

East Kilns, Rosedale, North Yorkshire

Report on an Archaeological Watching Brief



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EXECUTIVE SUMMARY

This report documents archaeological monitoring of works requested by the North York Moors National Park Authority (NYMNP) as a best practice conservation management response to the planned taking down of sections of unsafe fabric to allow the continuation of physical conservation works at Rosedale East Kilns, Rosedale, North Yorkshire. The conservation works are being undertaken as part of the Land of Iron Landscape Partnership Project. The site is a designated scheduled monument (NHLE 1018981), which sits within the North York Moors National Park.

The monitored works involved the removal, by hand, of identified sections of dangerous masonry and ironwork to the north and south sides of one of the stone-built piers which form part of the structure of the former ironstone kilns. The work was undertaken to allow safe access to this area, in order to consolidate the remaining masonry of the pier and parts of the surviving rear wall of the kilns.

The watching brief monitored the taking down of unsafe masonry and ironwork from the south side of 'Pier 3', the third surviving pier when counted from the northern end of the surviving kiln structure. The work involved a steeplejack knocking away loose and unsafe masonry and a surviving iron tie beam from the rear retaining wall to the immediate south of the pier itself. The masonry was photographically recorded prior to the works commencing and at completion. Working shots were also taken during the work. The watching brief also monitored the taking down of unsafe masonry and ironwork from the north side of the same pier.

The monitoring work has provided some new evidence for the structural history of the 'New' kilns at Rosedale East. Of significant interest is the additional information yielded regarding the construction of the tie beam arrangement which presumably once supported the wrought iron kiln structure which no longer survives. These adjustable tie beams appear to have been located within firebrick compartments behind the rear wall of the kilns. A number of these compartments are considered likely to survive in-situ to the rear of the relatively intact northern kiln bay at the site. The firebrick used to construct these compartments, stamped 'C & M', was manufactured at Crook Colliery in County Durham, the owners of which during the 1860s were Chapman and Morson. John George Chapman, one of the two partners, also had significant interests in the iron trade, most notably as the managing director of the Tees Bridge Ironworks at Stockton-on-Tees, and as a director of the adjoining Bowesfield Ironworks. It is presumably through these trade connections that his firebricks came to be used by the Rosedale and Ferryhill Iron Company during the construction of the 'New' Kilns.

The firebrick recovered from the surviving lining of the kilns is also of interest. Stamped 'EH BK', its origin is not certainly identifiable. Although possibly manufactured at East Hetton Colliery, which had an extensive firebrick works, it seems far more likely to have been made at East Howle Colliery, near Ferryhill, the 'EH BK' perhaps referring to 'East Howle Brick Kilns'. During the 1870s and 1880s East Howle was owned by the Carlton Iron Company, which acquired the Rosedale mines in 1881. It is interesting to consider that if the bricks were from East Howle, and were used by the Carlton Iron Company due to their ownership of the kilns, the surviving firebricks at the site, which have clearly been subjected to heating, represent a re-lining of the kilns, probably during the period of that company's ownership between 1881 and 1911. This is not to mention the obvious fact that the bricks themselves differ from those used in the construction of the compartments containing the articulated tie beams at the rear of the kilns as discussed above. Finally, the firebrick 'patch' of irregular brickwork noted on the north side of Pier 3 is also evidence to suggest repair, and therefore re-lining, of this area of the kilns. It may even be possible that re-lining was undertaken here due to a structural failure which was hurriedly repaired.

The wrought iron plate sections used as shims to raise up the tie beam to the south of the kilns are also considered to be of significant interest as possible remnants of the scrapped ironwork kilns which once formed the core of the 'New' kilns. Two sections of plate were inspected and retained as part of the watching brief work, with one plate section measuring \square of an inch in thickness and the other measuring $\frac{1}{2}$ an inch in thickness. It is suggested that these are retained as evidence worthy of further study in considering the structural history of the monument. The origin and historical background of the firebricks used at the site is also considered to be worthy of further study. The source of the 'EH BK' firebrick should be further investigated, as it seems possible that this could assist in dating the last firing or use of the kilns, which might be later than currently thought.

1. INTRODUCTION

1.1 PROJECT OUTLINE

This report documents archaeological monitoring of works requested by the North York Moors National Park Authority (NYMNP) as a best practice conservation management response to the planned taking down of sections of unsafe fabric to allow the continuation of physical conservation works at Rosedale East Kilns, Rosedale, North Yorkshire. The conservation works are being undertaken as part of the Land of Iron Landscape Partnership Project.

1.2 SITE LOCATION AND DESCRIPTION

The monitored works were situated at Rosedale East 'New' Kilns, c. 3.5 km to the north-west of Rosedale Abbey, centred at grid reference NGR SE 70546 98801 at a height of c. 300 m aOD (Figure 1). The site is a designated scheduled monument (NHLE 1018981), which sits within the North York Moors National Park. The site lies on the mudstone of the Whitby Mudstone Formation, with no superficial deposits recorded (BGS 2019). The project area is on open moorland.

The monitored works involved the removal, by hand, of identified sections of dangerous masonry and ironwork to the north and south sides of one of the stone-built piers which form part of the structure of the former ironstone kilns. The work was undertaken to allow safe access to this area, in order to consolidate the remaining masonry of the pier and part of the surviving rear wall of the kilns.

1.3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

An excellent summary of the history and archaeology of Rosedale East Kilns and their associated ironstone mines is provided within the scheduling details for the site (Historic England 2019). Rather than attempt to summarise or improve upon that summary, the full text of the scheduling detail has been reproduced here:

The monument includes standing, buried and earthwork remains of a mid-19th century iron mining complex located on the eastern side of Rosedale, extending between 2.8 km and 3.5 km north west of the village of Rosedale Abbey. It includes the standing remains of two banks of calcining kilns, the ruins of a workshop range, a mine ventilation chimney, and remains of other mining related structures. It also includes sample lengths of quarry face and spoil tips, along with sections of a tramway which runs on the same level and to the east of the two sets of kilns and a standard gauge branch line which runs parallel to this downhill to the west. The monument is in two areas of protection, each focussed on one of the banks of calcining kilns. These are core areas of Rosedale's wider iron mining landscape and further 19th century industrial remains lie beyond the boundary of the monument. The iron mines of Rosedale were a fringe part of the important Cleveland iron ore field in which the ore mostly occurs as horizontally bedded Jurassic ironstone, typically as a thick seamed, but relatively low-grade ore. Apart from small scale medieval surface workings, Cleveland iron ore was first exploited in the 1830s, peaked at six million tons in 1883, a third of Britain's output, and declined after World War I to end in 1964. The ore field was very important economically and helped to make Middlesbrough the centre of the international iron market in the late 19th century. At first the iron ore was typically worked by quarrying the outcrops, then by mining via drifts driven into the face, the thick seams often requiring no extraction of waste rock. This has left extensive, generally linear areas of remains, including working faces, tramways, engine houses, and relatively small waste tips compared to other mining sites.

In Rosedale rich deposits of iron ore were discovered in 1853 near Hollins Farm on the west side of Rosedale, which prompted prospecting around the rest of the dale. A branch line was constructed by the North Eastern Railway which was opened to its terminus at Low Bearing in August 1865. By about this time the Rosedale and Ferryhill Iron Company had opened the East Mines, working a seam of ironstone around 4m thick. This was a carbonate ore which required calcining before smelting and the company built two banks of calcining kilns, known as the Old and New Kilns, to process the ore before transporting it out of the dale via the branch line. In 1866, the first full year of production, the East Mines produced over 168,000 tons of ore, doubling in the early 1870s. However, there was then a slump in the iron market and the company collapsed in 1879. The mines were reopened by the Carlton Iron Company in 1881, which transferred steam powered haulage equipment to the East Mines from the Rosedale West Mines after they closed in 1885. In 1900 an electric generator for haulage,



drilling and lighting was installed, but this was removed when the company ceased production in 1911. Mining was then continued by a partnership, rapidly scaling down operations as the deposits were worked out. The large tips of iron rich calcine dust below both sets of kilns were removed between 1920 and 1927. Production at the East Mines, the last working in Rosedale, ended with the 1926 General Strike and the workings were officially abandoned in 1927, with the railway branch line finally closing on 13th June 1929.

The iron ore was initially extracted by quarrying along the dale side where it outcropped, using some of the spoil to create level terraces for a narrow-gauge tramway along the foot of the quarry and the standard gauge branch line below. Sample lengths of this quarry form the eastern sides of the two areas of protection. Quarrying was soon replaced by underground mining via drifts. The monument includes at least five of these drift entrances, all of which have collapsed. Three of these were still operational in 1912 when the area was mapped by the Ordnance Survey. The southernmost drift, which lies 30 m NNE of the northern end of the Old Kilns, retains a free-standing stone arch 3m wide which formed the original drift portal. Just outside the next drift, 40 m north, there are the sandstone footings of a structure just over 4 m square with a concrete engine bed 1 m by 0.6 m at its centre. This is interpreted as the mounting for a small electric winding engine for hauling mine tubs along the drift, the surrounding footings being the remains of its engine house. In the northern area, 140 m SSE of the New Kilns, there is a collapsed drift marked as Day Hole on the 1: 10,000 map. Just outside this to the south west, there are the remains of another engine house. This was larger, the main building over 10 m by 8 m, and was also built of stone. Disturbed by subsidence, it still retains a pair of sandstone engine beds which are interpreted as the mountings for a steam powered winding engine for underground tramway haulage. The underground tramways, which were all initially horse drawn, fed into the tramway that ran along the foot of the quarries. At its height, this tramway extended over 3 km running from the New Kilns and linking the drifts and quarries along the dale side southwards and then beyond the Old Kilns south and eastwards, almost as far as North Dale. The monument includes samples of this tramway system, including a range of features like stone-built culverts, retaining walls and embankments. The monument also includes the complex of branches, sidings and other features to the east of the northern set of kilns. This tramway allowed ore to be loaded directly from the mine tubs into the top of both sets of calcining kilns. By 1912 there was also a chute at the north end of the New Kilns to allow the tubs to be emptied directly into waggons on the branch line below. Leading towards the site of this chute, the tramway runs along a 74 m long stone lined cutting 0.8 m to 1.4 m deep and 2.25 m wide.

The two sets of calcining kilns are of different designs. The southern kilns, known as the Old Kilns, are thought to have been built first. They form a massive rectangular stone structure nearly 90 m long, built against the hillside. The interiors of each of the four kilns are elliptical in plan, and each has four firebrick lined arched openings 4 m to 5 m wide through the base of the western wall. The construction of this western wall also shows that the two southern kilns were a later addition to the northern pair. In the 1920s the upper part of the centre section was taken down to allow a winding engine to be placed on top. This powered a short incline up the face of the calcine dust tips to the west, allowing the dust to be loaded into waggons on the branch line. The New Kilns to the north also survive as a massive rectangular stone structure nearly 90 m long built into the hillside. However, these kilns were partly constructed with wrought iron plates which were removed after abandonment and the kilns now survive as a west facing open fronted structure, its three kilns forming three separate bays. The southern two kilns are choked with fallen debris, but the northernmost kiln has been cleared to exhibit its structure. This shows that the kiln interior is rectangular, narrowing towards its base, with the rear and side walls lined with firebrick, a lot of which has fallen away. At the base of the rear wall there are four narrow arched flues also lined with firebrick, and at the top there are the stubs of a series of iron tie bars. These tie bars are thought to have supported the iron plates which formed the front of the kilns. Both the Old and New Kilns would have worked continuously with ironstone and coal loaded into the top as the still hot calcined ore was drawn out from the bottom and loaded straight into metal bodied trucks on the branch line. It has been estimated that each kiln could produce around 2000 tons of calcined ore a week using about 80 tons of coal.

The monument includes a number of other features characteristic of iron mining sites. It is thought that in common with iron mining practices in Cleveland, most of the non-iron bearing rock removed during mining would have been stacked up underground. However, extending to the south of the Old Kilns there is a fingertip of mine spoil, suggesting that some sorting of waste rock from the ore took place immediately before loading the kilns. There is another set of spoil tips to the east of the New Kilns. These show a clear sequence from a different type



of operation. The tips are the result of the removal of overburden to allow the outcrop of ironstone to the east of the New Kilns to be quarried back. These tips demonstrate the difficulties of quarrying in a confined area and they overlie parts of the tramway network shown on the 1912 map.

One of the tramway lines covered by spoil leads to the eastern side of a range of five ruined workshops. This range measures just over 40 m by 8 m and is of rubble stone construction. The side walls typically stand to 0.6 m to 1.8 m high, with the gable ends and internal dividing walls standing much higher, some to eaves height. These workshops serviced equipment used at the mines and kilns. For instance, the northernmost workshop, which is entered by a tramway, is thought to have been used for repairing mine tubs. They appear to have been supplied by rail, as on the west side of the workshops there is the track bed for a siding off the branch line. Lying next to the tramway, approximately halfway between the Old and New Kilns, there are the remains of an explosives magazine. This is included in the southern area of protection and survives with a 0.5 m thick stone walls up to 0.8m high, describing a two-celled building with 6 m square room which is accessed via a room 4 m by 3 m on its south side. The southern area of protection also includes a 3.7 m square, stone-built chimney standing to 7.5 m high, which lies 40 m east of the northern end of the Old Kilns. The chimney, which was for mine ventilation, has two opposing arched openings at its base lined with firebrick. This was designed to allow a fire to be lit in the base of the chimney to draw foul air up mine from the mine workings below. All fence posts are excluded from the scheduling, although the ground beneath them is included.



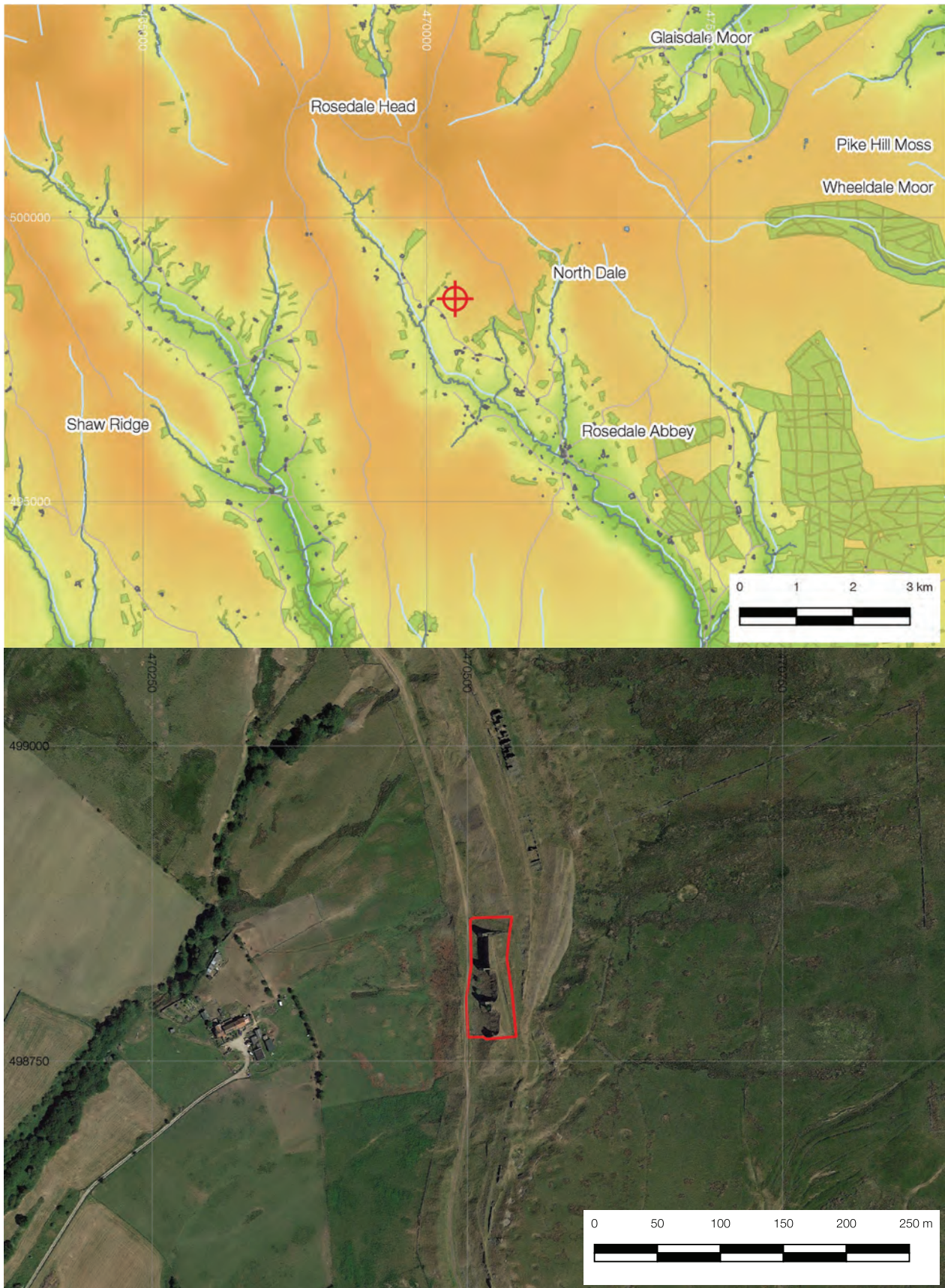
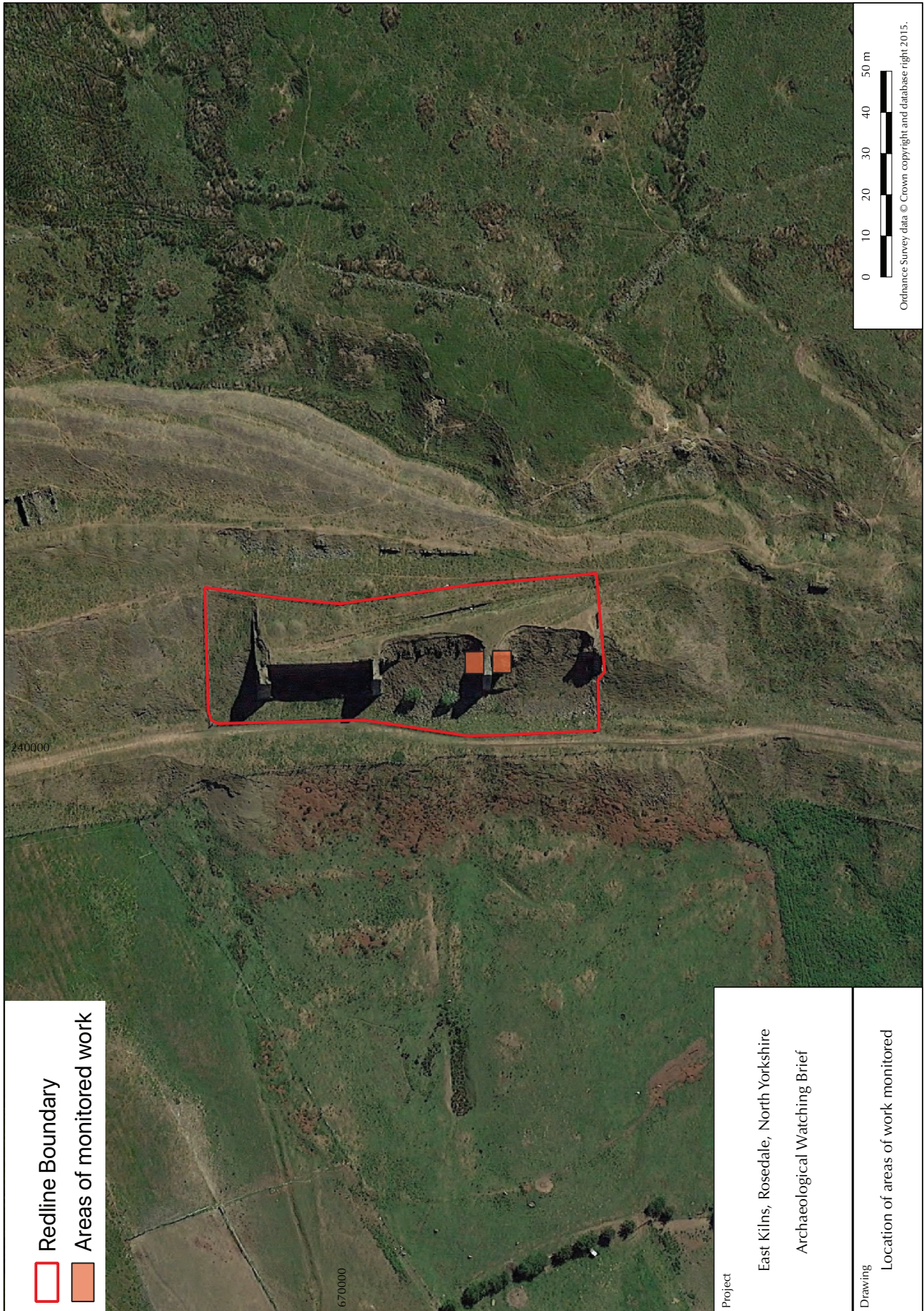


Figure 1 Site location



2. RESULTS

Monitoring of the takedown works was carried out on the 23rd and 24th September 2019 by Chris Scott MCIfA of Solstice Heritage LLP. All work was carried out by hand under the supervision of a suitably qualified archaeologist. Due to the nature of the work, monitoring was carried out from a safe distance, although sufficiently closely to well observe the work at all times. A summary of the methodology is included as Appendix 2.

2.1 WORKS TO THE SOUTH SIDE OF PIER

The watching brief monitored the taking down of unsafe masonry and ironwork from the south side of 'Pier 3', the third surviving pier when counted from the northern end of the surviving kiln structure (Figure 2). The work involved a steeplejack knocking away loose and unsafe masonry and a surviving iron tie beam from the rear retaining wall to the immediate south of the pier itself. The masonry was photographically recorded prior to the works commencing and at completion. Working shots were also taken during the work.

At the outset of the work, an original iron tie beam was present, sitting on top of an iron bearer at the upper extent of the masonry rear wall of the kilns at this location. The iron beam had been historically cut away or broken in line with the wall face and, presumably at the same time, had been raised up from its flat iron bearer to sit on a stack of shims apparently made of small irregular fragments of wrought iron plate (Figure 3). It seems most likely that this stack of shims most likely represented small sections of the former iron platework originally used to construct the kilns as it seems unlikely that such ironwork would have been imported to the site after the ironwork structures were scrapped following their abandonment (Historic England 2019). Below the iron tie beam, another wrought iron, round-section shaft was present which ran from the ground at the rear of the kiln into the masonry of the wall. It is presumed this represents a wall tie, which would have connected to a retaining plate on the front face of the rear wall of the kiln. Such ties are present elsewhere across the structure. Before work commenced it was also possible to observe the arrangement of connecting rods to the rear of the principal tie beam. It could be seen that the wrought iron rods which presumably anchor the tie beam back into the hillside behind the kiln had bolts and wedges allowing for some horizontal adjustment of the beam when in place. These connecting rods were also jointed to allow for movement vertically and horizontally (Figure 4). Presumably these features were intended to allow for expansion and contraction caused by heating and cooling when the kilns were in use. Given that this apparatus would have sat behind the masonry rear wall of the kilns when complete, the rods must have been accessed from above to allow for adjustments to be made, presumably sitting in a covered compartment. On the front face of the rear wall of the kiln, a number of cranked wrought iron ties were noted protruding from the masonry (Figure 5). These clearly illustrate the former presence of a firebrick lining which has been subsequently lost and are variously present across the rest of the monument.

The works commenced by winching the tie beam off its bearer and shims until it fell away to the south side of the masonry. This allowed the large iron bearer to be removed and the masonry of the rear wall to be reduced slowly from the top (Figure 7). A maximum length of c. 1 m of masonry was removed at the southern extent of this wall stub in order to remove clearly loose and dangerous stonework. The work was ceased when a relatively stable section of wall was reached which could be safely consolidated (Figure 8). No structures or included features were encountered within the rear wall during this work and the structure of the projecting pier was unaffected. It was noted that the rear wall of the kilns consisted of coursed, squared masonry to the front and rear faces of the wall, with a rubble core. This wall batters out towards its base and retains a large volume of unconsolidated loose fill behind it. This fill is formed of silty, ashy soil and common, large, angular fragments of sandstone, possibly construction debris (Figure 8).



Figure 3 Location and arrangement of tie beam structure at south side of pier, prior to commencement of work, looking north-west. No scale



Figure 4 Arrangement of adjusting bolts and articulating joints to rear of tie beam at south side of Pier 3, looking west. No scale



Figure 5 Detail of upper section of rear kiln wall prior to work commencing. Note thin wrought iron ties protruding from wall face at upper right. No scale



Figure 6 Area of work at south side of Pier 3 prior to commencement of work, looking north east. No scale



Figure 7 Takedown works being carried out to the south side of Pier 3, looking north



Figure 8 Work area at south side of Pier 3 at completion of the works, looking north

2.2 WORKS TO THE NORTH SIDE OF PIER

The watching brief monitored the taking down of unsafe masonry and ironwork from the north side of 'Pier 3', the third surviving pier when counted from the northern end of the surviving kiln structure (Figure 2). The work involved a steeplejack knocking away loose and unsafe masonry and a surviving iron tie beam from the rear retaining wall to the immediate north of the pier itself. The masonry was photographically recorded prior to the works commencing and at completion. Working shots were also taken during the work.

At the outset of the work, an original iron tie beam was present, sitting on top of an iron bearer at the upper extent of the masonry rear wall of the kilns at this location. The iron beam had been historically cut away or broken in line with the wall face (Figure 9). Before work commenced it was also possible to observe the arrangement of connecting rods to the rear of the principal tie beam. It could be seen that the wrought iron rods which presumably anchor the tie beam back into the hillside behind the kiln had bolts and wedges allowing for some horizontal adjustment of the beam when in place. These connecting rods were also jointed to allow for movement vertically and horizontally. Presumably these features were intended to allow for expansion and contraction caused by heating and cooling when the kilns were in use. Given that this apparatus would have sat behind the masonry rear wall of the kilns when complete, the rods must have been accessed from above to allow for adjustments to be made, presumably sitting in a covered compartment. Additional evidence for the presence of a compartment was present at this side of Pier 3, which had not been present to the south side. Prior to work commencing, it was noted that, to the rear of the rear retaining wall of the kilns, the tie beam arrangement was bounded by surviving brickwork executed in cream firebrick, possibly laid in English Garden Wall bond (Figure 10). This firebrick construction was presumably part of the structure of a compartment intended to allow for the heating and cooling of the tie beam arrangement, given the proximity to the heat of the kilns. All of the bricks within this construction were cream firebrick and stamped 'C & M'. Given that these bricks were buried to the rear of the rear wall of the kilns, it seems most likely that they were original to the construction of the kilns themselves.

The works commenced by levering the tie beam off its bearer until it fell away to the north side of the masonry. This allowed the large iron bearer to be removed and the masonry of the rear wall to be reduced slowly from the top (Figure 11). A maximum length of c. 0.5 m of masonry was removed at the southern extent of this wall stub in order to remove clearly loose and dangerous stonework. Loose fill and the firebrick brickwork surrounding the iron tie beam was also removed from behind the rear wall and a section of the surviving firebrick skin which was adhering to the north side of the projecting pier was also removed. The work was ceased when a relatively stable section of wall was reached which could be safely consolidated (Figure 12). No structures or included features were encountered within the rear wall during this work and the structure of the projecting pier was unaffected. It was noted that the rear wall of the kilns consisted of coursed, squared masonry to the front and rear faces of the wall, with a rubble core. This wall batters out towards its base and retains a large volume of unconsolidated loose fill behind it. This fill is formed of silty, ashy soil and common, large, angular fragments of sandstone, possibly construction debris. It was also noted that, as more of the firebrick lining was removed from the north side of Pier 3, more of an area of irregular, patched fabric was exposed behind it. This 'patch' appears to consist of irregularly laid firebrick, some of which appears to have been re-used, and some roughly dressed blocks of sandstone (Figure 12). It seems possible that this incongruous area of fabric may represent a hastily repaired collapse or partial repair during the life of the structure, and it seems possible that the brickwork contained within it may contain useful evidence on the historic working life of the wider structure. After their removal, some of the firebricks from the lining were examined as part of the watching brief, and found to all be stamped 'EH BK'.



Figure 9 Area of work to north of Pier 3, prior to commencement of works, looking south-west. No scale



Figure 10 Detail shot of tie beam surrounded by firebrick brickwork behind the rear kiln wall, looking south-west. No scale



Figure 11 Work underway on the north side of Pier 3, looking south-west



Figure 12 Area of work at north side of Pier 3 following completion of the works. No scale

3. DISCUSSION

The monitoring work has provided some new evidence for the structural history of the 'New' kilns at Rosedale East. Of significant interest is the additional information yielded regarding the construction of the tie beam arrangement which presumably once supported the wrought iron kiln structure which no longer survives. These adjustable tie beams appear to have been located within firebrick compartments behind the rear wall of the kilns. A number of these compartments are considered likely to survive in-situ to the rear of the relatively intact northern kiln bay at the site. The firebrick used to construct these compartments, stamped 'C & M', was manufactured at Crook Colliery in County Durham (Old Bricks 2019), the owners of which during the 1860s were Chapman and Morson (Durham Mining Museum 2019a). John George Chapman, one of the two partners, also had significant interests in the iron trade, most notably as the managing director of the Tees Bridge Ironworks at Stockton-on-Tees, and as a director of the adjoining Bowesfield Ironworks (Grace's Guide 2019a). It is presumably through these trade connections that his firebricks came to be used by the Rosedale and Ferryhill Iron Company during the construction of the 'New' Kilns.

The firebrick recovered from the surviving lining of the kilns is also of interest. Stamped 'EH BK', its origin is not certainly identifiable. Although possibly manufactured at East Hetton Colliery, which had an extensive firebrick works (Durham Mining Museum 2019b), it seems far more likely to have been made at East Howle Colliery, near Ferryhill (Durham Mining Museum 2019c), the 'EH BK' perhaps referring to 'East Howle Brick Kilns'. During the 1870s and 1880s East Howle was owned by the Carlton Iron Company (*ibid.*), which acquired the Rosedale mines in 1881 (Historic England 2019). It is interesting to consider that if the bricks were from East Howle, and were used by the Carlton Iron Company due to their ownership of the kilns, the surviving firebricks at the site, which have clearly been subjected to heating, represent a re-lining of the kilns, probably during the period of that company's ownership between 1881 and 1911 (*ibid.*). This is not to mention the obvious fact that the bricks themselves differ from those used in the construction of the compartments containing the articulated tie beams at the rear of the kilns as discussed above. Finally, the firebrick 'patch' of irregular brickwork noted on the north side of Pier 3 (Figure 12) is also evidence to suggest repair, and therefore re-lining, of this area of the kilns. It may even be possible that re-lining was undertaken here due to a structural failure which was hurriedly repaired.

The wrought Iron plate sections used as shims to raise up the tie beam to the south of the kilns are also considered to be of significant interest as possible remnants of the scrapped ironwork kilns which once formed the core of the 'New' kilns. Two sections of plate were inspected and retained as part of the watching brief work, with one plate section measuring $\frac{3}{8}$ of an inch in thickness and the other measuring $\frac{1}{2}$ an inch in thickness. It is suggested that these are retained as evidence worthy of further study in considering the structural history of the monument. The origin and historical background of the firebricks used at the site is also considered to be worthy of further study. The source of the 'EH BK' firebrick should be further investigated, as it seems possible that this could assist in dating the last firing or use of the kilns, which might be later than currently thought.

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APPENDIX 1 – POLICY AND GUIDANCE FRAMEWORK

LEGISLATION

National legislation which applies to the consideration of cultural heritage within development and the wider planning process is set out in Table 5 below.

Title	Key Points
Ancient Monuments and Archaeological Areas Act 1979 (amended by the National Heritage Act 1983 and 2002)	Scheduled Monuments, as defined under the Ancient Monuments and Archaeological Areas Act (1979), are sites which have been selected by a set of non-statutory criteria to be of national importance. Where scheduled sites are affected by development proposals there is a presumption in favour of their physical preservation. Any works, other than activities receiving class consent under The Ancient Monuments (Class Consents) Order 1981, as amended by The Ancient Monuments (Class Consents) Order 1984, which would have the effect of demolishing, destroying, damaging, removing, repairing, altering, adding to, flooding or covering-up a Scheduled Monument require consent from the Secretary of State for the Department of Culture, Media and Sport.

Table 1 Legislation relating to cultural heritage in planning

GUIDANCE

NATIONAL

During the assessment and preparation of this document, the following guidance documents have been referred to, where relevant:

Document	Key Points
Conservation Principles, Policies and Guidance (Historic England 2008)	This document sets out the guiding principles of conservation as seen by English Heritage and also provides a terminology for assessment of significance upon which much that has followed is based.
Standard and Guidance for Archaeological Watching Briefs (ClfA revised 2014b)	This document represents non-statutory industry best practice as set out by the Chartered Institute for Archaeologists. This work has been undertaken to these standards, as subscribed to by Solstice Heritage LLP.

Table 2 National guidance documentation consulted

REGIONAL

Archaeological work within North Yorkshire is often required to comply with *Yorkshire, The Humber and The North East: A Regional Statement of Good Practice for Archaeology in the Development Process* (SYAS 2011). The key principles in relation to the proposed monitoring works are summarised in the table below:

Principle	Key Points
2	Archaeological work should be undertaken by professionally qualified and appropriately experienced archaeologists and organisations.
3	All archaeological work will have a scope agreed in advance with the archaeological curator (this document), and any changes to the scope or methodology will be agreed in writing with the archaeological curator.
4	Monitoring of archaeological work by the local archaeological curator will be the norm, and reasonable notice of commencement of fieldwork will be given.

Principle	Key Points
5	Archaeological work will be undertaken in accordance with the best practice guidance of English Heritage and the ClfA.
6	The local Historic Environment Record should be consulted prior to the commencement of fieldwork.
7	Archaeological work in the planning process should have regard to national and local published research agenda (see section 4.2 below)
9	Reports and required data will be submitted to the archaeological curator and local HER in a timely fashion and in accordance with the agreed WSI.
10	Any comments made by the archaeological curator on reports and outputs will be made within a reasonable timetable of receipt.
11	Where appropriate significant archaeological findings will be submitted for publication in a suitable journal or journals.
12	Any archive produced will be deposited in an ordered and acceptable fashion within a reasonable timetable, the details of which will be given in the report.
13	During the course of archaeological work arrangements will be made, where possible, for disseminating information about the site to the general public.

Table 3 Key principles of the *Regional Statement of Good Practice*

APPENDIX 2 - METHODOLOGY

AIMS OF THE PROJECT

The overarching aim of the watching brief was:

- To ensure that important archaeological remains are not destroyed without first being adequately recorded.

The objectives of the watching brief were:

- clarify and record the extent, condition, character and any other archaeological contexts revealed within the works as to better understand their significance and relevance
- to facilitate and monitor the conservation works
- to mitigate the loss of historic fabric
- to make available the results of this investigation to add to the body of knowledge on the Rosedale mining
- To ensure all work is undertaken in compliance with the approved WSI, the *Code of Conduct* of the Chartered Institute for Archaeologists (CIfA) (2014a), *CIfA Standard and Guidance for Watching Briefs* (2014b), and the *Regional Statement of Good Practice*.

ARCHAEOLOGICAL MONITORING

All works were undertaken by hand under the supervision of a suitably qualified archaeologist. All fieldwork and post-fieldwork reporting/archiving was undertaken in line with the agreed Written Scheme of Investigation (WSI) (Calderon 2019).

RECORDING METHODOLOGY

Where archaeological features and deposits were encountered, these were recorded to the standards outlined in the relevant *CIfA Standard and Guidance*. Due to the nature of the works, the creation of a drawn record was not possible and photographic recording was principally used. The photographic record of the monitoring was undertaken in high-resolution digital format. There were significant safety constraints on the fieldwork, meaning that no close inspection of work areas was possible, and no measured survey could be undertaken to form a drawn record. As such, observations were recorded on site and detailed photography of the structure before, during and after the work was taken to form the principal record.

SMALL FINDS

Given the relatively small size of the area to be monitored, all small finds were to be initially retained and bagged by context for assessment at the post-fieldwork stage. Should an unexpected quantity of material be uncovered that was deemed to be of little significance then this was to be noted but not retained, subject to the agreement of the project management team and relevant archaeological curator. Small finds were to be handled, packed and stored in accordance with the guidelines in *First Aid for Finds* (Watkinson and Neal 1998).

In the event that finds of 'treasure' were uncovered then the local Coroner was to be informed and the correct procedures were to be followed as outlined under the *Treasure Act 1996*. In the event of human remains being uncovered, including evidence of cremations, these were to be initially left *in situ*, protected and covered from view. Should removal of the remains be deemed necessary then a licence was to be obtained from the Ministry of Justice (MoJ) prior to excavation proceeding. Exhumation of human remains would then proceed in accordance with the MoJ licence and all health and safety regulations and guidance.



SCIENTIFIC AND PALAEOENVIRONMENTAL SAMPLING STRATEGY

Given the uncertainty of the presence or level of archaeological remains likely to be encountered as part of the monitoring, the general aim of the scientific and palaeoenvironmental sampling strategy was: 'To provide information on the nature of human activity and the past environment in the immediate area, in relation to the archaeological deposits uncovered during the project'.

HEALTH AND SAFETY

All archaeological work was undertaken in a safe manner in compliance with the *Health and Safety at Work Act 1974*. A full risk assessment was undertaken in advance of the commencement of work, a copy of which was available on site for the duration of the fieldwork.

SMALL FINDS PROCESSING

All finds were to be processed and catalogued in line with standard guidance documents including *First Aid for Finds* (Watkinson and Neal 1998) and the *Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials* (ClfA 2014c).

SPECIAL ASSESSMENT AND ANALYSIS

After processing, artefacts and ecofacts were to be quantified and assessed to provide an overview of their potential to meet the aims and objectives of the project. This was to be undertaken by a relevant specialist as agreed in the WSI, and include a statement on the potential and requirement for further analysis. Where extensive analysis was recommended, and justified by the potential of the assemblage or sample, then this was to be undertaken after agreement with the project management team and relevant archaeological curator.

ARCHIVING

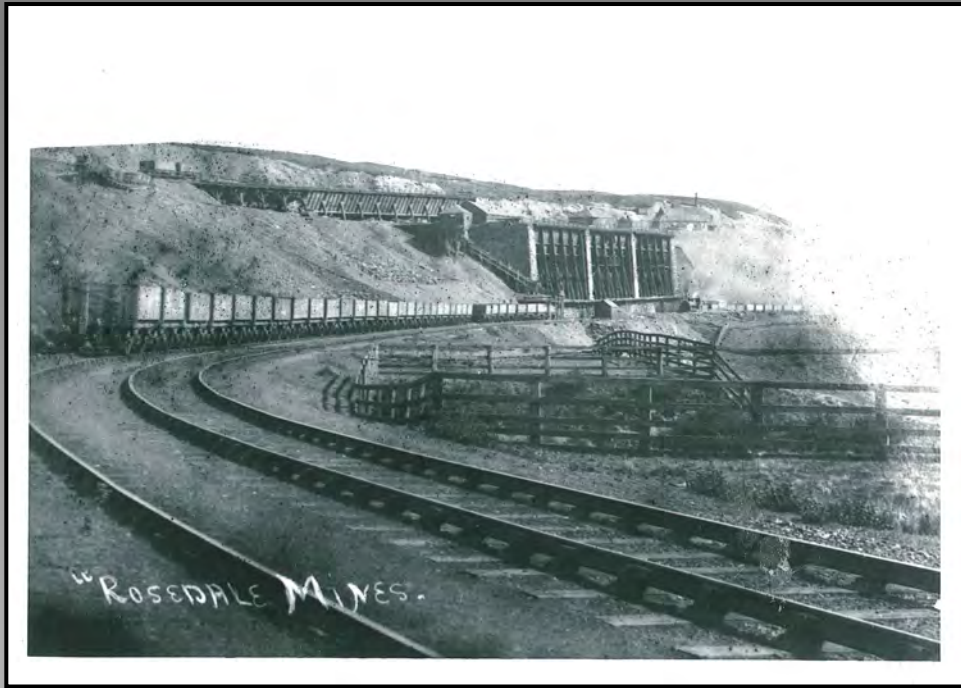
An OASIS record has been completed for this work, including a digital version of this report, the reference for which is **solstice1- 368547**. Deposition of the physical archive has been delayed until a determination is made on the need for, and scope of, any further work. In this instance then a single archive will be compiled and deposited.

CHRONOLOGY

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

- Palaeolithic (Old Stone Age): 1 million–12,000 BP (Before present)
- Mesolithic (Middle Stone Age): 10000–4000 BC
- Neolithic (New Stone Age): 4000–2400 BC
- Chalcolithic/Beaker Period: (2400–2000 BC)
- Bronze Age: 2000–700 BC
- Iron Age: 700 BC–AD 43
- Roman/Romano-British: AD 43–410
- Early medieval/Anglo-Saxon/Anglo-Scandinavian: AD 410–1066
- Medieval: AD 1066–1540
- Post-medieval: AD 1540–1900
 - » Tudor: AD 1485–1603
 - » Stuart: AD 1603–1714
 - » Georgian: AD 1714–1837
- Industrial: 1750–1900
 - » Victorian: AD 1837–1901
- Modern: AD 1900–Present

APPENDIX 3 - WRITTEN SCHEME OF INVESTIGATION



Rosedale: Iron Kilns

Written Scheme of Investigation for Archaeological Watching Brief

September 2019



**Funding raised by
The National Lottery**
and awarded by the Heritage Lottery Fund



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1 PROJECT INTRODUCTION

1.1 Summary

- 1.1.1 As part of the National Lottery Heritage Fund (NLHF) Landscape Partnership 'Land of Iron' a series of conservation and site maintenance works will be carried out. These will be led by project staff based at the North York Moors National Park Authority (NYMNP) and undertaken by various contractors. An archaeological watching brief is proposed to monitor the conservation works that will be carried out at Rosedale: Iron Kilns NHLE 1018981, SE 70545 98817, (Figure 1) (hereafter 'the Site'). The Site is owned and managed by the Rosedale Estate.
- 1.1.2 Partial controlled demolition works will take place at the Site in order to make the Site safe and facilitate further consolidation works. An archaeological watching brief has been commissioned by NYMNP in order to monitor these demolition works in order to capture and record archaeological information that may be destroyed or revealed as part of these works. The results of which may inform future management of the Site and increase knowledge.
- 1.1.3 This document has been produced in accordance with best practice as set out in *Standard and Guidance for Archaeological Excavation* (ClfA, 2014a) and *Management of Research Projects in the Historic Environment* (MoRPHE) (Historic England, 2015a). This WSI has been prepared by the Cultural Heritage Officer for NYMNP.

1.2 Site description

- 1.2.1 The Site is located upon the east side of the Rosedale valley. The Site is 3.75km northwest of the village of Rosedale Abbey. The Site comprises a rectangular parcel of land approximately 0.4 hectares in size, orientated north-south (Figure 1). The site is surrounded by open moorland to the north and east and farmland to the south and west. Both pedestrian and vehicular access is provided along the route of the old Rosedale Railway (East Branch) which remains in private ownership.
- 1.2.2 The Site is a Scheduled Monument (NHLE 1018981) and thus protected by Law under the Ancient Monuments and Archaeological Areas Act, 1979. The Site also within the boundary of a number of other designations, notably the the North York Moors National Park, the North York Moors Site of Special Scientific Interest (SSSI), Special Area Conservation (SAC) and Special Protection Area (SPA) of the same name.
- 1.2.3 Immediately adjacent to the Site are a number of historic features such as tramways, railways, cottages and other features associated with the ironstone industry.
- 1.2.4 The underlying geology is defined as the Dogger Formation - Sandstone. Sedimentary Bedrock formed approximately 170 to 174 million years ago in the Jurassic Period. (British Geological Survey, n.d.). Site is situated 289m aOD (Daft Logic, n.d.).

2 HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

2.1 Prehistoric – Post-medieval

2.1.1 There is little evidence for activity from the prehistoric to medieval periods within the Site. However, we know that ironworking has taken place in the wider Rosedale area since medieval times and coal mining during the post-medieval period

2.2 19th Century

2.2.1 Victorian mining in Rosedale began in about 1856 at Hollins Mine, down the steep hillside below Bank Top (NHLE 1018982). The ironstone discovered here was of high quality and often referred to as 'magnetic' (Hayes R.H. and Rutter J.G., 1974; Lane P., 1989; Staley N.R. and King L., 1980).

2.2.2 In response and in addition to the above a number of ironstone mines opened in Rosedale including Sheriff's Pit and the East Mines (NHLE 1018981). These brought an influx of workers and their families which created a significant surge in population numbers during this time (Hayes R.H. and Rutter J.G., 1974; Staley N.R. and King L., 1980; NE Yorkshire Geology Trust, 2010).

2.2.3 Initially iron had to be transported south via horse-drawn carriage to access main transport routes and eventually end up at processing plants in Teesside and County Durham. The building of the Rosedale Railway, by the North Eastern Railway (NER) and completed in 1861, made the western ironworking sites much more accessible and allowed iron ore to be transported across the North York Moors. This ran from Hollins Mine and Bank Top to Battersby Junction where it connected to the main line (Staley N.R. and King L., 1980; NE Yorkshire Geology Trust, 2010; Historic England, n.d.a).

2.2.4 At the East Mines ironstone working commenced in the late 1850s with the Rosedale East Railway branch being completed in 1865 by the NER (Historic England, n.d.b). This allowed the East Mines to be connected via Blakey and Battersby Junctions to the main railway access routes (Lane P., 1989; NE Yorkshire Geology Trust, 2010; Staley N.R. and King L., 1980).

2.2.5 There are two sets of kilns associated with East Mine, Iron Kilns (old kilns) and Stone Kilns (New Kilns). Both served the East Mines and were used for calcining purposes. Here iron ore was roasted, presumably in batches before the refined ore was transported to Middlesbrough via the railway. This is done to reduce the weight and to refine the product before it went to the blast furnaces.

2.2.6 In addition to the mines and railway a number of other associated structures were also built including; cottages, workshops, powder houses, air shafts, coal bunkers, tramways and sidings, railway station and house, chimneys, engine houses and reservoirs. Further evidence of the iron working also remains such as slag, spoil and calcine dust heaps (NYMNP, n.d.).

2.3 20th Century

- 2.3.1 The design of Iron Kilns is thought to be unique and an experiment at the time. Unfortunately, the experiment was not entirely successful, hence why the later Stone Kilns are of an earlier, more efficient design. It is thought that due to advances in blast furnace technology the Kilns became redundant prior to the closer of the mines, and of the two, that Iron Kilns were closed first for the above reason. However, they may have been used as drops at this later phase. After the East Mines closed in 1927 the railway continued to be used for a short while longer as it was found that the waste from the calcining kilns could be sold for profit. The Rosedale Railway was finally closed and the track taken up in 1929 (Hayes R.H. and Rutter J.G., 1974; Historic England, n.d.b).
- 2.3.2 Since that time the course of the former railway has served as an open access route (Anon, n.d.). In many sections of the former Rosedale Railway and various branches the cinder surface is still extant. However, many of the cuttings have become waterlogged over time and become vegetated. Within the Site the current status of the track bed is unknown.

2.4 **Map regression**

- 2.4.1 The first edition OS map (not reproduced) does not show the Site, and affirms that East Mines commenced working in the later 1950s. By 1893 the OS map (Figure 2) shows the kilns as extant but is not entirely clear due to the network of tramways above, presumably to charge the kilns with ore and fuel. Slag heaps can be seen below the kilns to the west. Workers cottages appear to the northeast (High Baring) and the west (Petch Cottages).
- 2.4.2 The 1912 OS map (not reproduced) a structure appears to be upon the site and the tramways have been altered. Perhaps these are the hoppers shown in a photograph thought to date from the early 1900s (front cover). Petch Cottages have been partially demolished; However, High Baring appears extant. Notably the slag heaps do not appear to have changed in size, indicating inactivity.
- 2.4.3 There appears to be no development within the site on subsequent mapping.

2.5 **Prior work**

- 2.5.1 A watching brief was conducted at the Site by York Archaeological Survey as part of a previous scheme of conservation works in the 1990s. It revealed the remains of sleepers to the top of the kilns, the remains of an iron plate, thought at the time to be a culvert, and some fire bricks to the front of the kilns. A schematic diagram of the railway upon its closure indicates no culverts in this area and the iron plate has been reinterpreted as a possible section of the kiln doors.

3 AIMS AND OBJECTIVES

3.1 Specific aims and objectives

3.1.1 The aims and objectives of the investigation are to:

- clarify and record the extent, condition, character and any other archaeological contexts revealed within the works as to better understand their significance and relevance;
- to clarify the results of the map regression;
- to facilitate and monitor the conservation works;
- to mitigate against the loss of any historic fabric
- to make available the results of this investigation to add to the body of knowledge on the Rosedale Mining.

3.1.2 Such an understanding will enable the informed management of the Site in the future. The Site will be archived to national standards and deposited with a suitable local repository.

3.2 General principles

3.2.1 As a general principle, in order to minimise potential archaeological disturbance, conservation works will only be conducted on the areas that are most at risk. In-situ preservation of archaeology will be practised where possible.

4 PROGRAMME OF WORK

4.1 General

4.1.1 Archaeological investigations will comprise;

- The monitoring of the conservation works in the form of an archaeological watching brief. It is envisaged that these archaeological investigations will be carried out between 23rd September and 25th September 2019.

4.1.2 Excavation for the conservation work will be primarily carried out mechanically and systematically with a toothless bucket. However, manual techniques will be employed where appropriate.

4.1.3 All works on Site will be undertaken in accordance with national guidelines (ClfA, 2014a) (Historic England, 2015a) and will be supervised by an appropriately qualified archaeologist and managed by the NYMNPA Cultural Heritage Officer, both should be/ are members of the Chartered Institute for Archaeology.

4.2 Excavation and recording

4.2.1 All archaeological features and deposits encountered e.g. pits, walls, ditches etc. will be investigated.

4.2.2 Excavation techniques will comprise monitoring of the controlled demolition. Manual excavation may be implemented where appropriate and mattocks, shovels and other hand tools will be utilised. It is envisaged that due to health and safety concerns with the site that monitoring will be undertaken from a safe distance.

4.2.3 Recording techniques will comprise a written and drawn record utilising the standard context record system, building a stratigraphic matrix of the Site as a whole. All plans will be drawn at 1:50 or 1:20 scale, and sections and elevations at 1:20 or 1:10 as appropriate.

4.2.4 A day record will be completed during each day of the watching brief. This will contain information on the events of the day including any meetings, phone calls, summary of finds/features, notes etc.

4.2.5 All features will be recorded and tied into the National Grid.

4.2.6 A photographic record of the Site will comprise digital images taken on a camera with at least a 10 megapixel sensor. All images will be taken in RAW format and processed into TIFFs in line with national guidance (Historic England, 2015b).

4.2.7 No spoil will be placed upon known archaeological features, and ideally will be placed away from the Site. Should ground conditions prove un conducive to spoil removal then spoil may be temporarily stored on Site. However, it will be stored on a permeable membrane and will be removed within 2 months as ground conditions permit.

- 4.2.8 All artefacts and finds encountered within an archaeological deposit will be retained. Un-stratified finds will generally remain on Site and will only be kept should they be of high significance. All finds will be treated in the proper manner as set out by guidance issued by York Museum Trust (Turnpenny, 2012) which adheres to all national guidelines (ClfA, 2014b).
- 4.2.9 On completion of the project it is anticipated that the landowner will consent to the finds to be deposited within a suitable local repository.
- 4.2.10 It is not envisaged that human remains will be encountered, however, should this prove to be the case all work on Site will cease and this WSI will be amended accordingly.
- 4.3 Access and storage**
- 4.3.1 There is limited vehicular access to the site at present. However, due to the nature of the works temporary access routes will be created by the principal contractor on the advice of the NYMNPA Head of Historic Environment and Natural England.
- 4.3.2 Spoil will be stored in agreed areas a suitable distance from the archaeological features, environmentally sensitive areas and watercourses.

5 HEALTH AND SAFETY

5.1 Staff and welfare

- 5.1.1 A full risk assessment will be carried out ahead of the commencement of works which will comply with the 1974 Health and Safety at Work Act and its subsequent amendments.
- 5.1.2 Appropriate provision of first aid, telephone and PPE as described in the SCAUM manual Health & Safety in Field Archaeology 2002 will be followed.
- 5.1.3 This Site will have as a minimum one qualified first aider, ideally two.
- 5.1.4 Welfare will be provided by the building contractor William Birch in the form of a welfare vehicle and will be available for all staff working on the Site.

5.2 Insurance

- 5.2.1 All NYMNPA staff and volunteers will be covered by the NYMNPA scheme of insurance (available on request). Contractors are required to insure they have adequate insurance.

5.3 Location of services

- 5.3.1 It is not envisaged that there will be any services due to the nature and location of the Site, however, this will be considered when compiling the risk assessment and a full CAT scan will be carried out prior to any excavation by the building consultants/ building contractors.

6 MONITORING

- 6.1.1 Investigations may be monitored by the Head of Historic Environment for the NYMNP. Access will be allowed at any reasonable time to other national bodies.
- 6.1.2 The Project team will be notified if standards detailed in this specification are not being met and will be expected to make good any observed deficiencies. The report for the work and deposition of the archive will be monitored and standards enforced where required.

7 REPORTING AND ARCHIVE

7.1 Report

7.1.1 All post-excavation work and reporting will be completed in accordance with ClfA standards (2014) and MoRPHE (Historic England, 2015a). The report for this site will be produced as part of a larger scheme of archaeological works for the Project.

7.1.2 The report will comprise:

- a summary of the project background;
- a description of the Site, including the NGR location;
- a description and review of the methodology;
- a description and interpretation of the results;
- a consideration of the results within the regional and national setting as appropriate;
- plans and sections of trenches and archaeological features;
- a selection of representative photographs;
- a table of the stratigraphic matrices and relationships where appropriate;
- a statement of the location and format of the archive; and,
- recommendations for future work and site management.

7.1.3 Details of the style and format of the report are yet to be determined, but will include a full bibliography, a quantified index to the site archive and a copy of this specification as an appendix. The introduction and summary of the report should make it clear that this work was undertaken to the WSI approved by the NYMNPA Head of Historic Environment.

7.1.4 The report will be completed prior to the conclusion of the Project in March 2021. A digital version of the report will be supplied to the HER as a .pdf file, including photos and illustrations, with plans and sections as appropriate. Digital copies of the report will be made available to other national bodies, as requested and submitted online as an OASIS record (<http://oasis.ac.uk/form/>).

7.2 Archive

7.2.1 The site archive will comprise all primary written documents, plans, sections, and a complete set of labelled photographic images, with a copy of the report. All photos will be provided as TIFFs for storage as part of the archive. The archive should be ordered and internally consistent and prepared to a minimum standard in accordance with York Museums Trust guidelines (Turnpenny, 2012) and industry guidance (ClfA, 2014c). An OASIS form will be completed which will include a copy of the Site report.

7.2.2 The archive should be deposited with the Cleveland Ironstone Mining Museum within 6 months of completion of Project.

7.3 **Publication and dissemination**

- 7.3.1 In addition to the above (7.1.4) the findings of this investigation will be made available within the larger scheme of publication by the Project, which is yet to be determined. The full project archive will be deposited with the Cleveland Ironstone Mining Museum in due course.

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9 FIGURES

