low
10104			1893	Post Medieval	SHAFT MOUND	402219	467534	Moderate	Low
10105			1893	Post Medieval	SHAFT MOUND	402196	467524	Moderate	Low
10106			1893	Post Medieval	SHAFT MOUND	402200	467498	Moderate	Low
10107		1736	1830	Georgian	LEAD WORKINGS	402314	467505	High	Medium
10108		1736	1830	Georgian	LEAD WORKINGS	402297	467508	High	Medium
10109				Uncertain	NATURAL FEATURE	402436	467477	N/A	N/A
10110			1893	Post Medieval	TRACKWAY	402431	467483	Moderate	Low
10111			1893	Post Medieval	LEAT	402494	467476	Moderate	Low
10112			1893	Post Medieval	TRACKWAY	402489	467482	Moderate	Low
10113			1893	Post Medieval	TRACKWAY	402489	467495	Moderate	Low
10114			1893	Post Medieval	LEAD WORKINGS	402510	467452	Moderate	Medium
10115			1893	Post Medieval	LEAD WORKINGS	402550	467444	Moderate	Medium
10116	MYD15080	1736	1830	Georgian	COE	402255	467551	High	High
10117		1735	1852	Post Medieval	MINE BUILDING	402330	467326	High	High
10118			1893	Post Medieval	DRESSING FLOOR	402180	467420	High	Medium
10119			1893	Post Medieval	SHAFT MOUND	402190	467482	Moderate	Low
10120			1893	Post Medieval	SHAFT MOUND	402174	467452	Moderate	Low
10121			1893	Post Medieval	SHAFT MOUND	402177	467438	Moderate	Low
10122			1893	Post Medieval	SHAFT MOUND	402177	467458	Moderate	Low
10123	MYD43888		1893	Post Medieval	SHAFT MOUND	402358	467376	Moderate	Low
10124	MYD43888		1893	Post Medieval	SHAFT MOUND	402391	467393	Moderate	Low
10125	MYD43888		1893	Post Medieval	SHAFT MOUND	402344	467368	Moderate	Low
10126	MYD43888		1893	Post Medieval	SHAFT MOUND	402430	467387	Moderate	Low
10127				Uncertain	NATURAL FEATURE	402339	467433	N/A	N/A
10128	MYD43888		1893	Post Medieval	SHAFT MOUND	402479	467371	Moderate	Low
10129			1893	Post Medieval	SHAFT MOUND	402532	467337	Moderate	Low
10130			1893	Post Medieval	LEAD WORKINGS	402483	467337	Moderate	Medium
10131				Uncertain	NATURAL FEATURE	402360	467343	N/A	N/A
10132				Uncertain	NATURAL FEATURE	402410	467334	N/A	N/A
10133			1893	Post Medieval	LEAT	402449	467303	Moderate	Low
10134			1893	Post Medieval	SHAFT MOUND	402399	467272	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10135	MYD42490	1735	1852	Georgian	LEAD MINE	402307	467336	High	Medium
10136		1735	1852	Georgian	COE	402257	467358	High	High
10137		1735	1852	Georgian	SPOIL HEAP	402307	467322	Moderate	Low
10138		1735	1852	Georgian	COE	402217	467410	High	High
10139			1893	Post Medieval	LEAD WORKINGS	402321	467368	Moderate	Medium
10140		1735	1852	Georgian	DRESSING FLOOR	402317	467309	High	Medium
10141		1735	1852	Georgian	LEAD WORKINGS	402442	467215	High	Medium
10142			1893	Post Medieval	LEAT	402406	467257	Moderate	Low
10143		1735	1852	Georgian	LEAD WORKINGS	402370	467269	High	Medium
10144		1735	1852	Georgian	SHAFT MOUND	402240	467403	Moderate	Low
10145		1735	1852	Georgian	MINE SHAFT	402239	467390	Moderate	Low
10146		1735	1852	Georgian	SHAFT MOUND	402419	467244	Moderate	Low
10147		1735	1852	Georgian	SHAFT MOUND	402464	467219	Moderate	Low
10148		1735	1822	Georgian	SHAFT MOUND	402448	467257	Moderate	Low
10149			1893	Post Medieval	LEAD WORKINGS	402406	467172	Moderate	Medium
10150			1893	Post Medieval	LEAT	402414	467190	Moderate	Low
10151			1893	Post Medieval	SHAFT MOUND	402451	467169	Moderate	Low
10152			1893	Post Medieval	SHAFT MOUND	402459	467157	Moderate	Low
10153			1893	Post Medieval	SHAFT MOUND	402486	467164	Moderate	Low
10154			1893	Post Medieval	PROSPECTING PIT	402496	467190	Moderate	Low
10155			1893	Post Medieval	LEAD WORKINGS	402332	467178	Moderate	Medium
10156			1893	Post Medieval	PROSPECTING PIT	402258	467181	Moderate	Low
10157			1893	Post Medieval	SHAFT MOUND	402273	467190	Moderate	Low
10158			1893	Post Medieval	PROSPECTING PIT	402272	467149	Moderate	Low
10159				Uncertain	NATURAL FEATURE	402376	467168	N/A	N/A
10160				Uncertain	NATURAL FEATURE	402376	467201	N/A	N/A
10161			1893	Post Medieval	SHAFT MOUND	402184	467205	Moderate	Low
10162			1893	Post Medieval	SHAFT MOUND	402141	467258	Moderate	Low
10163				Uncertain	NATURAL FEATURE	402331	467238	N/A	N/A
10164				Uncertain	NATURAL FEATURE	402220	467280	N/A	N/A
10165			1893	Post Medieval	SHAFT MOUND	402491	467061	Moderate	Low
10166			1893	Post Medieval	PROSPECTING PIT	402491	467144	Moderate	Low
10167			1893	Post Medieval	SHAFT MOUND	402515	467111	Moderate	Low
10168			1893	Post Medieval	SHAFT MOUND	402386	467129	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10169			1893	Post Medieval	SHAFT MOUND	402406	467142	Moderate	Low
10170			1893	Post Medieval	SHAFT MOUND	402421	467097	Moderate	Low
10171			1893	Post Medieval	LEAT	402380	467092	Moderate	Low
10172			1893	Post Medieval	SHAFT MOUND	402367	467105	Moderate	Low
10173			1893	Post Medieval	SHAFT MOUND	402332	467145	Moderate	Low
10174			1893	Post Medieval	PROSPECTING PIT	402230	467142	Moderate	Low
10175			1893	Post Medieval	PROSPECTING PIT	402245	467114	Moderate	Low
10176			1893	Post Medieval	SHAFT MOUND	402228	467123	Moderate	Low
10177		1747	1823	Georgian	SHAFT MOUND	402269	467117	Moderate	Low
10178		1747	1823	Georgian	SHAFT MOUND	402268	467105	Moderate	Low
10179			1893	Post Medieval	SHAFT MOUND	402260	467090	Moderate	Low
10180			1893	Post Medieval	PROSPECTING PIT	402279	467106	Moderate	Low
10181			1893	Post Medieval	SHAFT MOUND	402164	467129	Moderate	Low
10182			1893	Post Medieval	SHAFT MOUND	402198	467150	Moderate	Low
10183			1893	Post Medieval	SHAFT MOUND	402179	467114	Moderate	Low
10184			1893	Post Medieval	SHAFT MOUND	402280	467050	Moderate	Low
10185			1893	Post Medieval	PROSPECTING PIT	402255	467059	Moderate	Low
10186		1747	1823	Georgian	SHAFT MOUNDS	402359	467083	Moderate	Low
10187		1747	1823	Georgian	SHAFT MOUNDS	402321	467091	Moderate	Low
10188		1747	1823	Georgian	PROSPECTING PIT	402332	467079	Moderate	Low
10189		1747	1823	Georgian	PROSPECTING PIT	402316	467075	Moderate	Low
10190		1747	1823	Georgian	SHAFT MOUNDS	402409	467042	Moderate	Low
10191			1893	Post Medieval	SHAFT MOUND	402281	467027	Moderate	Low
10192		1774	1804	Georgian	SHAFT MOUND	402126	467035	Moderate	Low
10193		1765	1813	Georgian	SHAFT MOUND	402157	467056	Moderate	Low
10194		1774	1804	Georgian	SHAFT MOUND	402129	467057	Moderate	Low
10195		1765	1813	Georgian	SHAFT MOUND	402168	467041	Moderate	Low
10196			1893	Post Medieval	SHAFT MOUND	402150	467032	Moderate	Low
10197			1893	Post Medieval	PROSPECTING PIT	402166	467020	Moderate	Low
10198			1893	Post Medieval	PROSPECTING PIT	402151	467005	Moderate	Low
10199			1893	Post Medieval	PROSPECTING PIT	402214	467013	Moderate	Low
10200		1765	1792	Georgian	SHAFT MOUNDS	402353	466974	Moderate	Low
10201		1765	1792	Georgian	SHAFT MOUNDS	402236	467023	Moderate	Low
10202			1893	Post Medieval	LEAT	402324	467048	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10203			1893	Post Medieval	PROSPECTING PIT	402305	466934	Moderate	Low
10204			1893	Post Medieval	SPOIL HEAP	402378	466935	Moderate	Low
10205		1740	1830	Georgian	DRESSING FLOOR	402283	466959	High	Medium
10206			1893	Post Medieval	SHAFT MOUND	402306	466967	Moderate	Low
10207		1750	1830	Georgian	SHAFT MOUND	402394	466884	Moderate	Low
10208		1750	1830	Georgian	SHAFT MOUND	402367	466890	Moderate	Low
10209		1750	1830	Georgian	SHAFT MOUND	402346	466912	Moderate	Low
10210		1750	1830	Georgian	SHAFT MOUND	402328	466953	Moderate	Low
10211			1893	Post Medieval	SHAFT MOUND	402320	466973	Moderate	Low
10212			1893	Post Medieval	SHAFT MOUND	402277	466984	Moderate	Low
10213		1750	1830	Georgian	SHAFT MOUND	402264	466977	Moderate	Low
10214		1747	1823	Georgian	SHAFT MOUND	402490	466995	Moderate	Low
10215			1893	Post Medieval	PROSPECTING PIT	402165	466968	Moderate	Low
10216			1893	Post Medieval	PROSPECTING PIT	402182	466962	Moderate	Low
10217			1893	Georgian	PROSPECTING PIT	402213	466974	Moderate	Low
10218		1750	1830	Georgian	SHAFT MOUNDS	402296	466922	Moderate	Low
10219			1893	Post Medieval	PROSPECTING PIT	402217	466946	Moderate	Low
10220	MYD52933			Uncertain	NATURAL FEATURE	402197	467338	N/A	N/A
10221			1893	Post Medieval	SHAFT MOUND	402165	467311	Moderate	Low
10222	MYD52933	1735	1852	Georgian	DRESSING FLOOR	402203	467370	High	Medium
10223	MYD52933	1735	1852	Georgian	DRESSING FLOOR	402183	467400	High	Medium
10224			1893	Post Medieval	SHAFT MOUND	402387	466924	Moderate	Low
10225	MYD43472	1755	1830	Post Medieval	SHAFT MOUND	402372	466905	Moderate	Low
10226			1893	Post Medieval	SHAFT MOUND	402241	466925	Moderate	Low
10227			1893	Post Medieval	SHAFT MOUND	402337	467124	Moderate	Low
10228			1893	Post Medieval	SHAFT MOUND	402369	467111	Moderate	Low
10229	MYD42709	1821		Victorian	LEAT	402322	466804	Moderate	Low
10230	MYD15002	1750	1821	Georgian	SHAFT MOUNDS	402219	466861	Moderate	Low
10231		1750	1830	Georgian	SHAFT MOUND	402212	466852	Moderate	Low
10232			1893	Post Medieval	SHAFT MOUND	402231	466883	Moderate	Low
10233			1893	Post Medieval	SHAFT MOUND	402214	466897	Moderate	Low
10234			1893	Post Medieval	SHAFT MOUND	402211	466889	Moderate	Low
10235			1893	Post Medieval	MEERSTONE	402183	466881	High	Medium
10236			1893	Post Medieval	BUILDING PLATFORM	402173	466886	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10237			1893	Post Medieval	SHAFT MOUND	402236	466916	Moderate	Low
10238			1821	Post Medieval	PROSPECTING PIT	402245	466909	Moderate	Low
10239			1893	Post Medieval	SHAFT MOUND	402249	466929	Moderate	Low
10240			1821	Georgian	PROSPECTING PIT	402246	466849	Moderate	Low
10241			1893	Post Medieval	SHAFT MOUND	402236	466899	Moderate	Low
10242			1893	Post Medieval	SHAFT MOUND	402223	466922	Moderate	Low
10243		1750	1830	Georgian	DRESSING FLOOR	402207	466842	High	Medium
10244		1750	1830	Georgian	DRESSING FLOOR	402265	466914	High	Medium
10245			1830	Post Medieval	LEAT	402252	466907	Moderate	Low
10246			1893	Post Medieval	SHAFT MOUND	402251	466882	Moderate	Low
10247			1891	Post Medieval	COE	402342	466873	High	High
10248			1821	Post Medieval	SHAFT MOUND	402290	466846	Moderate	Low
10249		1750	1830	Georgian	SHAFT MOUND	402315	466842	Moderate	Low
10250		1750	1830	Georgian	SHAFT MOUND	402335	466830	Moderate	Low
10251			1821	Georgian	SHAFT MOUND	402299	466829	Moderate	Low
10252			1821	Post Medieval	LEAT	402311	466801	Moderate	Low
10253		1821		Victorian	LEAT	402352	466746	Moderate	Low
10254			1820	Georgian	SHAFT MOUND	402424	466951	Moderate	Low
10255			1891	Post Medieval	LEAT	402503	466857	Moderate	Low
10256		1823		Victorian	TRACKWAY	402616	466997	Moderate	Low
10257			1891	Post Medieval	PROSPECTING PIT	402420	466873	Moderate	Low
10258	MYD44191	1823	1826	Victorian	HORSE WHIM/SHAFT	402526	466935	High	High
10259				Post Medieval	DRESSING FLOOR	402503	466898	High	Medium
10260		1747	1823	Georgian	SHAFT MOUND	402524	466975	Moderate	Low
10261			1800	Georgian	HOLLOW WAY	402580	466995	Moderate	High
10262		1800	1891	Victorian	LEAT	402383	466794	Moderate	Low
10263			1891	Post Medieval	LEAT	402365	466756	Moderate	Low
10264			1891	Post Medieval	COAL MINING SITE	402395	466793	High	Low
10265		1739	1794	Georgian	SHAFT MOUND	402419	466766	Moderate	Low
10266			1821	Georgian	HOLLOW WAY	402381	466822	Moderate	High
10267			1800?	Georgian	HOLLOW WAY	402464	466882	Moderate	High
10268			1821	Georgian	HOLLOW WAY	402316	466770	Moderate	High
10269			1891	Post Medieval	LEAT	402292	466754	Moderate	Low
10270		1739	1794	Georgian	SHAFT MOUND	402492	466723	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10271		1739	1794	Georgian	SHAFT MOUND	402499	466752	Moderate	Low
10272		1739	1794	Georgian	SHAFT MOUND	402499	466776	Moderate	Low
10273	MYD4371			Later prehistoric	HUT CIRCLE SETTLEMENT	402526	466727	High	Low
10274		1739	1794	Georgian	SHAFT MOUND	402397	466737	Moderate	Low
10275		1739	1794	Georgian	SHAFT MOUND	402381	466721	Moderate	Low
10276		1739	1794	Georgian	SHAFT MOUND	402372	466694	Moderate	Low
10277		1739	1794	Georgian	SHAFT MOUND	402359	466679	Moderate	Low
10278		1739	1794	Post Medieval	LEAT	402441	466788	Moderate	Low
10279			1891	Post Medieval	DRESSING WASTE	402427	466797	High	Medium
10280			1891	Post Medieval	COAL MINING SITE	402416	466660	High	Low
10281			1891	Post Medieval	TRACKWAY	402357	466643	Moderate	Low
10282			1891	Post Medieval	TRACKWAY	402388	466659	Moderate	Low
10283			1891	Post Medieval	COAL MINING SITE	402408	466489	High	Low
10284			1891	Post Medieval	COAL MINING SITE	402410	466508	High	Low
10285			1891	Post Medieval	COAL MINING SITE	402404	466517	High	Low
10286			1891	Post Medieval	COAL MINING SITE	402391	466539	High	Low
10287			1891	Post Medieval	COAL MINING SITE	402430	466537	High	Low
10288			1891	Post Medieval	COAL MINING SITE	402404	466570	High	Low
10289			1891	Post Medieval	COAL MINING SITE	402399	466586	High	Low
10290			1891	Post Medieval	COAL MINING SITE	402417	466604	High	Low
10291			1891	Post Medieval	COAL MINING SITE	402407	466640	High	Low
10292		1821	1891	Victorian	LEAT	402430	466588	Moderate	Low
10293			1891	Post Medieval	LEAT	402470	466522	Moderate	Low
10294			1891	Post Medieval	COAL MINING SITE	402457	466390	High	High
10295			1891	Post Medieval	COAL MINING SITE	402450	466416	High	Low
10296			1891	Post Medieval	COAL MINING SITE	402446	466443	High	Low
10297		1891		20th Century	TRACKWAY	402460	466504	Low	Low
10298			1891	Post Medieval	COAL MINING SITE	402433	466516	High	Low
10299			1891	Post Medieval	COAL MINING SITE	402416	466462	High	Low
10300			1891	Post Medieval	COAL MINING SITE	402422	466470	High	Low
10301			1891	Post Medieval	LEAT	402500	466545	Moderate	Low
10302			1891	Post Medieval	LEAT	402519	466563	Moderate	Low
10303			1891	Post Medieval	LEAT	402551	466487	Moderate	Low
10304		1821	1891	Post Medieval	LEAT	402532	466496	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10305			1891	Post Medieval	LEAT	402492	466365	Moderate	Low
10306			1891	Post Medieval	LEAT	402475	466356	Moderate	Low
10307		1792	1882	Georgian	BRIDGE	402447	466317	Moderate	Low
10308		1792	1882	Georgian	SLAG HEAP	402463	466296	Moderate	Medium
10309	MYD42630	1792	1882	Post Medieval	SMELT MILL	402492	466300	High	Medium
10310		1792?		Georgian	PLATFORM	402470	466331	Moderate	Medium
10311		1792?		Georgian	BLACKSMITHS WORKSHOP	402491	466343	Moderate	Medium
10312	MYD42990	1637	1692	Stuart	SMELT MILL	402483	466382	High	Medium
10313			1891	Post Medieval	LEAT	402509	466526	Moderate	Low
10314			1891	Post Medieval	TRACKWAY	402466	466544	Moderate	Low
10315	MYD42709	1821	1891	Victorian	LEAT	402394	466673	Moderate	Low
10316			1891	Post Medieval	TRACKWAY	402522	466867	Moderate	Low
10317			1891	Post Medieval	DRESSING FLOOR	402317	466875	High	Medium
10318			1891	Post Medieval	SHAFT MOUND	402319	466852	Moderate	Low
10319			1891	Post Medieval	CAIRN	402359	466823	Low	Low
10320	MYD4371			Later prehistoric	HUT CIRCLE SETTLEMENT	402503	466715	High	Low
10321		1891		Victorian	TRACKWAY	402329	466873	Moderate	Low
10322			1891	Victorian	TRACKWAY	402642	466908	Moderate	Low
10323			1891	Post Medieval	LEAT	402440	466579	Moderate	Low
10324			1891	Post Medieval	LEAT	402523	466364	Moderate	Low
10325			1891	Post Medieval	LEAT	402429	466605	Moderate	Low
10326			1891	Post Medieval	COAL MINING SITE	402424	466580	High	Low
10327	MYD4371			Later prehistoric	CLEARANCE CAIRN	402543	466736	High	Medium
10328			1893	Post Medieval	PROSPECTING PIT	402309	467051	Moderate	Low
10329	MYD43369	1765	1792	Georgian	SHAFT MOUND	402403	466904	Moderate	Low
10330		1821		Victorian	RETAINING WALL	402165	466902	Moderate	Low
10331			1891	Post Medieval	QUARRY	402579	466081	low	Low
10332			1891	Post Medieval	COAL MINING SITE	402588	466127	High	Low
10333			1891	Post Medieval	SPOIL HEAP	402506	466250	Moderate	Low
10334			1891	Post Medieval	COAL MINING SITE	402544	466214	High	Low
10335			1891	Post Medieval	COAL MINING SITE	402546	466239	High	Low
10336			1891	Post Medieval	COAL MINING SITE	402620	466188	High	Low
10337			1891	Post Medieval	MINERAL RAILWAY	402510	466257	Moderate	Medium
10338	MYD42628		1891	Post Medieval	SPOIL HEAP	402533	466244	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10339	MYD42210		1891	Post Medieval	QUARRY	402533	466298	Moderate	Low
10340			1891	Post Medieval	FIELD BOUNDARY	402557	466280	Moderate	Medium
10341	MYD4373	1840	1882	Victorian	FLUE	402524	466322	Moderate	Medium
10342	MYD4373	1849	1882	Victorian	FLUE	402499	466328	Moderate	Medium
10343		1855	1882	Victorian	SETTLING TANK	402565	466312	High	Low
10344		1855	1882	Victorian	SETTLING TANK	402590	466283	High	Low
10345		1855	1882	Victorian	DRESSING WASTE	402573	466281	High	Medium
10346		1855	1882	Victorian	LEAT	402606	466279	Moderate	Low
10347		1855	1882	Victorian	LEAT	402570	466333	Moderate	Low
10348	MYD4373	1849	1882	Victorian	CONDENSING FLUE	402753	466448	High	Medium
10349	MYD4373	1852	1882	Victorian	CONDENSING FLUE	402870	466544	High	Medium
10350	MYD4373	1849	1882	Victorian	CONDENSING CHIMNEY	402951	466561	High	Medium
10351		1849	1882	Victorian	CONDENSER	402897	466607	High	Medium
10352			1891	Post Medieval	QUARRY	402919	466512	Moderate	Low
10353	MYD4373	1855	1882	Victorian	CONDENSING FLUE	402824	466335	High	Medium
10354			1891	Post Medieval	SHAFT MOUND	402852	466428	Moderate	Low
10355		1849	1882	Victorian	CONDENSER	402807	466480	High	Medium
10356			1891	Post Medieval	QUARRY	402589	466386	Moderate	Low
10357		1855	1882	Victorian	CONDENSER	402593	466375	High	Medium
10358			1891	Post Medieval	DRAIN	402563	466363	Low	Low
10359			1891	Post Medieval	LEAT	402622	466403	Moderate	Low
10360		1849	1882	Victorian	CONDENSING FLUE	402534	466339	High	Medium
10361		1849	1882	Victorian	CONDENSING FLUE	402594	466372	High	Medium
10362			1891	Post Medieval	LEAT	402579	466365	Moderate	Low
10363			1891	Post Medieval	LEAT	402537	466348	Moderate	Low
10364			1891	Post Medieval	LEAT	402555	466379	Moderate	Low
10365			1891	Post Medieval	SHAFT MOUND	402536	466366	Moderate	Low
10366			1849	Post Medieval	SANDSTONE QUARRY	402523	466346	Moderate	Low
10367			1891	Post Medieval	LEAT	402570	466471	Moderate	Low
10368			1891	Post Medieval	LEAT	402620	466430	Moderate	Low
10369				20th Century	DRAIN	402703	466431	Low	Low
10370			1891	Post Medieval	LEAT	402815	466464	Moderate	Low
10371	MYD42709	1821-4	1891	Post Medieval	LEAT	402593	466485	Moderate	Low
10372		1821	1891	Victorian	LEAT	402674	466459	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10373				Post Medieval	NATURAL FEATURE?	402647	466454	N/A	N/A
10374			1891	Post Medieval	LAUNDER	402556	466388	Moderate	Low
10375				Later prehistoric	HUT CIRCLE	402476	466714	High	Low
10376			1891	Post Medieval	DRAIN	402649	466365	Low	Low
10377			1891	Post Medieval	QUARRY	402691	466340	Moderate	Low
10378		1967/8		20th Century	PIPELINE	402776	466229	Low	Low
10379		1967/8		20th Century	PIPELINE	402859	466337	Low	Low
10380		1967/8		20th Century	PIPELINE	403044	466597	Low	Low
10381	MYD42709	1821		Georgian	LEAT	403016	466295	Moderate	Low
10382			1891	Post Medieval	LEAT	403080	466230	Moderate	Low
10383				Uncertain	NATURAL FEATURE	402777	466493	N/A	N/A
10384		1849	1882	Victorian	SETTLING TANK	402783	466497	High	Low
10385		1849	1882	Victorian	SETTLING TANK	402755	466505	High	Low
10386	MYD42709	1821		Georgian	LEAT	402765	466575	Moderate	Low
10387		1821		Georgian	SPOIL HEAP	402731	466546	Moderate	Low
10388		1821		Georgian	"BRAKE HOUSE "	402745	466564	High	High
10389		1821		Georgian	TRANSMISSION RODS	402798	466588	High	Medium
10390		1821		Georgian	TRANSMISSION RODS	402786	466587	High	Medium
10391				21st Century	DRAIN	402764	466630	Low	Low
10392		1956	1964	20th Century	SPOIL HEAP	402746	466602	Moderate	Low
10393		1956	1964	20th Century	SETTLING TANK	402671	466534	High	Low
10394			1891	Post Medieval	RESERVOIR	402836	466507	Moderate	Low
10395	MYD42531	1826	1968	Georgian	SAW MILL	402920	466677	High	Medium
10396		1910		20th Century	SPOIL HEAP	402906	466634	Moderate	Low
10397		1910		20th Century	QUARRY	402928	466646	Moderate	Low
10398		1826		Georgian	TRANSMISSION RODS	402921	466659	High	Medium
10399		1821		Georgian	TRANSMISSION RODS	402881	466627	High	Medium
10400		1821		Georgian	TRANSMISSION RODS	402837	466637	High	Medium
10401		1910		20th Century	DRAIN	402803	466617	Low	Low
10402			1891	Post Medieval	SPOIL HEAP	402817	466658	Moderate	Low
10403			1891	Post Medieval	LEAD WORKINGS	402879	466699	Moderate	Medium
10404	MYD42532	1750	1856	Post Medieval	LEAD MINE	402971	466717	High	Medium
10405		1833		Victorian	RESERVOIR	403041	466736	Moderate	Low
10406	MYD42528	1750	1864	Post Medieval	LEAD MINE	403024	466661	High	Medium

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10407	MYD42997	1857		Victorian	WHEEL PIT	402964	466776	High	High
10408				20th Century	PIPELINE	402983	466770	Low	Low
10409		1857		Victorian	LEAT	402988	466751	Moderate	Low
10410		1857		Victorian	LEAT	402970	466765	Moderate	Low
10411		1857		Victorian	SPOIL HEAP	402957	466778	Moderate	Low
10412		1857		Victorian	TRANSMISSION RODS	402979	466786	High	Medium
10413				Post Medieval	ADIT	402893	466738	Moderate	Low
10414		1750		Post Medieval	LEAD MINE	402904	466771	High	Medium
10415			1891	Post Medieval	SHAFT MOUND	402927	466777	Moderate	Low
10416			1891	Post Medieval	SHAFT MOUND	402920	466792	Moderate	Low
10417			1891	Post Medieval	WAGGONWAY	402918	466788	Moderate	Medium
10418		1956	1964	20th Century	"STORAGE TANK "	402821	466680	Low/Moderate	Low/Medium
10419		1956	1964	20th Century	BUILDING	402781	466709	Moderate	Medium
10420		1956	1964	20th Century	CHEMICAL INDUSTRY SITE	402803	466677	Moderate	Medium
10421		1956	1964	20th Century	RAMP	402839	466720	Low	Low
10422		1956	1964	20th Century	SETTLING TANK	402750	466669	High	Low
10423		1956	1964	20th Century	SPOIL HEAP	402780	466692	Moderate	Low
10424		1956	1964	20th Century	SPOIL HEAP	402865	466722	Moderate	Low
10425			1891	Post Medieval	DAM	402679	466638	High	Low
10426			1891	Post Medieval	DAM	402670	466666	High	Low
10427		1955	1964	20th Century	DRAIN	402701	466631	Low	Low
10428		1955	1964	20th Century	DRAIN	402634	466641	Low	Low
10429				Post Medieval	LEAT	402609	466678	Moderate	Low
10430				Post Medieval	LEAT	402641	466746	Moderate	Low
10431				Post Medieval	LEAT	402649	466554	Moderate	Low
10432		1955	1964	20th Century	SETTLING PIT	402603	466502	High	Low
10433				Post Medieval	EARTHWORK	402696	466713	Moderate	Low
10434				Post Medieval	SHAFT MOUNDS	402718	466743	Moderate	Low
10435				Post Medieval	SHAFT MOUNDS	402786	466799	Moderate	Low
10436				Post Medieval	SHAFT MOUNDS	402801	466863	Moderate	Low
10437			1891	Post Medieval	SHAFT MOUND	402998	466921	Moderate	Low
10438			1833	Post Medieval	LEAT	403007	466831	Moderate	Low
10439				Post Medieval	SHAFT MOUND	402971	466924	Moderate	Low
10440				Post Medieval	LEAT	402971	466921	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10441				Post Medieval	LEAT	402983	466971	Moderate	Low
10442				Post Medieval	DRESSING FLOOR	402902	467001	High	Medium
10443		1820	1851	Victorian	SHAFT MOUND	402828	467004	Moderate	Low
10444			1893	Victorian	SHAFT MOUND	402863	467016	Moderate	Low
10445			1893	Post Medieval	SHAFT MOUND	402884	467017	Moderate	Low
10446			1893	Post Medieval	SHAFT MOUND	402887	467005	Moderate	Low
10447			1893	Victorian	SHAFT MOUND	402785	466999	Moderate	Low
10448				Post Medieval	DRESSING FLOOR	402798	466965	High	Medium
10449		1820	1840	Victorian	SHAFT MOUND	402749	466987	Moderate	Low
10450	MYD43990	1820s	1891	Victorian	SHAFT MOUND	402722	466921	Moderate	Low
10451	MYD43990	1820?	1891	Victorian	SPOIL HEAP	402758	466871	Moderate	Low
10452			1820S?	Post Medieval	DRESSING FLOOR	402705	466890	High	Medium
10453			1795	Georgian	SHAFT MOUND	402590	466928	Moderate	Low
10454			1795	Georgian	SHAFT MOUND	402620	466913	Moderate	Low
10455			1891	Post Medieval	DRESSING FLOOR	402576	466904	High	Medium
10456				Post Medieval	DRESSING FLOOR	402658	466937	High	Medium
10457	MYD42620	1754	1822	Georgian	SHAFT MOUND	402630	466965	Moderate	Low
10458		1754	1822	Georgian	SHAFT MOUND	402667	466979	Moderate	Low
10459	MYD43694	1754	1822	Georgian	SHAFT MOUND	402671	467007	Moderate	Low
10460				Post Medieval	DRESSING FLOOR	402648	466982	High	Medium
10461				Post Medieval	HOLLOW WAY	402894	466922	Moderate	High
10462				Post Medieval	HOLLOW WAY	402885	466870	Moderate	High
10463		1820	1851	Victorian	RESERVOIR	402764	467019	Moderate	Low
10464	MYD42530	1752	1817	Georgian	ADIT	402822	466812	Moderate	Medium
10465		1750		Georgian	DRESSING FLOOR	402861	466778	High	Medium
10466			1891	Victorian	PROSPECTING PIT	402811	466773	Moderate	Low
10467		1891	1910	Victorian	SETTLING PIT	402854	466752	High	Low
10468		1820	1851	Victorian	LEAT	402752	467017	Moderate	Low
10469				Post Medieval	PROSPECTING PIT	402530	467067	Moderate	Low
10470				Post Medieval	PROSPECTING PIT	402532	467047	Moderate	Low
10471				Post Medieval	PROSPECTING PIT	402532	467000	Moderate	Low
10472				Uncertain	NATURAL FEATURE	402545	467085	N/A	N/A
10473				Post Medieval	PROSPECTING PIT	402672	467055	Moderate	Low
10474				Post Medieval	PROSPECTING PIT	402658	467077	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10475				Victorian	TRACKWAY	402698	467077	Moderate	Low
10476			1800	Georgian	HOLLOW WAY	402655	467114	Moderate	High
10477				Post Medieval	LINEAR FEATURE	402630	467101	Moderate	Low
10478				Post Medieval	PROSPECTING PIT	402586	467041	Moderate	Low
10479				Post Medieval	PROSPECTING PIT	402628	467112	Moderate	Low
10480				Post Medieval	LEAD MINE	402562	467116	Moderate	Medium
10481				Post Medieval	SHAFT MOUND	402602	467072	Moderate	Low
10482				Post Medieval	SHAFT MOUND	402628	467033	Moderate	Low
10483				Post Medieval	TRACKWAY	402643	467047	Moderate	Low
10484				Post Medieval	TRACKWAY	402603	467036	Moderate	Low
10485				Post Medieval	SHAFT MOUND	402724	467088	Moderate	Low
10486				Post Medieval	SHAFT MOUND	402759	467087	Moderate	Low
10487				Post Medieval	SHAFT MOUND	402793	467087	Moderate	Low
10488				Post Medieval	LINEAR FEATURE	402794	467063	Moderate	Low
10489				Post Medieval	DRESSING FLOOR	402821	467050	High	Medium
10490				Victorian	ROAD	402868	467051	High	Medium
10491				Post Medieval	MINE BUILDING	402855	467032	High	High
10492		1955	1964	20th Century	SPOIL HEAP	402838	467089	Moderate	Low
10493				Post Medieval	PROSPECTING PIT	402563	467011	Moderate	Low
10494				Post Medieval	ENCLOSURE	402618	467081	Moderate	Low
10495				Post Medieval	DRESSING FLOOR	402883	467057	High	Medium
10496		1825	C1851	Victorian	SHAFT MOUND	402849	467125	Moderate	Low
10497		1737	1823	Georgian	SHAFT MOUND	402799	467130	Moderate	Low
10498		1737	1823	Georgian	MINE SHAFT	402829	467131	Moderate	Low
10499			1964?	Post Medieval	DRESSING FLOOR	402711	467085	High	Medium
10500		1841	1877	Victorian	RETAINING WALL	402280	468131	Moderate	Low
10501		1753	1878	Post Medieval	HORSE WHIM	402338	467823	High	High
10502			1893	Post Medieval	MINE SHAFT	402493	467811	Moderate	Low
10503				Post Medieval	PLATFORM	402528	467730	Moderate	Medium
10504				Post Medieval	SHAFT MOUND	402206	467711	Moderate	Low
10505	MYD53561			Post Medieval	MEERSTONE	402661	467506	High	Medium
10506		1735	1852	Georgian	PLATFORM	402395	467263	Moderate	Medium
10507		1735	1852	Georgian	PLATFORM	402334	467298	Moderate	Medium
10508		1735	1852	Georgian	MINE SHAFT	402259	467368	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10509		1747	1823	Georgian	BOUSE TEAM	402301	467099	Moderate	Medium
10510				Post Medieval	PLATFORM	402492	466905	Moderate	Medium
10511		1765	1792	Georgian	BOUSE TEAM	402227	467022	Moderate	Medium
10512		1765	1792	Georgian	BOUSE TEAM	402189	467048	Moderate	Medium
10513		1750	1830	Georgian	BOUSE TEAM	402369	466886	Moderate	Medium
10514				Post Medieval	ADIT	402858	466825	Moderate	Low
10515				Post Medieval	RESERVOIR	402700	466942	Moderate	Low
10516				Post Medieval	CULVERT	402708	466905	Moderate	Low
10517				Post Medieval	DRESSING FLOOR	402597	466707	High	Medium
10518		1771?	1802?	Post Medieval	MEERSTONE	402423	466819	High	Medium
10519				Post Medieval	RETAINING WALL	402531	466440	Moderate	Low
10520				Post Medieval	SLUICE GATE	402557	466489	Moderate	Medium
10521				Post Medieval	DAM	402477	466548	High	Low
10522		1863		Victorian	MINE BUILDING	403152	466619	High	High
10523				Post Medieval	RETAINING WALL	402953	466709	Moderate	Low
10524				Post Medieval	TRANSMISSION RODS	402804	466604	High	Medium
10525				Post Medieval	STONE	402497	466363	Moderate	Low
10526				Post Medieval	GRAFFITI	402543	466268	Moderate	Low
10527				Post Medieval	MEERSTONE	403171	466193	High	Medium
10528				Early 20th Century	SHOOTING STAND	403729	467798	low	Low
10529		1861	1874	Victorian	BOUSE TEAM	403262	467542	Moderate	Medium
10530		1852	1869	Victorian	STEPS	403539	467284	High	Medium
10531	MYD52932			Victorian	MINE BUILDING	403456	467004	High	High
10532				Post Medieval	LEAT	403456	467021	Moderate	Low
10533				Post Medieval	RETAINING WALL	403503	467001	Moderate	Low
10534				Post Medieval	DRESSING FLOOR	403502	466977	High	Medium
10535	MYD53529			Post Medieval	MEERSTONE	403738	466855	High	Medium
10536	MYD53570			Post Medieval	MEERSTONE	403763	466933	High	Medium
10537		1751	1823	Georgian	TRANSMISSION RODS	403191	467025	High	Medium
10538		1751	1823	Georgian	BOUSE TEAM	403226	467021	Moderate	Medium
10539				Post Medieval	TRANSMISSION RODS	403116	466941	High	Medium
10540				Post Medieval	BOUSE TEAM	403239	467185	Moderate	Medium
10541	MYD53535			Post Medieval	MEERSTONE	403143	467133	High	Medium
10542				Post Medieval	BOUSE TEAM	402846	467120	Moderate	Medium

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10543				Post Medieval	BOUSE TEAM	402612	467183	Moderate	Medium
10544				Post Medieval	BOUSE TEAM	402636	467166	Moderate	Medium
10545				Victorian	HORSE WHIM	402744	467360	High	High
10546		1893?		Post Medieval	MINE BUILDING	402842	467727	High	High
10547		1820?	1877	Victorian	RETAINING WALL	402879	467844	Moderate	Low
10548		1750?		Georgian	MEERSTONE	402275	467990	High	Medium
10549				Post Medieval	DRESSING FLOOR	402512	468084	High	Medium
10550				Post Medieval	BOUSE TEAM	402769	467997	Moderate	Medium
10551		1853	1864	Victorian	WAGONWAY	402826	467333	Moderate	Medium
10552	MYD43226	1853	1864	Victorian	SHAFT MOUND	402847	467338	Moderate	Low
10553				Post Medieval	LEAT	402849	467286	Moderate	Low
10554		1956		20th Century	SPOIL HEAP	402860	467316	Moderate	Low
10555				Post Medieval	LEAT	402926	467377	Moderate	Low
10556		1956		20th Century	TRACKWAY	402836	467292	Low	Low
10557				Post Medieval	LEAT	402892	467234	Moderate	Low
10558		1820?	1893	Victorian	SHAFT MOUND	402863	467213	Moderate	Low
10559			1893	Post Medieval	SHAFT MOUND	402903	467234	Moderate	Low
10560				21st Century	GULLY	402870	467177	Low	Low
10561				21st Century	GULLY	402873	467160	Low	Low
10562			1893	Victorian	DRESSING FLOOR	402877	467206	High	Medium
10563				Post Medieval	SHAFT MOUND	402716	467490	Moderate	Low
10564				Post Medieval	TRAMWAY	402734	467483	Moderate	Low
10565				Post Medieval	LINEAR FEATURE	402742	467415	Moderate	Low
10566				Post Medieval	SHAFT MOUND	402688	467387	Moderate	Low
10567				Post Medieval	SHAFT MOUND	402708	467381	Moderate	Low
10568				Post Medieval	DRESSING FLOOR	402711	467371	High	Medium
10569				Victorian	HORSE WHIM	402743	467361	High	High
10570				Post Medieval	SPOIL HEAP	402760	467359	Moderate	Low
10571	MYD42989		1864	Victorian	MINE SHAFT	402750	467385	Moderate	Low
10572		1956		20th Century	SPOIL HEAP	402778	467378	Moderate	Low
10573				Post Medieval	LEAT	402797	467256	Moderate	Low
10574				Georgian?	ROAD	402719	467211	High	Medium
10575				Georgian?	ROAD	402790	467287	High	Medium
10576		1853	1864	Victorian	WAGONWAY	402789	467357	Moderate	Medium

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10577				Georgian?	ROAD	402746	467262	High	Medium
10578				Post Medieval	LEAT	402818	467254	Moderate	Low
10579				Georgian?	SHAFT MOUND	402691	467246	Moderate	Low
10580		1778	1783	Georgian	SHAFT MOUND	402726	467234	Moderate	Low
10581		1770s	1842	Georgian	SHAFT MOUND	402779	467228	Moderate	Low
10582		1770s	1842	Georgian	MINE SHAFT	402763	467194	Moderate	Low
10583				Victorian?	MINE SHAFT	402820	467184	Moderate	Low
10584				21st Century	DRAIN	402792	467190	Low	Low
10585				Post Medieval	TRACKWAY	402797	467207	Moderate	Low
10586		1770s	1822	Georgian	SHAFT MOUNDS	402837	467213	Moderate	Low
10587		1770s	1822	Georgian	SHAFT MOUND	402842	467185	Moderate	Low
10588				Post Medieval	DRESSING FLOOR	402840	467167	High	Medium
10589		1869		Victorian	SHAFT MOUND	402659	467387	Moderate	Low
10590				Post Medieval	MINE SHAFT	402562	467404	Moderate	Low
10591				Post Medieval	SHAFT MOUND	402655	467442	Moderate	Low
10592				Post Medieval	DAM	402647	467458	High	Low
10593				Post Medieval	SHAFT MOUNDS	402652	467417	Moderate	Low
10594				Post Medieval	SHAFT MOUND	402532	467395	Moderate	Low
10595				Uncertain	NATURAL FEATURE	402643	467286	N/A	N/A
10596				Post Medieval	PROSPECTING PIT	402485	467231	Moderate	Low
10597				Post Medieval	SHAFT MOUND	402515	467225	Moderate	Low
10598				Post Medieval	SHAFT MOUND	402531	467214	Moderate	Low
10599				Post Medieval	SHAFT MOUND	402550	467228	Moderate	Low
10600			1808?	Post Medieval	PROSPECTING PIT	402537	467212	Moderate	Low
10601				Uncertain	NATURAL FEATURE	402573	467239	N/A	N/A
10602				Post Medieval	DAM	402622	467265	High	Low
10603				Post Medieval	LEAT	402586	467172	Moderate	Low
10604				Post Medieval	SHAFT MOUND	402599	467225	Moderate	Low
10605				Post Medieval	PROSPECTING PIT	402597	467213	Moderate	Low
10606				Post Medieval	LEAT	402598	467208	Moderate	Low
10607				Post Medieval	SHAFT MOUND	402637	467218	Moderate	Low
10608				Post Medieval	SHAFT MOUND	402667	467220	Moderate	Low
10609		1808	1843	Victorian	MINE SHAFT	402543	467186	Moderate	Low
10610				Post Medieval	SHAFT MOUND	402581	467185	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10611				Post Medieval	PROSPECTING PIT	402575	467206	Moderate	Low
10612				Post Medieval	SHAFT MOUND	402521	467157	Moderate	Low
10613				Post Medieval	SHAFT MOUND	402502	467158	Moderate	Low
10614				Post Medieval	SHAFT MOUND	402500	467176	Moderate	Low
10615				Post Medieval	PROSPECTING PIT	402512	467171	Moderate	Low
10616				Post Medieval	SPOIL HEAP	402540	467156	Moderate	Low
10617				Post Medieval	SHAFT MOUND	402559	467158	Moderate	Low
10618				Post Medieval	DRESSING FLOOR	402588	467141	High	Medium
10619		1737	1823	Georgian	SHAFT MOUND	402630	467150	Moderate	Low
10620				Victorian	SHAFT MOUND	402616	467186	Moderate	Low
10621				Victorian	SHAFT MOUND	402642	467189	Moderate	Low
10622				Victorian	SHAFT MOUND	402642	467165	Moderate	Low
10623				Victorian	DRESSING FLOOR	402612	467176	High	Medium
10624		1820?	1842?	Victorian	SHAFT MOUND	402685	467181	Moderate	Low
10625				Post Medieval	SPOIL HEAP	402643	467143	Moderate	Low
10626		1842?	1853?	Post Medieval	DRESSING FLOOR	402705	467149	High	Medium
10627				Post Medieval	LEAT	402518	467137	Moderate	Low
10628				Post Medieval	SHAFT MOUND	402515	467183	Moderate	Low
10629				Post Medieval	SHAFT MOUND	402830	467074	Moderate	Low
10630		1776?	1830?	Post Medieval	RESERVOIR	402627	467482	Moderate	Low
10631				Post Medieval	PROSPECTING PIT	402647	467386	Moderate	Low
10632				Uncertain	NATURAL FEATURE	402623	467206	N/A	N/A
10633				Post Medieval	LEAT	402685	467270	Moderate	Low
10634				Georgian?	SHAFT MOUND	402746	467266	Moderate	Low
10635				Post Medieval	RESERVOIR	402679	467027	Moderate	Low
10636				Post Medieval	LEAT	402736	467045	Moderate	Low
10637				Post Medieval	SHAFT MOUND	402604	467537	Moderate	Low
10638				21st Century	DRAIN	402530	467563	Low	Low
10639				Post Medieval	LEAT	402538	467616	Moderate	Low
10640				Post Medieval	SHAFT MOUND	402576	467619	Moderate	Low
10641		1863	1871	Post Medieval	SPOIL HEAP	402634	467605	Moderate	Low
10642				Post Medieval	SHAFT MOUND	402595	467607	Moderate	Low
10643				Post Medieval	SHAFT MOUND	402624	467620	Moderate	Low
10644				Post Medieval	SHAFT MOUND	402620	467611	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10645				Post Medieval	DRESSING FLOOR	402613	467587	High	Medium
10646				Post Medieval	SHAFT MOUND	402657	467566	Moderate	Low
10647				Post Medieval	TRAMWAY	402672	467574	Moderate	Low
10648				Post Medieval	SHAFT MOUND	402677	467515	Moderate	Low
10649				Post Medieval	DRESSING FLOOR	402651	467534	High	Medium
10650				Post Medieval	LEAT	402697	467578	Moderate	Low
10651				Victorian	SHAFT MOUND	402679	467582	Moderate	Low
10652	MYD43264	C18, 1829-39	1866-71	Victorian	MINE SHAFT	402788	467535	Moderate	Low
10653				Victorian?	MINE SHAFT	402732	467555	Moderate	Low
10654				Post Medieval	SHAFT MOUND	402805	467577	Moderate	Low
10655			1839?	Victorian	LEAT	403049	467557	Moderate	Low
10656				Post Medieval	MINE SHAFT	402776	467622	Moderate	Low
10657				Post Medieval	LINEAR FEATURE	402786	467616	Moderate	Low
10658				Post Medieval	LEAT	402695	467619	Moderate	Low
10659				Post Medieval	LINEAR FEATURE	402776	467630	Moderate	Low
10660				Post Medieval	PROSPECTING PIT	402632	467640	Moderate	Low
10661		1863	1871	Victorian	BOUSE TEAM	402667	467629	Moderate	Medium
10662		1863	1871	Victorian	MINE SHAFT	402689	467656	Moderate	Low
10663				Post Medieval	MINE SHAFT	402719	467651	Moderate	Low
10664				Post Medieval	SHAFT MOUND	402658	467671	Moderate	Low
10665				Post Medieval	SHAFT MOUND	402599	467676	Moderate	Low
10666	MYD44132	1831	1863-4	Post Medieval	MINE SHAFT	402767	467656	Moderate	Low
10667			1917?	Post Medieval	LINEAR FEATURE	402633	467741	Moderate	Low
10668				Post Medieval	TRACKWAY	402618	467811	Moderate	Low
10669	MYD43160	1741	1820	Georgian	SHAFT MOUND	402716	467842	Moderate	Low
10670				Post Medieval	DRESSING FLOOR	402737	467820	High	Medium
10671				Post Medieval	DRESSING FLOOR	402810	467830	High	Medium
10672				Post Medieval	TRACKWAY	402654	467873	Moderate	Low
10673				Post Medieval	DRESSING FLOOR	402810	467664	High	Medium
10674				Post Medieval	SPOIL HEAP	402866	467774	Moderate	Low
10675				Post Medieval	SPOIL HEAP	402891	467833	Moderate	Low
10676				Post Medieval	SPOIL HEAP	402915	467740	Moderate	Low
10677				Post Medieval	DRESSING FLOOR	402922	467800	High	Medium
10678				Post Medieval	DAM	402909	467803	High	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10679				Post Medieval	SHAFT MOUND	403019	467529	Moderate	Low
10680				Victorian	LEAT	402928	467651	Moderate	Low
10681				Post Medieval	LEAT	403018	467514	Moderate	Low
10682				Post Medieval	SHAFT MOUND	402942	467268	Moderate	Low
10683				Post Medieval	SHAFT MOUND	402926	467173	Moderate	Low
10684				Post Medieval	SHAFT MOUND	402977	467209	Moderate	Low
10685				Post Medieval	SHAFT MOUND	402901	467187	Moderate	Low
10686				Post Medieval	SHAFT MOUND	402931	467226	Moderate	Low
10687				Post Medieval	HORSE WHIM	402698	467681	High	High
10688				Post Medieval	PROSPECTING PIT	402665	467697	Moderate	Low
10689				Post Medieval	LEAT	402607	467685	Moderate	Low
10690				Post Medieval	SHAFT MOUND	403059	467922	Moderate	Low
10691				Post Medieval	SHAFT MOUND	403016	467916	Moderate	Low
10692				Uncertain	NATURAL FEATURE	403267	467918	N/A	N/A
10693				20th Century?	DRAIN	402639	468131	Low	Low
10694				Post Medieval	SHAFT MOUND	402895	467900	Moderate	Low
10695		1834		Victorian	SPOIL HEAP	402872	467891	Moderate	Low
10696	MYD42464	1834	1835	Victorian	WAGONWAY	402875	467920	Moderate	Medium
10697				Post Medieval	SHAFT MOUND	402852	467902	Moderate	Low
10698				Post Medieval	SHAFT MOUND	402976	467947	Moderate	Low
10699				Post Medieval	SPOIL HEAP	402968	467923	Moderate	Low
10700				Post Medieval	LEAD WORKINGS	402942	467948	Moderate	Medium
10701				Post Medieval	DRESSING FLOOR	402879	467929	High	Medium
10702				Post Medieval	QUARRY	402819	467974	Moderate	Low
10703				Post Medieval	EARTHWORK	402903	467980	Moderate	Low
10704				Post Medieval	"POND "	402821	467955	Moderate	Medium
10705				Post Medieval	DRESSING FLOOR	402843	467937	High	Medium
10706		1833		Victorian	DRESSING FLOOR	402767	467980	High	Medium
10707		1834?		Victorian	QUARRY	402774	468006	Moderate	Low
10708		1737	1817	Georgian	SHAFT MOUND	402713	468016	Moderate	Low
10709		1737	1817	Georgian	SHAFT MOUND	402695	468018	Moderate	Low
10710		1737	1817	Georgian	SHAFT MOUND	402672	468029	Moderate	Low
10711		1737	1817	Georgian	SHAFT MOUND	402684	468029	Moderate	Low
10712		1737	1817	Georgian	DRESSING FLOOR	402609	468038	High	Medium

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10713		1737	1817	Georgian	SHAFT MOUND	402576	468051	Moderate	Low
10714		1737	1817	Georgian	ADIT	402568	468067	Moderate	Low
10715		1737	1817	Georgian	"POND"	402561	468060	Moderate	Medium
10716		1737	1817	Georgian	"POND "	402590	468059	Moderate	Medium
10717		1737	1817	Georgian	"POND "	402626	468046	Moderate	Medium
10718		1737? 1877?	1817? 1899?	Post Medieval	WAGONWAY	402422	468133	Moderate	Medium
10719		1737	1817	Georgian	SHAFT MOUND	402482	468099	Moderate	Low
10720		1737	1817	Georgian	DRESSING FLOOR	402417	468101	High	Medium
10721		1737	1817	Georgian	DRESSING FLOOR	402458	468073	High	Medium
10722		1737	1817	Georgian	DRESSING FLOOR	402616	468009	High	Medium
10723		1833		Victorian	SHAFT MOUND	402811	468138	Moderate	Low
10724	MYD43792	1833		Victorian	SHAFT MOUND	402798	468103	Moderate	Low
10725	MYD43489	1836		Victorian	MINE SHAFT	402788	468066	Moderate	Low
10726	MYD42463	1833		Victorian	ADIT	402780	468034	Moderate	Medium
10727				Post Medieval	SHAFT MOUND	402805	468120	Moderate	Low
10728	MYD15084			Post Medieval	RESERVOIR	402578	468187	Moderate	Low
10729				Post Medieval	SHAFT MOUND	402551	468316	Moderate	Low
10730				Post Medieval	LEAT	402550	468266	Moderate	Low
10731				Post Medieval	LEAT	402524	468218	Moderate	Low
10732				Post Medieval	LEAT	402664	468269	Moderate	Low
10733				Post Medieval	LEAT	402594	468535	Moderate	Low
10734	MYD15082			Post Medieval	LEAT	402742	468910	Moderate	Low
10735				Post Medieval	SHAFT MOUND	403137	468751	Moderate	Low
10736				20th Century	DRAINAGE SYSTEM	402926	468714	Low	Low
10737				Post Medieval	LEAT	403399	468325	Moderate	Low
10738				Post Medieval	LEAT	403511	468001	Moderate	Low
10739				Post Medieval	EARTHWORK	403334	468358	Moderate	Low
10740				Post Medieval	SHAFT MOUND	403335	468330	Moderate	Low
10741				Post Medieval	SHAFT MOUND	403338	468310	Moderate	Low
10742			C18?	Georgian	SHAFT MOUND	403441	468314	Moderate	Low
10743				Post Medieval	SHAFT MOUND	403366	468325	Moderate	Low
10744				Post Medieval	SHAFT MOUND	403488	468353	Moderate	Low
10745				Post Medieval	SHAFT MOUND	403488	468337	Moderate	Low
10746				Post Medieval	SHAFT MOUND	403488	468331	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10747				Post Medieval	SHAFT MOUND	403488	468314	Moderate	Low
10748				Post Medieval	SHAFT MOUND	403488	468302	Moderate	Low
10749				Post Medieval	PROSPECTING PIT	403346	468250	Moderate	Low
10750				Post Medieval	SHAFT MOUND	403374	468133	Moderate	Low
10751				Post Medieval	SHAFT MOUND	403354	468158	Moderate	Low
10752				Post Medieval	SHAFT MOUND	403353	468177	Moderate	Low
10753				Post Medieval	SHAFT MOUND	403367	468072	Moderate	Low
10754				Post Medieval	SHAFT MOUND	403365	468007	Moderate	Low
10755				Post Medieval	SHAFT MOUND	403363	467992	Moderate	Low
10756				Post Medieval	SHAFT MOUND	403590	468009	Moderate	Low
10757				Post Medieval	SHAFT MOUND	403653	467973	Moderate	Low
10758	MYD4367			Medieval	ENCLOSED SETTLEMENT	403657	468181	High	High
10759				Post Medieval	SHAFT MOUND	403965	468175	Moderate	Low
10760				Post Medieval	SHAFT MOUND	403951	468202	Moderate	Low
10761				Post Medieval	SHAFT MOUND	403841	468208	Moderate	Low
10762				Post Medieval	SHAFT MOUND	404004	468152	Moderate	Low
10763				Post Medieval	SHAFT MOUND	403985	468135	Moderate	Low
10764				Post Medieval	SHAFT MOUND	403967	468120	Moderate	Low
10765				Post Medieval	SHAFT MOUND	403949	468103	Moderate	Low
10766				Post Medieval	SHAFT MOUND	403930	468087	Moderate	Low
10767				Post Medieval	SHAFT MOUND	403935	468053	Moderate	Low
10768				Post Medieval	SHAFT MOUND	403933	468026	Moderate	Low
10769				Post Medieval	SHAFT MOUND	403934	467996	Moderate	Low
10770				Post Medieval	SHAFT MOUND	403935	467977	Moderate	Low
10771				Post Medieval	SHAFT MOUND	403932	467943	Moderate	Low
10772				Post Medieval	SHAFT MOUND	403927	467912	Moderate	Low
10773				Post Medieval	SHAFT MOUND	403905	467878	Moderate	Low
10774				Post Medieval	SHAFT MOUND	403889	467861	Moderate	Low
10775				Post Medieval	SHAFT MOUND	403940	467851	Moderate	Low
10776				Post Medieval	SHAFT MOUND	403924	467810	Moderate	Low
10777				Victorian	SHEEP FOLD	403789	468094	Low	Low
10778				Post Medieval	SHAFT MOUND	403911	467703	Moderate	Low
10779				Post Medieval	SHAFT MOUND	403938	467746	Moderate	Low
10780				Post Medieval	SHAFT MOUND	403979	467721	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10781				Post Medieval	PROSPECTING PIT	403972	467718	Moderate	Low
10782				Post Medieval	SHAFT MOUND	404064	467711	Moderate	Low
10783				Post Medieval	SHAFT MOUND	404038	467709	Moderate	Low
10784				Post Medieval	SHAFT MOUND	404027	467726	Moderate	Low
10785				Post Medieval	LEAD WORKINGS	404000	467757	Moderate	Medium
10786				Post Medieval	DRESSING FLOOR	404034	467699	High	Medium
10787				Post Medieval	DRESSING FLOOR	403947	467769	High	Medium
10788				Post Medieval	SHAFT MOUND	403724	467973	Moderate	Low
10789				Post Medieval	QUARRY	403223	467990	Moderate	Low
10790				20th Century	DRAINAGE SYSTEM	403979	467879	Low	Low
10791				Post Medieval	LEAD WORKINGS	403234	467894	Moderate	Medium
10792				Post Medieval	SHAFT MOUND	403317	467854	Moderate	Low
10793				Post Medieval	SHAFT MOUND	403313	467824	Moderate	Low
10794				Post Medieval	SHAFT MOUND	403396	467912	Moderate	Low
10795				Post Medieval	SHAFT MOUND	403368	467863	Moderate	Low
10796				Post Medieval	SHAFT MOUND	403361	467950	Moderate	Low
10797				Post Medieval	PROSPECTING PIT	403354	467933	Moderate	Low
10798				Post Medieval	SHAFT MOUND	403399	467841	Moderate	Low
10799				Post Medieval	SHAFT MOUND	403437	467856	Moderate	Low
10800				Post Medieval	SHAFT MOUND	403516	467832	Moderate	Low
10801				Post Medieval	SHAFT MOUND	403558	467835	Moderate	Low
10802	MYD43464	1844 (1759?)	1853	Victorian	LEAD MINE	403601	467798	Moderate	Medium
10803				Post Medieval	SHAFT MOUND	403614	467749	Moderate	Low
10804				Post Medieval	PEAT CUTTING	403688	467726	Moderate	Medium
10805		1967/8		20th Century	PIPELINE	403735	467625	Low	Low
10806				Post Medieval	MINE BUILDING?	403741	468063	High	High
10807				Post Medieval	LEAT	403633	467692	Moderate	Low
10808				Georgian	SHAFT MOUND	403143	467526	Moderate	Low
10809				Georgian	SHAFT MOUND	403139	467547	Moderate	Low
10810	MYD44108	1861	1874	Victorian	LEAD MINE	403252	467548	Moderate	Medium
10811				Post Medieval	FEEDER CHANNEL	403448	467383	Moderate	Low
10812		1848		Post Medieval	WAGONWAY	403451	467527	Moderate	Medium
10813	MYD43363	1848	1853	Victorian	LEAD MINE	403478	467506	Moderate	Medium
10814		1848		Victorian	DRESSING FLOOR	403479	467473	High	Medium

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10815				Post Medieval	LEAT	403486	467615	Moderate	Low
10816		1848		Victorian	WAGONWAY	403455	467536	Moderate	Medium
10817				Post Medieval	PEAT CUTTING	403253	467493	Moderate	Medium
10818				Post Medieval	EARTHWORK	403299	467359	Moderate	Low
10819				Post Medieval	PEAT CUTTING	403379	467432	Moderate	Medium
10820		1778?		Georgian	SHAFT MOUND	403125	467170	Moderate	Low
10821		1831	1871	Victorian	MINE SHAFT	403046	467428	Moderate	Low
10822	MYD43723	1852	1869	Victorian	LEAD MINE	403554	467294	Moderate	Medium
10823				Post Medieval	LEAT	403299	467400	Moderate	Low
10824				Post Medieval	PEAT CUTTING	403439	467219	Moderate	Medium
10825	MYD15077	1826		Georgian	DAM	403931	467206	High	Low
10826		1826		Georgian	TUMBLING WEIR	404024	467186	Moderate	Medium
10827				Post Medieval	LEAT	403336	467288	Moderate	Low
10828	MYD43361	1778	1839	Georgian	LEAD MINE	403234	467192	High	Medium
10829		1778	1839	Georgian	DRESSING FLOOR	403242	467166	High	Medium
10830				Post Medieval	DRAIN	403069	467212	Low	Low
10831	MYD42298	1826		Victorian	DAM	404012	467065	High	High
10832	MYD42298	1826		Victorian	DAM	403981	467059	High	High
10833	MYD15018	1821		Victorian	DAM	404179	466873	High	High
10834		1965 APPROX		20th Century	RESERVOIR	403809	467050	Moderate	Low
10835				Post Medieval	LEAT	403636	467181	Moderate	Low
10836	MYD43324	1845		Victorian	MINE SHAFT	403556	467044	Moderate	Low
10837	MYD43461	1764	1880	Post Medieval	LEAD MINE	403514	467031	High	Medium
10838				Post Medieval	DRESSING FLOOR	403531	466953	High	Medium
10839				Post Medieval	RESERVOIR	403434	467059	Moderate	Low
10840				Post Medieval	LEAT	403334	467041	Moderate	Low
10841	MYD42585	1855	1879	Victorian	LEAD MINE	403829	466943	Moderate	Medium
10842		1855	1879	Victorian	DRESSING FLOOR	403835	466905	High	Medium
10843		1821		Georgian	BOB SETTING	403303	466885	Moderate	Medium
10844				Georgian	SHAFT MOUND	403279	466964	Moderate	Low
10845		1833?		Victorian	LEAT	403458	466869	Moderate	Low
10846	MYD15016	1833		Victorian	RESERVOIR	403361	466836	Moderate	Low
10847				Post Medieval	SHAFT MOUND	403212	467103	Moderate	Low
10848				Post Medieval	SHAFT MOUND	403166	467088	Moderate	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10849				Post Medieval	LEAT	403178	467083	Moderate	Low
10850	MYD42534	1738	1879	Post Medieval	LEAD MINE	403175	467028	High	Medium
10851				Post Medieval	SHAFT MOUND	403045	466948	Moderate	Low
10852				Post Medieval	SHAFT MOUND	403053	466970	Moderate	Low
10853				Post Medieval	SHAFT MOUND	403097	466974	Moderate	Low
10854		1751	1870s	Post Medieval	DRESSING FLOOR	403123	467009	High	Medium
10855				Post Medieval	DRESSING FLOOR	403144	466929	High	Medium
10856		1848		Victorian	MINE BUILDING	403503	467495	High	High
10857				Post Medieval	LEAT	403212	467225	Moderate	Low
10858				Post Medieval	LEAT	403177	467168	Moderate	Low
10859				Post Medieval	LEAT	403139	467059	Moderate	Low
10860				Post Medieval	SHAFT MOUND	403106	467102	Moderate	Low
10861				Post Medieval	LEAT	403138	467079	Moderate	Low
10862				Post Medieval	SHAFT MOUND	403093	467058	Moderate	Low
10863				Post Medieval	SHAFT MOUND	403062	467112	Moderate	Low
10864				Post Medieval	SHAFT MOUND	403072	467078	Moderate	Low
10865				Georgian	SHAFT MOUND	403054	467092	Moderate	Low
10866				Georgian	SHAFT MOUND	403068	467060	Moderate	Low
10867		1775	1796	Georgian	SHAFT MOUND	403047	467070	Moderate	Low
10868				Post Medieval	SHAFT MOUND	403053	467039	Moderate	Low
10869				Post Medieval	SHAFT MOUND	403024	467054	Moderate	Low
10870		1736	1820	Georgian	SHAFT MOUND	403089	467030	Moderate	Low
10871				Post Medieval	MINE SHAFT	403120	467055	Moderate	Low
10872		1736	1820	Georgian	SHAFT MOUND	403019	467008	Moderate	Low
10873		1736	1820	Georgian	SHAFT MOUND	402989	467030	Moderate	Low
10874		1775	1794	Georgian	SHAFT MOUND	402961	467046	Moderate	Low
10875				Post Medieval	DRESSING FLOOR	402956	467014	High	Medium
10876				Post Medieval	DRESSING FLOOR	403025	466997	High	Medium
10877				Post Medieval	LEAT	403021	466938	Moderate	Low
10878				Post Medieval	EARTHWORK	402956	466913	Moderate	Low
10879				Post Medieval	LEAT	402944	466908	Moderate	Low
10880				Post Medieval	SETTLING PIT	402951	466949	High	Low
10881				Post Medieval	LEAT	402965	466947	Moderate	Low
10882				Post Medieval	SETTLING PIT	402941	466913	High	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10883				Georgian	SHAFT MOUND	402930	467121	Moderate	Low
10884				Georgian	SHAFT MOUND	403022	467112	Moderate	Low
10885				Post Medieval	LEAT	403038	467144	Moderate	Low
10886				Georgian?	EARTHWORK	403042	467142	Moderate	Low
10887		1769	1819	Georgian	SHAFT MOUND	402982	467128	Moderate	Low
10888		1775	1794	Georgian	SHAFT MOUND	402963	467084	Moderate	Low
10889		1775	1798	Georgian	SHAFT MOUND	402930	467081	Moderate	Low
10890		1775	1798	Georgian	SHAFT MOUND	403005	467088	Moderate	Low
10891				Georgian	LEAD MINE	402899	467121	Moderate	Medium
10892				Georgian	DRESSING FLOOR	402904	467160	High	Medium
10893		1769	1819	Georgian	DRESSING FLOOR	402964	467103	High	Medium
10894				Post Medieval	DRESSING FLOOR	403055	466864	High	Medium
10895		1821		Georgian	TRANSMISSION RODS	403303	466929	High	Medium
10896		1821		Georgian	DRAIN	403310	466839	Low	Low
10897				20th Century	DRAIN	403238	466813	Low	Low
10898		1821		Georgian	TRANSMISSION RODS	403218	466839	High	Medium
10899				Uncertain	PROSPECTING PIT	403154	466905	Moderate	Low
10900				20th Century	DRAINAGE SYSTEM	403463	466901	Low	Low
10901		1833		Victorian	LEAT	403219	466681	Moderate	Low
10902		1833		Victorian	LEAT	403187	466737	Moderate	Low
10903				20th Century	DRAIN	403176	466706	Low	Low
10904				20th Century	DRAINAGE DITCH	403121	466687	Low	Low
10905				20th Century	DRAIN	403165	466702	Low	Low
10906		1821		Georgian	LEAT	403894	466805	Moderate	Low
10907				20th Century	DRAINAGE DITCH	403927	466818	Low	Low
10908		1821		Georgian	LEAT	404068	466779	Moderate	Low
10909		1821		Georgian	FILTER BED	404089	466864	Moderate	High
10910				Post Medieval	DRAIN	404084	466813	Low	Low
10911				20th Century	DRAIN	404078	466833	Low	Low
10912				Post Medieval	LEAT	403872	466843	Moderate	Low
10913				Post Medieval	LEAT	403812	466798	Moderate	Low
10914	MYD15086	1826		Georgian	WATER CHANNEL	404099	467309	Moderate	Low
10915	MYD42708	1821		Georgian	LEAT	403720	466501	Moderate	Low
10916				20th Century	DRAINAGE SYSTEM	403840	467433	Low	Low

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10917				20th Century	DRAINAGE SYSTEM	403507	466513	Low	Low
10918		1750	1820?	Georgian	SHAFT MOUND	403209	466513	Moderate	Low
10919				Georgian	SHAFT MOUND	403280	466457	Moderate	Low
10920				Georgian	SHAFT MOUND	403288	466421	Moderate	Low
10921				Georgian	SHAFT MOUND	403079	466614	Moderate	Low
10922				Georgian	SHAFT MOUND	403114	466582	Moderate	Low
10923				Post Medieval	LEAT	402999	466622	Moderate	Low
10924				20th Century	DRAINAGE SYSTEM	403082	466461	Low	Low
10925				Uncertain	PIT	403766	466208	Moderate	Low
10926				Post Medieval	SHAFT MOUND	403505	466223	Moderate	Low
10927	MYD42709	1821		Georgian	LEAT	404087	465990	Moderate	Low
10928	MYD43722	1821		Georgian	RESERVOIR	403335	466172	Moderate	Low
10929				Post Medieval	PEAT CUTTING	403705	467476	Moderate	Medium
10930	MYD43550	1838	1839	Victorian	SHAFT MOUND	404303	466928	Moderate	Low
10931		1821		Georgian	DAM	404087	466822	High	High
10932				Post Medieval	RESERVOIR	403238	467082	Moderate	Low
10933		1852	1869	Victorian	RESERVOIR	403466	467381	Moderate	Low
10934				Post Medieval	LEAT	403730	468226	Moderate	Low
10935				Post Medieval	BUDDLE	402499	467200	Moderate	Low
10936		1835	1877	Victorian	MINE SHAFT	402868	467854	Moderate	Low
10937		1855	1856?	Victorian	SHAFT MOUND	403767	467078	Moderate	Low
10938	MYD53554			Georgian	MEERSTONE	403753	467076	High	Medium
10939				Prehistoric	FINDSPOT	402741	468048	Moderate	Medium
10940				Post Medieval	FINDSPOT	403372	468131	Moderate	Low
10941				Post Medieval	WALL	402508	468016	Low	Medium
10942				Post Medieval	STONE	402368	467922	Moderate	Low
10943				Uncertain	ENCLOSURE	402439	467835	High	Medium
10944				Prehistoric	STOCK ENCLOSURE	402486	467840	High	Medium
10945				Prehistoric	HUT	402472	467855	High	Low
10946				Prehistoric	CAIRN	402452	467853	High	Medium
10947				Post Medieval	DRESSING WASTE	402511	466799	High	Medium
10948				Victorian	ADIT	402490	466837	Low	Low
10949		1821		Victorian	SLUICE GATE	404150	466858	Moderate	Medium
10950		1821		Victorian	WALL	404163	466837	Low	Medium

GMLUID	HER No.	Year Min	Year Max	Period	Monument Type	Easting	Northing	Significance	Vulnerability
10951				Post Medieval	"STRUCTURE "	404117	466826	Low	Medium
10952		1826		Victorian	TRACKWAY	403926	467036	Low	Low
10953				Prehistoric	FINDSPOT	402514	467853	Low	Low
10954		1820		Georgian	CULVERT	402332	466795	Low	Low
10955		1820		Georgian	CULVERT	402800	466896	Low	Low
10956		1820		Georgian	CULVERT	402873	466895	Low	Low
10957		1820		Georgian	BRIDGE	402463	466357	Low	Low

9.0 GLOSSARY OF LEAD MINING TERMS

ADIT or LEVEL	A level tunnel (usually driven into a hillside) in order to give access to a mine, and used for drainage or the hauling of broken ore. Deeper adits did not necessarily connect to surface, and were used to carry water back from distant workings to a pumping shaft.
ADVENTURERS	Shareholders in a mine or mining venture.
BALANCE BOB	A large counterweighted lever attached to the shaft pump rods and used to offset their weight and thus reduce the work of a pumping engine to lifting water alone. A surface balance bob would be mounted adjacent to the shaft on a pair of plinths or on a masonry support at ground level (balance bob mounting), the attached counterweight - a large box filled with scrap iron or rocks - working in an adjacent stone-lined pit. Other balance bobs would be installed in chambers cut into the rock adjacent to the shaft wall as needed to counterbalance the weight of the pump rods, especially on a deep shaft.
BARMOOT	The Barmote or Barmoot court is a court held in the lead mining districts of Derbyshire, and other areas of England, for the purpose of determining the customs peculiar to the industry and also for the settlements of any disputes which may arise in connection therewith.
BARYTES	The mineral Barium Sulphate (BaSO4)
BINGSTEAD	Stone storage bunkers used for storing lead ore after processing for transportation to the smelt mill
BING	Processed lead ore which has gone through the dressing process and is ready for smelting. Also standard weight of material, often applied to lead concentrate, usually 8 cwt (407 kg).
BOB PIT	Stone-lined pit or rock-cut chamber into which the counterweight from a balance bob would drop.
BOUSE	Unrefined lead ore mixed with waste materials
BOUSE TEAM OR ORE BIN	A storage place for bouse. Usually arranged in bays or storage hoppers.
BUCKING	The breaking down of mineral ore on an anvil to about 10mm in diameter using small hammers, after which the ore was separated from the waste by hand.
BUCKER	A broad flat-headed type of hammer used for manually breaking or crushing ore.
BUDDLE	A device for concentrating lead ore. In the mid-19th century these most usually took the form of a circular pit with rotating brushes; the ore from the crusher was fed into the centre or side of the pit and was graded by gravity, concentrating the heavy ore near the inlet point. These were often mechanically worked. Earlier buddles were trapezoidal in shape, and manually operated. A variation used in tailings works to treat sands and slimes was the Round Frame: a free-standing, all wooden, mechanically-actuated buddle, whilst a further variation was the dumb buddle or dumb pit, which was not mechanically operated. Named after John Buddle (1773-1843).
CHIMNEY	The word is used in its normal sense. Smelter chimneys are normally free-standing and fed by a flue, whereas engine house chimneys are normally attached to the

	building.
COE	A coe, from the old German Kove for hut or cage, is a small building (c.4m x 2m), usually of stone, built over or near to an early lead mine shaft. The building served to protect the shaft, and was also used as a tool or ore store, and as a clothes changing room for the miners. The shaft often lay under a trapdoor in the floor (Jones 1996, 76).
CONCENTRATE	Dressed lead ore ready for smelting.
CONDENSER	A small building erected in a flue and filled with wet brushwood to condense any lead fume in the gases leaving the furnaces.
CONNECTING RODS	Reciprocating (or very occasionally rotative) iron rods used to transfer power from an engine.
CROSS CUT	A tunnel driven usually at right angles to strike the vein in the shortest distance.
CRUSHER	A mechanised device for crushing ore similar to a mangle. In practice normally the timber frame for the crushing rollers only survives.
CRUSHING CIRCLE	A horse-powered crusher, consisting of an edge-runner stone running on a circular stone or iron bed.
CRUSHING MILL	A building containing mechanically-powered crushers.
CULVERT	A small tunnel constructed to carry a channel of water.
CUPOLA	A smelting furnace, sometimes taken to refer to one of reverberatory pattern (where the fire is burned on a grate in a chamber separate from the charge), but nowadays referring to a shaft furnace.
DAM	The word is used in its normal sense.
DEAD GROUND	Any ground which was unproductive, which might even be the vein itself.
DEADS	Waste material either from the mine or the dressing floor.
DRESSING FLOORS	An (often extensive) surface area on a mine where the various processes of concentration of ore took place - these consisted of crushing or stamping to attain a uniform size range, sizing (particularly on later mines), separation of waste rock, concentration (generally mechanically and hydraulically), the removal of contaminant minerals (by calcination, flotation, magnetic separation), and finally drying and bagging for transportation to the smelter. Dressing floors in particular were generally laid out down a slope to reduce mechanical or manual handling between stages in the process.
DRESSING MILL	A building containing an integrated array of mechanically-powered ore processing devices.
DRESSING WASTE	The residues from ore-processing operations; intact tips may preserve considerable evidence on the processes used.
ENGINE BED OR MACHINE BASE	The solid stone or concrete base on which an engine or machine was mounted; may give considerable information on the form of the engine.
ENGINE SHAFT	A shaft for winding or pumping by mechanical means.

FATHOM	The nominal mining measurement of length, 6 feet or l.85m.
FINGER DUMP OR TIP	A linear dump of waste material from a mine or quarry, flat-topped to allow material to be barrowed or trammed along it, and often equipped with a temporary tramway track.
FLAT	A horizontal ore-bearing vein or the replacement of country rock by mineralisation.
FLUORSPAR	The mineral fluorite, calcium fluoride (CaF2). Widely used as a flux in blast furnaces and as a source of fluorine in the chemical industry. Also used for special glasses and ceramics. Many lead mines were later worked for the fluorspar content.
FLUE	A near-horizontal chimney or passage designed to take the poisonous fumes away from the smelting mill and to create a draught for the furnace. Can be of considerable length.
FURNACE	The term used in a broad sense for any form of smelting furnace or hearth.
GALENA	Lead sulphide, the lead mineral normally mined (PbS).
GANGUE	The waste material in a vein, from which the lead minerals have to be separated, and which are usually dumped near the mine. Since the gangue minerals include fluorspar and barytes, many spoil heaps have since been reworked.
GRATING	Sometimes bouse was raked over a grate in a stream of water to wash and clean it for further dressing. The small particles would run to the slimes pit in readiness for buddling.
HEAD GEAR OR HEAD FRAME	The tall construction set over a shaft which carried the sheave wheels over which the winding ropes ran. Head frames usually contained ore bins or ore chutes to allow the broken rock in the skips or kibbles to be tipped into trams at surface.
HOTCHING (TUB)	A concentrating device used to separating the lead ore from the gangue material, by repeated suspension and settling in water. Also known as a jig.
HUSH	A method of working by which water is ponded up and then released along a prepared downward route to effectively strip the top soil and overlying rocks to reveal the lead vein. Often an early indicator of mining. Also often used for prospecting.
JIG	A large mechanically or hand-operated sieve set in a tank of water and agitated to separated out lead ore from waste. Sometimes constructed in groups within jigging houses.
KIBBLE	A large, strongly-constructed, egg-shaped, iron container used for ore and rock haulage in earlier shafts.
KNOCK-STONE	A stone or platform on which lumps of ore were manually broken to Size, often with a bucker.
LAUNDER	A wooden or steel trough used to carry water or other liquids; often used to feed water or finely-divided material in suspension around a dressing floor.
LEAT	An open watercourse (normally horizontally graded and following the contours) carrying a water supply for power or washing use. Often simply dug as an

	earthwork channel although may have stone sides.
LODE (VEIN)	A linear area of mineralisation underground. Sometimes referred to as a VEIN. Generally vertical or near-vertical, and often extending for considerable distances along its strike.
MEER	A measure of length of a vein, varying from 28 to 32 yards, by which grants were made to prospectors.
MINE SHOP	Dormitory-type accommodation for workers not living permanently on site. Often two storey, with accommodation above and smithy, workshops and/or stables below.
MIDDLINGS	An intermediate product of dressing, which normally contained sufficient lead mineral to make re-dressing worthwhile.
OPENCUT OR OPENCAST	An open working on a vein or other mineralisation, not worked by water.
ORE HEARTH	A method of smelting lead, similar to a blacksmith's hearth.
PEAT HOUSE	A purpose-built building used to store peat as fuel for smelting. Often open sided or well ventilated to allow the stored peat to dry.
POWDER HOUSE	A purpose-built building used to store gunpowder or other explosives, often at some distance to the mine. Also magazine store.
ROASTING HEARTH	A furnace for heating lead concentrate in contact with air before smelting, to drive off sulphur and improve physical characteristics.
RODWAY	The line of a flat-rod system transmitting power from an engine or waterwheel to point(s) of use; may survive as earthwork, tunnel, or line of mountings.
ROPEWAY	The line of a rope-operated haulage or power system.
ROYALTY	The payment of a certain stipulated sum on the mineral produced from an area of land.
SETTLING TANK	A tank in which sediments were deposited from waste waters, for reprocessing.
SHAFT	A vertical or near-vertical tunnel sunk to give access to the extractive areas of a mine.
SIEVING	A method of dressing by repeated suspension and settling in water, using a hand-held box fitted with a grid of wires or rods.
SLAG	The liquid waste product resulting from smelting.
SLAG HEARTH	A furnace for re-smelting ore-hearth slag to extract further lead.
SLAG TIP	A tip of slag from any form of smelter.
SLIMES	The finest material treated in dressing. Difficult to deal with but, by using the right techniques, could be successfully huddled to produce lead concentrate.
SMELTER OR SMELT MILL	A site where metallic lead was extracted from ore. Process include the bole-hill, the ore-hearth, the roasting furnace, the reverberatory furnace, and the slag hearth.

	Associated processes such as silver refining were also undertaken on some sites.
SPOIL HEAP	A tip of waste rock discarded directly from the mine without further processing. Spoil collars encircle shafts.
STAMP MILL	A building or structure containing a set of mechanically-powered stamps for pulverising ore.
STOPE	Excavated area produced during the extraction of ore-bearing rock. Often narrow, deep and elongated, reflecting the former position of the lode. Where open to the surface, these are termed openwork
TAILINGS	The waste sand and slime from a mine dressing floor, not containing workable quantities of mineral.
TAILRACE	The channel along which water flows after having passed over or under a water-wheel and is then generally returned to the water course.
TUB OR WAGGON	A waggon on rails for transporting ore, deads, and materials required in the mine.
VEIN	Mineral body in a horizontal, vertical or angled position.
VIRGIN GROUND	Unworked area.
WASHING FLOOR	An often terraced area, on which a range of ore processing operations was carried out, often open to the elements.
WATER-WHEEL	Wheel fitted with buckets or paddles around its periphery, and driven by the weight or force of a stream of water directed onto them. Housed in a wheel-pit.
WHEEL HOUSING	A structure built to house a water-wheel, often excavated and stone-lined, but sometimes free-standing.
WHIM OR GIN	A winding engine, worked by horses.

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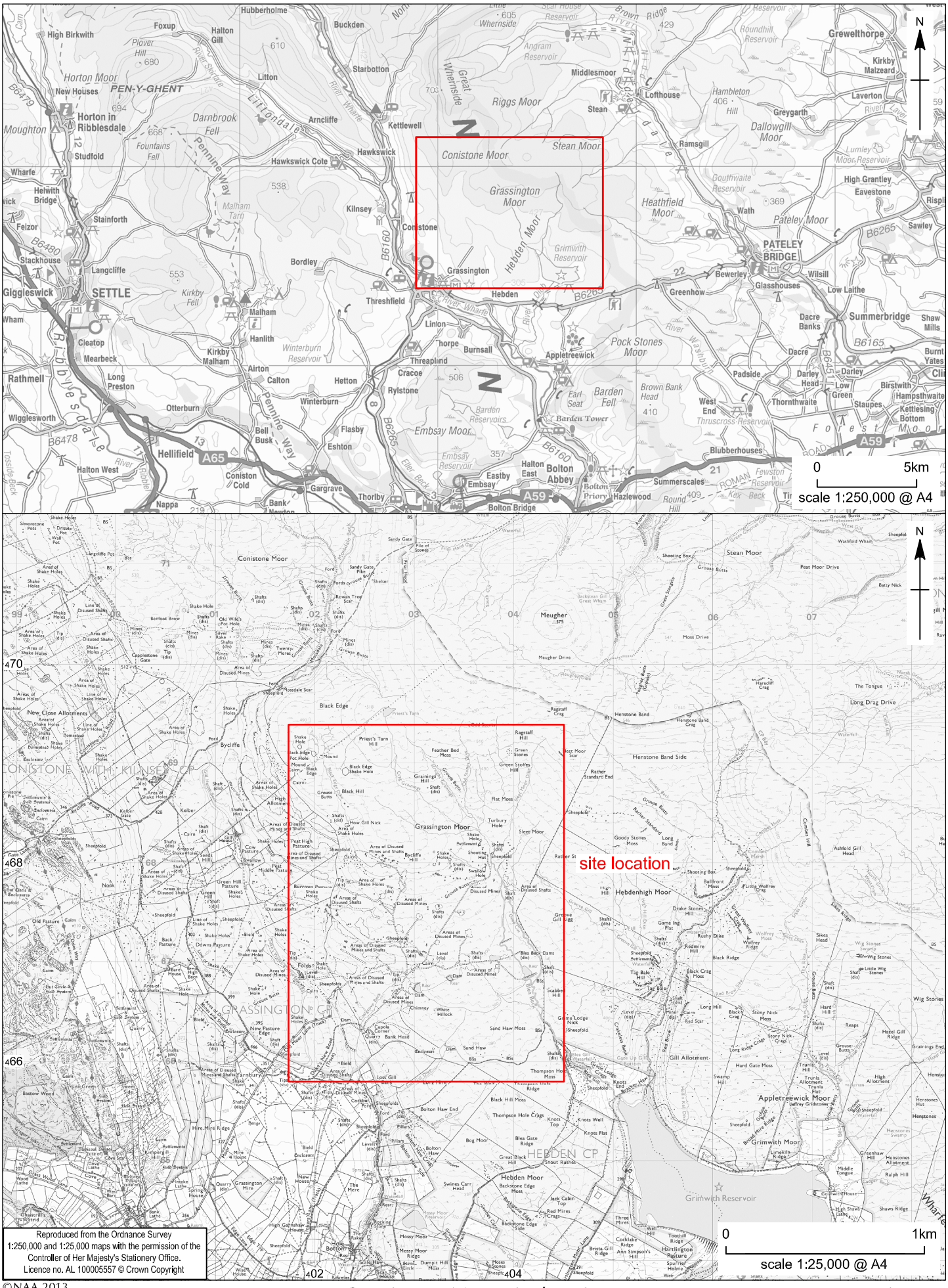


Grassington Moor: site location *Figure 1*

KEY
Scheduled Monument
survey area

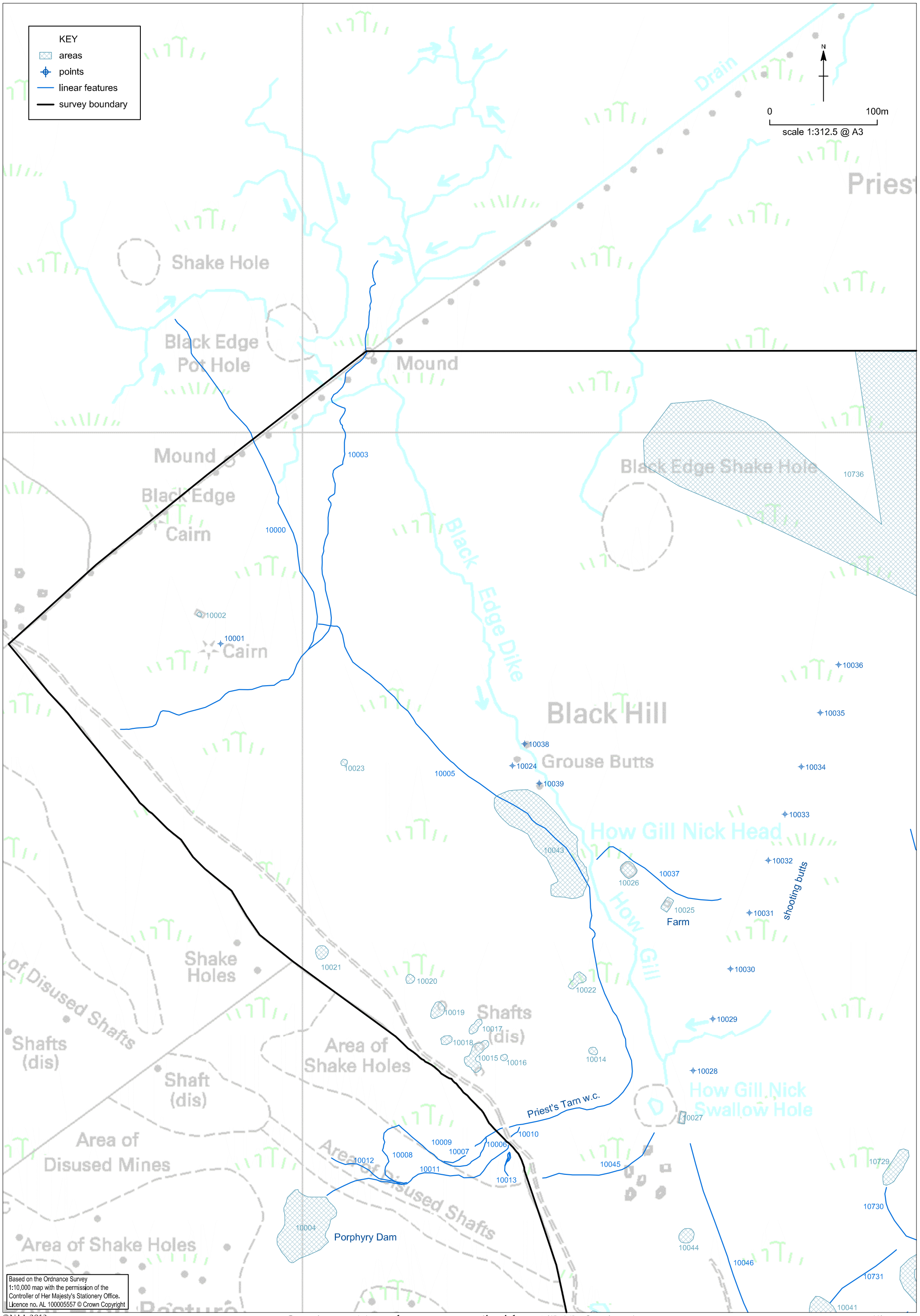
Section A
Section B
Section C
Section D
Section E
Section F
Section G
Section H
Section I

N

0 500m
scale 1:12,500 @ A3

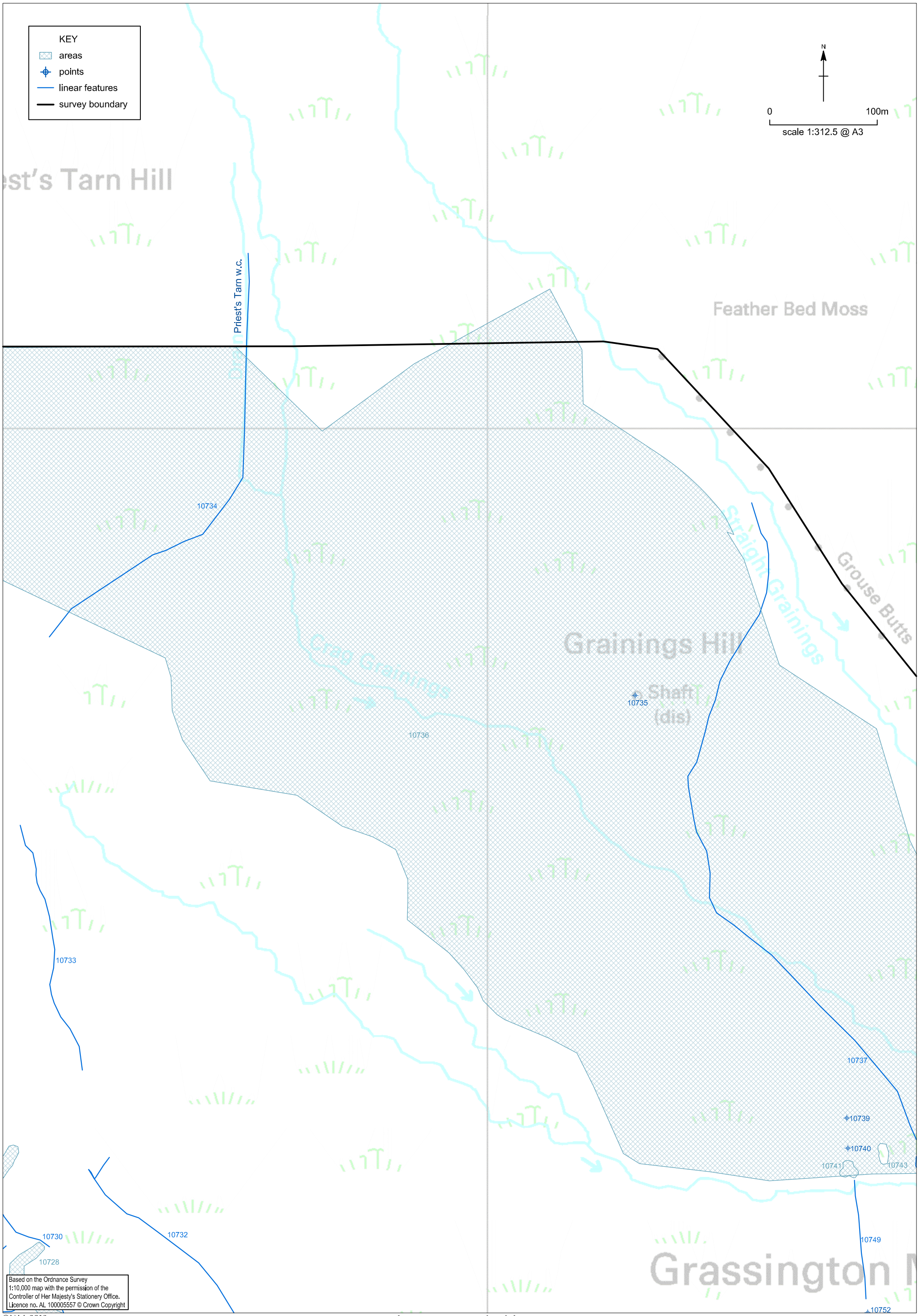
Grassington Moor: survey area and Scheduled Monument

Figure 2



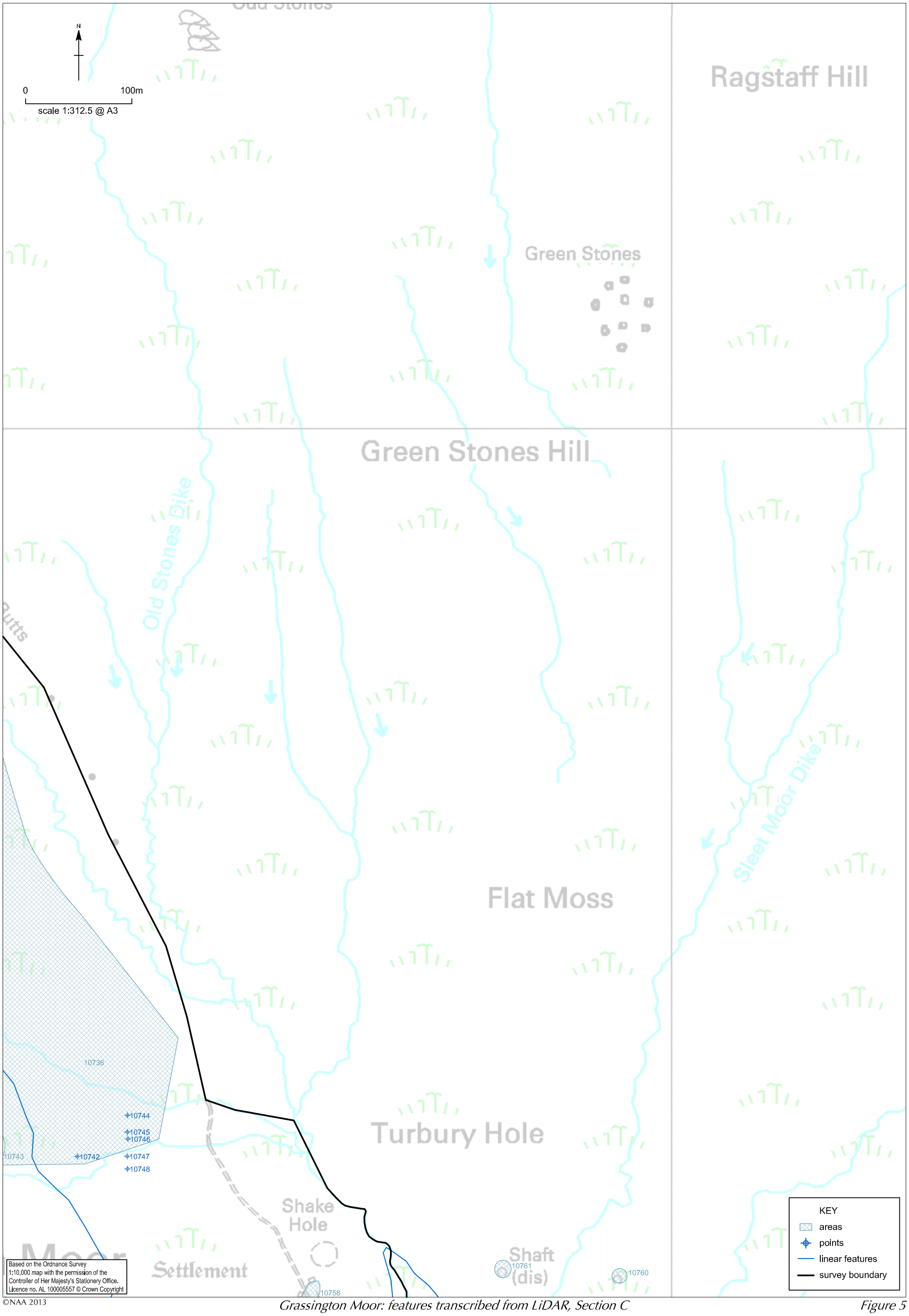
Grassington Moor: features transcribed from LiDAR, Section A

Figure 3



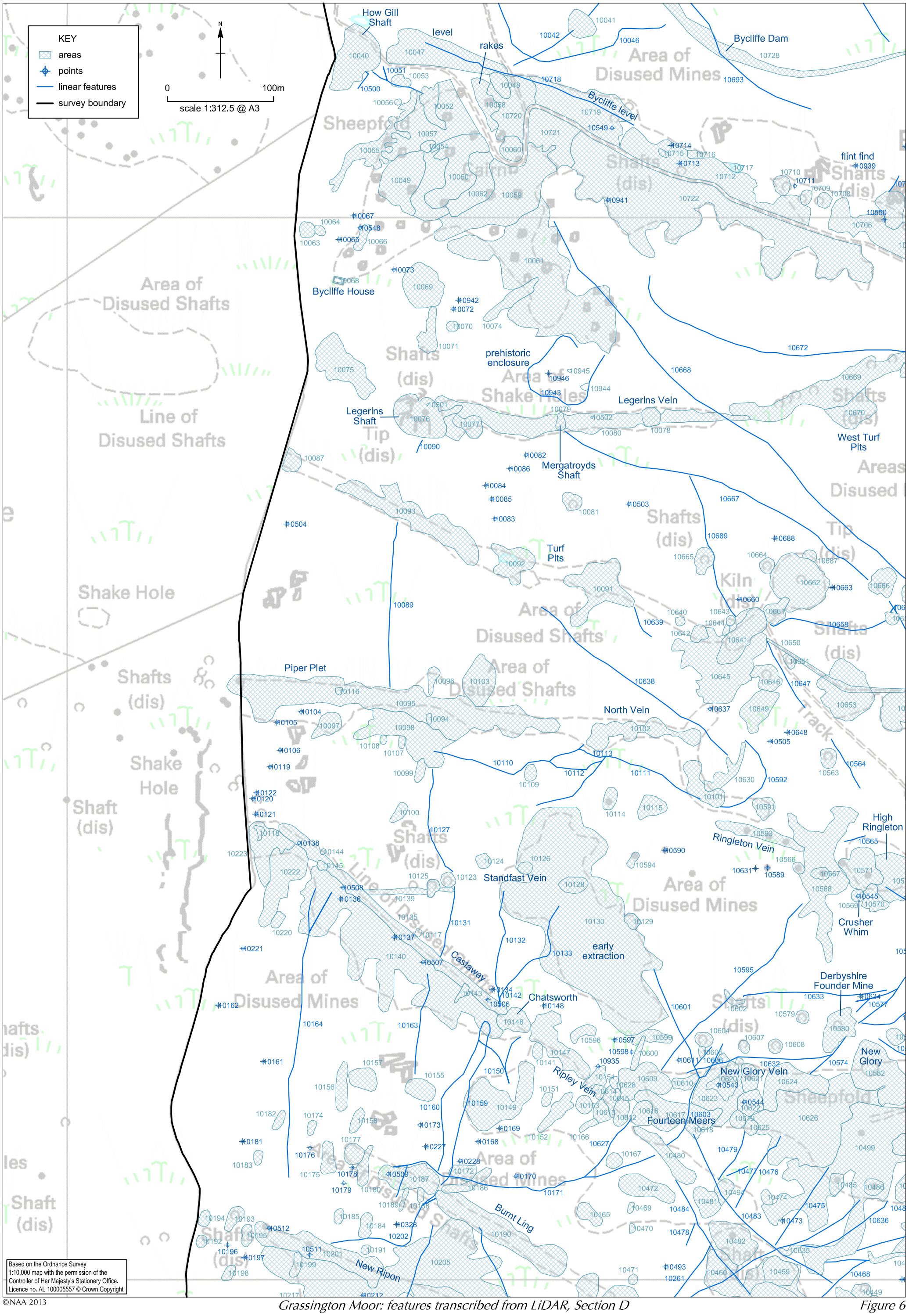
Grassington Moor: features transcribed from LiDAR, Section B

Figure 4



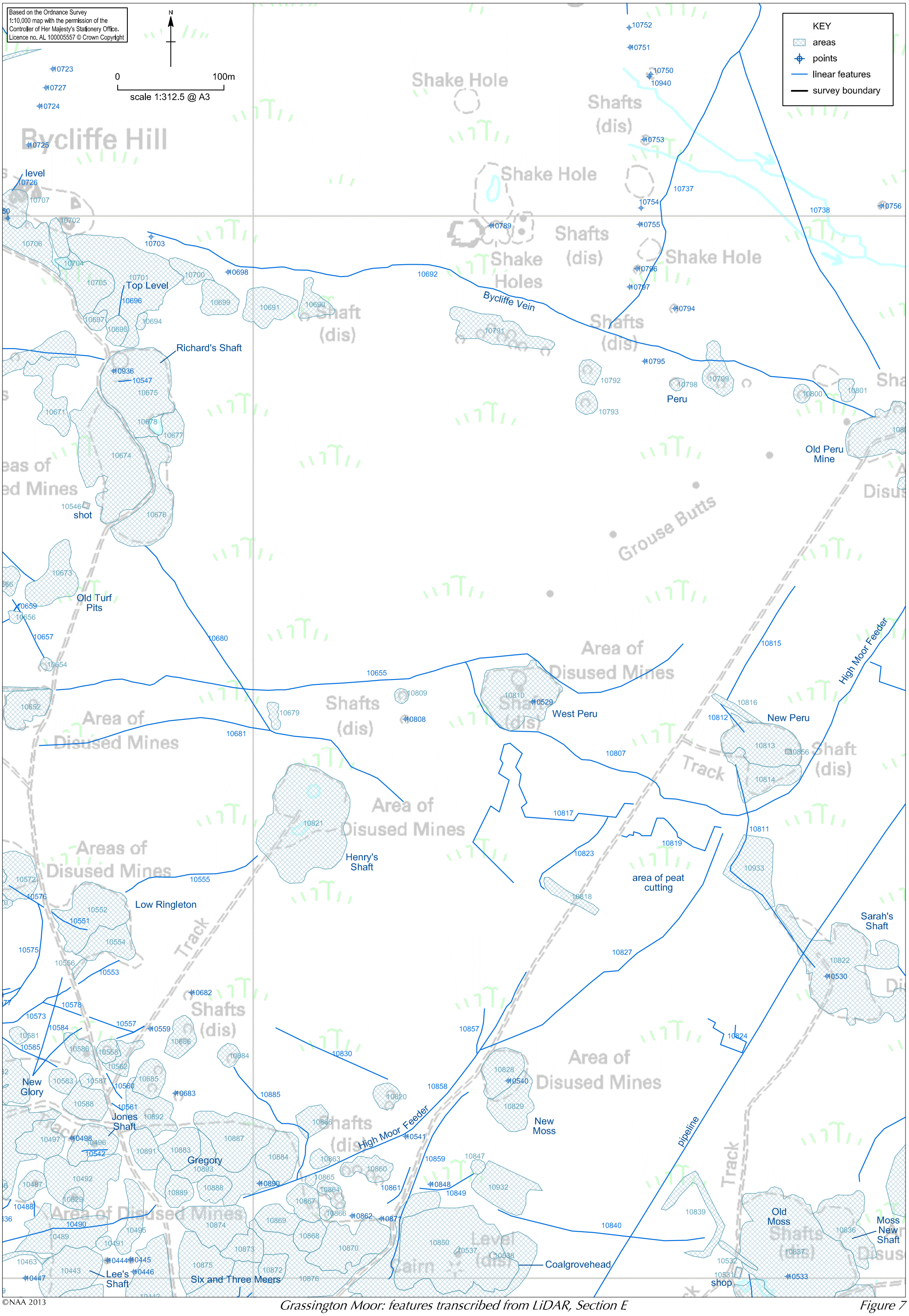
Grassington Moor: features transcribed from LiDAR, Section C

Figure 5



Grassington Moor: features transcribed from LiDAR, Section D

Figure 6



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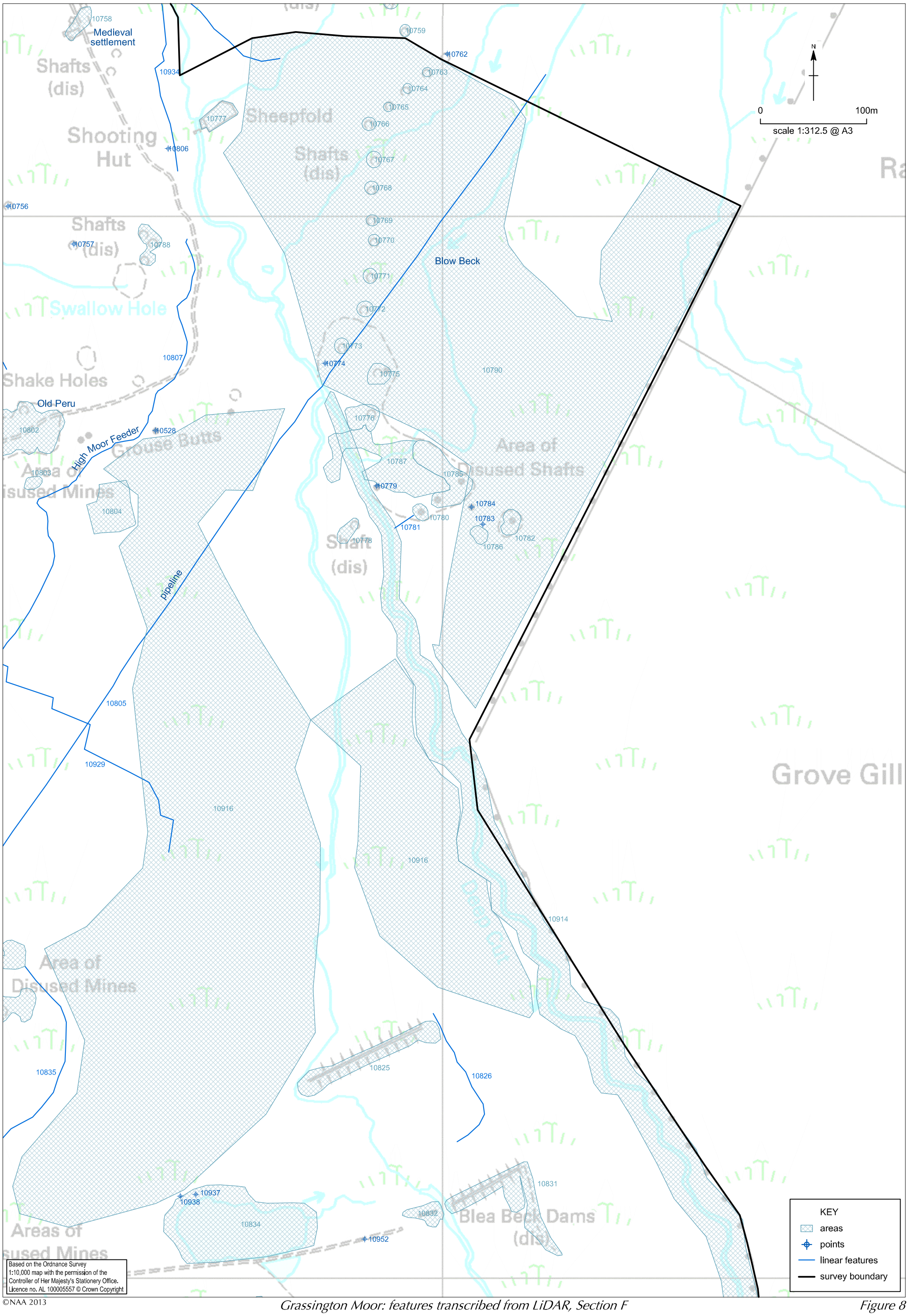
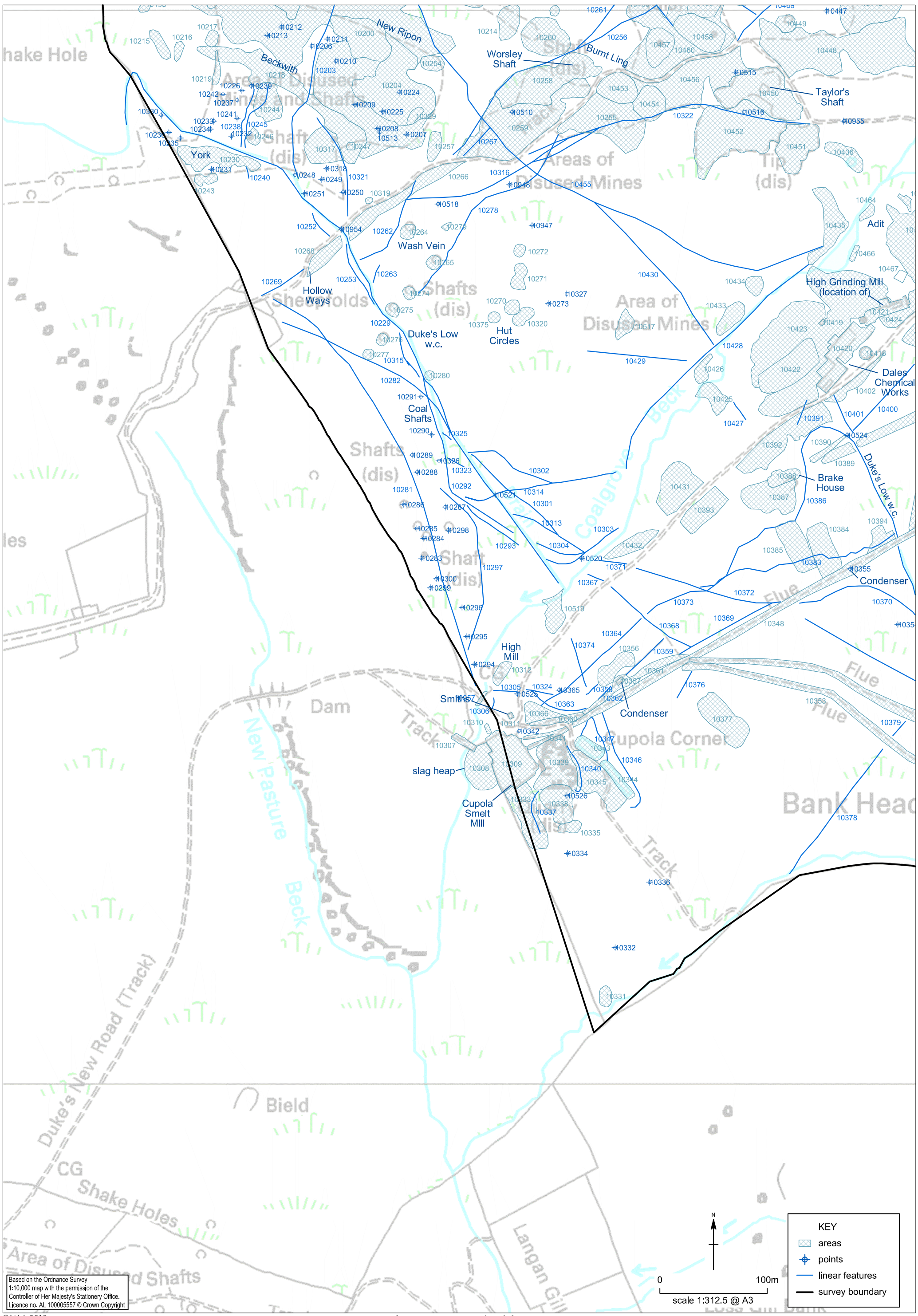
Grassington Moor: features transcribed from LiDAR, Section E

Figure 7



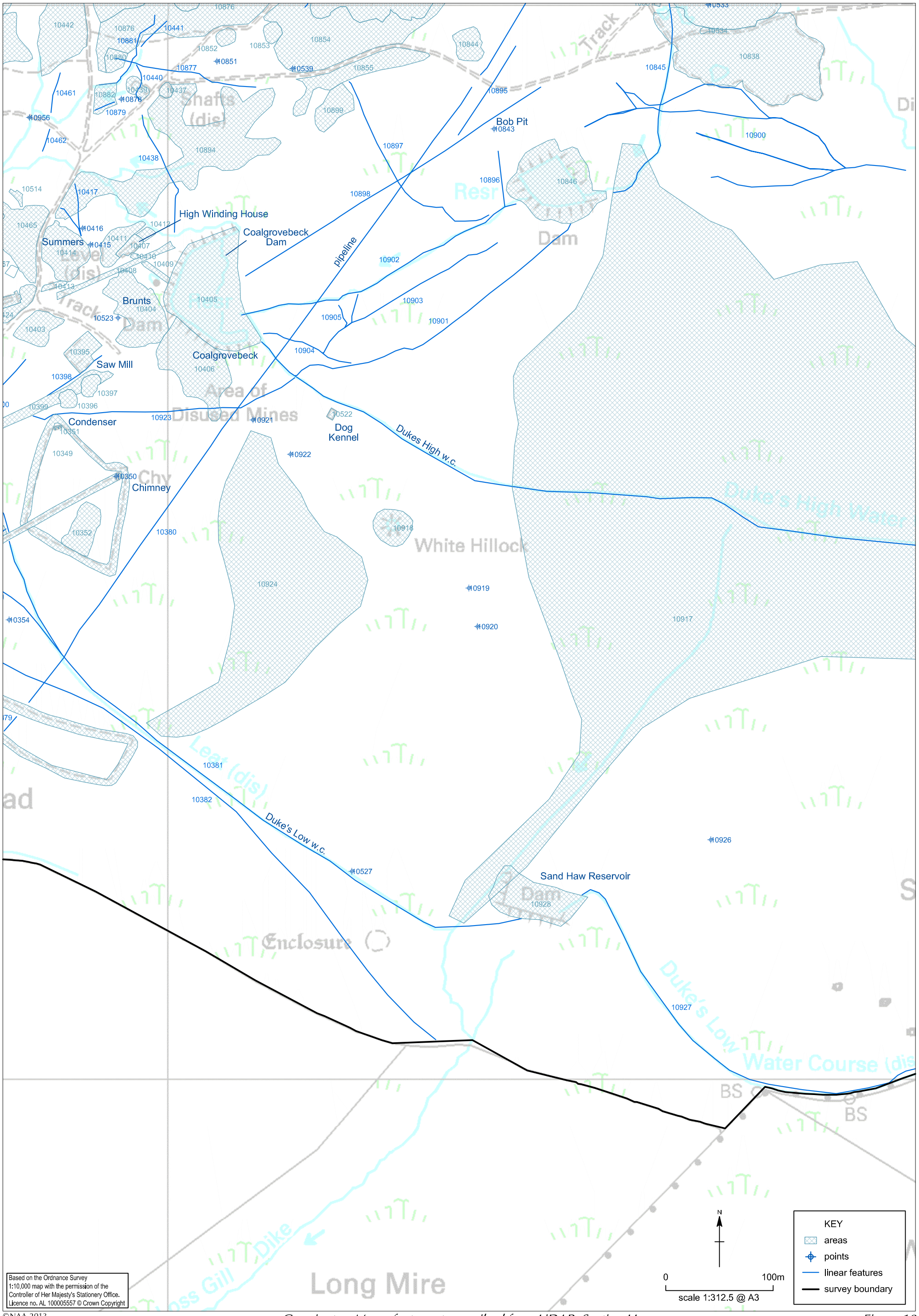
Grassington Moor: features transcribed from LiDAR, Section F

Figure 8



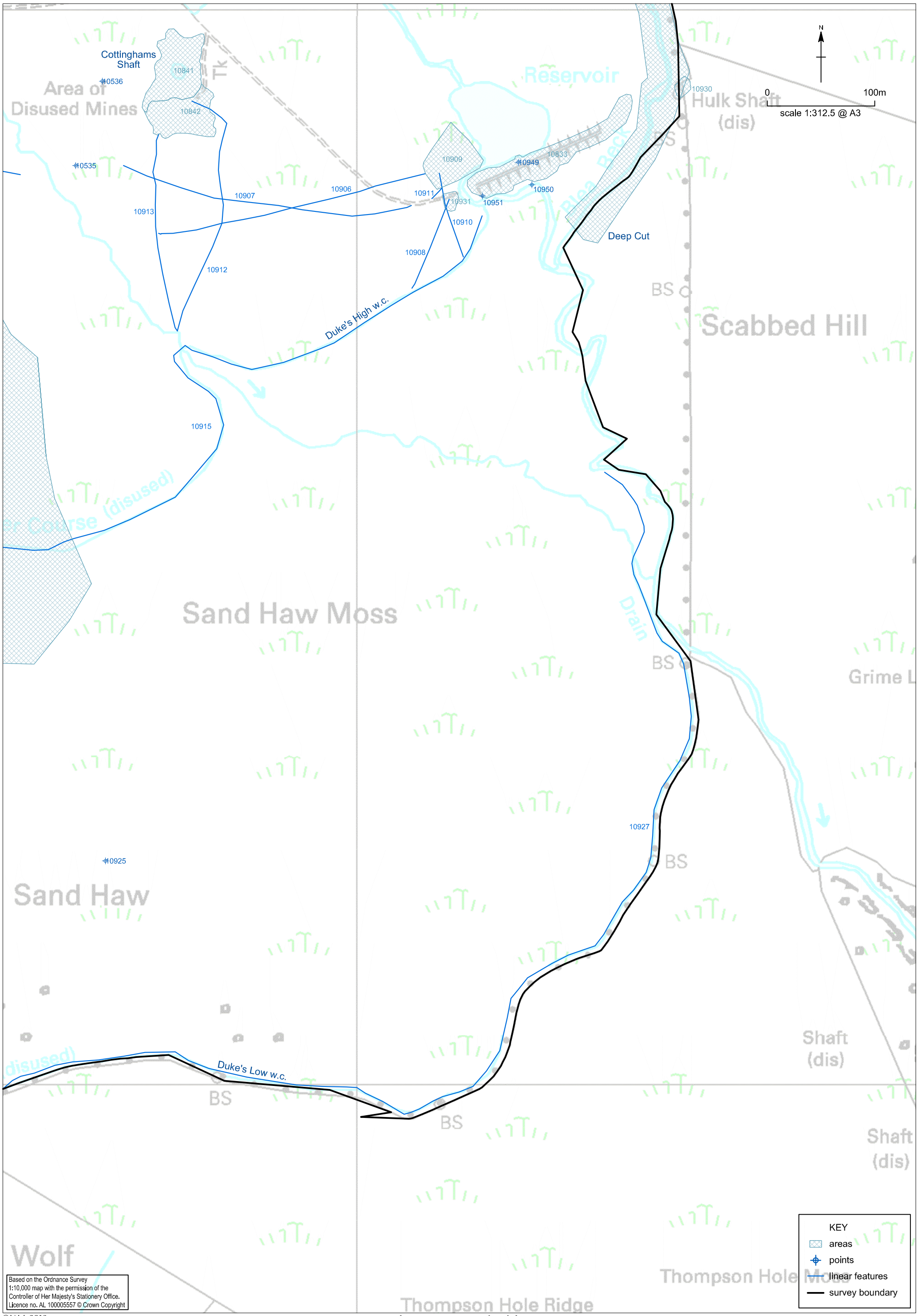
Grassington Moor: features transcribed from LiDAR, Section G

Figure 9



Grassington Moor: features transcribed from LiDAR, Section H

Figure 10



Grassington Moor: features transcribed from LiDAR, Section I

Figure 11