

TAN HILL AND KING'S PIT COLLIERIES,
MUKER AND BOWES,
NORTH YORKSHIRE AND COUNTY DURHAM

ARCHAEOLOGICAL SURVEYS



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EXECUTIVE SUMMARY

In February 2017, in order to support a separate Statement of Significance report, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Mr Miles Johnson, Senior Historic Environment Officer of the Yorkshire Dales National Park Authority (YDNPA) to undertake detailed measured archaeological surveys of a number of surviving earthwork features, principally shaft complexes including whim circles, coke ovens and causeways, within the Tan Hill and King's Pit collieries, located close to Tan Hill in North Yorkshire and County Durham.

The work equated to Level 3 archaeological surveys of seven specific sites or complexes. The work incorporated some of the extensive documentary research previously completed by mining historian Mr Les Tyson. The project was funded by the YDNPA as part of the Yorkshire Dales Industrial Monuments Management Scheme (YDIMMS), an Historic England funded programme designed to help conserve some of the most significant industrial heritage of the National Park.

The combination of detailed measured survey and extensive primary documentary research is ideal for understanding historic industrial landscapes from any post-Conquest period. The work undertaken at the Tan Hill and King's Pit collieries has recorded a selection of the surface structures in far greater detail than before, and has allowed these structures to be placed within the development of the collieries to a far greater degree than was previously possible. This is particularly the case with the horse whims, and the development of winding generally within both collieries. Recommendations are made as to how, through further targeted survey work, the development of horse-powered winding at other North Yorkshire collieries could be better understood.

1 INTRODUCTION

Reasons and Circumstances of the Project

- 1.1 In February 2017, in order to support a separate Statement of Significance report (Richardson & Dennison 2018), Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Mr Miles Johnson, Senior Historic Environment Officer of the Yorkshire Dales National Park Authority (YDNPA) to undertake detailed measured archaeological surveys of a number of surviving earthwork features, principally shaft complexes including whim circles, coke ovens and causeways, within the Tan Hill and King's Pit collieries, located close to Tan Hill in North Yorkshire and County Durham.
- 1.2 The seven separate surveys equate to Level 3 archaeological surveys, as defined by Historic England (English Heritage 2007). The work involved a combination of documentary research and detailed measured survey, the results of which were used to prepare this report. The extent of the project was defined by discussions between the YDNPA and EDAS. The project was funded by the YDNPA as part of the Yorkshire Dales Industrial Monuments Management Scheme (YDIMMS), an Historic England funded programme designed to help conserve some of the most significant industrial heritage of the National Park.
- 1.3 It should be noted that the following text uses the modern term for King's Pit, compared to the older Kings Pit (no apostrophe), which is often referenced in the historic documents.

General Site Location and Summary Description

- 1.4 The wider survey area for the Statement of Significance report covered the core of the Tan Hill and King's Pit Collieries complex, and straddled a number of administrative boundaries, including the modern County boundary between North Yorkshire (Muker parish) and County Durham (Bowes parish), and the historic boundary between the lordships or liberties of Swaledale and Bowes; part of the area of North Yorkshire also includes the Yorkshire Dales National Park (see figure 1).
- 1.5 The main part of the survey area lies on the south side of the unclassified road (known as the 'Long Causeway') which runs between Reeth and Appleby-in-Westmorland, with a smaller part lying to the north of the road, to the rear of the Tan Hill Inn. The southern part covers Tanhill Moss and the former Tan Hill Colliery, while the northern part covers the former King's Pit Colliery. The land to the south of the road forms part of the Gunnerside Estate whilst to the north it falls within the Bowes Estate. The survey area is all open access land, defined by the Countryside and Rights of Way (CROW) Act 2000, with the eastern half falling within a large grouse moor.
- 1.6 The county boundary between North Yorkshire and County Durham is partly defined on the ground by a series of boundary stones, and there is a single modern post and wire fence which also crosses the survey area. The boundaries of the survey area are largely defined either by natural features such as gills or sikes, or the extent of the surface mining remains. In terms of surface vegetation, in general terms, the eastern half of the survey area (the former King's Pit area) has a thick covering of heather, interspersed with areas of peat bog, whereas the western part (Tan Hill) is largely rough grass, again interspersed with peat bog.

- 1.7 In terms of previous research, the King's Pit and Tan Hill collieries were included in a wider consideration of coal mining within the Yorkshire Dales by Gill (2008, 88-91). Large scale maps of both collieries, including underground workings and surface remains, have been prepared (largely from historic maps) by the Northern Mine Research Society (NMRS) and are held in their archives. However, the most detailed research undertaken to date, including inspection of the surface remains, has been carried out by mining historian Mr Les Tyson. At the time of writing, this research remains unpublished, although Mr Tyson generously allowed EDAS access to it during the course of this project, as well as the use of copies of various maps and plans he has obtained. The majority of the early plans and maps relating to the collieries are held in the North Yorkshire County Record Office (NYCRO) in Northallerton.

Aims and Objectives of the Project

- 1.8 The aims and objectives of the project were:
- to support the findings of the Statement of Significance;
 - to produce detailed measured archaeological surveys of a number of the most important or representative features within the two colliery complexes.

Survey Methodologies

- 1.9 Using the information gained during the rapid walkover survey undertaken for the earlier Statement of Significance (Richardson & Dennison 2018), a number of elements within the colliery landscapes were chosen for further detailed measured survey. The Statement of Significance had identified that, in terms of the surface remains, the surviving whim circles, coke ovens and causeways were of particular importance. A selection of these were therefore surveyed, based on their state of preservation, their representativeness, or their unusual form. The measured survey included both whole shaft complexes and their individual elements. A total of seven separate sites or site complexes were surveyed.

Collation of Documentary Material

- 1.10 Information relating to the surveyed sites, and the wider area in general, was obtained from the YDNPA Historic Environment Record (HER) and Historic England's National Record of the Historic Environment (NRHE) (Pastscape). This information comprised lists of identified archaeological sites and monuments, records/reports of any previous historic research and archaeological activity, current and historic aerial photographs, past management and land ownership records, and historic maps and plans. Information was also requested from the Durham County Council HER, but it was found that they did not have any relevant information. The NYCRO in Northallerton was not specifically consulted, in view of the amount of material already collated by Les Tyson (see below).
- 1.11 Liaison was also undertaken with Mr Les Tyson (mining historian) and Mr Mike Gill (Recorder of the NMRS). Les Tyson in particular has been researching the history of Tan Hill and King's Pit collieries for over ten years, and has amassed a very large body of information on their operation from the later medieval period through to the mid 20th century. This unpublished research was very generously made available to the authors during the writing of this report, but only a very small proportion of it has been reproduced.

- 1.12 A full list of primary and secondary sources consulted are given in the Bibliography (Chapter 5) below.

Detailed Measured Survey

- 1.13 Surveys were undertaken at a scale of 1:200 of the Low Gin Shaft and Gin Shaft complexes within Tan Hill colliery using EDM total station equipment. Sufficient information was gathered to allow the survey area to be readily located through the use of surviving structures, fences, walls, water courses, trackways and other topographical features. The survey recorded the position at ground level of all structures, wall remnants and revetments, earthworks, water courses, leats, paths, stone and rubble scatters, ironwork, fences, walls and other boundary features, and any other features considered to be of archaeological or historic interest. The survey also recorded any differences in the exposed surface detritus, such as sorted stone and/or rubble scatters, as well as differences in coarse vegetation; these features may aid the functional differentiation and interpretation of the site. The individual site surveys were not integrated into the Ordnance Survey national grid, and heights above Ordnance Datum were not obtained, due to the lack of any easily accessible nearby OS benchmarks; north was obtained using a hand-held compass in the field. On completion of the total station survey, the field data was plotted and re-checked on site in a separate operation, and any amendments or additions were surveyed by hand measurement. The resulting site surveys were produced at a scale of 1:200 and presented as interpretative hand-drawn wet ink hachure plans using conventions analogous to those used by English Heritage (1999; 2002, 14; 2007, 31-35), now Historic England.
- 1.14 Other surveys were undertaken using traditional hand-held measuring techniques, at a scale of 1:50. Generally, a grid was set out around the earthworks or structure using tapes, ranging rods and an optical square. The whim circles at Low Gin Shaft, High Gin Shaft and Tanhill High Gin within Tan Hill colliery were recorded in this way, with profiles also made across each circle at a scale of 1:50 using a dumpy level. Within King's Pit colliery, plans were made of a possible whim circle at Miles Shaft, a structure associated with a possible 1950s drift or level, and a plan and profile across a causeway leading to King's Pit High Gin. The resulting site surveys were presented as interpretative hand-drawn wet ink hachure plans as described above.
- 1.15 Sufficient notes were taken in the field to provide a detailed written description of all surveyed features. No specific photographs were taken of the site, as this element had already been covered by the previous Statement of Significance report. The majority of the survey work took place between February and April 2017, with a final visit undertaken in August 2017.

Survey Products

Archaeological Survey Report

- 1.16 This EDAS archive survey report has been produced from the results of the documentary collation and the information obtained through the detailed measured survey work. The report is illustrated with reduced versions of the inked-in field drawings, copies of historic maps, and a selection of photographic plates, as appropriate.

- 1.17 Mr Les Tyson and Mr Richard Lamb kindly provided comments on a pre-consultation draft of the survey report. The final survey report was then provided in hard copy and electronic pdf format to the YDNPA.

Archaeological Survey Archive

- 1.18 An archive of material, comprising paper, magnetic and plastic media, relating to the project has been ordered and indexed according to the standards set by Historic England. This was combined with the archive resulting from the Statement of Significance report, and was deposited with the YDNPA HER at the end of the project (EDAS site code THC 17).

2 HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

Introduction

- 2.1 A detailed outline of the historical development of the Tan Hill and King's Pit Collieries has already been given in the Statement of Significance report (Richardson & Dennison 2018), which draws very heavily on private research undertaken by mining historian Les Tyson. This is not repeated here, although the following text concentrates on those elements of the surface remains (whim circles, coke ovens and causeways) which formed the focus of the survey work; once again, it again draws heavily on private research undertaken by Les Tyson.

Causeways

- 2.2 Coal was being worked in the Tan Hill area, within Bowes lordship, from at least the very end of the 13th century, and this working continued throughout the later medieval period (Vellacott 1912, 339). There is no doubt that these coal mines would have been connected into the local transport network around Tan Hill, and also further afield, given that coal was being taken to Richmond by the late 14th century. Throughout this period, and into the post-medieval period, the vast majority of the coal is likely to have been taken out of Tan Hill by packhorse, perhaps being transferred onto carts when better highways closer to major settlements such as Richmond were reached.
- 2.3 It is likely that a network of roads or causeways running between the pits at both collieries was present by at least the mid to late 18th century, and had probably been present in some form since the late 17th century, when the boundary between the two mining areas was defined for the first time (NYCRO ZAW 127). Most of the pits in the Tan Hill coalfield were sunk through peat and it was necessary to build a series of causeways across the peat to serve them (Gill 2008, 88). It is suggested that, as a shaft was being sunk, the spoil and waste was tipped in the direction of where the next shaft was planned to be, so that the causeway could be extended in that direction (Les Tyson, *pers. comm.*). The coal was moved by packhorse, and a complex network of routeways developed around the collieries, with at least seven packhorse routes converging on Tan Hill (Wright 1985, 133). At some point between 1738 and 1763, when King's Pit was owned by Wingate Pulleine, a plan was made, entitled "A Sketch of Part of the Lordship of Bowes where the Coale Pittes are belonging to Wingate Pullein Esq" (NYCRO ZAW 237/1). As well as showing surviving dated boundary markers and some named shafts, dashed lines marked running between the shafts may in part represent causeways (see figure 2).

- 2.4 In the latter part of the 18th century, the importance of an improved local transport network to both King's Pit and Tan Hill collieries cannot be overestimated (Les Tyson, *pers. comm.*). The Middleton Tyas-Brough-Bowes road had been turnpiked in 1743, but it lay some 3½ miles north of Tan Hill, with transport to and from the collieries still dependent on packhorse tracks. Interestingly, Wingate Pulleine had been sent a copy of the 1743 Turnpike Act to comment on, which he did as follows:

'Sir, I have looked over your Bill you inclosed and I think it will now do with some little alterations I have made viz you have made me Lord of Bowes, which I am not for that was sold off by Hanby, that is ye power of keeping Courts which as we were all Lords and could not answer to our own Courts I observe what you say as to ye Turnpike, sixpence per score and one penny per horse is ye most should be layed on, if more you will set all ye cattle another road and if less will not repair ye road, so this should be well considered, for I do assure you near one half of ye cattle went another road this year and I wish this other Turnpike do not make more fly it till it be got thoroughly mended, it will, I am sure. As to ye Trustees I care not who they be, make but a proper qualification, it will demolish most of ye Westmorland chaps. But if you could drop Whittell and Brunskill I should be glad of it. In my opinion Colliers should pay in full for they do ye most damage and I hope they will order it so. Upon second thoughts no coals will come upon the New Turnpike Road, they will only cross it where no gate can be fixed.' (NYCRO ZAW 134).

- 2.5 In 1768, an Act was passed for the creation of a secondary road from near Maiden Castle to Reeth, via the collieries at Tan Hill, King's Pit and Taylor Rigg, with the aim of improving the carriage of lead and coal (Wright 1985, 181 & 189). An accompanying map of c.1770 (Vyner 2001, 149) is of great interest, in that it shows the Tan Hill area in some detail (see figure 4). The now demolished 'Tann Hill House' appears as a two storey building of symmetrical appearance, with two windows to each of the ground and first floors, and a stack at either end of the roof ridge. The causeways to both 'Tann Hill' and 'King's Pitt' collieries are shown. The Tan Hill causeway was marked as being '96 Roods' in length - a rood more usually denotes a unit of area, but it can also be an obsolete unit of linear measurement, of between 16½ to 24 feet (roughly 5.0m to 7.3m). Taken in this sense, the causeway shown on the map would be between 480m and 700m long. Starting at the Long Causeway, and following the main causeway through the colliery as shown on a later 1822 plan (see below), a distance of 480m would run close to Jonathan's Shaft, whereas 700m would reach either short of Barker's Shaft or Nook Shaft. Using the same methodology for King's Pit, the causeway would be between 295m and 431m long; the former distance would reach short of another Nook Shaft, the latter between Nook Shaft and Water or Rigg Shaft. This would make the King's Pit causeway considerably shorter than that shown on a c.1774-1816 plan (see below). However, it may be the lengths given on the map refer to what was going to be improved as part of the works, rather than what was actually laid out. From about 1790, and perhaps as a result of the works outlined above, small carts were also slowly being introduced into the coalfield (Wright 1985, 128); contemporary documentation for the isolated Fountains Fell colliery, North Yorkshire, makes frequent references to the use of horses and carts for transportation in the very early 19th century (Evans & Quartermaine 2017, 15).

- 2.6 A number of maps and plans survive from the first decades of the 19th century, which give a detailed depiction of both the above and below-ground workings at both collieries. At the beginning of the 19th century, King's Pit colliery remained in the ownership of Henry Pulleine, and was leased by him to various lessees. One plan, dating from the period of his ownership (1774-1816), shows the surface

layout of King's Pit in some detail (NYCRO ZAW 237/2) (see figure 3). Entitled "A Plan of Henry Pulleine Esq's Colliery at Tan Hill", it depicts a trackway or causeway branching off the south side of the Long Causeway and then running south-east. It bifurcates at its south-eastern end, and has a total of 13 shafts or pits marked along its length, many of which are named.

- 2.7 However, in terms of surface remains, probably the most useful of the plans was that made in 1822 (Robert White collection), which includes a considerable amount of detail which does not occur on earlier or later plans (see figure 5). The causeways linking the shafts at both collieries are shown in a reasonably realistic topographic manner, and one 'Old Road' is also marked within the Tan Hill colliery area. The causeways to Tan Hill and King's Pit collieries are also shown on contemporary non-mining plans and maps, such as Anthony Clarkson's 1833 *Profile of the Road up Arkindale from Reeth to Tanhill* (CB Inn, Arkengarthdale) but generally not in the same detail.
- 2.8 The causeways at King's Pit appear to have been the subject of some dispute in 1827, when that from 'Arkingarthdale Road to Bell Shaft' was stated to be in a bad state for want of repair. The repairs had formerly been undertaken by the West Country Commissioners (i.e. those responsible for the adjacent turnpike road), but they were of the opinion that they were only responsible for that part of the causeway that was in existence at the time of the original Act (i.e. 1768), and not for any subsequent branches or extensions (NYCRO ZAW 232). Somewhat earlier, in 1779, accounts paid by Pulleine's agent Edward Cherry record £2 6s 8d spent on 'repairing the Turnpike at Tanhill' by Thomas Alderson (WYAS SpSt/5/4/3/81), and it is possible that this too may refer to the causeway within Tan Hill colliery rather than the turnpike road itself. The Ordnance Survey 1856 6" to 1 mile map (sheet 22) shows that the causeways at both collieries had been extended south-eastwards since 1822, following the progress of the underground pillar and board workings (see figure 7).

Whims

Nomenclature

- 2.9 A recent study has outlined the differences between horse gins and horse whims (Gill, Knapp & Gallagher 2014). Both devices had a substantial timber frame which supported a central rotating vertical axle. One end of a long lever was fixed to the axle, with the horse(s) harnessed to the other end. The horse then walked on a circular path, usually paved with crushed stone, to drive the device. A *gin* made use of crude cog and rung gearing - a large diameter cog was fixed to the rotating axle and its teeth (usually wooden pegs) meshed with the rung on the end of a winding drum set over the shaft, thus dictating that the shaft was inside the horse walk (see figure 8 top). These gins have also been termed 'cog and rung gins' by Roe (2003, 111), and indeed by much earlier authors, including Sir John Clerk in the early 18th century (Duckham 1968, 223-224 & 249). By contrast, a *whim* had a horizontal winding drum which was fixed high up on the vertical axle (see figure 8 bottom). The winding rope(s) ran on jockey pulleys over the horse to the shaft, which lay outside the horse walk. Gill *et al* note that there is clear evidence for the long-term inter-changeability of the two names on maps and other historic documents (Gill, Knapp & Gallagher 2014, 82-83). In relation to those sites surveyed by EDAS, in all cases where the relationship can be discerned on the ground, the horse-walk is placed to one side of the shaft, rather than surrounding it. Therefore, in the following text, where earthwork features for the horse-walk survive, they are referred to as 'whims' rather than 'gins'.

General Historical Background

- 2.10 The use of horse power for winding or raising in mining operations is obviously of some antiquity. As already outlined above, there appear to have been two main types of horse-powered winding mechanism, the gin and the whim, with the 'cog and rung' gins often being presented as the earlier and inferior of the two, although Roe (2008, 37-38) suggests that both types have been around since at least the 15th century. In 1556, Agricola documented a horse-powered whim for winding, and also described similarly structured horse-powered mechanisms for pumping and blowing (Hoover & Hoover 1950, 164-167 & 210-211). A variation of the whim, known as a *Winde*, was used in German millstone quarries, turned first by men and latterly by horses. The main difference was that, rather than having a winding drum mounted on the vertical shaft, the chain wound around the shaft itself. Although well documented in the early 19th century (Kenneth Major 1982, 198-201), their form suggests that they had significantly earlier origins.
- 2.11 Horse-powered winding mechanisms are thought to have been introduced into Britain during the 17th century, and they became widespread throughout the 18th century on mining operations for many different materials. In the Leicestershire and South Derbyshire coalfield, the first reference to coal being raised by means of a horse gin, perhaps of the cog and rung variety, comes in the mid 17th century (Griffin 1978, 68). Cog and rung gins are suggested to have been used at Scottish collieries during the 17th century and, as described above, the winding drum was placed on a horizontal axle immediately over the shaft. These types of gins are said to have been inefficient in terms of energy, and their operation also tended to obstruct the shaft mouth (Isaac 1987, 1). They would appear to have a number of disadvantages in comparison to a whim, as follows:
- the cog and rung gin requires a larger diameter horse circle to clear both the shaft and the gearing mechanism, which in turn necessitates a longer span beam, resulting in much greater complexity and hence cost, an increased liability to damage and resultant breakdowns, and much more friction;
 - the mouth of the shaft lies within the horse circle, thus causing access problems, although it could be arranged for the coal and spoil to be removed while the horse is waiting; and
 - there is very little clearance between the barrel and the ground for landing the corves (container or basket), necessitating some kind of warning for the horse to stop (Richard Lamb, *pers. comm.*).

The possible earthwork remains of cog and rung gins may have been recognised at the Greenhow Lead Mines in North Yorkshire (Roe 2003), and at former collieries in Middleton Park, Leeds, West Yorkshire (Roe 2008, 38-41).

- 2.12 The use of horse-powered winding in coal mining is well documented on Tyneside. It is suggested, based on contemporary sources, that gins were introduced into this area in the early 18th century, and that in 1724 cog and rung gins were the only type in operation. They remained in use in the late 18th century and possibly into the early 19th century, but were believed to have been universally superseded by whims by the 1840s (Roe 2008, 37-38). In 1724, the Scottish colliery owner Sir John Clerk, during a visit to Tyneside, sketched what he stated was the variety of gin found in the area, showing what would become termed a cog and rung gin. However, in what he described as a *Scotch Gin*, he drew the mechanism that is now generally referred to as a whim, stating that *I think that the form we use is to be preferred to the Newcastle engine, which has a great deal more friction in it ... I seldom observed any of them at that place where the Teeth or Cogs were all*

entire, and there was always a sudden Jirk given, where any of these happened to be broken (Duckham 1968, 223-224 & 249).

- 2.13 It is interesting to note that on his sketches of both the whim and the gin, Sir John Clerk showed two harnesses on each of the turning arms, indicating that a pair of horses was to be used. This coincides with the advice given in *The Compleat Collier*, written some 16 years earlier in 1708 and relating to coal mining as then undertaken in Sunderland and Newcastle. The author recommended that for drawing coal from a pit, with 21 score of corves being drawn per day, eight horses would be needed, working in four shifts of two (JC 1708, 32-33).
- 2.14 In some coalfields, whims were in probably in use by the mid 18th century; the 'gin wheel' and 'pullies' referred to at Swannington in Leicestershire probably represents a whim (Griffin 1978, 68). The whim is traditionally stated to have evolved from the 'cog and rung' gins, with the winding drum mounted on the vertical shaft being usually between 12 feet (c.4.0m) and 16 feet (c.5.3m) in diameter. The head pivot of the vertical shaft was supported by a long beam, sometimes called the span beam, which rested at either end on inclined timber legs or a timber frame. The turning arm was generally between 30 feet (c.10m) to 36 feet (c.12m) long in total, with horses harnessed to one or both ends. The track around which the horses walked was circular and often consolidated with gravel, with diameters of between 25 feet (c.7.6m) and 40 feet (12.2m). Ropes passed off from opposite sides of the drum and led over small guide pulleys to sheaves set in the shaft-frame overhanging the pit (Isaac 1987, 2).
- 2.15 The earliest known whim erected at the lead mines on Grassington Moor was by William Brown, a colliery viewer, at Coalgrovebeck in 1765 (Gill, Knapp & Gallagher 2014, 82). However, horse-winding equipment was evidently being set up significantly earlier than this at other North Yorkshire collieries. Accounts for the sinking of Speedwell Pit, at the Colsterdale colliery near Masham, in 1736-37 include a payment to a William Buston of 'Witton on Wear' (Witton-le-Wear, near Bishop Auckland, County Durham) for making a 'Ginn' and also to travel to Colsterdale to 'sett out wood for the said Ginn' (NYCRO M2181.F2330 & ZS Box 37). These accounts contain a substantial amount of interesting detail regarding the 'Ginn', and it is additionally significant that someone was brought in from outside Yorkshire to set it up. The local colliers were evidently able to erect the 'Roll and Standers [standards]' over the shaft, but required Buston's expertise with the gin, possibly indicating that this was new technology in the region necessitating outside assistance (Richard Lamb, *pers. comm.*). In this regard, it is quite possible that a similar process might have taken place at Tan Hill, given the relative geographical proximity of County Durham.
- 2.16 It was not unknown for whims to be set up in underground chambers as well as on the surface, with either the chamber surviving, as at the Burtree Pasture lead mine in Weardale (Dunham & Hobbs 1976, 13) or more rarely the whim itself, as at the Scaleburn Vein in Nenthead (Gill, Knapp & Gallagher 2014, 86). From the mid 18th century, as collieries increased in size and sank deeper shafts, the limitations of horse whims and gins began to become clear - a single horse whim could not raise more than 100 tons per day, creating bottlenecks below ground (Isaac 1987, 2). A partial solution to this was to sink multiple shafts, but colliery owners increasingly turned to either water or steam power, with steam winding being introduced on Tyneside and in Leicestershire during the 1780s (Griffin 1978, 68). Nevertheless, horse whims remained in use at the smaller coalfields well into the 20th century, with at least one still in operation at Madeley in Shropshire as late as 1948 (Brown 1976, 59).

Tan Hill Colliery

- 2.17 The earliest possible reference to whims at either the Tan Hill or King's Pit collieries may come on the plan referred to above titled "A Sketch of Part of the Lordship of Bowes where the Coale Pittes are belonging to Wingate Pullein Esq" and dating to between 1738-63 (see figure 2). Within Tan Hill colliery, two of the shafts are possibly named as 'Gin Shaft', although this is not absolutely certain. A more definite reference to winding equipment comes on the aforementioned c.1770 map accompanying the 1768 Act passed for the creation of a turnpike branch from near Maiden Castle to Reeth, via the collieries at Tan Hill, King's Pit and Taylor Rigg, with the aim of improving the carriage of lead and coal (Vyner 2001, 149) (see figure 4). The causeways leading to the collieries at Tan Hill and King's Pit both terminate in stylised square shafts with a two-handled jack-roll drawn over the shaft. A jack-roll was a hand-operated piece of winding equipment, essentially comprising a horizontally mounted roller around which the rope was wound, set on a simple frame and with a handle at one or both ends. Their use extends back to at least the late medieval period, with a two-handled example very similar to those shown on the c.1770 map illustrated by Agricola in 1556 (Hoover & Hoover 1950, 161). On rare occasions, more recent examples can survive within mine workings, such as the example photographed at the Prince Edward gold mine in North Wales in 1982 (https://www.aditnow.co.uk/Photo/Jack-Roll-1982_98512). There are early 18th century references to similar winding equipment in the Tan Hill area (see below).
- 2.18 In 1779, the shaft being worked at Tan Hill was named as 'Gin Shaft', suggesting that at least one whim must have been present by that date (WYAS SpSt/5/4/3/81). Slightly later, in 1785, it was noted that *Butson the Pitman met me yesterday at Richmond and says there are two Pitts at Tanhill and one at Cotterdale, and that the materials at each are worth about 3 pounds, besides which there is an Old Whim erected about 20 years ago, the old materials of it being worth about 40 shillings, making in the whole 11 pounds* (WYAS SpSt/5/2/69). If the 'old Whim' referred to was at either Tan Hill or King's Pit, then this would extend their use at one of the collieries back to at least c.1760.
- 2.19 A plan entitled 'Plan of the Workings Made in King's Pit Colliery near Bowes in the County of York belonging to Henry P Pulleine Esq' (see figure 6) has several additions of a later date, and also appears to have served as the Official Abandonment Plan in the 20th century (Les Tyson collection). Henry Percy Pulleine was lessor of the colliery between 1816 and 1833 (Les Tyson, *pers. comm.*). The plan also includes some information on the border area with Tan Hill, and notes 'Tanhill High Gin 24 fathoms preparing for coal work Sep 1829'. In 1822, Low Gin Shaft and High Gin Shaft are shown with horse circles, although other pits still preserved a 'gin' element to their names. In 1836 it was reported that *Tanhill New Pit now at work, started sinking her in June 1835, depth 26 fms, Gin upon her and full rise of seam northeast* (NEIMME Wat3/58/59).
- 2.20 It is not known when whims finally ceased to be used at Tan Hill. It is tempting to see Walter White's 1858 comment that the public house at Tan Hill was 'situate in the midst of a desolate brown upland, in which appear the upreared timbers of coalpits, some abandoned and others in work' (White 1858, 188) as referring to whims circles still dotting the landscape, but of course they may no longer have been in use by this date.

King's Pit Colliery

- 2.21 From 1693 until 1724, King's Pit Colliery was worked by the owner, Thomas Pulleine, in conjunction with Christopher Whyttell. In 1729, Whyttell (or Whittell) leased other coal mines in Stainmore from the Lord of Thanet, bordering those at Tan Hill and King's Pit. The agreement states that *And further that Christopher Whittell his executors or assigns shall at end of said term of 21 years surrender deliver yield up all coal pits and coalmines above mentioned with ye House thereto belonging in good sufficient repair not sunk, drowned laid waste or otherwise made useless together with all and every ye Engines instruments and work tools in a schedule hereto annexed belonging to said works* (NYCRO ZAW 112). The reference to 'engines' is interesting, in that it could be an early reference to whims or gins in an area bordering on Tan Hill/King's Pit, although it might equally refer to hand-operated winding equipment.
- 2.22 The agreement also lists the equipment present at the colliery on Stainmore: *A schedule of work tools belonging to ye Coal Pitts of the Right Honourable Thomas Earl of Thanet on Stainmore taken 25th March 1710. Three Turntrees, four Ropes, ten picks, six corves, two sinking tubs, one Tram, one oaken Bedstand, one pair of Bellows, one anvil with an oaken stock, one pair of tongues, one Kibble and a set of Boring Rods. I do agree that Chris Whittell shall not be answerable for any neglect or default committed by John Banks who formerly farmed ye said coal pits. Signed sealed and delivered in presence of Richard Strother & Thomas Busey* (NYCRO ZAW 112).
- 2.23 Again, the reference to the 'three turntrees' is of interest. This term is used in relation to mid 17th century Derbyshire lead mining, when it formed part of a piece of winding equipment known as a stowe or stowse:

Stowe or Stowse, or, as sometimes called, a Possession or Stowse Of Pretence, is a machine which formerly was the only apparatus for drawing up the ore in tubs from the mine, it is constructed of seven pieces of timber, namely, two bearers of flat wood 1-1/2 feet long, called sole-trees; two others about one foot long, called hing-benches, which are laid over the ends of the former, and to which they are pinned at the corners with wooden pins (if they are nailed they are not properly constructed, and the machine is not by custom a possession, nor will it confer one); two upright pieces of wood called stow-blades, about one foot long, which are morticed into the middle of the sole and under-pinned; they have a nick in the top like an arrow's head, called a stow, and about the middle of them going between and through them both is a piece of wood called a spindle or turntree, by which the earth or mine is drawn out of the pit

The stowe, as above stated, is called a possession, because by placing two of them "in all men's sight" upon a meer of ground, or in the range of the vein, or in the grove, pit, or place where the miners intend to sink a pit, according to custom, they confer as perfect a possession therein, and as good a right thereto as a deed of conveyance does to a purchaser. The stowe, in order to confer the above right, must be constructed strictly according to custom, and no part of it must be wanting The founder has, however, the power to place stowes for the takers meers; so also may one miner after another set what number of possessions or stowes he or they shall think fit, as and for taker possessions or meers of ground.

The cross and hole made in the earth keeps possession for three days only, which is often done while the stowes are being constructed. At or before the end of the above three days, the miner must by custom set down his stowes, which preserve

his possession for three weeks. It is upon the spindle of the stow that the barmaster sets his nicks, when he formally gives the ground to the miner; or the miner is guilty of an offence against the custom which warrants such a proceeding; when the spindle had been nicked three times according to custom, the barmaster has power to remove the stowe, which proceeding in effect ousts the miner from the possession. So, if the mine remains for a certain period unwrought, unless hindered by wind or water, the barmaster may also remove the stowes (Tapping 1851, 33).

- 2.24 The reference from Stainmore demonstrates that similar winding equipment (if not the same mining custom) was in use there at the start of the 18th century, and it seems likely that it would also have been present at Tan Hill and King's Pit. As already noted above for Tan Hill, the map accompanying the 1768 turnpike branch Act shows stylised jack-rolls, similar to the Derbyshire stowes, at the end of the causeways running through both collieries. In an estimate of working expenses made for King's Pit in 1804, over £6 was itemised for 'Finding & upholding tubs, sledges & Jack Rolls' (NEIMME Wat/3/58/3).
- 2.25 The first definite reference to horse-powered winding at King's Pit is made in a 1763 letter to Thomas Babbington Pulleine, and this is worth reproducing at some length for the light it sheds on contemporary working practices, including the fact that horse-powered mechanisms were not always superior to hand-powered ones: *Mr Close desires to know your orders concerning going to work at the Gin Shaft, which if you please I would have you to set them down at [?], for the coals will come a great deal cheaper per score getting than what they do at present, which you will please to observe by the enclosed. Likewise Mr Close says that if you take down the Gin they will draw them for 3d per score, which is one penny score cheaper than they draw them at present. Likewise he says that if a storm of snow comes, no horse can go in the Gin Ring it will be so drifted but men with a Roller can work any day and serve the country faster than they can with a horse, and as for the Ginn wood it can be disposed of without much loss and as they can serve the country with one pit going it is quite needless to have two going, for it is only bringing a great Bank of coals and throwing away money. I hear he has sold 50 loads of Cinders this week, so I shall if you please to give me orders go up this first Saturday and let him know what to do. Likewise Close says that if you would give him power to turn off and put on what men he pleased he would soon do for William Gill and Low Pitt both, for their work is carried on by the best hands that was turned off from Tanhill by Edward Cherry and he says that he could get them again by turning off some of them that he has at present that know very little about a colliery. Likewise it would make the men stand more in awe of him when he had that power. The Low pitt is no funder than when you see it, but sometimes they will get 20 or 30 loads in a day, 3 or 4 days in a week, but they talk still of getting their Gin set forward (WYAS SpSt/5/2/46).*
- 2.26 The aforementioned plan entitled "Plan of the Workings Made in King's Pit Colliery near Bowes in the County of York belonging to Henry P Pulleine Esq' has several additions of a later date (Les Tyson collection) (see figure 6) - Henry Percy Pulleine was lessor of the colliery between 1816 and 1833 (Les Tyson, *pers. comm.*). The plan names the various shafts within the colliery and gives depths, including 'New Gin 22 1/2 fathoms' and 'Old Gin or Working Pit 14 1/2 fathoms'. The previously noted 1822 plan (Robert White collection), which appears to differentiate between shafts that incorporate 'gin' in their names and those that had working circles at the time that it was drawn up, also shows circles at Gin Shaft and New Gin Shaft within King's Pit (see figure 5).

- 2.27 There were two horses at King's Pit in November 1829, the property of the former lessee, but it is not known if they were used to work whims (NEIMME Wat3/58/44). In the same month, there was some dispute as to the value placed by different parties on equipment at King's Pit, one party having valued the 'Gin' at £24 but the other party estimating only £10 (NEIMME Wat3/58/45). In 1830, a tally of coals wrought at King's Pit Colliery noted 612 dozen at Old Gin Shaft and 478 dozen at Middle Gin Shaft (NEIMME Wat3/58/42). In 1834, it was noted that at both Old Gin Shaft and East Pit, a jack-roll rather than a gin or whim was in use (NEIMME Wat3/58/55), whilst the horse and drawer cost 5d per dozen in 1835 (NEIMME Wat3/58/58).
- 2.28 A detailed report by William Watson to Pulleine in 1836 notes of the workings off Gin Pit: *Leaving the Pillars about 5 yards square, used to leave them 6 or 7 yards but found that 5 yards was sufficient. Water goes all away into Tanhill Colliery now, and from thence finds its way out at a Day Level. Were stopped working next to the Tanhill Boundary by water but have since holed into Tanhill therefore will commence alongside of the Boundary again the coal being better there but no difference in height. Hewing price is 1s 4d per dozen of 22 Boxes which holds 9 Peck. Putting is 1s 2d for 300 yards and Boxes go upon Trams in this Pit. Putters Hook on themselves. Banksman gets 4d per dozen. Gin Horse and Boy are paid 5½d.* (NEIMME Wat3/58/59).
- 2.29 Watson further noted that the Old Gin Shaft had been laid in about ten months before, and that at the Middle Pit, the Banksman got '8d per dozen for the Jack Roll', whilst at New Pit 'Drawing costs 6d per dozen' (NEIMME Wat3/58/59). His report suggests that only a whim was in use at that time, the horse being led by a boy, with a jack roller or other hand-operated equipment present at the other working pits. On the 1856 Ordnance Survey 6" to 1 mile map (sheet 22), two shafts are shown with a 'gin' element to the name, namely King's Pit Smithy Gin and King's Pit High Gin (see figure7).

Coke Ovens

- 2.30 In early documentation, coke is often referred to as 'cinders'. In 1678, there is an early reference to cinders from Tan Hill being used in the slag hearth of a lead smelting mill (Les Tyson, *pers. comm.*). Coking was taking place at other Dales' collieries during the 17th century; for example, it may have started on Preston Moor in Wensleydale as early as the 1630s (Spensley 2014, 118-119). However, the majority of documentary evidence for coking dates from the late 18th century and after.
- 2.31 There is relatively little surviving evidence for coking at the Tan Hill Colliery. In 1785 it was noted that the coals were generally taken away as they were raised 'saving a few loads of small refuse coals which are burnt into cinders' (WYAS SpSt/5/2/69). The aforementioned 1822 plan (Robert White collection) marks 'Cinder Oven' to the east and west of the 'Pit Houses' (the only survivor of which is the Tan Hill Inn itself) (see figure 5). It is possible that one oven served King's Pit and the other Tan Hill, providing a single coking point for each colliery, rather than having coke ovens at the pits themselves. The 1856 Ordnance Survey map (sheet 22) marks three 'Cinder Ovens', two at Gin Pit and one at Tanhill High Gin (see figure 7).
- 2.32 Fortunately, more evidence has survived for coking at the King's Pit Colliery. In September 1763, it was said that the foreman of the pit, Mr Close, had sold '50 loads of Cinders this week' (WYAS SpSt/5/2/46). In 1783, it was noted that

cinders were burnt at 2d per sack (CRO D/Lons/L12/3/11/29). As already described above, the aforementioned 1822 plan (Robert White collection) marks a 'Cinder Oven' to the east and west of the 'Pit Houses' (the only survivor of which is the Tan Hill Inn itself). A report relating to a new lease of King's Pit, made in November 1829, stated that there were 'Cinder Ovens; 2 at New Pit, 3 at Mill Pit, 2 at Grisedale Shaft (Middling)' (NEIMME Wat3/58/44). A letter regarding the lease from Henry Percy Pulleine, sent at the same time, states that different valuers had placed different values on various elements of the colliery, including the coke ovens: *The Smith Shop is only valued at £3 but the Cinder Ovens come to a large sum according to Bell's valuation viz 2 Old Cinder Ovens at the Pipe Shaft £2, 2 Old Cinder Ovens at Quarry Pit £1, 2 Old Ovens at New Shaft £8, 3 Old Ovens at Mile's Shaft £11 and 2 Old Ovens at Gin Shaft £7 10s, which makes a value of £29 10s* (NEIMME Wat3/58/45).

- 2.33 In this document, eleven ovens are listed in total. Four years later, in 1833, Matthias Dunn reported that *A good deal of the Dead Small is burnt into cinders, which are sold for 2½d per Imperial Bushel ... Cinders carried mostly into Arkengarthdale & Westmorland. 9 corves of small coal will produce 18 Bushels of Cinders* (NEIMME Wat3/58/52). In 1836, William Watson stated of King's Pit that *They make Cinders here which costs 2s per day for a mans labour and sell for about 5s to 6s per cart. They get a deal of Trade for them at the present time and the chief trade is into Westmorland for burning Lime* (NEIMME Wat3/58/59). In the following year, he noted that *They have a great demand for Cinders at present most of which go into Westmorland. They pay a man 4s an Oven per week as wages and have 3 Ovens going* (NEIMME Wat3/58/60).
- 2.34 The 1856 Ordnance Survey 6" map (sheet 22) marks only 'Old Cinder Oven' adjacent to a causeway in the eastern part of the colliery, showing two small square structures (see figure 7). A relatively late reference to coking at Tan Hill comes in an indenture of 1870, where the lessees *Shall also provide at the Pit or Shaft where coals are brought to Bank upon reasonable notice in writing by the Lessor or her Agents all such Cinders as the Lessor shall or may have occasion to expend, use or burn in or about any Smelting Mill or Mills, Furnace or Furnaces in Swaledale she or they paying or allowing the Lessees after the rate of 12 pence and no more per sack, each sack to contain not exceeding 6 Bushels Imperial Measure to each sack* (DRO D/HH/6/4/47).

3 EARTHWORK SURVEY DESCRIPTIONS

Tan Hill Colliery

Site 1: Tan Hill High Gin (see figure 9)

- 3.1 This site lies at the south-east end of a long causeway adjacent to the West Grain beck, towards the south-eastern edge of Tan Hill colliery (at NGR NY 90456 05617 centred) (see figure 1). The site was identified as Site 21 in the previous Statement of Significance report (Richardson & Dennison 2018), and is identified on the YDNPA HER as site MYD21171.
- 3.2 No shaft is marked here in 1822 (see figure 5). It may be this shaft which is referred to in 1836, when it was stated that *Tanhill New Pit now at work, started sinking her in June 1835, depth 26 fms, Gin upon her and full rise of seam northeast* (NEIMME Wat3/58/59). In 1856, the shaft is named 'Tanhill High Gin' and is placed at the south-east end of a causeway (see figure 9). A cinder oven is shown to the immediate north of the shaft, which may have been surrounded by a

structure at this date. A sub-circular feature may be an attempt to show the whim circle. Tanhill High Gin was also mentioned in a boundary definition of 1859 (DRO D/HH/6/2/237). It is marked as an 'Old Shaft' on the 1895 Ordnance Survey 6" to 1 mile map (sheet 22SW) (see figure 9). The site is shown as 'Piles of Stones' on the modern Ordnance Survey map (see figure 1).

- 3.3 The whim circle is located on the south-east side of the shaft (see figure 9). It is sub-circular in plan, slightly flattened to the north-east and south-west sides, with an average interior diameter of c.8.0m across the base. There is a small sub-circular depression, 0.5m in diameter, to the approximate centre of the circle which once housed the bearing for the vertical wooden shaft supporting the drum; it has pieces of stone packed around one side. The circle is surrounded by a flat topped earth bank, standing up to 0.8m in height to the steeply-sloping interior scarp (see plate 1). The bank varies slightly in width around the circle, with a maximum width of 2.0m to the north-west side, but is more generally 1.5m-1.6m across. To the southern side, the bank appears to be in two parts. The inner part is wider and of earth, but appears to have a narrower outer part either revetted with stone or forming the remains of a collapsed drystone wall. Rubble facing survives close to the north-east pier (see below), possibly with an earlier, curving bank containing a high proportion of stone running towards the pier itself. Beyond the southern bank of the whim circle, there is a level area, before the ground surface falls away steeply into the adjacent natural peat gully. Adjacent to the north-east pier, there may be the remains of rubble edging or revetment to the outer edge of the level area. There is a 2.0m wide break in the north-west side of the bank, presumably to allow the horse to be led in and out of the whim circle.
- 3.4 The drystone piers formerly supporting the span beam survive to the south-west and north-east outer sides of the circle. The north-east pier is aligned north-west/south-east, measures 4.00m long by 1.75m wide, and stands up to 1.80m in height. It is built of roughly coursed and squared drystone rubble, with slightly battered wall faces to all four sides. The south-west pier is placed directly opposite the north-east pier, and once ran parallel to it, but has partly collapsed into the large peat gully to the immediate south of the whim circle (see plate 2). The surviving part measures a maximum of 3.40m long by 1.90m wide, and stands to a maximum height of 1.00m; it is again built of roughly coursed and squared drystone rubble, with slightly battered wall faces.
- 3.5 The shaft lies off the north-west side of the whim circle; the centre of the shaft is set 6.7m to the north-west of the circle's centre. The shaft is oval in plan, with maximum dimensions of 2.5m by 1.4m. It is stone-lined, the lining surviving to a height of 0.5m around the east side (see plate 3). There is a piece of timber built into the top of the shaft, projecting slightly above the wall face below. The shaft is surrounded by a low spoil collar; there are no visible traces of any surrounding structure, if indeed this was what was being shown in 1856. To the south-west of the shaft are the remains of a U-shaped drystone structure, rectangular in plan, open to the north-east side and measuring a maximum of 5.5m long by 3.0m wide (see plate 4).

Site 2: Low Gin Shaft (see figures 10 and 11)

- 3.6 This site lies in the south-west part of the Tan Hill colliery, east of the Moulds Gill coal level and on the north bank of the gill (at NGR NY 89437 05488 centred) (see figure 1). This site was identified as Site 15 in the previous Statement of Significance report (Richardson & Dennison 2018), and is identified on the YDNPA HER as site MYD20501.

- 3.7 An 1938 abandonment plan for the Tan Hill colliery, based on an earlier plan of 1821 with annotations and additions, marks the shaft as 'Low Gin' and shows the extensive underground workings to which it was connected, including several trail ways. The shaft appears as 'Low Gin Shaft' in 1822, to the eastern side of the causeway, which widens here to meet it (see figure 10 top). The shaft appears to be shown with rectangular walls to either side, and has a horse circle to the immediate south-east. In 1856, it is marked as 'Low Gin Shaft' and shown as a circle, possibly an attempt to depict the whim circle (see figure 10 bottom). There are two square structures to the west, the northern of which has 'Cinder Oven' above it. The adjacent causeway shown in 1822 has since been re-aligned. The site is named as 'Pit (dis)' on the modern Ordnance Survey map (see figure 1).
- 3.8 The Low Gin Shaft complex covers an irregularly shaped area measuring a maximum of 50m east-west by 40m north-south (see figure 11 left). The complex is bisected by a former causeway (now followed by the route of the Pennine Way), the major part lying to the south of the causeway. Erosion, by walkers and from an adjacent peat gully, has gradually caused the causeway to become slightly sunken, but at the eastern end of the survey area, the bank running parallel to the south side still survives.
- 3.9 The north side of the complex is defined by a 38.0m long bank, measuring up to 5.0m wide and with relatively steeply scarped sides standing up to 1.3m in height, with a flattened top. The bank is aligned broadly east-west, and is set wholly to the north of the former causeway. It incorporates two angled returns along its line, where it steps south towards the causeway; there may also be some evidence towards the western end that the main bank was once surmounted by a smaller, narrower one. At the east end of the main bank, where it becomes a rather spread feature cut by a natural peat erosion gully, the bank can be seen to comprise mostly soil, but incorporating colliery waste towards the base.
- 3.10 The eastern boundary of the complex is formed by an intermittent, rather spread curvilinear bank; the gap between this and the bank to the north of the former causeway is c.6.0m wide. The bank runs towards a raised sub-triangular area on the north-east side of the whim circle (see below), and then re-appears to the south-west of the circle, where it is continuous with the bank surrounding the circle itself. The flat-topped bank marking the boundary then continues on a sinuous alignment south-west; the steep, outer scarp is the most prominent, and stands up to 1.2m in height. The inner scarp is much lower and fainter, and indeed eventually fades out altogether. The outer scarp angles sharply to the north-west and then again to the east. Continuing north-eastwards, the inner scarp again becomes visible and more prominent, to the extent that it begins to resemble a small separate bank on top of the outer scarp. Gradually both scarps become equal in size, and the bank angles sharply to the north, terminating just short of the causeway.
- 3.11 The whim circle itself is located on the southern side of the complex. It is sub-circular in plan, slightly flattened to the north and west sides, with an average interior diameter of c.11.0m across the base (see figure 11 right) (see plate 5). There is a small sub-oval depression, 1.7m across, to the approximate centre of the circle which once housed the bearing for the vertical wooden shaft supporting the drum. The circle is surrounded by a flat topped earth bank, standing up to 0.8m in height to the steeply-sloping interior scarp. The bank varies in width around the circle, with a maximum width of 5.0m to the north-west side, but is more generally 2.5m to 3.5m across. There appear to be traces of stone rubble lining to the top of the bank's inner scarp on the western side of the circle. There is no

obvious break in the bank to allow the horse to be lead in and out of the whim circle, although the bank is less steep in the north-east and south-west quadrants.

- 3.12 There are no clear remains of drystone piers or timber legs formerly supporting the span beam, but there are earthworks to the north-east and south-west sides of the bank surrounding the circle which may mark their positions. To the north-east side, there is a rectangular platform, 3.0m long by 1.8m wide, with a slightly raised sub-square mound to the south-east, possibly all that is left of a drystone pier. To the south-west side of the bank, there is a raised U-shaped mound, with a lower crescentric bank to the immediate west, the latter apparently containing a high proportion of stone rubble. Together, the two features look more like something into which a large vertical timber was once set, rather than a collapsed stone pier.
- 3.13 The shaft lies to the north-west side of the whim circle; the centre of the shaft is set 8.5m to the north-west of the circle's centre. The shaft is oval in plan, with maximum dimensions of 2.4m by 2.0m. There is no visible trace of stone lining, but the shaft is surrounded by a low spoil collar.
- 3.14 To the immediate north-east of the whim circle are the probable remains of a coke oven. A steep west-facing scarp, 8.0m long by 2.0m wide, has a smaller bank running parallel to but set back from its top. There may also have been another structure of some kind at the furthest south-west extent of the complex. Here, the scarp defining the outer limit of the complex rises up to support what appears to be a sub-rectangular raised platform, 5.0m long by 3.0m wide.

Site 3: High Gin Shaft (see figure 12)

- 3.15 This site lies in the south-west part of the Tan Hill colliery, north-east of the Moulds Gill coal level and north-east of Low Gin Shaft (at NGR NY 89581 05727) (see figure 1). This site was identified as Site 14 in the previous Statement of Significance report (Richardson & Dennison 2018), and is not specifically identified on the YDNPA HER.
- 3.16 The 1938 abandonment plan for the Tan Hill colliery, based on an earlier plan of 1821 with annotations and additions, marks the shaft as 'High Gin' and shows the extensive underground workings to which it was connected, including a railway. The shaft appears as 'High Gin Shaft' in 1822, to the eastern side of the causeway, which widens here to meet it (see figure 12 left). The shaft is apparently shown with rectangular walls to either side, and has a horse circle to the immediate east. It is not shown in 1856 (see figure 7). The site is named as 'Pit (dis)' on the modern Ordnance Survey map (see figure 1).
- 3.17 The whim circle is located on the east side of the shaft complex (see figure 12 right). Approximately half has been lost due to the collapse of the shaft to the west, but what remains suggests that rather than being sub-circular in plan, the whim 'circle' was actually closer to an octagon (see plate 6). The circle has an average interior width of 10.0m across the base between the flattened sides. There is a shallow sub-square area of disturbed ground, measuring 2.0m by 1.8m, to the approximate centre of the circle which once housed the bearing for the vertical wooden shaft supporting the drum. The circle is surrounded by a flat topped earth bank, regularly constructed, standing up to 0.7m in height to the steeply-sloping interior scarp. The bank varies slightly in width around the circle, but generally maintains a width of between 1.4m and 1.6m. To the north-eastern side, there is a second bank, set parallel to and 0.7m beyond the first; it contains a high proportion of stone rubble.

- 3.18 There are no clear remains of drystone or timber piers formerly supporting the span beam(s), but there are earthworks to the north and south sides of the bank surrounding the circle which may mark their positions. On both sides, the earthworks comprise a thickening of the bank, apparently with a parallel, shallow sub-rectangular depression beyond; together, these features each cover an area measuring c.3.0m by 1.5m. The shaft lies to the west side of the whim circle, but has partly collapsed, and is now formed by a regular circular depression 5.7m in diameter and 1.5m deep. The centre of the shaft (as it now exists) is set c.8.0m to the west of the circle's centre. The shaft is flanked to the north and south by steep, angular scarps, facing towards the shaft itself. That to the south defines the back walls of what was once a rectangular building, measuring 5.5m east-west by 4.0m north-south. An internal scarp appears to mark the position of a probable fireplace set across the building's former south-east internal angle.

Site 4: Gin Shaft (see figure 13)

- 3.19 This site lies in the southern part of the Tan Hill colliery, east of the Moulds Gill coal level and on the east side of West Grain beck (at NGR NY 90082 05468 centred) (see figure 1). This complex was identified as Site 18 in the previous Statement of Significance report (Richardson & Dennison 2018), and is identified on the YDNPA HER as site MYD21175.
- 3.20 No shaft is shown here in 1822 (see figure 5). It appears that for most of their history, both the Tan Hill and King's Pit collieries relied almost wholly on horse power for winding and haulage; steam engines appear to have been relatively scarce at Dales' collieries, although other examples were known at Colsterdale and at West Scafton in Coverdale (Spensley 2014, 52). However, the exception was in the Tan Hill colliery, at what became known as Gin Shaft, where a steam engine was installed in 1843. In August of that year, it was noted that *There is a temporary stoppage at Tanhill while the shaft is being refitted with cages, steam engine and waterwheel* (NYCRO ZAW 113). This implies that a pre-existing shaft, sunk prior to 1843 and perhaps originally provided with a horse whim, was being modified, rather than a new shaft being created. It is suggested that the steam engine was used to pump water to the waterwheel, which was itself undertaking the winding (Les Tyson, *pers. comm.*). It is not certain exactly where the waterwheel was located (although one would assume in close proximity to the engine), but in slightly later documentation from 1850, reference is made to *Water Wheels underground* (NYCRO ZHG Box 2). In the following year, two separate valuations were obtained for the "steam engine" at Tan Hill. Mr Charlton put the value of the engine at £20, together with £3 for "Use of Steam Engine for 4 months". Mr Marchant however put a much higher value of £60 on the engine, together with £10 for "wear and tear for 4 months" (NYCRO ZHG Box 2).
- 3.21 The steam engine was still present in 1856, when 'Engine House' appeared on the Ordnance Survey 1st edition 6" to 1 mile map (sheet 22) (see figure 13), but it was subsequently replaced by Mould Gill Level, which was driven up to the Low Gin Shaft in the early 1840s. In January 1854, a long branch of the level was begun and driven to the south-east, and it extended the mine's life by accessing coal further down the dip slope (Gill 2008, 89-90). However, although it may have become disused, the steam engine may have remained on site until as late as the 1890s. In 1891, a schedule of all the plant, timber, sleepers, rails, iron and woodwork at Tan Hill colliery was made, and it was noted that "Pumping Engine cost roughly £29 and has been very little used"; it was valued, with its metal pipes, at £17 (NYCRO ZPL/1 (Series B) no 187). There are no subsequent references, and so it is assumed that the engine was either sold or scrapped soon after this

date. It was still marked as an 'Old Engine House' on the 1895 (see figure 13) and 1920 Ordnance Survey 6" to 1 mile maps (sheets 22SW). The site is named as 'Pit (dis)' on the modern Ordnance Survey map (see figure 1).

- 3.22 The Gin Shaft complex covers an irregularly shaped area measuring a maximum of 70m east-west by 60m north-south (see figure 13). The complex was accessed by a former causeway approaching from the north-east. This causeway is formed by a flattened linear strip, up to 6.5m wide, flanked by banks on either side. The eastern bank is small but still relatively well-defined, whereas the larger, western bank is up to 3.0m wide and 1.0m high. There is a sunken shooting butt (for guns 7 and 3) positioned close to the bank, towards the northern limit of the surveyed section.
- 3.23 The central part of the complex is relatively flat, apart from two rectangular mounds, each aligned north-east/south-west, measuring 7.0m long and 3.0m wide and standing up to 1.0m in height. The eastern mound is better defined, and may represent an archaeological feature, whereas the western mound has a sunken shooting butt (for guns 8 and 2) at one end. It may therefore be no more than upcast from the excavation of the butt, although it is noticeable that the bank around the butt comprises colliery waste with a high shale content.
- 3.24 The north side of the complex is defined by a steep north-facing scarp, standing up to 1.0m in height, and running 30m to the south-west as far as a sunken shooting butt (for guns 8 and 2). It then becomes a spread bank with a sub-angular plan form, up to 6.0m wide and 1.0m high. The bank continues south-west for a further 24.0m, before being cut by a natural peat erosion gully; throughout its length, but especially where it is cut by the gully, it can be seen to comprise colliery waste, shale and coke. The eastern boundary of the complex is formed by a well-defined, slightly sinuous, bank. This bank is aligned north-south, up to 5.0m wide and standing up to 1.5m in height. A short lobe projects from the east scarp of the bank. It is possible that the bank was built to catch water running off the higher moorland to the east and to stop it entering the complex; it appears to comprise soil, with no colliery waste visible.
- 3.25 Although named Gin Shaft, there are no obvious traces of any surviving whim circle. As noted above, a whim might have been present prior to 1843 but any remains are now obscured by later activity. Alternatively, the name may derive from a contracted form of 'engine', referring to the steam engine. The shaft itself has collapsed, leaving a substantial sub-circular depression, up to 12.0m in diameter and over 4.0m deep (see plate 7). The fact that cages were being fitted in 1843 might suggest that the shaft was of somewhat larger cross-section than many of the others recorded within the colliery, thus leaving the proportionately larger depression when it eventually collapsed. There are the remains of a collar of spoil around the north-east side, with a more generally raised area to the east. A short distance to the south-west, there is a prominent sub-oval mound, 20.0m long and standing up to 1.7m high. It appears that waste was also tipped to the north-west of the shaft, as a raised linear mound extends for some 35m from the existing edge of the shaft towards a natural peat gully; where it meets the gully, it can be seen to comprise colliery waste, shale and coke. A coke oven (see below) was subsequently cut into/built onto the north-western end of this mound of waste.
- 3.26 The stone foundations of the engine and boiler house survive on the south-west side of the shaft, although some of the foundations have clearly fallen into the shaft itself as it collapsed. The surviving foundations measure c.7.0m long by c.6.5m wide, and are divided into two parts (see plate 8). The wider, western, part is

c.4.0m wide, and defined by a stone wall along the western side. The eastern part is only slightly narrower but comprises more of a rubble spread, with wall footings visible to the east side. Between the two, on the southern edge of the collapsed shaft's lip, are several large *in situ* stone blocks, one with a projecting threaded bolt (see plate 9). Several other similar blocks, also bearing evidence for former fittings, have fallen into the collapsed shaft.

- 3.27 Of the two coke ovens shown in 1856, the north-eastern one appears to have been demolished, leaving a steep north-facing scarp to the north-east of the collapsed shaft, measuring 7.0m long and standing up to 1.5m high; there is stone rubble eroding out of the face of the scarp. The other coke oven, set some 32m to the north-west, is the best preserved example within either Tan Hill or King's Pit collieries (see plate 10). As has already been noted above, it appears to be partially built into an earlier linear spread of spoil, which was also utilised to provide a charging ramp for the oven. The structure itself is aligned broadly east-west, measuring 9.0m long by 6.0m wide, with battered thinly coursed drystone walls standing up to 1.0m high. There are the remains of two sub-oval depressions to the top, once opening to the north-east side (see plate 11) and showing that the structure comprised a battery of two ovens. The south-west corner of the structure is starting to collapse. A sunken grouse butt (for guns 9 and 1) has been constructed some 15m to the south-west of the coke oven.
- 3.28 Some c.50m to the south-east of the collapsed shaft, there may be a dam, perhaps to pond a supply of water for the steam engine. The dam is sub-triangular in plan, and has maximum dimensions of 25.0m by 35.0m, the sides formed by gently sloping scarps up to 1.0m in height. The dam narrows towards the west, and there may be a small rectangular structure located on the south side of the narrowest point. A reed-filled gully runs away from the dam to the south-west.

King's Pit Colliery

- 3.29 The two best-preserved whim circles within the King's Pit colliery are at King's Pit Smithy Gin and King's Pit High Gin; these were identified as Sites 41 and 42 in the Statement of Significance report (Richardson & Dennison 2018). However, because King's Pit Smithy Gin was similar to the partly collapsed circle recorded at High Gin Shaft in the Tan Hill colliery (see above), and that at King's Pit High Gin was laid out during the same period (1822-1856) as the complete example already recorded at Tanhill High Gin (also Tan Hill colliery; see above), it was decided to seek other examples.
- 3.30 Within the eastern part of King's Pit colliery, the 'Gin Shaft' shown with a horse-walk in 1822 is marked as an 'Old Gin' on the c.1774-1816 plan, but by 1856 only two square structures are depicted, named 'Old Cinder Oven' (see figures 3, 5 and 7). The site comprises an irregularly shaped raised mound, aligned broadly east-west, c.20.0m long, 5.0m-6.0m wide and up to 1.5m high, with a marked sub-rectangular scarp to the south-east end of the north side. The form of the earthwork is similar to the decayed cinder/coke ovens noted elsewhere. However, it is difficult to see any clear traces of either the shaft or a whim or gin circle. There are several possible positions for the former shaft, but no convincing remains of a horse-walk; it is therefore assumed that there was some post-abandonment disturbance here. A bank is placed on the opposite side of the causeway running past the shaft to the other earthworks, as has already been described above at some of the surviving whim circles within Tan Hill colliery. The condition of this site was such that a detailed survey was not considered to be necessary.

- 3.31 Therefore, in the absence of any complete or markedly different whim circles, it was decided to concentrate on some of the more minor earthworks and structures within the King's Pit colliery, in order to be able to illustrate a representative selection of the differing states of preservation across both collieries. In addition, a more detailed record was made of one of the causeways within King's Pit colliery, as where these survive well, they are arguably more substantial structures than those within Tan Hill.

Site 5: Mill's Pit (Miles Shaft) (see figure 14 left)

- 3.32 This site lies in the south-eastern part of King's Pit colliery, adjacent to a causeway to the east of Gin Shaft (at NGR NY90718 06142 approximate) (see figure 1). This shaft may be the 'Miles Shaft' marked on the c.1774-1816 plan (see figure 3). It appears as 'Mill's Pit' on the 1816-33 plan of King's Pit colliery (see figure 6), and a 'Shaft' is marked here on the 1822 plan (see figure 5). It is shown, but not named, in 1856 (see figure 7). The site was noted but not specifically identified in the previous Statement of Significance report (Richardson & Dennison 2018).

- 3.33 A possible whim or gin circle is located to the north of the causeway here. The circle has an average interior width of between 6.0m to 6.5m across the flattened base, somewhat smaller than the other whim circles recorded by this phase of survey work. The circle is surrounded by a steeply sloping scarp, up to 0.5m in height but generally much lower on the western side, giving the impression of being open in this direction. There is no external bank of spoil or any indication of an encircling rubble wall. To the immediate east of the possible circle, there is an irregularly shaped depression, measuring a maximum of 5.0m east-west by 2.75m north-south; the south side is defined by a steep curving north-facing scarp, whereas the scarp marking the northern side is both straighter and shallower. It is possible that this earthwork is a remnant of the shaft, although it is perhaps more likely that the circular earthwork to the west is actually the shaft, rather than a horse circle.

Site 6: Stone Structure, associated with Possible Level (see figure 14 centre)

- 3.34 This site lies in the eastern part of the King's Pit colliery, at the end of a north-east/south-west aligned causeway on Mirk Fell Edge (at NGR 90847 06321 approximate) (see figure 1). Nothing is shown or marked here on any of the maps or plans consulted during the research undertaken for this report. However, in this area, on the eastern edge of King's Pit colliery, there are several features which resemble abandoned levels. They may be the 'drifts' made in about 1950 described as being by the side of an old coal road which runs below Mirk Fell Edge (Les Tyson, private research; R Hutchinson, *pers. comm.*). The site was noted but not specifically identified in the previous Statement of Significance report (Richardson & Dennison 2018).

- 3.35 The stone structure is located a few metres to the east of the causeway. It takes the form of an irregular square, measuring c.3.6m along each side, and probably formed a small shelter or shed. All four sides are built of drystone rubble, but only the east side survives to any height, to a maximum of 1.0m (see plate 12). There is a doorway opening at the east end of the south side. To the south of the structure, there is a shallow linear depression, perhaps representing an abandoned drift or level. To the north of the causeway, in line with the level, there is a c.25m long flat-topped spoil heap, tipped from south-west to north-east.

Site 7: Causeway, west of King's Pit High Gin (see figure 14 right)

- 3.36 This site lies in the southern part of the King's Pit, between two branches of a prominent watercourse, west of King's Pit High Gin (at NGR NY 90599 05819 approximate) (see figure 1). The causeway leading to King's Pit High Gin was constructed between 1822 and 1856. Where the causeway crosses the upper reaches of Mirk Fell Gill, it is particularly prominent and well preserved (see plate 13), and a partial collapse across the gill has revealed something of its internal structure (see plate 14). The site was noted but not specifically identified in the previous Statement of Significance report (Richardson & Dennison 2018).
- 3.37 The section of the causeway is aligned east-west and measures c.85m in length. It has a width of up to 8.5m across the base, but is typically between 5.0m and 6.0m. The flattened top has an average width of between 3.0m to 4.0m, with the north scarp generally being longer but less steeply sloping than the south scarp. The causeway stands up to 2.0m in height. Where the causeway has partially collapsed into the gill, the internal structure can be viewed. Flat slabs or stones at the bottom of the causeway were previously interpreted as having been laid to form a base, but on closer examination they could be seen to form the remains of a slab-topped culvert, 0.20m high internally and at least 0.50m wide, running across the full width of the causeway. By allowing water to drain through the culvert, it prevented the causeway acting as a dam, impounding water behind that would have ultimately led to its collapse. It is likely that there are several such culverts through this section of the causeway. Above the culvert's slab top, there are a few pieces of angular rubble, but the main body of the causeway (to a height of c.1.0m) comprises compacted peat. Above the peat, there is a layer of compacted angular stone rubble (varying between 0.5m to 1.0m in depth), forming the surface upon which horses and carts travelled.

4 DISCUSSION AND CONCLUSIONS

Winding: Rollers and Whims

General Usage

- 4.1 The clear evidence for the long-term inter-changeability of the names 'gin' and 'whim' on maps and other historic documents has been previously noted (Gill, Knapp & Gallagher 2014, 82-83). In the following text, the original term used in the documentary reference is kept. However, within the EDAS survey areas, in all cases where the relationship can be discerned on the ground, the horse-walk is placed to one side of the shaft, rather than surrounding it. Therefore, where technical functioning is being discussed, they are always referred to as whims rather than gins.
- 4.2 As set out in detail in Chapter 2 above, there is a reference in 1729, from the area bordering onto the collieries at Tan Hill and King's Pit, to the use of 'three turntrees', a hand-operated winding mechanism similar to a jack-roll. Stylised jack-rolls appear at both collieries on the map accompanying the 1768 turnpike branch Act (see figure 4), and a 'roller' using for winding is mentioned at King's Pit in 1763. A jack-roll was also being used at King's Pit as late as 1836, on shafts with depths of up to 14 fathoms or 84 feet. It therefore seems likely that these hand-operated mechanisms were present at both collieries throughout the 18th century and into the first four decades of the 19th century. This was probably not an uncommon practice; for example, a recent survey of the extensive Fountains Fell colliery in North Yorkshire, worked mostly between the late 18th and the mid 19th

centuries, apparently revealed no evidence for horse-powered winding equipment. This may be in part due to the relatively shallow average depth of the shafts, estimated at around 10m or 30 feet (Evans & Quartermaine 2017, 28). Although there is a possible early mention of gins at Tan Hill on the 1738-63 plan made for Wingate Pullein Esq (see figure 2), at both collieries the earliest definite notices of horse-winding equipment come in the 1760s and 1770s. In 1763, a single horse-powered gin was in use at King's Pit, and in 1779 the shaft being worked at Tan Hill was named 'Gin Shaft'. A whim may be noted at Tan Hill in 1779, when it was described as being about 20 years old. In 1822, two horse-circles are shown at both Tan Hill and King's Pit, as opposed to the larger number of shafts which still preserved a 'gin' element to their names (see figure 5). A new pit at Tan Hill, which started sinking in 1835, was equipped with a gin by 1836. It is not known when whims finally ceased to be used at the collieries, but given that Mould Gill Level was completed in 1858, with coal being sold from the level mouth in the same year, it is possible that Walter White saw some of the last working examples in 1858.

- 4.3 Negative physical evidence is also instructive. During the walkover survey undertaken for the previous Statement of Significance report, it was noted that there was a general absence of earthwork evidence for whims in the north-western parts of both Tan Hill and King's Pit Collieries. It may of course be that some whim circles have been destroyed by later activity, and this seems to be the case with one circle shown in 1822 within King's Pit. Additionally, it is possible that cog and rung gins may have been present prior to the whims, and that their remains have yet to be recognised. However, taking these caveats into account, there is no definitive evidence for whim circles within a distance of 830m and 945m south and south-east of the Long Causeway within Tan Hill and King's Pit colliery respectively. The combined documentary and map evidence therefore suggests that, certainly during the first half of the 19th century, there were never more than two whims in use at either colliery at any given time.
- 4.4 The length of time that a whim remained in position at one shaft would have varied depending on the depth of the coal deposits and the extent of the workings from the base of the shaft. For example, in 1835, it was reported that at King's Pit, the workings extended almost 200 yards from the New Gin Pit (NEIMME Wat3/58/58). The 1938 abandonment plan for the Tan Hill colliery, based on an earlier plan of 1821 with annotations and additions, marks the shaft as 'Low Gin' and shows the extensive underground workings to which it was connected, including several trial ways. Some of the workings are dated into the early 1840s, and so it seems likely that the whim may have been in position over the shaft for at least 20 years. This is supported by the documentary evidence available for individual shafts within both collieries, which points to a working life of perhaps 20 years for each early to mid 19th century whim position; earlier whims, set on shallow shafts with less extensive associated workings, may of course have been moved more frequently.
- 4.5 In terms of the depths of the shafts which the whims were working, surviving historic documentation provides some specific and general information. In 1783, it was recorded that the average depth of the shafts at Tan Hill colliery was 15 fathoms, and at King's Pit between 13 to 14 fathoms (CRO D/Lons/L12/3/11/29 Small Box). Assuming a fathom to be 6 feet or 1.83m, this gives an average shaft depth of 90 feet (27.45m) and 78 to 84 feet (23.79m to 25.62m) for Tan Hill and King's Pit respectively. In 1810, at King's Pit, it was noted that the depth of the pits then working was 23 fathoms (138 feet or 42.06m), but that new pits would increase in depth as they extended southwards (NEIMME Wat3/58/4). However, in 1834, Gin Pit Shaft remained at a depth of 22 fathoms (132 feet or 40.23m). At both Old Gin Pit (14 fathoms; 84 feet or 25.60m) and East Pit (7 fathoms; 42 feet

or 12.80m), winding was undertaken with a jack-roll (NEIMME Wat3/58/55). This is in line with other contemporary mining operations; for example, the Nentsberry Green Lead Mine Company on Alston Moor in Cumbria used jack-rolls at their shafts during the 1820s and 1830s, with no convincing evidence that they ever erected a whim (Fairbairn 1980, 250-251), although of course as they were winding lead ore, they were dealing with a very much lesser quantity both in terms of total weight and volume than coal (Richard Lamb, *pers. comm.*).

- 4.6 Turning to the map evidence, on the 1816-33 map of the King's Pit colliery (see figure 6), the shafts where depths are given increase from 4½ fathoms (27 feet or 8.23m) at the north-western extent of the colliery to 22 fathoms (132 feet or 40.23m) at the south-eastern extent. The deepest shaft shown, Tanhill High Gin on the boundary with King's Pit, is given as 24 fathoms (144 feet or 43.90m). Gill (2008, 89) states that a series of gin shafts were used with depths varying between 60ft and 240ft (18.2m-73.1m), but it is not clear what the source for the greater depth quoted is. On the whole, the shafts wound by whims at either colliery were shallower than those at the Grassington Moor lead mines, which averaged between 20 and 50 fathoms in depth, and one was as deep as 100 fathoms (Gill, Knapp & Gallagher 2014, 81).

The Structure and Operation of the Whims

Whim Circles

- 4.7 With one exception (High Gin Shaft, Tan Hill - see below), all the complete or semi-complete whims that were surveyed were circular in plan. Their internal diameters vary between 8m to 11m, but including incomplete examples that were measured but not surveyed, the average internal diameter is broadly between 8.5m and 9.0m. The possible example at Mill's Shaft (King's Pit) was significantly smaller at between 6.0m to 6.5m, but this may be a collapsed shaft rather than a whim circle (see figure 14 left). The average internal diameter of 8.5m to 9.0m for the colliery whims is somewhat smaller than the apparent c.14m average internal diameter of whims recorded in lead-mining areas at Grassington and in Arkengarthdale (Roe 2006, 119). Comparable figures for Grassington Moor have the radius of most horse circles falling between c.18 feet and c.23 feet (c.5.5m to c.7.0m), which would again give diameters somewhat larger than those recorded by the current survey. However, a number of examples had a radius of between c.13 feet and c.15 feet (c.3.96m to 4.57m), which is closer to those recorded by the current survey (Gill, Knapp & Gallagher 2014, 81). A whim circle sketched at a colliery in Shropshire in 1965 (Isaac 1987) had an internal diameter of c.15.80m, again considerably larger than those recorded at Tan Hill/King's Pit, although it was estimated that, based on an *ex situ* winding drum, another Shropshire example could have had a horse circle only c.18 feet (c.6m in diameter).
- 4.8 The exception to the general pattern described above is High Gin Shaft in Tan Hill colliery (see figure 12). Modern colour aerial photography suggests that this had once had a more octagonal plan, and this was confirmed by detailed measured survey. The octagon has a maximum internal width of 10.0m, somewhat larger than the circles, although the horse walk within was obviously circular in plan. It is not clear why this octagonal plan was adopted; it might have been so that a roof could be erected over the whim, although there is no earthwork or documentary evidence that this was ever the case, and one wonders how long any such structure would have survived in this location. Given the very exposed nature of the whole of the Tan Hill and King's Pit collieries, one might have expected some sort of protection for the horse and those leading it within the whim, if only because

work might have been delayed. Drifting snow was clearly a problem during the winter, as evidenced by the 1763 letter to Thomas Babbington Pulleine regarding King's Pit, where it was noted that *if a storm of snow comes, no horse can go in the Gin Ring it will be so drifted* (WYAS SpSt/5/2/46).

- 4.9 Several of the surveyed whims preserved evidence for either a drystone revetment or perhaps a former drystone wall along part of the top of the outer bank. Many of the examples recorded in the Grassington area were also surrounded by drystone walls (Roe 2006, 119), containing a gap to allow the horse in and out of the circle; these walls can be very substantial features, such as that surrounding the horse circle at New Glory Shaft on Grassington Moor. Although nothing like this survives at Tan Hill or King's Pit, many of the whim circles have a base set up to 0.7m below the top of the surrounding earth bank; even a drystone (or turf) wall on top of the bank which was only a 1.0m in height would therefore have provided some protection from the weather for the horse and driver. Such provision is suggested in the 1736-37 Colsterdale colliery accounts where, in relation to the horse circle, Thomas Loftus was paid for six days work *getting stone & walling same at west end side of Speedwell Pit & making shelter for horse* (NYCRO M2181.F2330 & ZS Box 37). It was initially thought that the fact that only the west side is mentioned might indicate that the wall did not go all the way round, and perhaps it was only built in that part of the circle most exposed by the prevailing wind. However, a field visit to the remains of Speedwell Pit (Colsterdale) revealed no evidence for a raised surrounding wall, and in fact the walling referred to in 1736-37 may be represented by ruined revetment walling built to hold up one side of a possible gin (rather than a whim) circle (Shaun Richardson, *pers. comm.*). Nevertheless, the field remains at Tan Hill and King's Pit collieries do suggest that at least some effort was made to shelter the horse in this way and perhaps also to prevent drifting snow hampering the operation of the whim.

Mechanical Details and Operation

- 4.10 All of the historic drawings and prints of gins and whims consulted for this report, including sketches made of derelict examples, show the span beam to be supported on timber legs or frames (see figure 8). Similarly, no published examples have been uncovered of gins or whims with drystone piers supporting the span beam, such as those which survive at both Tan Hill and William Gill. Another example with stone piers is known at Bolton Greets lead mine in Wensleydale (Ian Spensley, *pers. comm.*). The use of the stone piers therefore may be a localised practice, meaning that surviving examples will accrue a greater significance. The use of stone, rather than wood, was probably driven by the availability of local materials and the harsh climate. It is also noticeable that the shafts which retain whims with stone piers are generally some of the last to be sunk at either colliery; the aforementioned whim at Bolton Greets shaft was also not constructed until 1854, accounts containing a payment for 'getting Stones for the Ginn walls' (Ian Spensley, *pers. comm.*). It may therefore be that the use of stone piers was a later practice. The surviving stone piers vary considerably in size. Those at Tanhill High Gin are up to 4.0m long by 1.75m wide and stood up to at least 1.8m high (see figure 12). By contrast, the piers at the nearby William Gill colliery were both never any larger than 2.8m by 1.1m, but they survive to a height of 2.6m. Unfortunately, none of the piers preserve any evidence as to how the span beam was joined to them, but it must have been fixed in some way to prevent it working loose from the stones around it. The presence of surviving stone piers should not be taken as evidence that all of the whim circles at Tan Hill and King's Pit collieries were once equipped with similar features, and it is probable that some had timber legs or frames as depicted in historic illustrations. It is also possible

that in some cases stone piers might have replaced timber legs or frames when these decayed.

- 4.11 All of the surveyed whims preserve some evidence for the presence of the central bearing for the vertical wooden shaft supporting the drum, normally in the form of some disturbance where the shaft had been removed, but in one case stone packing that had been used to hold the bearing in place remained; it is quite possible that a number of bearings remain *in situ*. It is less likely that any *ex situ* shafts remain, although one example, inverted and re-used as a gatepost, survived in Shropshire as recently as 1965 (Isaac 1987). It is not known if there was a single arm attached to the vertical shaft, or two, or if a single horse, or a pair of horses (as seems to have been the early 18th century practice in Tyneside) was used. There were two horses at King's Pit in 1829, the property of the former lessee, but it is not certain that they were both used to work whims (NEIMME Wat3/58/44). By contrast, in 1836, in relation to a shaft using a whim at the same colliery, only a singular 'Gin Horse' is noted (NEIMME Wat3/58/59). In the early 18th century, Sir John Clerk stated that a single horse whim would serve a shaft with a depth of between 10 to 20 fathoms, but that two were necessary for depths of between 20 to 60 fathoms (Duckham 1968, 224). It is assumed that horses were stabled at either Tan Hill or King's Pit Houses and led out to their place of work each morning.
- 4.12 At Codnor, in Derbyshire, a single horse was used on the whims, with a drag arm connected to the opposite end of the main arm to the horse, which was used to prevent the drum from turning in reverse and dropping miners back down the shaft (<http://www.codnor.info/cupit.php>). The whim sketched by Sir John Clerk in Scotland in 1724 had a counterweight placed at the end of the arm opposite the one that the horses were tethered to (Duckham 1968, 223); the counterweight was presumably employed to counterbalance the weight of the driver (Richard Lamb, *pers. comm.*). There must also have been a way of turning the horse without unfastening it from the whim mechanism. Some illustrations of gins and whims suggest that the harness was connected to the arm in such a way that it could pivot or turn on a bolt passing through the arm. Other illustrations of the early 1800s from north-east England even show a seat slung under the arm, on which the (adult) driver sat (Beamish Museum 2010, 47). However, this may have been an uncommon, or late development, as in the early 18th century Sir John Clerk noted that, although there was sometimes a seat where the driver of the horse sat, more "commonly the Driver goes on foot" (Duckham 1968, 223).
- 4.13 It is not known what size or type of horse was used in the whims at Tan Hill and King's Pit collieries, and indeed published information on such matters seems scarce. It might be speculated that Dales ponies, such as that illustrated by Mitchell (1988, 55) were used. In 1708, *The Compleat Collier* advised against the use of old horses, as although they could be bought cheaply they were soon worn out. The purchase of 'young, strong and mettled Geldings or Mares' was recommended, but not 'Stone-Horses' because they were 'more unruly' and 'ungovernable' (JC 1708, 33-34).
- 4.14 The size of the winding drums for the whims recorded by the current survey work remains unknown. In 1724, Sir John Clerk sketched a whim in Scotland said to have a drum 20 feet in diameter, although a second, undated, sketch appears to show a drum of somewhat smaller size (Duckham 1968, 223-224 & 249). In addition to the sizes given in historical information - between 12 feet (c.4m) and 16 feet (c.5.3m) in diameter (Isaac 1987, 1) - a few scarce surviving examples have been recorded. A winding drum recovered during re-development works in

Shropshire in 1987 was only six feet (c.2m) in diameter and two feet (c.0.70m) deep. Oak had been used for the main body of the structure, with an open-cross frame inside. Around the circumference, three wrought-iron bands supported a regular series of wooden slats, at right-angles to the bands. The drum could not be dated accurately, but was thought to be no earlier than the 19th century and of similar design to an example photographed still standing in c.1940 (Brown 1976, 58-59; Isaac 1987, 3). A whim drum surviving in an underground chamber at Scaleburn Vein in Nenthead, Cumbria (Gill, Knapp & Gallagher 2014, 86) appears to be of relatively sophisticated design, using both wrought and cast-iron elements, and so might not be representative of those in use at Tan Hill. The recorded whim circles all have a measurement from the centre of the circle to the centre of the shaft of between 6.7m and 8.5m. However, in one example (at Tanhill High Gin), and at another at William Gill, where both circles and shafts are well preserved, the measurement is between 6.7m and 7.0m, suggesting that this slightly shorter distance was closer to the norm. In three of the recorded examples, the shaft was located either to the north-west or west of the whim circle, but it is not certain if this reflects a particular working preference or merely local topography.

- 4.15 It is difficult to be certain exactly what weight the tubs or 'corves' being raised up the shaft by the whim were. In 1783, it was noted that a corf at both collieries comprised five pecks (CRO D/Lons/L12/3/11/29 Small Box). This would be the equivalent of ten gallons, although the Imperial gallon had not been introduced at this date, so it is possibly the very slightly larger ale gallons which are being referred to. By comparison to the Newcastle bushel, said to weigh 84lb, the Tan Hill/King's Pit corf would therefore contain 105lb (Richard Lamb, *pers. comm.*). In 1829, it was said that at Tan Hill each corf or tub was not to exceed 25 gallons Winchester Measure (NEIMME Wat1/5/83); according to notes kept by James Watt, a coal merchant, a Winchester bushel was said to be 2,730 cubic inches. Thus one Winchester gallon would be 341.25 cubic inches and 25 Winchester gallons 8,531.25 cubic inches, 5 cubic feet or 30.25 ale gallons. However, this may have been an error, as a Winchester bushel as actually adopted by the United States in 1836 was 2,150.42 cubic inches. This suggests a volume of 23.8 ale gallons or by inference a load of 250lb for the Tan Hill/Kings Pit corves (Richard Lamb, *pers. comm.*). Again in 1829, when measured, a working tub was found on average to be 30¼ inches long, 20½ inches broad and 11 inches deep (NEIMME Wat1/5/84). This gives a volume of 6,821.375 cubic inches or 3.95 cubic feet, equating to 24.2 ale gallons, very similar to the 23.8 figure given above (Richard Lamb, *pers. comm.*).
- 4.16 In 1804, at King's Pit, each corf was to hold six pecks (12 gallons) (NEIMME Wat3/58/2), but in 1816 this was qualified as being "six Newcastle Coal Pecks or five Westmorland Coal Pecks" (NYCRO ZAW 112). A peck was the equivalent of one quarter of a bushel, so six Newcastle coal pecks would weigh c.126lb (Richard Lamb, *pers. comm.*). In 1833, a corf was said to weight 1½ cwt (NEIMME Wat3/58/52); assuming a cwt to be 112 pounds, this would equate to a corf weight of 168 pounds. There are obviously many caveats to all of the above calculations, not least the bulk density of the coal, i.e. a combination of the specific gravity of the coal and its particle size distribution. Nevertheless, it may be significant that the calculated weights appear to fall broadly into two groups, one of between 126lbs to 168lbs, and one of around 250lbs. Might this reflect the use of one or two horses to work each whim, the greater weights requiring the use of two horses (Richard Lamb, *pers. comm.*)?
- 4.17 The mention of a 'boy' driving the horse at a whim at King's Pit in 1836 (NEIMME Wat3/58/59) accords with the documentary evidence from other mining operations,

where the employment of children with the whim or gin horses appears to have been common. For example, in 1840 it was noted that at Mill Lane Pit, Madeley, Shropshire, children were used to whip or pelt the horse with stones, for which they were paid 6d per day (Isaac 1987, 2). At Cupit Green Ironstone Pits, near Codnor in Derbyshire (<http://www.codnor.info/cupit.php>), the report for the 1842 Children's Employment Commission recorded numerous examples of children driving the gin horse. All were aged under 13, and several who were currently working the horse when interviewed were eight or nine years old. In one case they were working from 6 a.m. to as late as 9 p.m., with three quarters of an hour allowed for dinner. The children appear to have been paid 6d on average for their work, a similar rate to the 5½d for the same task noted at King's Pit (NEIMME Wat3/58/59). The contracts for horse drawing at the Grassington Moor mines were let for a year at a time, with payment being per 100 kibbles raised. In 1834, the taker of the contract had to provide a horse to draw at any time required by the men, with payment being between 8 shillings to 9 shillings per 100 kibbles drawn (Gill, Knapp & Gallagher 2014, 83). A year later, at King's Pit, the horse and drawer were said to cost 5d per dozen (NEIMME Wat3/58/58).

- 4.18 In terms of the values of the equipment, the 'old Whim' that may have been present at Tan Hill or King's Pit in 1779 was valued at about 40 shillings or £2 (WYAS SpSt/5/2/69). It was then about 20 years old. Horse gins horse shown in an inventory at Lane Pit, Madeley, Shropshire in 1747 were valued at £5 and £10 (Isaac 1987, 2), but these may well have been newer, in better condition or better constructed. In 1829, the 'Gin' at King's Pit was estimated by two different parties to have a widely differing value of either £10 or £24 (NEIMME Wat3/58/45).

Calculations using a Specific Example

- 4.19 Gill, Knapp and Gallagher (2014, 84-85) made the following calculations for the well-preserved whim at Glory Shaft, on Grassington Moor, possibly erected in c.1820. As the authors make clear, a number of assumptions had to be made in the calculations, but they provide a valuable example when attempting a similar exercise with the whims recorded by the current survey.
- 4.20 Glory Shaft is 37 fathoms (222 feet deep), and the horse walk is 42 feet in diameter, giving it a circumference of 132 feet. A diameter of 10 feet was assumed for the winding drum, with the use of a 30mm diameter (1.18 inches) hemp rope having a breaking load of 5,840 lbs. The horse's load, including the weight of the rope and the loaded kibble, was estimated at being in the order of 800lbs. This could have been largely balanced out if two kibbles (one full ascending, one empty descending) were in use, but then a deeper drum would have been needed. Based on a drum radius of five feet and a whim circle radius of 21 feet, the ratio of the applied force to the lifting force would be 4:2:1. Assuming that at least 70 kibbles were expected to form a working day, a ten foot diameter drum would take five minutes to wind a loaded kibble up Glory Shaft, requiring 7.07 full rotations of the whim. The horse and winder would walk 933¼ feet per kibble load, covering at least 12.4 miles per day, plus the walk to and from the shaft from their base. Including estimated loading and emptying times for the kibbles, the winding work would take just over nine hours with no break.
- 4.21 Using the information from the complete whim circle at Tanhill High Gin (see figure 9), a similar calculation can be attempted. This shaft was probably sunk in 1835, and by 1836 had a depth of 26 fathoms (156 feet). The whim circle has an average internal diameter of 26¼ feet (c.8m), and the distance from the centre of the drum to the centre of the shaft is just over 22 feet (6.70m). It is assumed, as is

commonly shown on historic illustrations, that a two kibble or corf system was in use at Tan Hill/King's Pit, i.e. a full corf was brought up on one rope as an empty corf descended on another rope. The loaded corves were presumably filled at the coal face and then dragged to the base of the shaft using either sledges or wheeled transport, as took place at other coalfields during the 18th and early 19th centuries (Turnbull 2016, 113); they would then be hooked onto the rope. Although it might be thought that the relatively small size of the stone-lined shaft at Tanhill High Gin (c.2.40m by 2.0m) was too tight to allow two corves to pass one another, it is possible that provision was made for this underground; the 1736-37 Colsterdale colliery accounts previously referred to contain a payment of £2 5s to Robert Porter and partners *for making the meetings in the middle of the shaft so that one corf may pass by one another* (NYCRO M2181.F2330 & ZS Box 37). The rope would have needed to have been wrapped around the winding drum a sufficient number of turns to prevent slippage; historic illustrations suggest between three to six turns were used. Thus the horse travelling in one direction lowered one corf while raising the other. At the end of travel, which needed to be more or less simultaneous, the horse would be stopped. Contemporary descriptions appear to make little mention of stopping and turning the horse. There must have been some kind of warning, either visual or audible, to allow for slowing down and halting in the correct position, as over-running of the corf into the overhead pulleys would cause considerable damage and might have precipitated material falling back down the shaft whence it had just been lifted. There may also have been a need to adjust the rope length to take up stretch, so that the corf being lowered just reached the ground as the corf being raised achieved a position where it could be pulled on to the side of the shaft for unloading. Once loading and unloading were completed, the horse would be turned and set off in the opposite direction (Richard Lamb, *pers. comm.*).

- 4.22 To return to the calculations for Tanhill High Gin, assuming a horse circle of 25 feet diameter and a winding drum of 10 feet diameter, the mechanical advantage would be 2.5:1. The circumference of the drum is 31.4 feet, giving the number of turns 4.97 to raise the corf up the shaft, representing just over 390 feet walked by the horse; with the horse walking at 2½ miles per hour (220 feet per minute), this would take 1.77 minutes with a rope velocity of 88 feet per minute. Assuming the load to be 168lbs, the two corves balance each other out and if the rope weighed perhaps 50lbs, the starting load was therefore 218lbs; the pull on the horse was only 87.2lbs. If winding 70 corves in a day, the horse would walk c.5.2 miles. Assuming that there was stabling at Tan Hill House, the return journey from the stables to Tanhill High Gin was a further 1.8 miles, or seven miles in total. With a somewhat smaller drum, such as eight feet in diameter, the mechanical advantage would be 3.125:1, resulting in the horse walking further but with a lighter load. If so, it may be that the type of horse used was as speculated above a small Dales pony, more suited to the harsh environment and the lighter loads (Richard Lamb, *pers. comm.*).

Causeways

- 4.23 It is likely that a network of roadways or causeways running between the pits at both collieries was present by at least the mid to late 18th century, and had probably been present in some form since the late 17th century or earlier. From the late 18th century, the transportation of coal from Tan Hill and King's Pit was greatly improved by the turnpiking of local routes, and in 1768 the trackways or causeways through the collieries themselves were improved as part of one scheme. Carts, in addition to packhorses, are believed to have been introduced at the collieries for surface transportation in about 1790, and given the exposed

nature of the local area and the frequent bad weather, the use of sleds should not be ruled out; the purchase of sledge horses was recommended in *The Compleat Collier* in 1708, the author noting that 'aged worn out Coal-Horses' were suitable for this task (JC 1708, 34). The causeways at King's Pit were said to be in poor repair in 1827. There is no evidence that surface tramways, horse-drawn or otherwise, were ever introduced at either colliery, and substantial causeways continued to be constructed into the first half of the 19th century.

- 4.24 Whilst they do not bear comparison in scale with some of the earthworks relating to early horse-drawn railways in South Wales, for example (Van Laun 2001, 29 & 219), some of the causeways that were built represent significant pieces of infrastructure. For example, that leading to King's Pit High Gin, constructed between 1822 and 1856, is c.85m long, typically 5m-6m wide across the base and up to 2m high. The causeway is constructed from compacted peat, topped by compacted angular rubble, with stone-built culverts allow water to pass through or under the earthwork, as well as alongside, to prevent any water build up and potential damage or erosion (see figure 14 right). The schematic cross-section constructed during the current survey from viewing a part-collapsed area could no doubt be enhanced by the excavation of an archaeological cross-section, as with the excavation of the 1826 horse-drawn Brunton and Shields Railway in North Tyneside (Wood 2010, 77-90).
- 4.25 It has been suggested that, as a shaft was being sunk, the spoil and waste was tipped in the direction of where the next shaft was planned to be, so that the causeway could be extended in that direction (Les Tyson, *pers. comm.*). As the shafts were sunk to service the underground workings, such a pattern would depend on an ability to predict closely where the seams would be most productive and how extensive they would be. It is therefore perhaps more likely that, once the underground workings had reached a distance from the working whim shaft that made haulage uneconomic or too time consuming, the whim was moved forward to its new position based on the location that the underground workings had reached. It is however quite possible that some of the spoil thrown up around the previous whim shaft was then re-used to form a causeway to the new whim position. Indeed, such a practice would explain the pattern of earthworks around some of the whim shafts recorded by the current survey, where there is a wider area around the shaft and circle, slightly raised above the surrounding landscape and edged by a slightly higher bank or scarp. This is reminiscent of the pattern seen at larger 19th century spoil heaps which were re-worked during between the 1940s and 1970s, leaving a cleared area with a slight bank around the edge. It might also explain why several of the whim shafts have a bank of spoil placed on the opposite side of the causeway to the whim and shaft; the causeway was later extended through the earlier spoil heap when the whim was set forward, leaving a bank of spoil isolated.

Coke Ovens

- 4.26 Coking has taken place at Tan Hill since at least 1678, although the majority of the surviving documentation comes from the late 18th century and after. It appears that, certainly in the 1760s, more coke was being produced at King's Pit than at the Tan Hill colliery, and in 1783 this was being sold at 2d per sack. In the early 1820s, it is possible that there was a single coking point for each colliery adjacent to either King's Pit House or Tan Hill House, rather than having coke ovens at the shafts themselves. Eleven coke ovens were listed at King's Pit in 1829, and in 1837 it was noted that a man was paid 4s per oven per week as wages, with three ovens in operation. The number of working coke ovens appears to have declined

again by the 1850s, although a relatively late reference to coking at Tan Hill was made in 1870.

- 4.27 The work undertaken for the previous Statement of Significance report (Richardson & Dennison 2018) noted that, in addition to the relatively well preserved coke oven at Gin Pit, there were at least another six possible denuded ovens (or pairs of ovens) surviving at other shafts, and that this represented the greatest surviving concentration of such structures within the National Park. Based on the dimensions of the surviving earthworks, all the coke ovens at Tan Hill/King's Pit appear to have once been similar to the well-preserved example at Gin Pit (see figure 13). The closest comparative structure to the Gin Pit example is probably the well-known coke oven on Fountains Fell in North Yorkshire (Gill 2008, 45), although this is a single oven, whereas that at Gin Pit was formed by a pair. However, recent survey has revealed the poorly preserved remains of a second coke oven at Fountains Fell, in the same area as the first. The latter is described as a square structure, 4m by 4m in plan, and 2.2m high, which internally had a circular, conical, beehive profile, extending up to a small, but now blocked, aperture at the top. There was a principal arched entrance in the western façade, which was 0.6m by 0.7m in size, defined by large dressed alternate quoins in local millstone, with the arch constructed of flat slates. The poorly preserved second coke oven appears to have been of a similar size (Evans & Quartermaine 2017, 34-40).
- 4.28 Surviving documentary evidence indicates that the surviving coke ovens within the Tan Hill and King's Pit collieries are either late 18th or more probably early 19th century in date. The Fountains Fell oven contained a hemispherical dome, giving it the popular name of a 'beehive oven'. Ovens of this type had been in use for other purposes, such as the recovery of wood tar, since at least the 17th century, and were present near Newcastle by 1765, although they are somewhat taller than Fountains Fell and Gin Shaft examples. The earliest recorded use of a beehive oven for coke making comes from a colliery near Throckley in Northumberland in 1759, although it is possible that a battery of similar examples were erected at Maryport in Cumbria at around the same date. The earliest use of such for coking in Yorkshire is said to be 1802 in Sheffield (Mott 1936, 29-34). It would need archaeological excavation to prove that the surviving examples of coke ovens at Tan Hill and King's Pit are of the beehive type, but if this were to be proved, then some may be relatively early examples of their type. Prior to the use of the ovens, coking within the survey area was probably undertaken by burning in heaps, a method which persisted in South Staffordshire into the 1930s (Mott 1936, 28).

Conclusions

- 4.29 The additional survey work undertaken at Tan Hill and King's Pit collieries has recorded a selection of the surface structures in far greater detail than has previously been achieved. In addition, the extensive unpublished documentary research made available to EDAS by mining historian Les Tyson has allowed these structures to be placed within the development of the collieries to a far greater degree than was previously possible.
- 4.30 This is particularly the case with the horse whims, and the development of winding generally within both collieries. The combination of detailed measured survey and extensive primary documentary research is the ideal one for understanding historic landscapes from any post-Conquest period. In this regard, it would be possible to expand the Tan Hill and King's Pit survey work to include other contemporary North Yorkshire collieries, in order to better understand the development of the

industry across the county. For example, the 1736-37 Speedwell Pit accounts for Colsterdale colliery have the potential, when combined with field survey, to shed light on a potentially early use of horse-winding equipment in North Yorkshire in several different ways. When discussing possible surviving examples of cog and rung gins based on earthwork evidence, Roe (2003; 2008, 38-41) did not have the detailed documentary evidence for these individual shafts. When discussing gins and whims based on detailed documentary evidence, Gill, Knapp and Gallagher (2014, 81) decided not to consider Roe's earthwork evidence.

- 4.31 However, even when both forms of evidence are present, interpretation is not always straightforward. A field visit to Speedwell Pit in 2017 noted that the remains were formed by a raised sub-circular mound, c.15m across, with a slight bulbous projection to the northern end. The shaft has collapsed, producing a steep-sided depression over 10m across, which has removed some of the surface evidence, and there was also a deep covering of heather at the time of the visit. The mound at Speedwell is slightly smaller than the possible examples of cog and rung gins recorded by Roe, nor is there now any evidence for the slightly offset shaft position seen at Middleton (Roe 2008, 38-41). Nevertheless, there is no clear surviving indication of a whim circle, and so the possibility must be considered that the 1736-37 accounts do refer to a cog and rung gin. In several places, the mound retains the remains of an external stone revetment wall at least three courses in height. This could be argued to be more necessary for a gin, where the horse was walking around the outside of the shaft, and there are also a few worn slabs in the surface of the mound that might form the remains of a paved trod. If Speedwell Shaft could be proved to retain the remains of a cog and rung gin, then it would be a rare surviving North Yorkshire colliery example that could be dated through supporting documentary evidence. If, on the other hand, the earthworks form the remains of a whim, then they would still be an early dated example of such in North Yorkshire.

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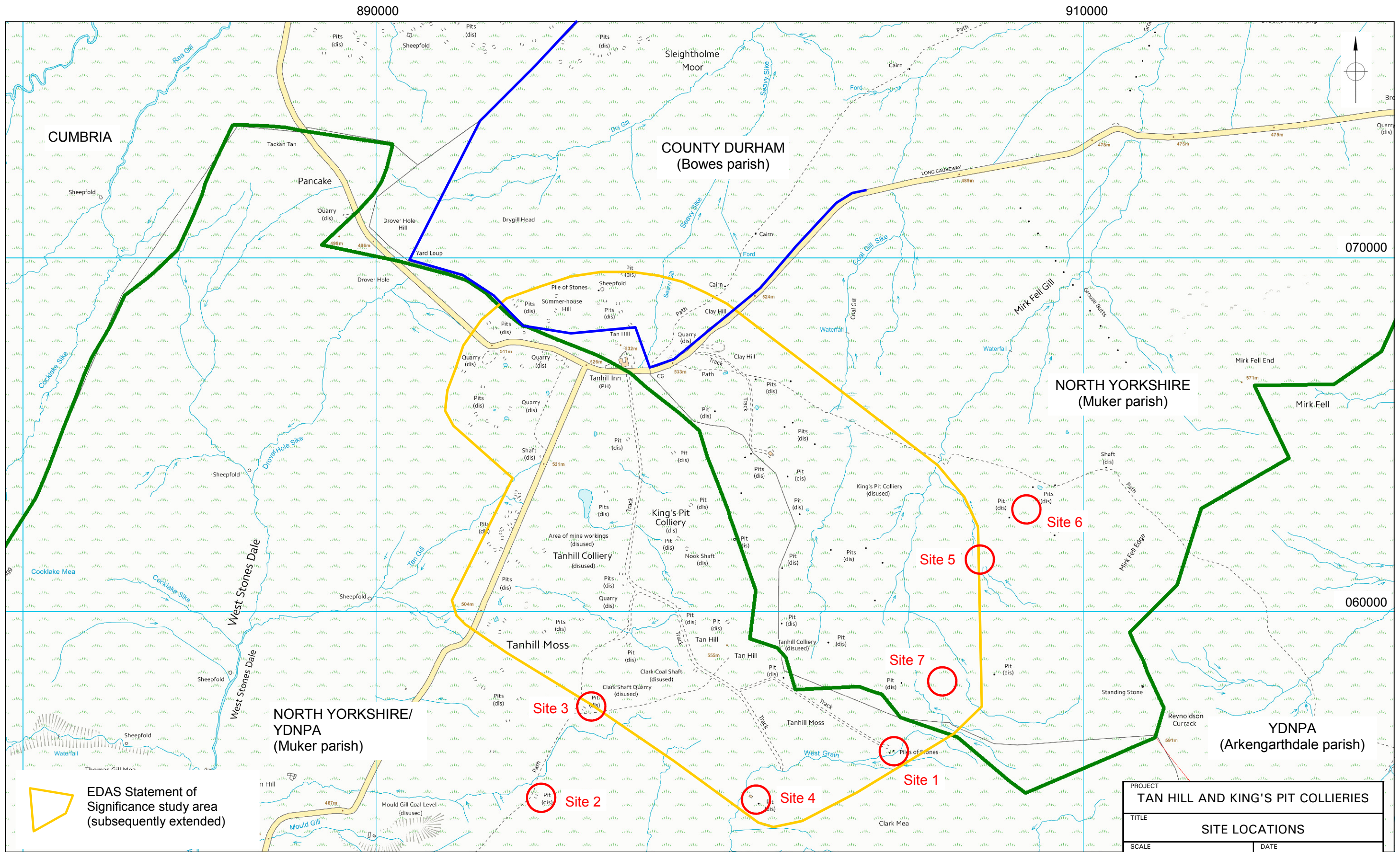
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6 ACKNOWLEDGEMENTS

6.1 The archaeological surveys were commissioned by Mr Miles Johnson, Senior Historic Environment Officer of the Yorkshire Dales National Park Authority (YDNPA). The on-site survey work was undertaken by Shaun Richardson and Richard Lamb, some in conjunction with Benchmark Surveys of Leeds. The considerable assistance provided by Mr Les Tyson, in respect of the documentary materials, is especially and gratefully acknowledged. Ian Spensley also provided useful information regarding coal mines in Wensleydale. The final report and other

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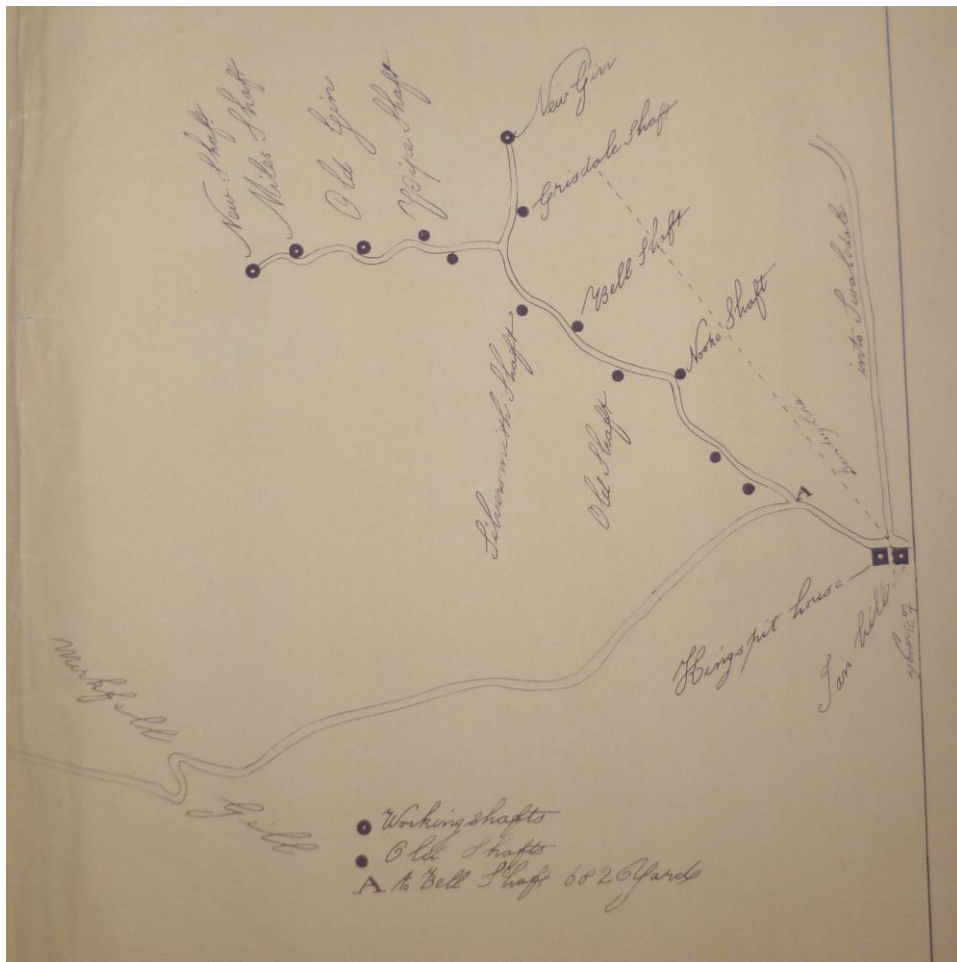
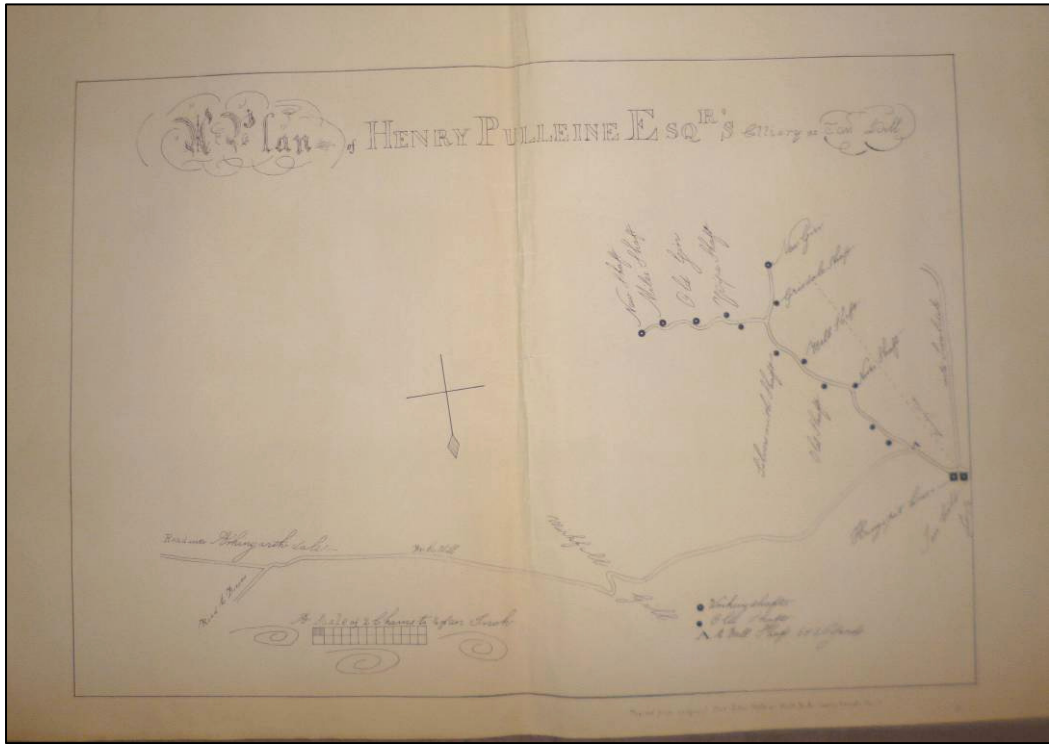


EDAS Statement of Significance study area (subsequently extended)

Map base provided by YDNPA.

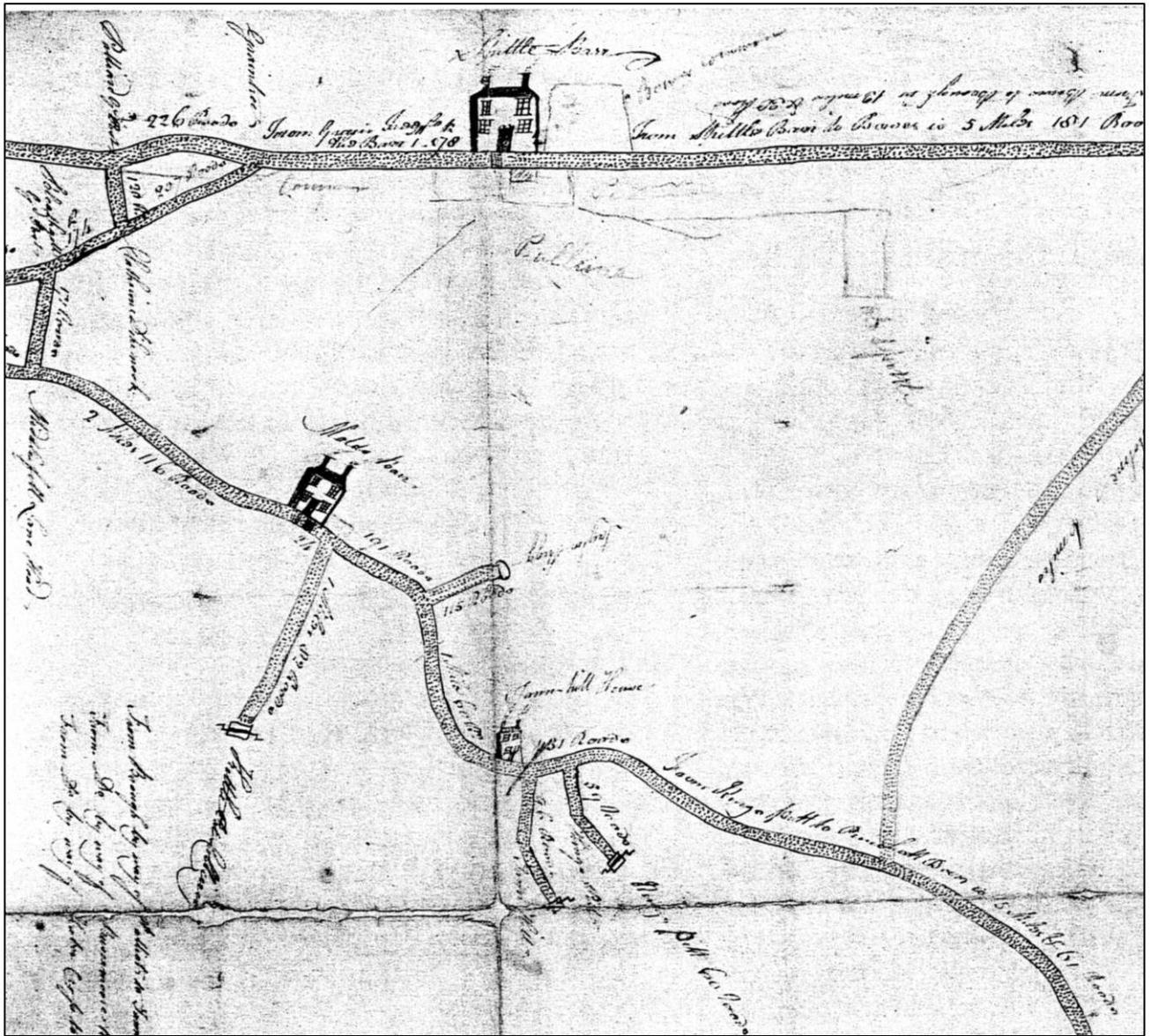


PROJECT TAN HILL AND KING'S PIT COLLIERIES	
TITLE SITE LOCATIONS	
SCALE AS SHOWN	DATE NOV 2018
EDAS	FIGURE 1



Source: "A Plan of Henry Pulleine Esq's Colliery at Tan Hill" (NYCRO ZAW 237/2) (provided by Les Tyson).

PROJECT		TAN HILL AND KING'S PIT COLLIERIES	
TITLE		MAP OF 1774-1816	
SCALE	NTS	DATE	NOV 2018
EDAS		FIGURE	3



Source: Vyner, B 2001 *Stainmoor: the Archaeology of a North Pennine Pass*, p149 (figure 100).

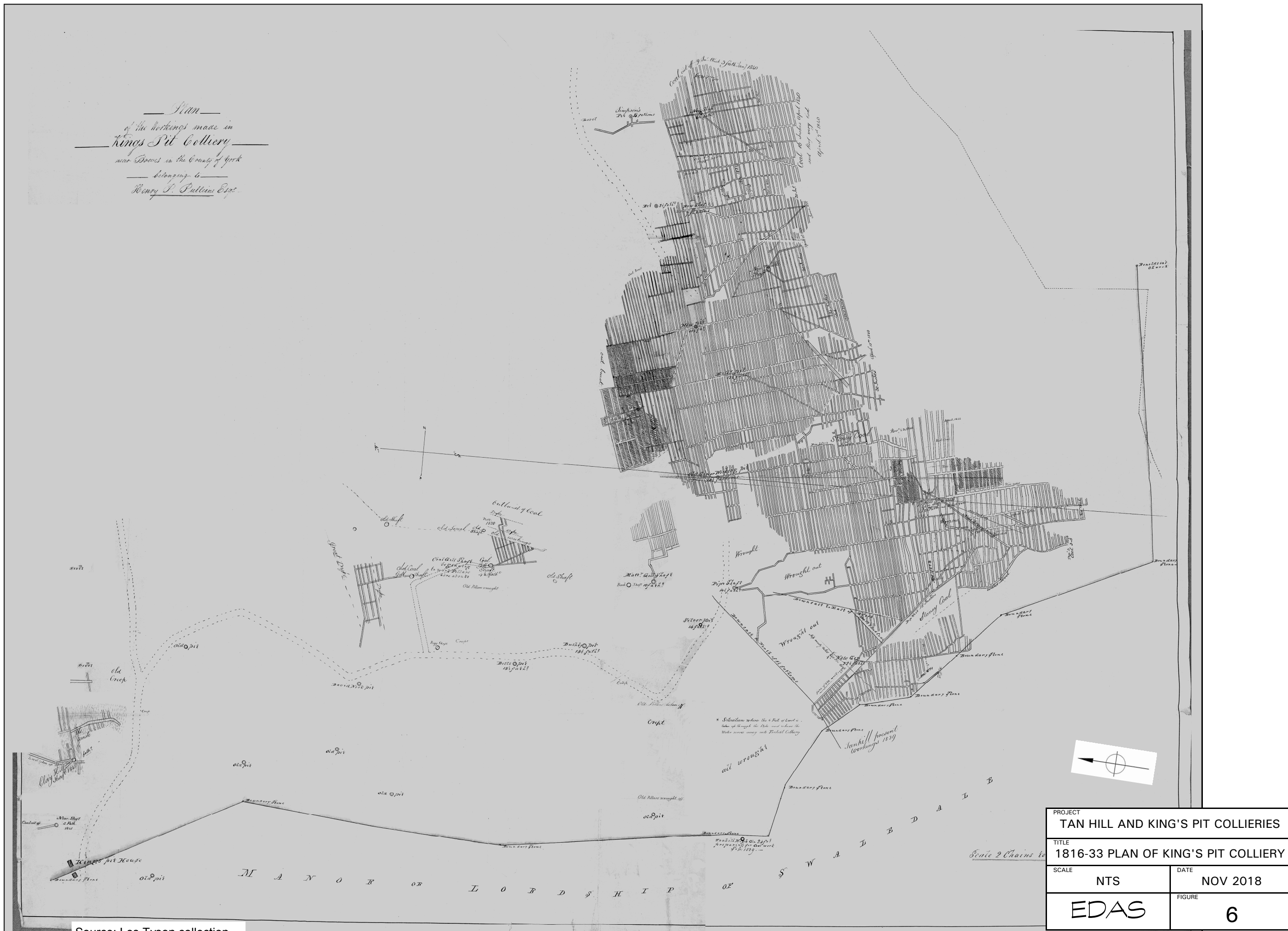
PROJECT	
TAN HILL AND KING'S PIT COLLIERIES	
TITLE	
TURNPIKE MAP c.1770	
SCALE	DATE
NTS	NOV 2018
EDAS	FIGURE
	4



PROJECT		TAN HILL AND KING'S PIT COLLIERIES	
TITLE		PLAN OF 1822	
SCALE	NTS	DATE	NOV 2018
EDAS		FIGURE	5

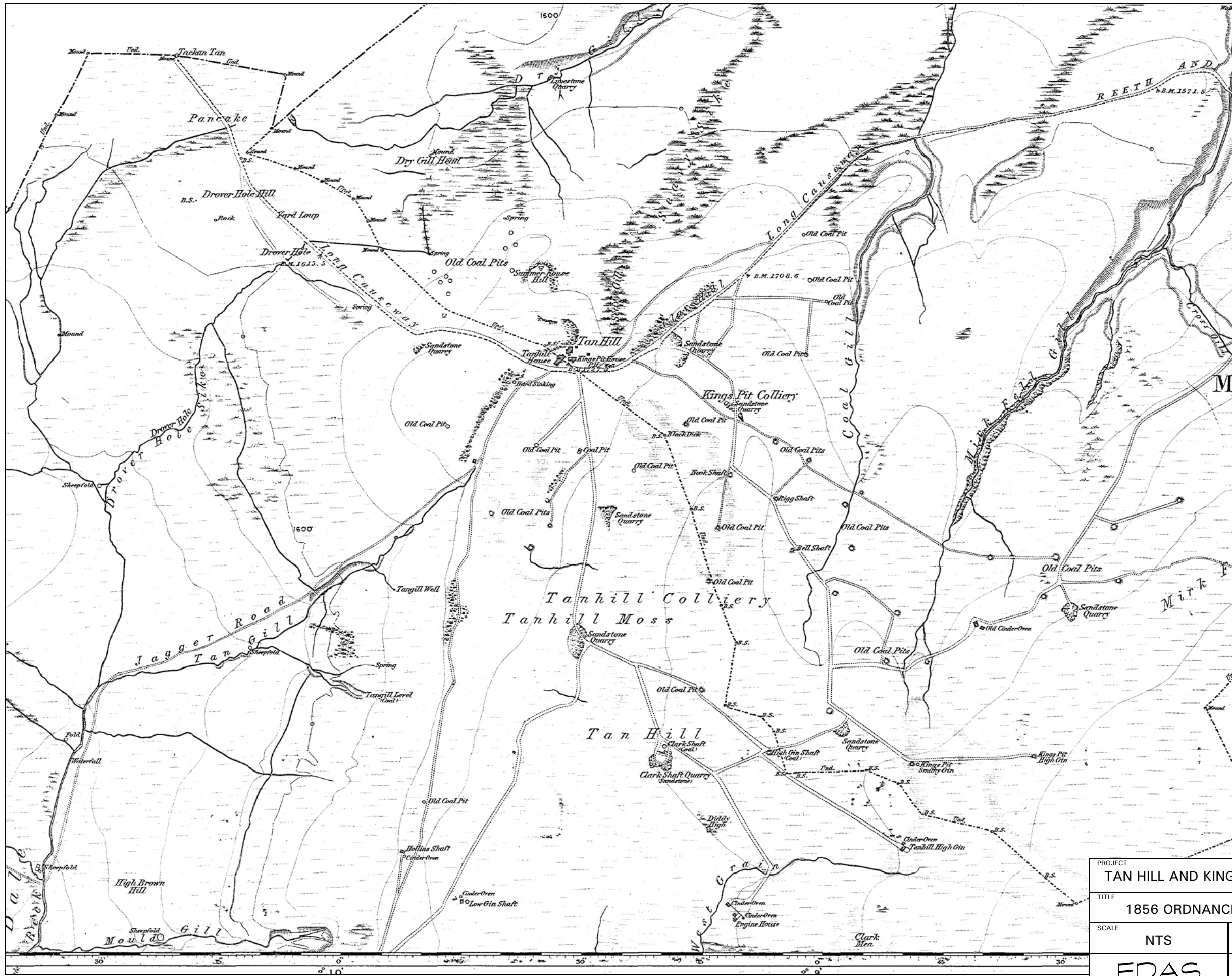
Source: "A Plan of King's Pitt & Tan Hill Collieries, 1822" (Robert White collection).

Plan
of the workings made in
Kings Pit Colliery
near Doves in the County of York
belonging to
Henry S. Pullam Esq.



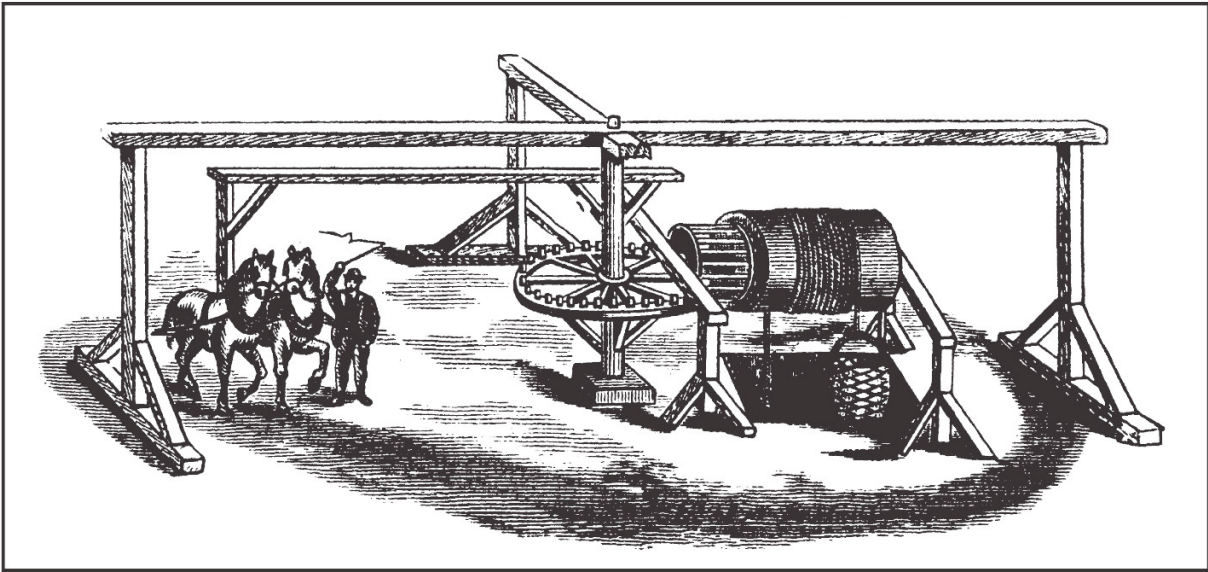
PROJECT TAN HILL AND KING'S PIT COLLIERIES	
TITLE 1816-33 PLAN OF KING'S PIT COLLIERY	
SCALE NTS	DATE NOV 2018
EDAS	FIGURE 6

Source: Les Tyson collection.

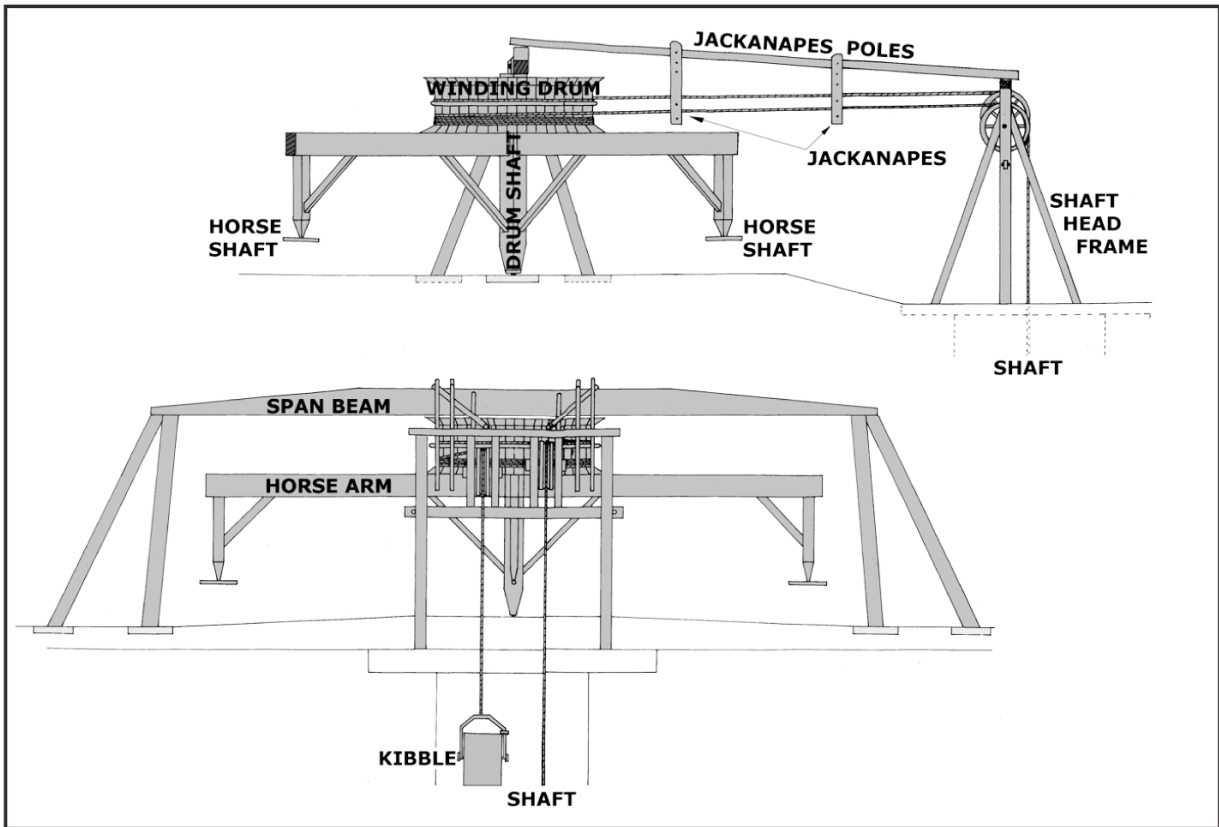


PROJECT		TAN HILL AND KING'S PIT COLLIERIES	
TITLE		1856 ORDNANCE SURVEY MAP	
SCALE	NTS	DATE	NOV 2018
EDAS		FIGURE	7

Source: 1856 Ordnance Survey 6" to 1 mile map Yorkshire sheet 22 (surveyed 1854).



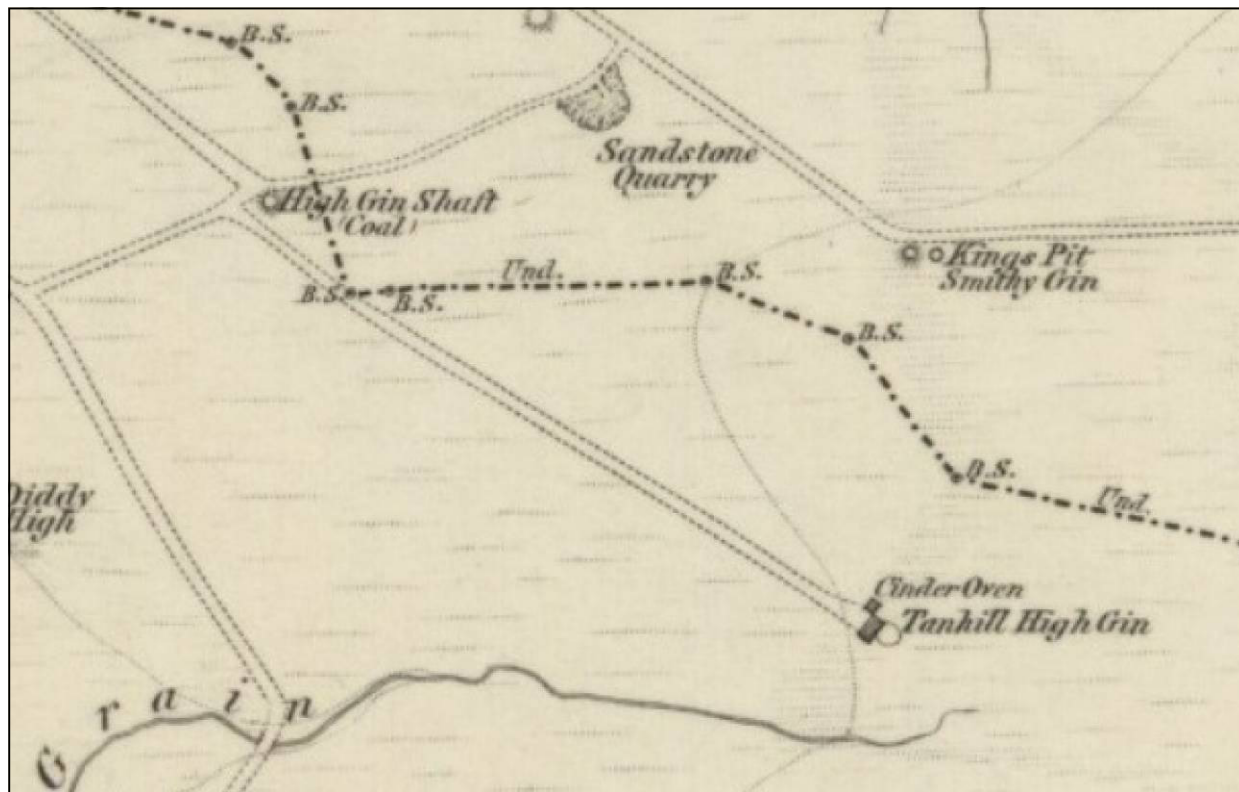
A Horse Gin



A Horse Whim

Source: Gill, M, Knapp, T & Gallagher, P 2014 'Horse Whims and Gins - a Study'. *British Mining* no 98, 81-89 (figures 1 and 2).

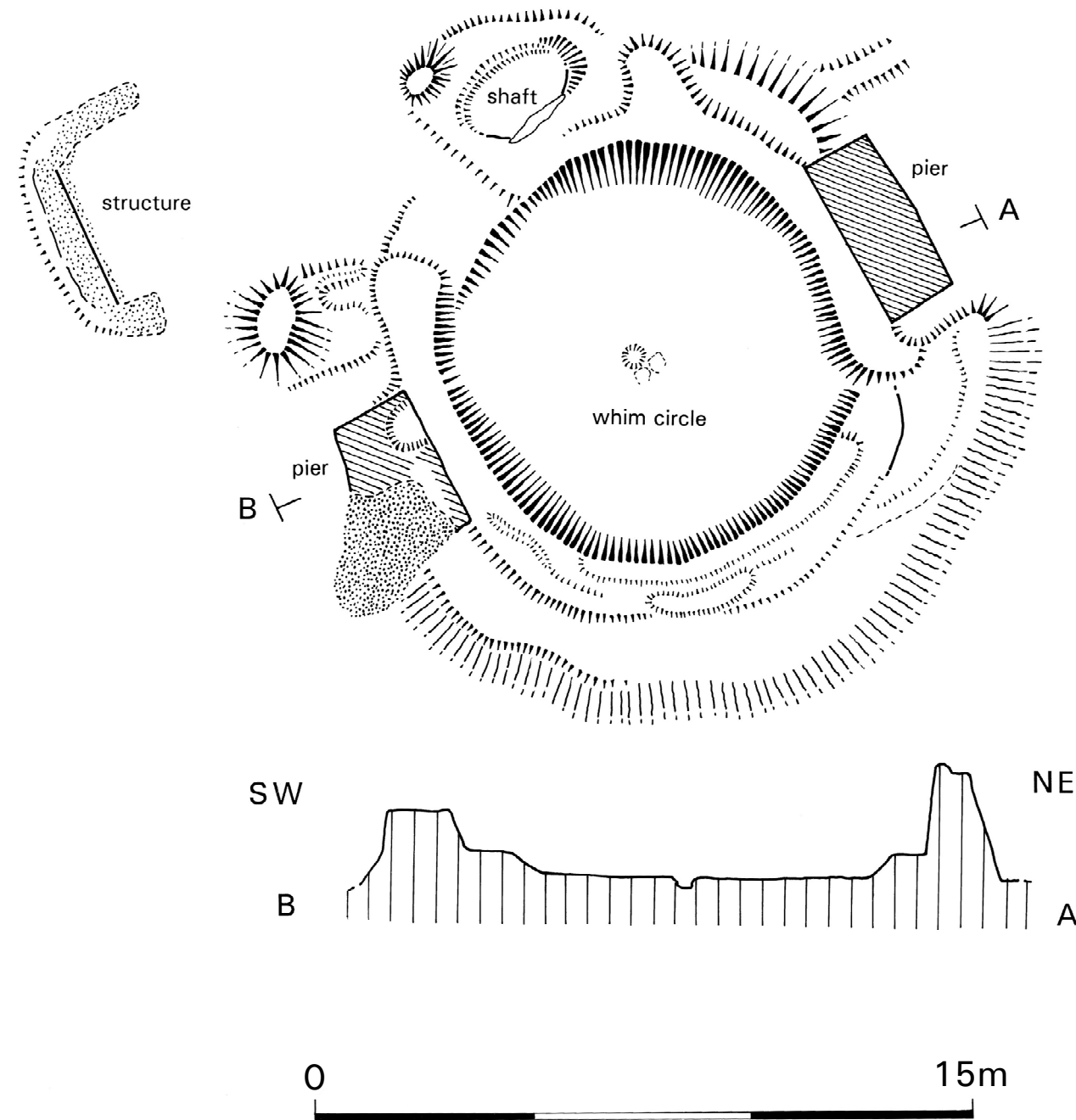
PROJECT		TAN HILL AND KING'S PIT COLLIERIES	
TITLE		HORSE GIN AND HORSE WHIM	
SCALE	NTS	DATE	NOV 2018
EDAS		FIGURE	8



Ordnance Survey 1856 6" to 1 mile map Yorkshire sheet 22 (surveyed 1854).



Ordnance Survey 1895 6" to 1 mile map Yorkshire sheet 22SW (surveyed 1891).



PROJECT TAN HILL AND KING'S PIT COLLIERIES	
TITLE TAN HILL HIGH GIN (SITE 1)	
SCALE NTS	DATE NOV 2018
EDAS	FIGURE 9

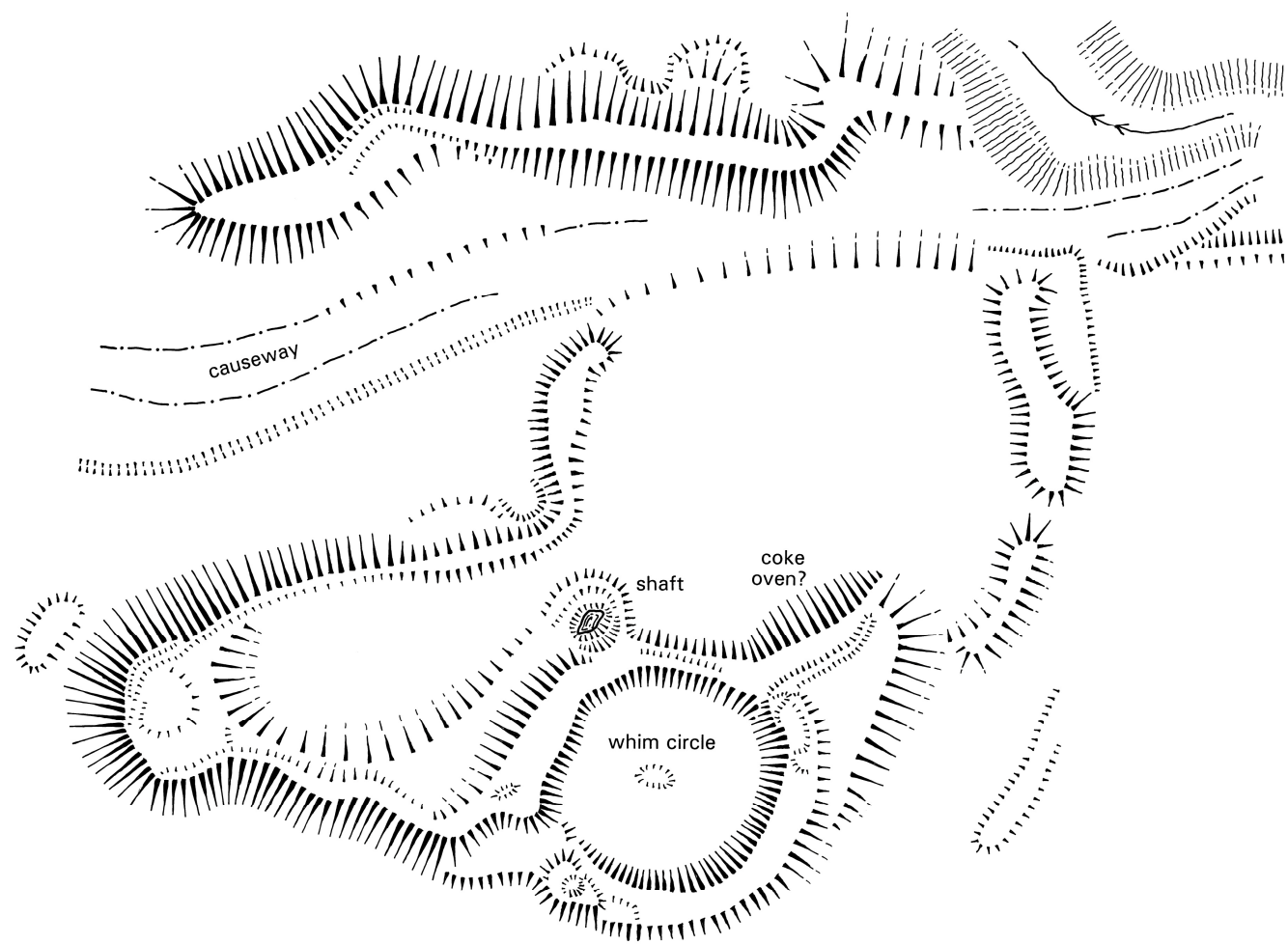


"A Plan of King's Pitt & Tan Hill Collieries, 1822" (Robert White collection).

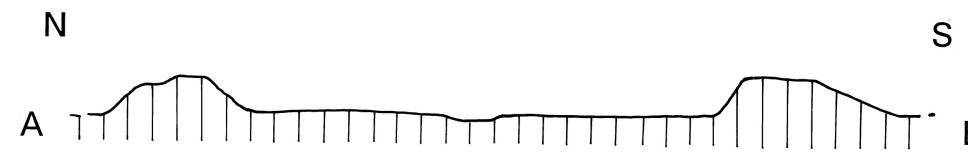
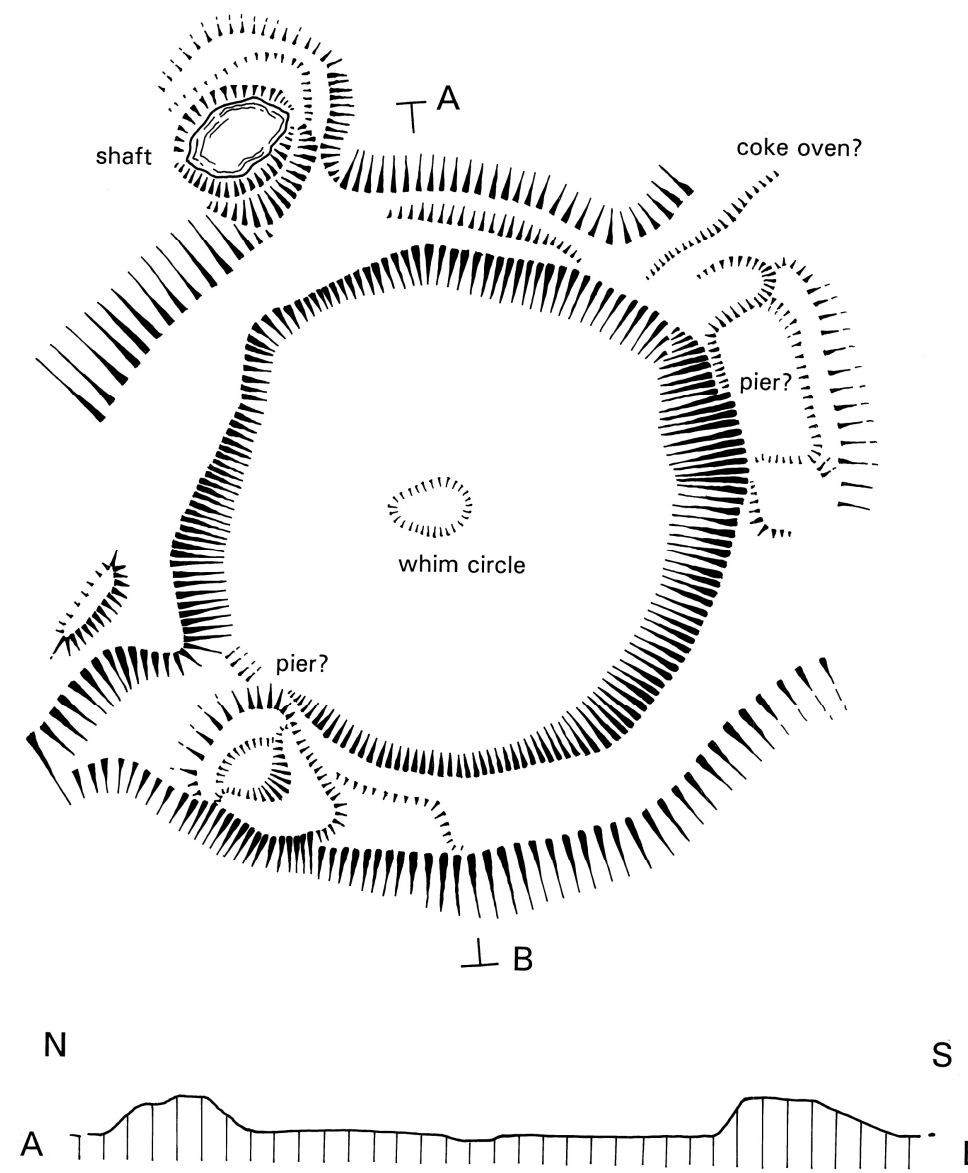


Ordnance Survey 1856 6" to 1 mile map
Yorkshire sheet 22 (surveyed 1854).

PROJECT		TAN HILL AND KING'S PIT COLLIERIES	
TITLE		TAN HILL LOW GIN SHAFT (SITE 2)	
SCALE	NTS	DATE	NOV 2018
EDAS		FIGURE	10



0 25m

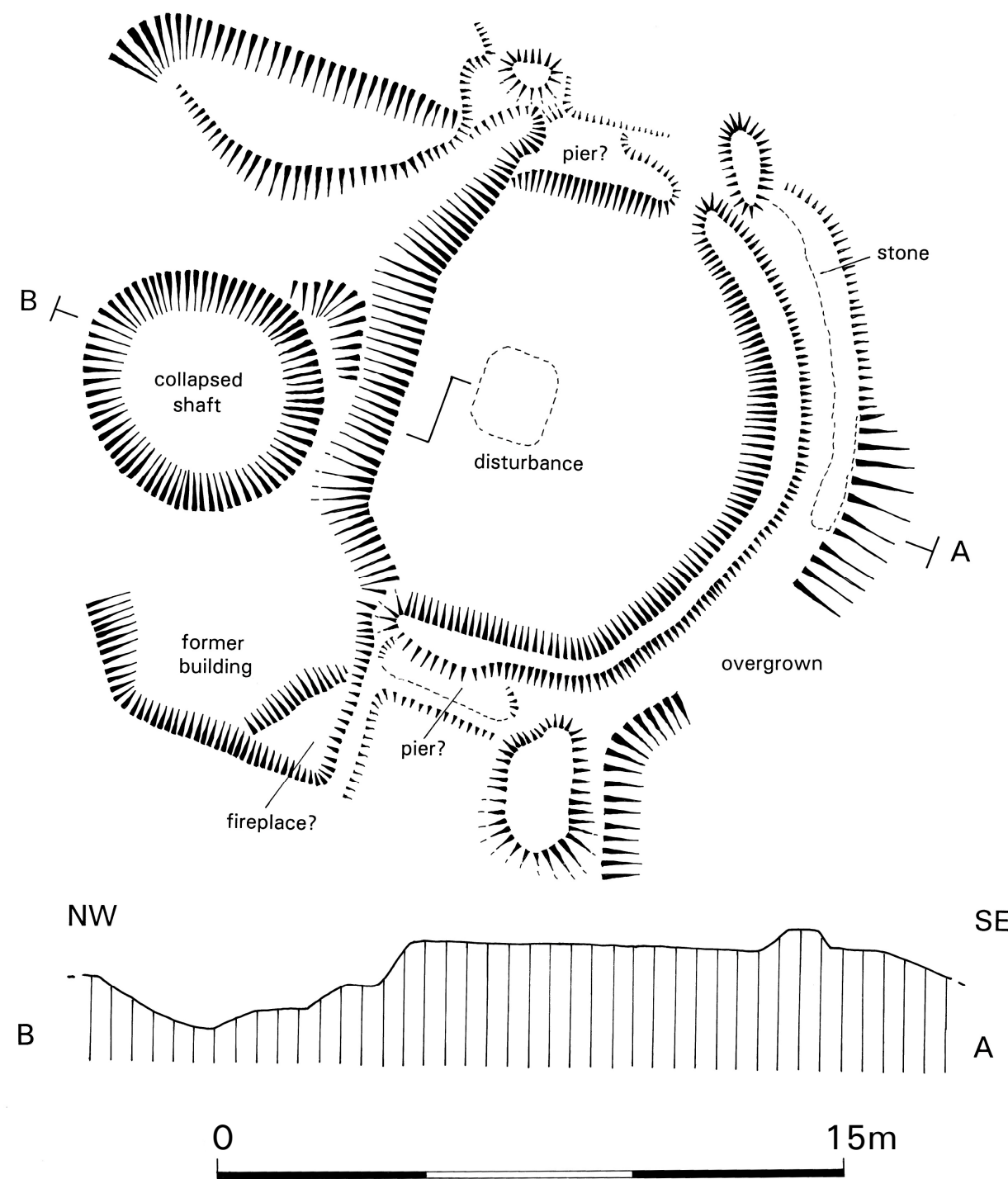


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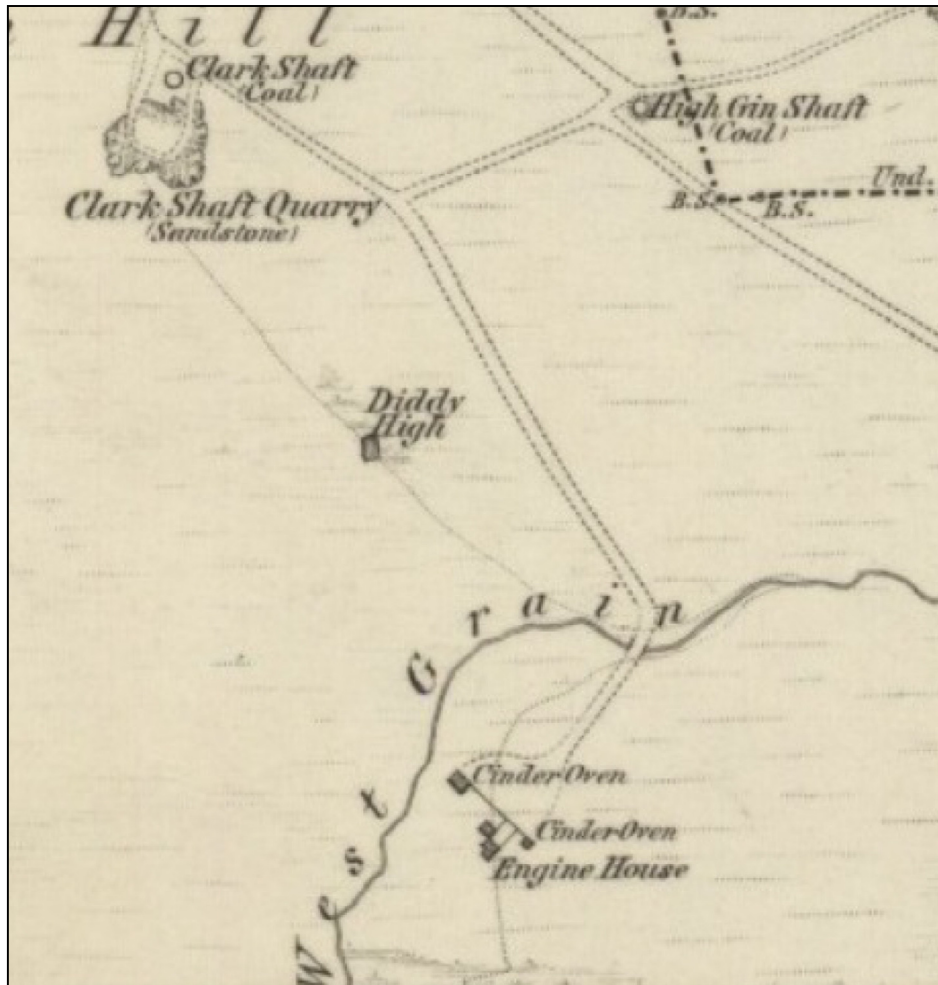
PROJECT TAN HILL AND KING'S PIT COLLIERIES	
TITLE TAN HILL LOW GIN SHAFT (SITE 2)	
SCALE AS SHOWN	DATE NOV 2018
EDAS	FIGURE 11



"A Plan of King's Pitt & Tan Hill Collieries, 1822" (Robert White collection).



PROJECT TAN HILL AND KING'S PIT COLLIERIES	
TITLE TAN HILL HIGH GIN SHAFT (SITE 3)	
SCALE AS SHOWN	DATE NOV 2018
EDAS	FIGURE 12

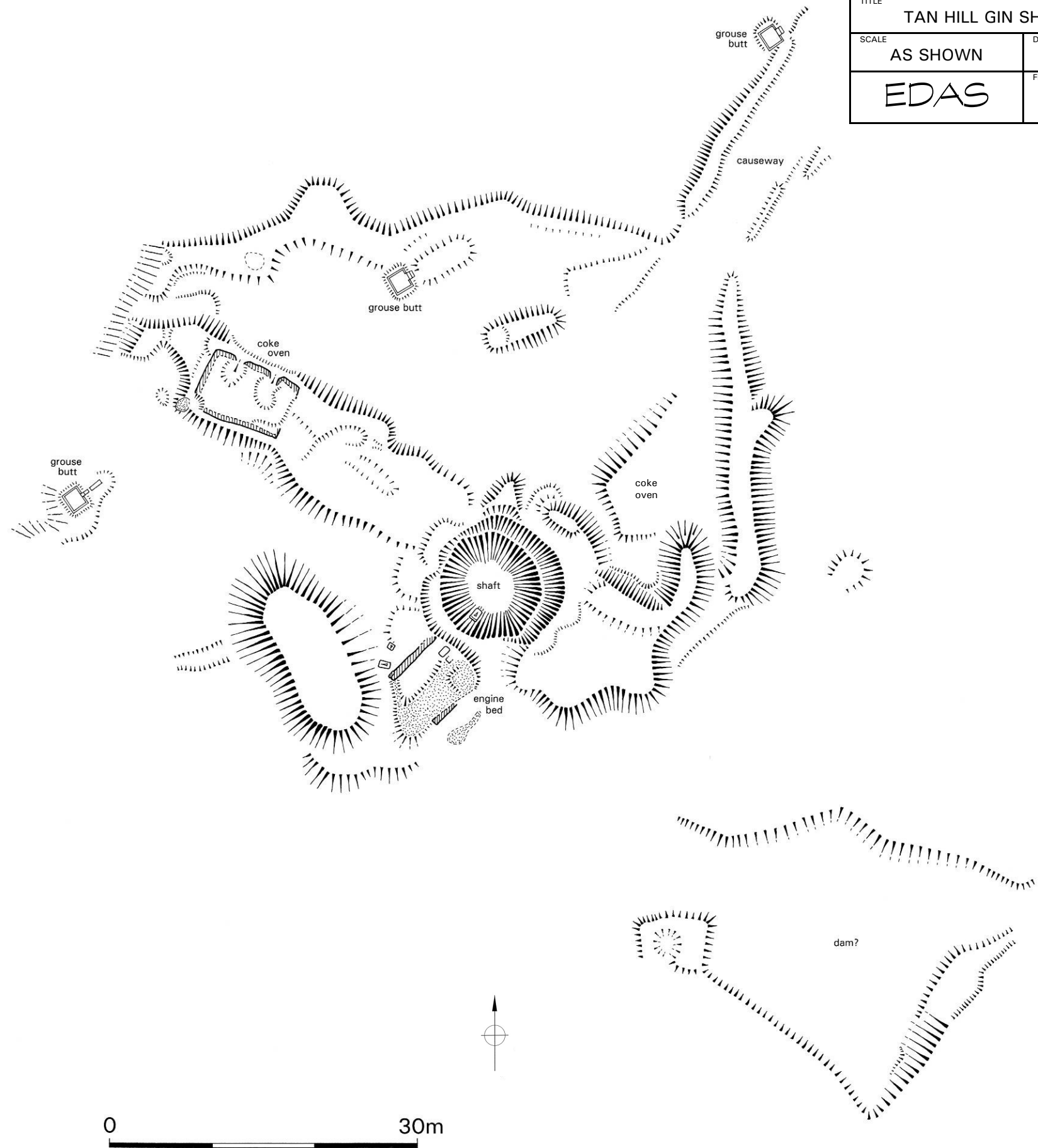


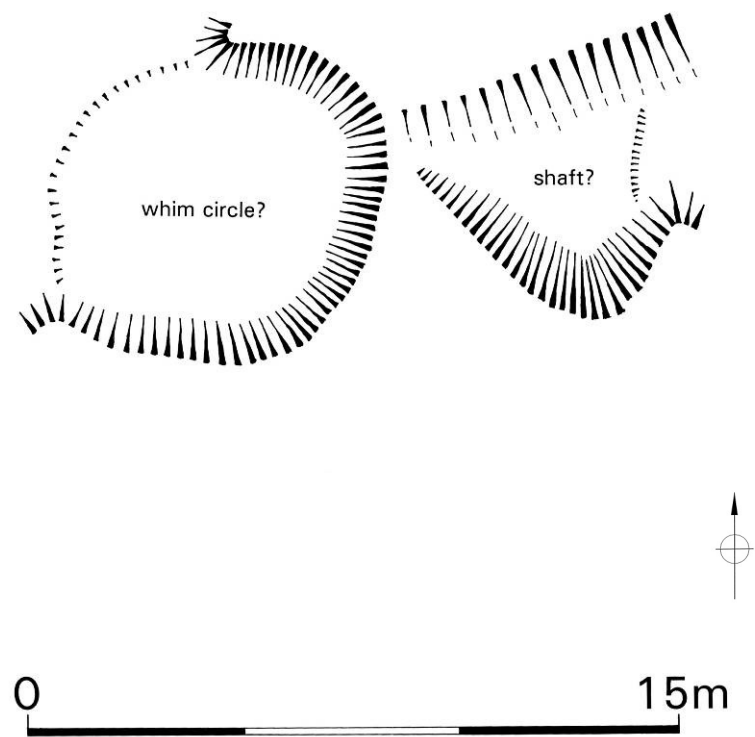
1856 Ordnance Survey 6" to 1 mile map Yorkshire sheet 22 (surveyed 1854).



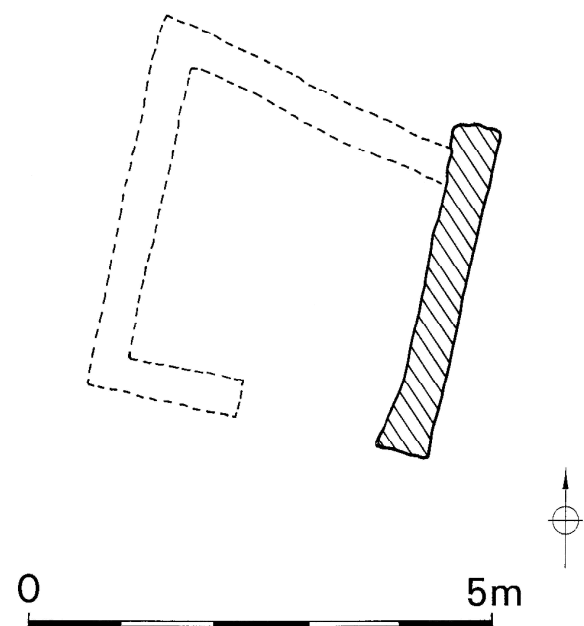
1895 Ordnance Survey 6" to 1 mile map Yorkshire sheet 22SW (surveyed 1891).

PROJECT TAN HILL AND KING'S PIT COLLIERIES	
TITLE TAN HILL GIN SHAFT (SITE 4)	
SCALE AS SHOWN	DATE NOV 2018
EDAS	FIGURE 13

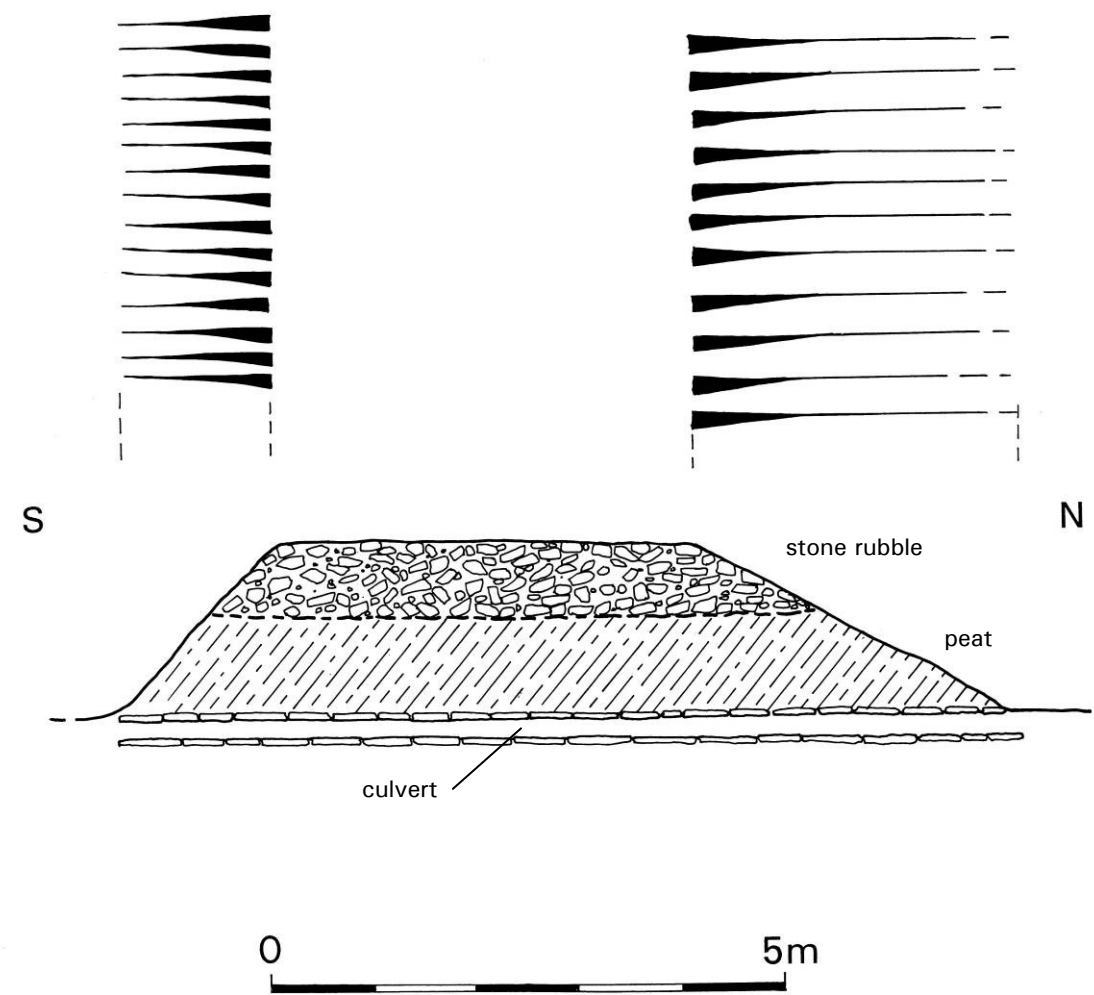




Site 5: Mill's Pit or Miles Shaft.



Site 6: Stone Structure, associated with possible level.



Site 7: Causeway, west of King's Pit High Gin.

PROJECT TAN HILL AND KING'S PIT COLLIERIES	
TITLE KING'S PIT SITES	
SCALE AS SHOWN	DATE NOV 2018
EDAS	FIGURE 14



Plate 1: Tan Hill Colliery, whim circle at Tan Hill High Gin (Site 1), looking SW.



Plate 2: Tan Hill Colliery, south-west pier to whim circle at Tan Hill High Gin (Site 1), looking NE.



Plate 3: Tan Hill Colliery, shaft at Tan Hill High Gin (Site 1), looking SW.



Plate 4: Tan Hill Colliery, structure at Tan Hill High Gin (Site 1), looking NW.



Plate 5: Tan Hill Colliery, whim circle at Tan Hill Low Gin Shaft (Site 2), looking N.



Plate 6: Tan Hill Colliery, whim circle at Tan Hill High Gin Shaft (Site 3), looking SE.



Plate 7: Tan Hill Colliery, shaft at Gin Shaft (Site 4), looking NW.



Plate 8: Tan Hill Colliery, engine bed at Gin Shaft (Site 4), looking NE.



Plate 9: Tan Hill Colliery, shaft and engine bed at Gin Shaft (Site 4), looking NE.



Plate 10: Tan Hill Colliery, north- west coke oven at Gin Shaft (Site 4), looking NE.



Plate 11: Tan Hill Colliery, north-west coke oven at Gin Shaft (Site 4), looking SE.



Plate 12: King's Pit Colliery, structure at possible level (Site 6), looking S.



Plate 13: King's Pit Colliery, causeway west of King's Pit High Gin (Site 7), looking SW.



Plate 14: King's Pit Colliery, section through causeway west of King's Pit High Gin (Site 7), looking NW.