

Califat Colliery, Swannington Common: Site History and Excavation Report

by Peter Neaverson

This paper describes a project prompted by a previous excavation of a haystack steam boiler in a small wood near Swannington in Leicestershire. In common with other archaeological investigations of industrial sites, fieldwork was supported by extensive documentary research. Excavation and clearance revealed a series of demolished structures thought to be part of an engine house. Maps and colliery records enabled conclusions to be reached concerning the operations of the coal mine, while comparison with similar sites indicated that the engine house had once contained an inverted beam pumping engine, an unique piece of machinery in this county.

Introduction

Califat Colliery (NGR SK 4124 1719), also known as Coleorton No. 2, Alabama or Windmill Pit,¹ is located in north-west Leicestershire in a small spinney south-west of the intersection of the A512 and A447 roads north of Swannington (illus. 1). The spinney is enclosed by fencing which more or less marks the boundary of recent open-casting for coal, subsequent to the shaft mine closure. During 1969, a haystack boiler was noticed on the site and this was cleared and recorded before removal for safe-keeping. In 1993, following the ownership of the site passing from the Trustees of the Wyggeston Hospital to the Swannington Heritage Trust, it was decided that the Leicestershire Industrial History Society should return to the site. Further clearance of debris would enable the form and function of the buildings to be ascertained. Although the haystack boiler had not been in use for steam raising when found, it could have been associated with a Newcomen atmospheric engine and therefore the type of engine would be of particular interest. This clearance work, together with documentary research, was brought to a close in 1999.

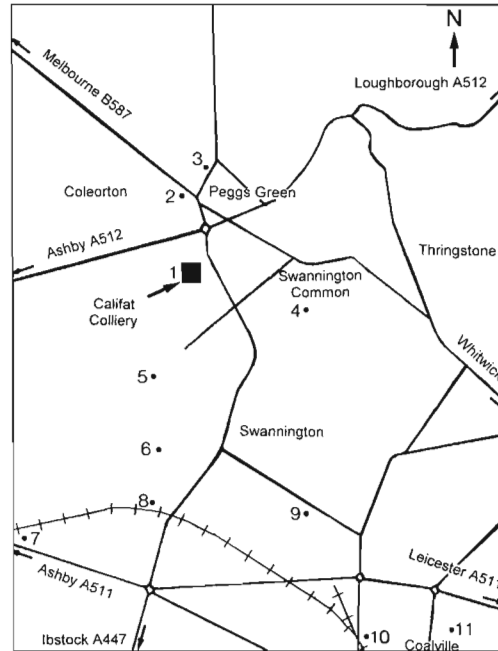
Analysis of maps

A local search for map evidence has been carried out. The earliest map, John Prior's map of Leicestershire, published in 1777, shows no development in the site area, although coal pits are indicated further south on Swannington Common where the coal seams out-cropped.² Similarly, no mining structures are shown on the first edition of the Ordnance Survey One-inch-to-the-mile for which the initial surveys were made between 1814 and 1817, subsequently revised in 1834 before publication in 1835.³ However,

¹ Owen, Colin, *The Leicestershire and South Derbyshire Coalfield, 1200-1900*, Moorland Publishing (1984), 205.

² LLRRO, 1777. John Prior's Map of Leicestershire.

³ Ordnance Survey, 1835. David & Charles, reprint 1970, sheet 43.



two windmill symbols occur in the area, one more or less on the site of the extant tower mill and the other in the south-west corner of the present spinney. A plan of the

1. Location map of Califat Colliery, Swannington, Leicestershire showing the principal colliery workings.

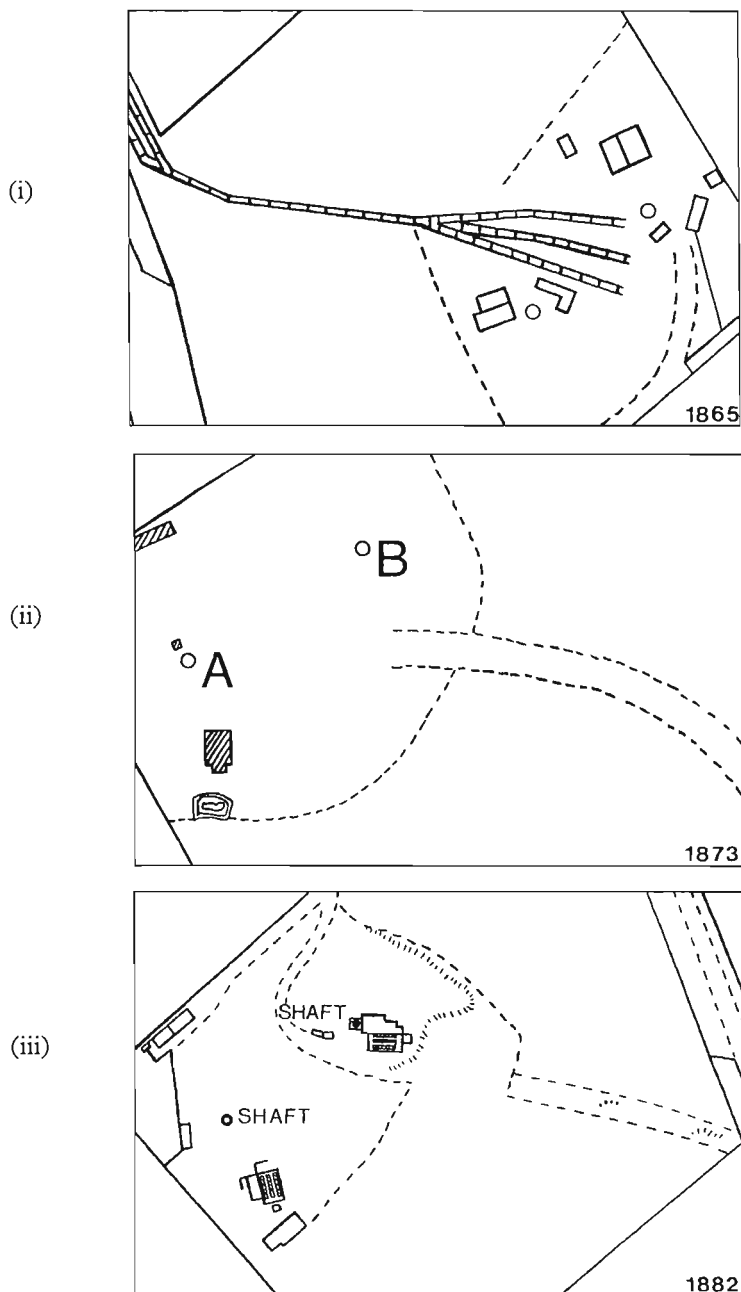
- Key:
- 1 Califat or Coleorton No.2 or Alabama or Windmill
 - 2 California or Coleorton No.1
 - 3 Peggs Green
 - 4 Calcutta or Swannington No.1
 - 5 Limby Hall Engine
 - 6 Dawkins
 - 7 Sinope or Swannington No.2
 - 8 Clink or Swannington No.3
 - 9 Snibston No.3
 - 10 Snibston No.1
 - 11 Whitwick or Long Lane

township of Swannington⁴ depicting the ownership of minerals is not actually dated, although a line showing the extent of workings from the New Pit at Snibston is dated 1st June 1843. No developments are shown on the Califat site.

The earliest map found which shows evidence for mining on the site was submitted to the Leicestershire Quarter Sessions in 1865.⁵ The relevant section is reproduced as illus. 2(i). The plans were drawn up by James Brunlees, Engineer, to accompany a proposal for a railway from Melton Mowbray, via Loughborough to Ashby-de-la-Zouch. The Califat site lay within the lines of deviation for the proposed railway which was located to the south of it. The plan shows various buildings on the site, together with a

⁴ LLRRO, 1843. 3D42/M28/4, Plan of township of Swannington.

⁵ LLRRO, QS.73/166, Quarter Sessions deposit, 1865.



2. Map evidence for the Califat Colliery site,

redrawn to same orientation and approximately to same scale.

- (i) 1865, redrawn from the map accompanying the 1865 railway proposal, LLRRO QS.73/166.
The site is labelled 'Coal Pit'.
- (ii) 1873, redrawn from map dated 2nd August 1873, LLRRO DE.490/28.
The site is labelled as Coleorton No.2 Colliery and a note assigns Shaft A to 'Snibston Colly Co' and Shaft B to 'Pumping Co'.
- (iii) 1882, redrawn from the first edition Ordnance Survey 25 inch to 1 mile map, LLRRO Sheet XVI.11 published 1882. Two shafts are shown and the site is labelled 'Califat Colliery (Disused)'.

tramway that led from the colliery to the Leicester and Swannington Railway terminus. The embankment of this tramway may still be seen running alongside the road at SK 416 168. The proposed railway was never built.

A map dated 2nd August 1873, drawn up by George Lewis, Mining Engineer, Derby, is entitled 'Plan shewing the land belonging to the Trustees of Wigston Hospital which has been used for Colliery Purposes by the Coleorton Colliery Company'.⁶ It is drawn at a scale of 2 chains to an inch and is reproduced as illus. 2(ii). The original showed an area coloured pink totalling 3 acres 2 roods and 3 perches and comprised the spinney area and two strip sections forming part of the tramway connecting the pit to the Leicester and Swannington Railway. It must be presumed that the tramway had been lifted by this date. In the spinney area, marked in pencil 'Coleorton No 2 Colliery' two shafts are marked A and B, the cottages formerly in the north-west corner are shown, as is a single building and pond in the south-west corner, possibly associated with Shaft A. A further pencilled note shows 'Shaft A – Snibston Colliery Co and Shaft B – Pumping Co' – the date of these later notes is not known.

The first edition of the 25 inch to 1 mile Ordnance Survey map published in 1882 is reproduced in illus. 2(iii).⁷ The mine is marked as 'Califat Colliery (disused)' and the path taken by the former tramway can be seen. Two shafts are shown together with two engine houses having boiler houses attached: one resembling a beam pumping engine house, adjacent to the mine shaft and the other resembling a winding engine house, more remote from the mine shaft. On the second edition 25 inch map, published in 1903,⁸ the boiler houses are not shown and both shafts are labelled 'Old Shaft' – this could indicate a complete abandonment since the 1882 survey.

The map evidence is therefore somewhat contradictory. The 1865 railway map, illus. 2(i), may be taken to show two engine houses and shafts, roughly corresponding to those shown on the 1882 map, illus. 2(iii). The 1873 map, illus. 2(ii), shows two shafts and a building indicated in the south-west corner of the spinney area. It is of course possible that the map for illus. 2(ii) was intended only to show land boundaries and that an earlier base map had been re-used and newly dated. The buildings indicated on the 1882 map more or less echo those on the 1865 map, so either the accuracy of illus. 2(ii) must be questioned or, if correct, it could indicate that a considerable amount of clearance and new construction or rebuilding took place between 1865 and 1882. This anomaly might be accounted for by other documentary or by site clearance evidence.

Analysis of aerial photographs

The National Monuments Record at Swindon has a considerable number of aerial photographs showing the Swannington area: the earliest taken in April 1944 and the latest in 1980. These have been checked and the earliest overhead photograph shows the cottages in the north-west corner and possibly a roofed building in the south-west corner but otherwise no other evidence of the site previous to open-casting.⁹

⁶ LLRRO, DE.490/28, plan dated 2nd August 1873.

⁷ Ordnance Survey, 1882. Leicestershire Sheet XVI.11.

⁸ Ordnance Survey, 1903. Leicestershire Sheet XVI.11.

⁹ National Monuments Record, Air Photographs. Numbers 13075 dated 18 April 1944; 4104 dated 17 May 1948; 3094 dated 30 July 1951; 67221 dated 15 June 1967; 083 & 308 dated 7 December 1980.

Analysis of documentary sources

Care had to be taken in documentary searches, since the original Coleorton collieries, where three shafts were in operation in 1572, were located on Coleorton Moor to the west of the site under investigation.¹⁰ Coleorton New Pit was in fact only sunk in 1875 by G. Checkland & Co. on the south side of Coleorton Moor on land leased from Sir George Beaumont.¹¹ Another problem was the large-scale operations of the lessee, William Worswick, of a number of collieries, known variously as Coleorton, Pegg's Green and Swannington, the operations of which were closely connected.

Wyggeston's Hospital, a charitable institution, administered by the trustees of the Chaplain and Poor of Wyggeston Hospital, had been created in 1521 by William Wyggeston, who belonged to a prosperous Leicester family of wool merchants. Their first hospital was near the Guildhall in St Martins and a new hospital on Fosse Road North was opened in 1864, where the charity still functions in modern buildings. The Hospital was endowed with extensive estates in Leicestershire, Warwickshire, Lincolnshire, Derbyshire and Staffordshire. The Swannington estate was leased out from the 1560s to various operators for coal mining, among them John Wilkins, William Newark, Gabriel Holland and William Fenton, and eventually, in 1823, the land only to Kirkby Fenton, the mineral rights being retained by the Hospital. The estate was managed by a Receiver, successively various Leicester solicitors, who employed mineral agents and surveyors, to oversee the mining leases. In the later nineteenth century, the area was worked by four mining companies on an intensive basis, rather than the small-scale surface and shallow workings on the outcrops which had been going on for several hundred years.

Initially the shafts were sunk to the Main Coal, the best seam; there were other seams above and below this, the lowest being the Roaster Coal but these others were of inferior quality. An important point to make is that the seams dipped towards the east, with a slope of around 1 in 14, so that any water in the western workings would drain into adjacent lower workings to the east, unless suitable barriers were left. This was to lead to the creation of a joint drainage company, with its expenses shared at various times by up to four separate mining companies. Disputes over flooding and exceeding the specified acreage of coal allowed per annum were to be the cause of considerable litigation in the 1850s, 1880s and 1890s and it is through the archive which the legal arguments created that some information about the operations at Califat or Coleorton No.2 Colliery can be found.¹²

It was reported to the Hospital Trustees in 1852 that, of its holdings in Swannington, about 575 acres of the Main Coal had been leased in 1840 to William Stenson, and that William Worswick had offered to take a lease of the remaining 747 acres of Main Coal.¹³ Worswick was a Leicester coal merchant, and, according to Owen a contractor, a wealthy property owner with land holdings in Syston and Thurcaston and also owner of the manors and halls at Birstall and Normanton. He was associated with Benjamin Walker in operating the Smoile Colliery, leased from Sir George Beaumont.¹⁴ A 35-year lease was agreed and dated 31st December 1852,¹⁵ at a rate of £111 per acre of coal

¹⁰ Owen, as note 1, 32.

¹¹ Owen, as note 1, 250.

¹² LLRRO 3D67/III/2307-2313; 2422; 2425-9. Legal depositions on case in Chancery 1882, W.4946 Robson versus Worswick and case in the High Court of Justice, Chancery Division, Mr Justice Pearson, 1884 S.70, the Snibston Colliery Co. versus Worswick and James Bouskell (with counter claim).

¹³ LLRRO, 3D67/III/2366, report from Farrer, in Court of Chancery, 25 June 1852.

¹⁴ Owen, ref. 1, 205.

¹⁵ LLRRO, 3D67/IX/17178, counterpart lease dated 31st December 1852.

worked, and the lessee had to pay for the equivalent of 12 acres per annum, even if no coal was worked. In January 1857, the income since Michaelmas 1856 from Worswick was stated to be £1,332 plus extras reckoned at least £800, in other words about 19 acres of coal had been extracted.¹⁶

The first information found concerning Worswick's operations on the property are contained in a statement in October 1857 by the Receiver for the Hospital, Charles Smith, who wrote:

Mr Worswick has erected two collieries on the estate and has far exceeded the minimum quantity of 12 acres per annum. He has recently erected a private railway nearly parallel to the Coleorton line from the terminus of the old Swannington to his newest pit on the Common.¹⁷

This clearly refers to the Califat site, or Coleorton No.2 pit, and the other colliery referred to would be Swannington No.1 or Calcutta Pit on the east side of Swannington Common where sinking began in February 1853.¹⁸ Both these collieries were on Hospital property. Coleorton No.1 Pit or California Pit had been sunk by Worswick and Walker in 1849 as an extension to the Smoile Colliery, referred to above, and lay to the north of No.2 Pit.

Worswick was, in addition, to work other shafts further south on the Swannington lease, namely Swannington No.2 or Sinope (sunk 1861) and No.3 or Clink (sunk 1863). So successful were his mining operations that in 1861 he negotiated a 20-year lease with Leonard Fosbrooke, of Ravenstone Hall, for the Main Coal under 59 acres in the parish of Ravenstone at £100 per acre.¹⁹ In 1869, Worswick leased the Main Coal under 15 acres of the adjoining Ravenstone Glebe for 5 years, for a single consideration of £703 2s 6d.²⁰

By 1866, Woodhouse and Jeffcock, the surveyors for the Hospital, suggested that problems of water in the mines would affect the income of the Charity within five years and also, in view of the rate of extraction of the Main Coal, they proposed an exploratory drilling below it.²¹ At that time there were in the district, including Ibstock, fifteen shafts through which coal was drawn and seven for pumping and ventilation. There were five pumping engines erected on the Swannington Common district, four of them then working, Swannington, Coleorton, Pegg's Green and Lount and a fifth, Windmill, was not working. This latter would probably refer to the pumping engine at Califat. They further reported: '... that none of these engines is economical in working and three of them are very old. If any plan of pumping be adopted it must be done by one powerful engine and one which would work with the greatest economy of fuel'.

Worswick notified the Receiver in March 1866 of his intention to close Swannington No.1 colliery by the middle of April as the Main Coal was worked out.²² A subsequent plan dated 12 January 1870, by George Lewis, shows the Exhausted Mines at Swannington No.1 colliery.²³ The exploratory sinking below the Main Coal was carried

¹⁶ LLRRO, DG9/2260/14, schedule of rental income dated 27th January 1857.

¹⁷ LLRRO, DG9/2260/38, statement by the Receiver for the Wyggeston Hospital, Charles Smith, dated October 1857.

¹⁸ Owen, as note 1, 205.

¹⁹ LLRRO, 3D67/III/2446, copy of lease dated 30th March 1861.

²⁰ LLRRO, 3D67/III/2447, copy of lease dated 5th August 1869.

²¹ LLRRO, DG9/2260/39, Report on the Lower Mines and Water Question for the mines at Swannington, for the Wyggeston Hospital, dated 4th January 1866, from Woodhouse and Jeffcock, Derby.

²² LLRRO, DG9/2260/35, letter from Charles Smith to Mr Herrick, dated 17th March 1866.

²³ LLRRO, Plan of Exhausted Mines at Swannington No.1 Colliery, 12th January 1870, signed by George Lewis.

out at Swannington No.1 shaft (Calcutta) by Mr Worswick, under the terms of his 1852 lease, with a contribution to costs of £1000 paid by the Hospital itself. J.T. Woodhouse reported: 'the results are not on the whole satisfactory in as much as the seams expected below the main coal are not favourable'.²⁴ Under the original 1852 lease, Worswick had the first refusal on leasing the lower coal seams.

By 1871, the output of coal from the Worswick holdings had fallen considerably, as shown by letters from the Hospital Receiver to Mr Gray, Mr Worswick's manager. For the year ended Midsummer 1871, the coal was just below the £1,332 minimum rental for 12 acres, in the 1871-1872 year some 14 acres were taken.²⁵ Similarly, in 1873 only about 11.5 acres were extracted.²⁶ The lessee's dissatisfaction with the reducing outputs from the holding were further confirmed in 1875, when the Receiver wrote to J.T. Woodhouse (the surveyor): '... have had a letter from Gray that they intend to cease paying the minimum rent on account of the Main Coal being worked out'²⁷ and later Gray had requested that the surveyor check the Main Coal since they (the lessees) did not wish to pay the half yearly minimum rental.²⁸ Correspondence in a similar vein continued for nearly two years, culminating in the Swannington Colliery Company giving formal notice of closure on the 16th June 1877²⁹ which was followed by a request to the surveyor, Woodhouse, to measure the coal taken.

Notices of sale by auction of plant on the instructions of the Swannington Colliery Company appeared in the *Colliery Guardian* shortly afterwards in August 1877. Specifically mentioned were five horizontal high pressure pumping engines at No.2 [Sinope] and No.3 [Clink] Pits.³⁰ In March 1878, much of the materials were apparently again offered for sale by auction at Swannington, on that occasion on the instructions of a Mr. Wibberley, with the addition of further plant to be sold on behalf of the Swannington Pumping Company, including two horizontal winding engines and a condensing beam pumping engine.³¹ The significance of this last inclusion can only be ascertained with an investigation into the workings of the Pumping Company and their connection with Califat Colliery, which will be treated in a separate section.

By March 1878, the Worswick mining activities had moved to Linby in Nottinghamshire, working on the newly-exploited concealed coalfield. A letter to Mr T.H. Gray, the former Swannington manager, who was then at Linby, indicates that the lease rental for Swannington Colliery was still being paid.³² Negotiations over the lease determination and site clearance continued for several years, only in 1883 could the Receiver, Mr Smith, write to T.H. Gray, at Linby:

I could not help having a good laugh this morning when the Hospital Solicitor came in to see me, on his saying that at last the Worswick Solicitor had sent back the draft surrender of the lease. It appears that it was sent in the summer of 1881 and was returned the day before yesterday. You must not tell me again of delay on the part of Hospital officials.³³

²⁴ LLRRO, DG9/2260/21, report on trial sinking at Swannington, dated 26th January 1867, from J.T. Woodhouse, Derby.

²⁵ LLRRO, 1872. 3D67 letter book 266, Smith to Gray, 10th September 1872.

²⁶ LLRRO, 3D67 letter book 405, Smith to Gray, 25th September 1873.

²⁷ LLRRO, 3D67 letter book 632, Smith to J.T. Woodhouse, 23rd March 1875.

²⁸ LLRRO, 3D67 letter book 717, Smith to Gray, 16th August 1875.

²⁹ LLRRO, 3D67 letter book 65, Receiver, C. Sebastian Smith to T.H. Gray, manager of the Swannington Colliery Company, 30th June 1877, confirming receipt of his notice of closure dated 26 June 1877.

³⁰ *Colliery Guardian*, 17th and 24th August 1877, 280 and 320.

³¹ *Colliery Guardian*, 8th March 1878, 384.

³² LLRRO, 3D67 letter book 189, letter to T.H. Gray at Linby, 21st March 1878.

³³ LLRRO, 3D67 letter book 283, letter from Mr Smith to T.H. Gray, 27th January 1883.

From the above limited map and documentary evidence for coal mining activity found for Coleorton No.2 or Califat or Alabama or Windmill Pit it would appear that under the terms of the 1852 lease, a new shaft was sunk and plant erected. Substantial amounts of coal, well above the minimum amount leased, had been raised and a private railway had been laid by 1857: that railway was still in situ in 1865. Mining activity on the Worswick leases gradually concentrated on the Swannington collieries further south where extra leases were taken in 1861 and 1869. In January 1866 it was reported that the pumping engine at Windmill Pit was not working. By March 1866, Main Coal extraction at the northern Swannington No.1 (Calcutta) was running down and the shaft was to be closed. By inference it is most probable that working at the Califat Pit nearby was also ceasing. This is supported by the 1870 Plan of exhausted Mines and the 1873 map, illus. 2(ii) which shows no buildings by the Califat shaft marked B, with which this investigation is concerned. If this evidence is accepted, then it can only be concluded that the buildings shown on the 1882 Ordnance Survey map were newly erected. This plant was most probably erected by the Swannington Pumping Company.

Documentary evidence (The Swannington Pumping Company)

The first reference found to the Pumping Company are the annotations to the 1873 map, illus. 2(ii), the second takes the form of hand-written notes attached to a copy of a draft assignment lease in respect of lands and premises at Swannington, between the executors of the late William Worswick, George Robert Stephenson, Joshua Sandars, William Burley Hume and the Wygggeston Hospital.³⁴ This re-states the original 1852 lease for 35 years. The written notes refer to:

... two closes of land coloured pink on the enclosed plan numbered 1 and 2 which were leased to William Fenton and William Worswick, two shafts were sunk A and B and a railway made across part of close number 1 from the shafts. ... The parties of the first part [Worswick] have no further need to use the shafts or occupy the said closes. Parties of the second part [George Robert Stephenson, Joshua Sandars, William Burley Hume (Snibston Colliery Company)] entered into possession of the spoil banks and shafts on or about 29 September 1873, but they have not paid any rent for same ... Assign the two closes and also the aforesaid shafts and the buildings works and railways upon the said closes and all benefit and advantage thereof (subject nevertheless to the right of access at all times to the said shaft B for the servants or agents of a certain association called The Swannington Pumping Co to which the said parties hereto are parties)

The 'enclosed plan' was not with the draft lease, but it can be assumed from the above-mentioned details thereon that it is in fact the plan shown as illus. 2(ii) dated 2nd August 1873. The above notes imply that mining operations at Califat had ceased by that date and that the Snibston company had taken possession of the site, using Shaft A and the Pumping company was in possession of Shaft B, which is the subject of this investigation.

Further information on the pumping company may be found from a legal brief document prepared in 1884 on behalf of the plaintiffs in support of their case.³⁵ This case arose due to an alleged trespass by the Swannington Colliery Company

³⁴ LLRRO, DE.490/8, copy draft assignment lease prepared by Miles Gregory Bouskell, Macaulay and Co., unsigned and undated.

³⁵ LLRRO, as note 12.

into Snibston workings by mining away the safety barrier in or about 1877. This alleged offence only came to light when pumping ceased at a later date and the water level rose, entering the Snibston workings in the seams below the Main Coal and flooding them. The case was eventually heard in February 1886 and was arranged.³⁶ The brief summarises the leases at Swannington, involving the Coleorton, Whitwick, Swannington and Snibston colliery companies and describes the pumping activities.

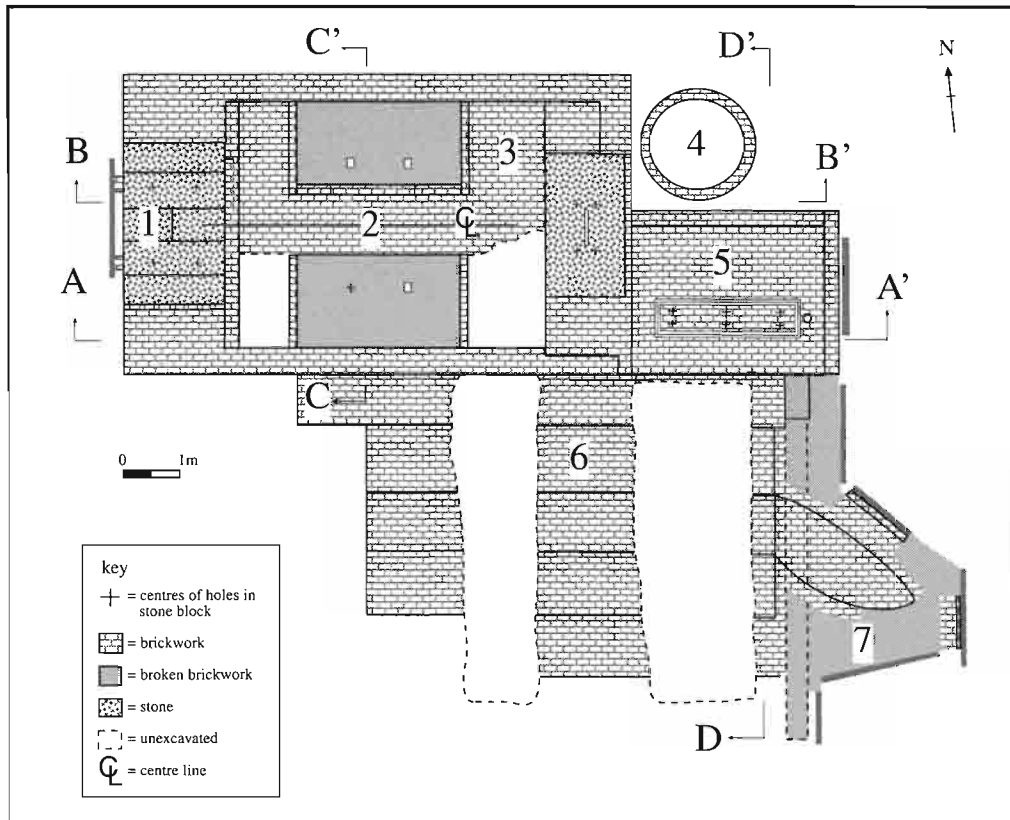
Prior to and including 1870, water was pumped separately on all the mining leases at their own expense. The Coleorton company had pumps at No.1 and No.2 shaft and at Pegg's Green and Lount Pits, the Swannington company was pumping and winding water at all three shafts and the Whitwick company was also pumping and winding water. On 16th April 1869, an agreement had been reached between the Snibston and Whitwick companies for a joint pumping arrangement, involving an exchange of coal getting. On 15th December 1870, a joint pumping agreement was reached between three companies, Whitwick, Snibston and Swannington, each was to pay one third of the costs of operating the Swannington No.1 pumping station (Calcutta), which must have continued in use after coal-getting ceased there in 1866.

This arrangement continued until the beginning of 1872 when a separate pumping company was formed in which the costs of pumping were to be borne by four companies in equal shares – Snibston, Whitwick, Swannington and Coleorton. New plant was to be put down at Swannington No.1 station to raise 2,000 gallons per minute. The Snibston and Whitwick companies were to put down the capital cost, and the Swannington and Coleorton companies were to pay them 4% on their share of the capital cost as well as their shares of the pumping costs. On 27th February 1873, a tender was accepted from Stephenson and Company for the supply of engine and boilers (£11,360), and pumps (£2,230). Site preparation began immediately but the new station was not operational until 21st January 1878, having involved a total expenditure of £34,751 16s 9d.

The Coleorton Colliery Company lease having expired, the pumping company resolved in April 1873 that the expense of pumping from 25th March 1873 should be borne by the other three companies only, and subsequently they resolved to purchase the whole of the plant, pumping engines and buildings at Coleorton No.1 and 2 Pits, and the pumping machinery at Pegg's Green: a valuation of £3,417 5s 8d was arrived at. On or around June 1877, the Swannington Company ceased mining operations and on 1st March 1878, it was resolved that the Snibston and Whitwick companies should pay to the Swannington Company the sum of £902 10s 11d for their pumping plant at Swannington No.3 Pit. Thus the whole expense of pumping drainage now devolved upon the Snibston and Whitwick companies: the cessation of pumping in July 1882, then amounting to £2,000 per annum, was to lead to the rise in water levels in the Swannington workings and the eventual flooding of the Snibston workings which brought about the legal dispute.

Until 1870, Worswick was operating pumps at Coleorton No.1 and No.2, Pegg's Green and Lount collieries. Operations at the Coleorton pits ceased in 1873 and by September 1873 the Snibston Colliery Company and the Swannington Pumping Company had entered the Califat site, although there were no buildings or plant indicated on a map prepared in August 1873. Yet in April 1873, the Swannington

³⁶ *Colliery Guardian*, 19th and 26th February 1886, 305/6 and 345.

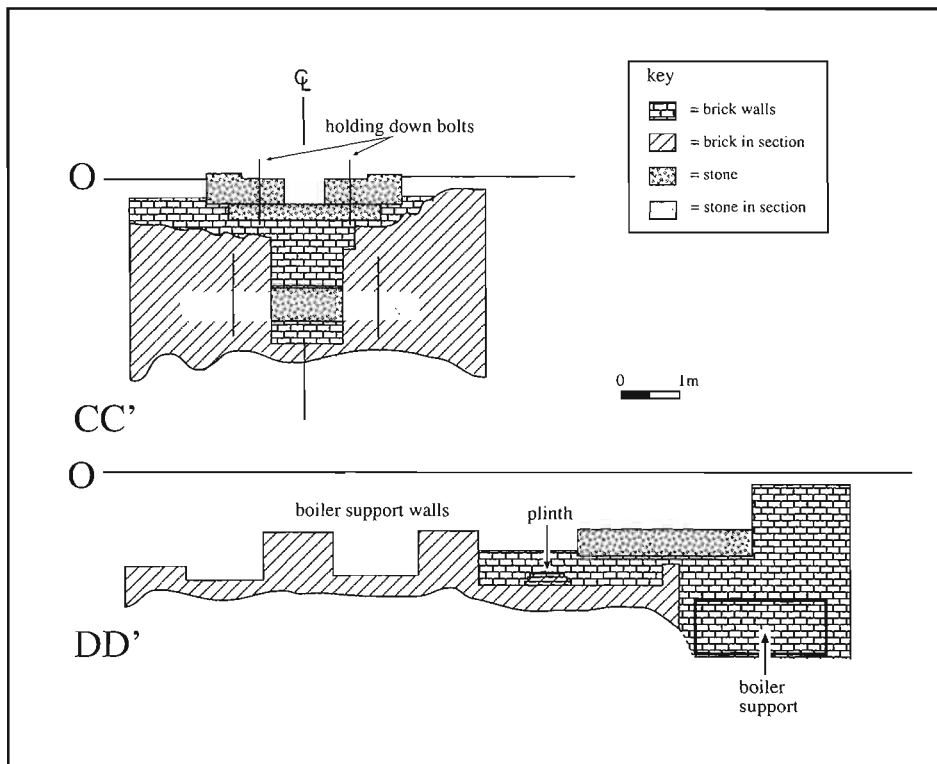
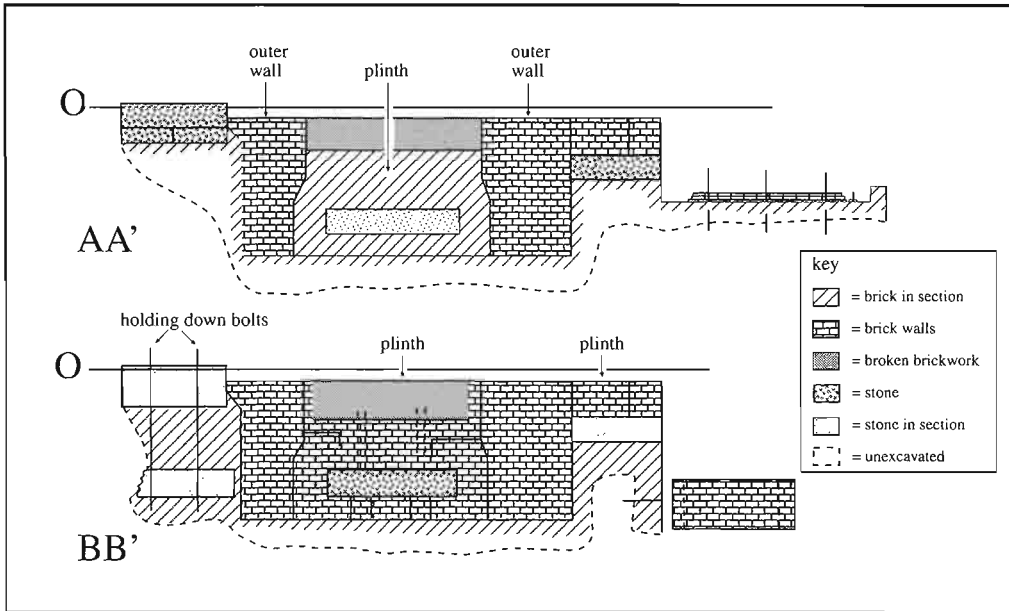


3. Plan of Califat site, boundaries of unexcavated sections are shown dashed.

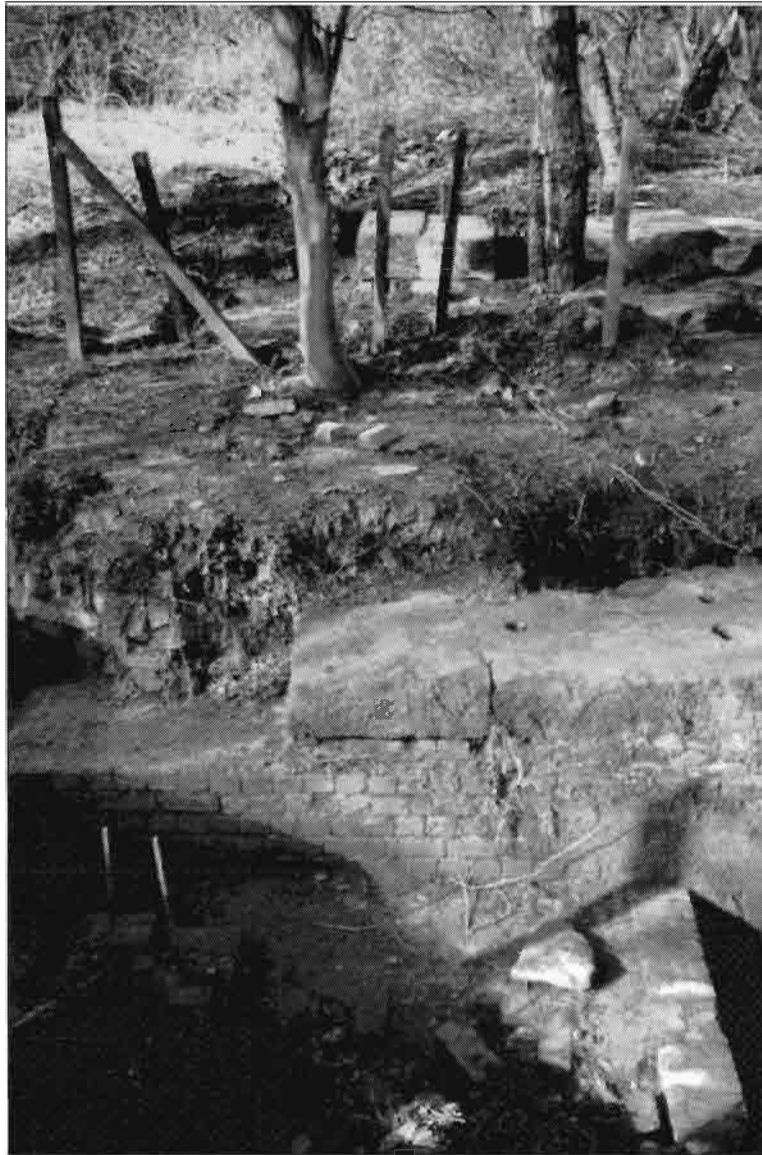
Pumping Company had agreed to buy plant on the site which they might have kept in operation until the commissioning of their new Stephenson plant at the Calcutta shaft early in 1878. The completion of the new pumping machinery would then make the other pumps redundant. It is possible, then, that the machinery offered for auction sale, on behalf of the Swannington Pumping Company, in March 1878 – the condensing beam pumping engine – was the engine from Califat Pit.³⁷ The engine house shown on the 1882 Ordnance Survey map at Califat B shaft might therefore have contained no engine, if the sale was successful. The plant could have been later cleared by the lessors as residual owners, probably for its scrap value.

From the above, often contradictory or ambiguous documentary evidence, it has not been possible, so far, to either date or ascertain the type of machinery on the Califat Colliery site.

³⁷ *Colliery Guardian*, 8th March 1878, 384.



4. Sections AA', BB', CC' and DD'.



5. A view of the site from east to west at an early stage of the clearance. In the foreground Area 5, in front of the transverse plinth Area 3, with the stone blocks Area 1 behind the tree trunks and fence posts.

Site clearance and excavation

In 1969, a haystack boiler which had been re-used for water storage was located on the site and it was recorded by the embryonic Leicestershire Industrial History Society (LIHS) before its removal, first to the Museum of Technology off Abbey Lane in Leicester and subsequently to the

Snibston Discovery Park in Coalville.³⁸ The boiler was 8ft 1in diameter, 7ft 1.5in high with a base of 6ft 3in diameter which rested on an annular brick-built plinth (see illus. 3). The boiler abutted a brick wall on the western side, but no further site investigations were made until 1993 when several LIHS members returned to the site, by then the property of the Swannington Heritage Trust. Open-casting for coal in the area had left the spinney in which the site was located as an island within the open-casted area. This activity had, however, been accompanied by the bulldozing of any upstanding walls, the in-filling of old pit shafts and considerable alteration in ground levels within the spinney.

The obvious surface remains extended over an area of approximately 16m east-west by 12m north-south, roughly in accordance with the building footprint shown on the first edition 25 inch Ordnance Survey map, illus. 2(iii). This image resembled a steam pumping engine house, immediately adjacent to a shaft and adjacent exposed boilers with a chimney stack. All that remained of the engine house was some rectangular-shaped stones and broken brickwork over which subsoil and topsoil had been placed, in some cases to a depth of over 3m, covered with trees, bushes and scrub (illus. 5). In view of this, and the labour available, complete clearance was not carried out. Clearance was done where there were exposed upstanding walls or obvious flat surfaces. Those areas not cleared are shown as blank on the site plan (illus. 3).

In addition to the nucleus of the site, three isolated rectangular shaped stone blocks were found, approximate dimensions 1.90m by 1.06m by 0.45m. One was adjacent to the west end of the site and the other two several metres away to the north-west and south-east as if they had been pushed by a bulldozer to their present positions, indeed two of them might be upside down. Each of the three has a single hole 120mm diameter through it. A careful search has not so far revealed a fourth similar block which it is thought must have formed part of the original engine house structure.

Reference to the site plan, illus. 3, will show the extent of site clearance and the various main parts which have been numbered for descriptive purposes; these will be described separately before attempting to interpret the overall assembly.

Area 1. (illus. 6) At the west end of the site, adjacent to the mound covering the disused pit shaft is a heavy structure of stone and brick construction with two westernmost holding-down bolts *in situ*, one retaining a nut. The upper part consists of two stone blocks 1.81m by 1.22m by 0.41m (north) and 1.81m by 1.17m by 0.41m (south) their long faces separated by 0.58m north-south. These two blocks rest on two more blocks abutting one another on the north-south axis, the lower pair of stones are each 2.43m by 0.89m by 0.28m. The upper stones overlap the lower pair and the space is in-filled with brickwork which is supported on further stone block(s) some 1.75m below the upper recessed faces. The lower block(s) are mounted on stepped brickwork with crow holes for access to the bottom of the holding-down bolts, the bottom nut of one of which was still *in situ*. The crow hole bases were 2.60m below the recessed faces. The 115mm diameter holding-down bolt holes are centred 0.83m east-west and 1.42m north-south and the two remaining bolts are 35mm diameter and their exposed lengths 0.49m long, the remaining top nut is 60mm across flats. The part of the top blocks through which the four holes pass is recessed 0.70m wide N-S in the top face of each of the upper pair of blocks. The recessed surfaces of the two top stone blocks were taken as datum level for the subsequent levels taken on site. The brickwork supporting the blocks extends north and south of them with flat upper surfaces remaining; that on the north side is 1.28m wide and 0.10m below datum, whilst on the south side the flat area is 1.27m wide and 0.57m below datum. It is not known whether these flat surfaces are floors or parts of a demolished wall structure.

FINDS A single-ended curved arm spanner which fitted the remaining upper hexagonal nut was found in one of the crowholes.

³⁸ Baker, D.W. & R.N. Thomson, 'A Newcomen type Boiler at the Califat Colliery, Swannington', in *Leicestershire Industrial History Society Bulletin*, 2, April 1977, 7-14.



6. Stone blocks, Area 1, with holding-down bolts in situ for a rocking beam support.
In the foreground, one of the three rectangular blocks found on site.

Area 2. (illus. 7 & 8) Adjacent to Area 1 is a rectangular pit, of interior dimensions approximately 5.80m in length and 4.55m in width and 2.35m in depth. This contains two mounting supports 3.15m long east-west placed more or less centrally within it, these supports form part of the north and south wall construction, the upper surfaces of both have been considerably damaged by clumsy removal of plant or by bulldozing, probably being originally flat-topped, but now irregularly stepped. Each block has rectangular holes for two holding-down bolts at centres 1.05m east-west and 2.10m north-south; one cut-off bolt remains *in situ* in the S block. This bolt is 45mm in diameter, its original length unknown. The construction of these two supports is similar to that of Area 1 above except that there were no stone blocks on the top surface, only two horizontal stone blocks each with two crow holes below for access to the bottom of the bolts. Damage to these supports enabled their method of construction to be seen, remains of timbers which had supported the bolts within the supports were apparent. The brick-paved floor of the pit was some 2.60m below datum.

FINDS. Pieces of cast-iron boiler grate firebars, iron spike with 0.25m square head, sundry coach bolts, iron rod, part of shovel, three eye bolts, parts of strap hinges, remains of clack type shut-off valve with leather seal, three square washers (probably for bases of holding-down bolts), a square nut, iron ball approximately 77mm diameter, one square headed bolt, one set screw, one iron rod threaded either end and a spanner with right angled jaw end.

Area 3. At the east end of the rectangular pit is another stone block approximate dimensions 2.16m long (north-south) by 1.42m width (east-west) and depth varying from 0.36 to 0.23m, the upper face was slightly stepped and worn. This stone was quite badly broken up and of poorer quality stone than the blocks at the west end. There are four holes for holding-down bolts and a 50mm wide groove running north-south in the upper surface, probably wear caused by a swinging



7. The northern plinth in Area 2, showing the badly damaged upper and inner faces. The lower stone block with crow-hole spaces beneath can be seen with Area 1 in the background.

arm. The holes are 100mm in diameter and spaced 0.82m north-south and 0.34m east-west. Remains of two 25mm diameter holding-down bolts remain in the holes. This stone block was again supported on brickwork as for Areas 1 and 2, the brickwork was 1.47m in width (E-W) with a lower stone block with crow holes below. The main surface of this transverse block was 2.30m below datum.

Area 4. (illus. 9) This annular ring of brickwork, 2.12m external diameter, 1.64m internal diameter and at least 10 courses (0.70m) deep had supported the haystack boiler removed in



8. The southern plinth of Area 2, showing the partly undamaged inner face and the cut-off holding-down bolt still *in situ*.

1969 when it was concluded that the boiler had been lately used for water storage. This was confirmed by further excavation of the area proving the absence of any hearth structure.

Area 5. A rectangular brick paved floor, 3.59m east-west by 2.79m north-south and 1.55m to 1.67m below datum, with a raised rectangular stepped brick base, 2.70m long by 0.69m wide, upper surface 0.50m wide. This base was three courses high and had supported a timber beam, traces of which remained, section approximately 0.38 by 0.50m. There were holes for six holding-down bolts, of which there were bent remains, ranging in diameter from 17.5 to 31mm and respectively from west to east 0.51m, 0.27m and 0.46m in length above the brick base. The remains of a vertical iron pipe approx. 80mm internal diameter projected from the floor at the east end of the stepped base and approximately on its east-west centre line. The east-west centre line of the stepped base was some 1.75m south of the main centre line for Areas 1 and 2.

Area 6. From the 25 inch OS map, illus. 2(iii), it was thought that this was the location of two boilers. Three exploratory trenches were dug across the area as shown. Remains were found of three parallel brick walls running east-west of which the upper faces were comparatively undamaged in places at a consistent height of 0.90m below datum. The walls were respectively approximately 0.92, 1.12 and 1.08m wide north-south with two channels between of 1.20m wide and bases 1.59m below datum. Investigation was made of the grate areas at the west end but the walls were considerably damaged and the ash-pits were not excavated. There was no brickwork surviving of the boiler casings at the east end.

Area 7. (illus. 10) This area was considerably damaged. It appeared that the two bottom boiler flues joined together before entering the base of a chimney at the extreme east end of the excavated area. The flues were brick-bottomed and passed over an arched tunnel which ran north-south as indicated. This tunnel was approximately 0.44m wide and 1.50m high and still coated with soot in



9. Part of the annular brick support for the haystack boiler, Area 4.
The transverse plinth with crow-holes for the holding-down bolts can be seen behind.

places. The base of the channel was around 2.40m below datum. The tunnel ran from the south edge of the brick paved area (Area 5) to beyond the outer boiler support wall and appeared to have had some form of access door at the southern end. Such was the damage to the roof of this tunnel that it was not possible to establish whether the connections between the flues and the tunnel were intentional. Clearance of the chimney area was not completed, a brick floor, thought to be the base of the chimney was some 1.21m below datum. Excavation beyond this floor indicated the presence of a large mass of lime, adjacent to the chimney, possibly used for treating boiler feed water.

FINDS. Two pieces of corroded iron plate 1.05m by 0.19m, with holes drilled, possibly to seal inspection or raking holes for the boiler flues.



10. The northern end of the tunnel under Area 7, in the foreground the base Area 5. The under-flue of a boiler can be seen centre right along with the base of the connection to the chimney stack.

Discussion

Area 1 is of massive construction and resembles the top of the thicker bob-wall of a beam engine house, having four holding-down bolts for the cast-iron brackets which carried the trunnions of the rocking beam – the principal difference being the relatively low position of the pivot compared to present ground level. The proximity of this heavy

structure to the in-filled mine shaft suggests it was a pumping engine.

Area 2 with its two massive composite brick and stone foundations, each with two holding-down bolts, but with a east-west gap between does not resemble the normal interior of a beam engine house. In that case the cylinder base would be at a much lower level relative to the bob-wall pivot – in this case there is no obvious cylinder support and there is very little difference in the vertical heights of the tops of the two foundations and the postulated axis of the rocking beam. In view of this, it is suggested that the cylinder was in fact mounted above the inward end of the rocking beam, rather than below as is conventional in a beam pumping engine.³⁹ It is suggested that in the case of the Califat pumping engine the cylinder could have been mounted on cast-iron or fabricated supports bolted to the brick foundations and the rocking beam moved between their vertical faces. In addition the beam could have extended beyond the piston connecting rod coupling with the balance weight suspended on the end. It is also possible that there were stone blocks on top of the brick foundations upon which the cylinder supports were placed, resembling the construction of Areas 1 and 3. The dimensions of the *three* remaining rectangular stone blocks on site are such that, with a fourth block of similar dimensions which has not yet been located, they could have been part of a similar construction to Areas 1 and 3.

If the above interpretation is correct, it is probable that the rocking beam extended beyond the coupling for the piston rod, and supported a balance weight for the pump rods in the mine shaft, this weight moving vertically in the eastern part of the rectangular pit. Neither the site or map evidence shows a balance bob pit at the shaft head connecting straight to the pump rod in the shaft.

Area 3 has not been interpreted, it would seem that a secondary motion might have been created from the inward end of the rocking beam to another rocking structure swinging in an north-south direction at right angles to the main beam. This secondary device has produced the groove worn in the upper face of the stone block.

Area 4, as has already been mentioned, supported the haystack boiler, which LIHS removed from the site.

Area 5 has also not been interpreted. The raised support with six holding-down bolts could have been for a further rocking structure, moving in the same direction as the main beam, or might have supported a small pump; the bolts were such that a very heavy structure is unlikely.

Area 6, it would appear that these walls had supported two boilers with single under-type flues, there being no evidence for side flues. It is suggested that the boilers were egg-ended approximately 24 feet in length and 4 feet to 4.5 feet in diameter. The use of side flues would have made for more expensive construction and more efficiency, but enough slack coal was probably freely available at the pit head to render them unnecessary. Removal of the boilers had destroyed their enclosing brickwork, grates and the upper parts of the flues.

Area 7, the under-flues from the boilers passed over the north-south brick tunnel and joined up before connection to the chimney stack, probably with sliding plate valves to each flue and inspection plates. The purpose of the tunnel has not been established, although the presence of soot indicates some connection either with the boiler flues, the bases of which were badly damaged, or some secondary grate(s). The possibility of the tunnel belonging to an earlier boiler or boilers cannot be ruled out.

³⁹ An inverted beam engine is illustrated in Percy, C.M., *The Mechanical Engineering of Collieries*, *Colliery Guardian*, 1888, p.109, Fig. 65.

Following the clearance, the excavated areas will be back-filled to leave the outlines of the engine house wall, the brick plinths Areas 2 and 3 and the stone blocks, Areas 1 and 2, visible.

Conclusion

If the above interpretation is correct then the Califat pumping engine was unusual on the Leicestershire coalfield, indeed on coal mines in general. A search of documentary sources has revealed a few examples. Two such engines were photographed still at work by the late George Watkins in 1936, these were operated by the Newton Chambers Company in South Yorkshire, who made the engines at their own foundry and works at Thorncliffe and Chapeltown.⁴⁰

No other surviving remains are known of this type of engine house. Several examples of engine houses for Bull-type engines are known; in this type the beam was dispensed with altogether, the cylinder being mounted directly over the mine shaft. A working example of this type of engine, formerly used for public water supply, may be seen at Kew Bridge pumping station. At South Frances tin mine in Cornwall, an engine house remains which was designed for two compound inverted beam pumping engines to be mounted side-by-side serving a single large diameter shaft, although only one of them was ever installed.

There are also very few examples of egg-ended boilers, *in situ*. One remains at The Snuff Mill, Fishponds in Bristol, Avon. This installation, with side flues as well as an under flue, has been restored and is located in a public park.⁴¹

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⁴⁰ Watkins, George, 1936. Watkins Collection in National Monuments Record, Swindon, photographs WAT 66 A & B and WAT 67 and notebooks.

⁴¹ Bartlett, J.A., 'The Snuff Mill', in *BLAS Journal*, 22, 1992, 25.