The
Saltburn Rutway Survey

2005 & 2006

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TEES ARCHAEOLOGY

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1 Introduction

In August 2006, Tees Archaeology in partnership with the Nautical Archaeology Society NE (NAS NE), and the Teesside Archaeological Society (TAS), carried out an archaeological survey of an area of foreshore at Saltburn-by-the-Sea, Cleveland (Fig.1).

Fig.1 Panoramic view of Huntcliff, Saltburn

Run over 5 days, between Monday 7th and Friday 11th August 2006 inclusive, the project's main aim was to consolidate and enhance the results of the previous year's survey, and to locate and survey a further series of rutways identified but not recorded during the 2005 survey.

This network of rutways cut into the foreshore around Huntcliff Foot is believed to be associated with the local 18th and 19th century Alum and/or Ironstone industries, and covers a very extensive area of the foreshore.

The results of both surveys now form part of a permanent, on-going archive of the site held by Tees Archaeology under the site codes 'SRS 05' and 'SRS 06'.

2 Historical and Archaeological Background

A great deal of research into the local 18th and 19th century Alum and Ironstone industries has already been carried out, much of it by the late John Owen, whose extensive investigations have been published through the Cleveland Industrial Archaeology Society's publications. An English Heritage report on the Alum Works at Kettleness, North Yorkshire has also recently been published (Jecock, Dunn, Carter and Clowes, 2003).

The mining, quarrying, collecting, processing and outward shipment of Alum and Ironstone resulted in the creation of a number of small docks and harbours and, of course, an extensive network of rutways. The ships that carried these outbound cargoes also brought in a range of other bulk materials and goods necessary for the running of the works, particularly the coal required for the furnaces and steam engines.

The rutways “clearly served as forms of railway, permitting carters to carry on their work through the night and through the tides, confident that as long as the cart wheels remained in the ruts, the way ahead would be clear of boulders, shingle or faulted ground” (Owen, 1986, p.26). There are numerous photographs from around the country showing the use of two-wheeled carts being used to offload cargo (Greenhill & Giffard, 1976; Simper, 1977; MacGregor, 1984).

3 Results of the 2005 Survey

Run over 4 days between Monday 22nd and Thursday 25th August 2005 inclusive to coincide with a period of Low Spring tides, the survey team concentrated on an area of foreshore stretching from Saltburn to Huntcliff Foot, locating and identifying a significant number of surviving sections of rutways.

The team primarily comprised Rachel Grahame and the author (Tees Archaeology), Dave Coston (NAS NE Projects Officer), Audrey Sanderson, Carole Tyson, Ted Coles, Melanie Partlett, Joan Weighell and Steve Sherlock (TAS).

Although the rutways had, in many places, been completely eroded away, it was possible to establish six discrete Rutways, or sections of Rutways, from a total of over 500 individually logged survey points. Nevertheless, this represented only a very small percentage of the overall extent of these features, which were seen to continue south around Huntcliff Foot towards Skinningrove.

The majority of the rutways conformed to a common gauge of 1.32m (4 feet 4 inches), although a number of narrower rutways were also identified (fig.2). There was also some evidence that a number of rutways were routed between pairs of prominent, immovable boulders.

Fig.2 One of a number of narrower rutways identified during the survey

At least two square-cut post holes were clearly identified, each approximately 0.3m square, with a similar feature possibly making a total of three. No finds were recovered, with only one small iron plate or fastening being located *in situ* near one of the rutways (fig.3).

Fig.3 Small iron plate bolted into the bedrock

4 The 2006 Survey

The 2006 survey was again timed to coincide with a period of low Spring tides. This would not only expose the greatest area of foreshore, and therefore the greatest number of rutways, but would also give the survey team maximum time on site to record these features. The team primarily comprised Rachel Grahame and the author (Tees Archaeology), Dave Coston (NAS NE Projects Officer), Audrey Sanderson, Carole Tyson, Robbie Booth, Ted Coles and Steve Sherlock (TAS).

5 Aims and Objectives

The primary aim of the 2006 survey was to consolidate the results of the previous year's work, and to record additional rutways that had been identified but not surveyed in 2005.

Building on the results of the first survey, a number of objectives were set:

- complete the survey of the partially recorded rutways on the Saltburn side of Huntcliff Foot
- specifically identify and record any rutways narrower than 1.32m (4' 4")
- undertake a walk-over survey south of Huntcliff to identify the potential extent and quality of survival of the rutway system as it runs towards Skinningrove

6 Methodology

On reaching the site area, it was found that the 2005 survey datum-points had disappeared, either as a result of the actions of the sea, or from the attentions of beachcombers. New datums, in easily recognisable locations (fig.4), were accordingly established using Tees Archaeology's Topcon GTS-38 Geodetic Station Theodolite (GTS – often referred to as a TST).

Fig.4 Setting-up the TST on one of the new 2006 datum points

The 2005 survey had highlighted a number of practical problems, and various refinements were developed and employed during the 2006 survey.

The survey team was again split into working groups of two or three, each group being equipped with a pole-mounted prism (for use with the TST), two-way radio, a number of wire-mounted flags to identify specific lengths of rutway, and a lightweight 'Rutway Detector' (fig.5). The detector legs were set at 4 feet 4 inches wide (1.32m), the common gauge of the contemporary Yorkshire two-wheeled cart. Simply placing the detector across the ruts confirmed the presence of either a standard or narrow rutway, or indicated the features were simply natural fissures in the rock.

Fig.5 Two of the survey team in action with prism and 'Rutway Detector'

The very large area covered by the rutway network, the rocky nature of the foreshore and the natural process of tidal action, created significant difficulties in delineating previously recorded rutways. It had been found in 2005 that the

wire-mounted flags were only suitable as a temporary markers, and needed to be gathered in at the end of each day's surveying.

In addition, a curious effect of the topography, experienced by all team members, was to render the terrain both familiar and un-familiar at the same time. What appeared to be unique and unmistakable features, such as prominent boulders or large natural fissures, proved extremely difficult to recognise and re-locate, even when only a few metres away.

Two previously untried methods of marking were therefore tried, ie surveyors wax road-marking crayons and nylon 'feathers'. The latter proved to be the most effective, being capable of withstanding the effects of tidal action and generally being visible from some distance away. However, they were prone to attracting and holding seaweed detritus, producing a very effective camouflage.

7 Results

In addition to consolidating the results of the 2005 Survey, a significant number of previously unidentified sections of rutway were recorded, together with a number of new post-holes bringing the overall total to four. Figures 6, 7 and 8 (at the end of this report) show the survey results overlaid on O.S. mapping and aerial photographic coverage.

The greatest concentration of rutways occurs in the vicinity of the most northerly of a set of three, low parallel ridges, crossed by at least three and probably four rutways. At this crossing point, close to Survey Station SRSE, three closely parallel rutways run almost due north towards the open sea, while a number of other rutways head in a more north-easterly direction towards Huntcliff Foot.

The significance of these particular rutways is not clear. If, as is likely, they were all in use at the same time, it would indicate substantial cart traffic, perhaps following regular railway practice of 'up' and 'down' lines, together with a 'passing line' or siding. This would maximise loading/off-loading capacity in the area of foreshore where the working tidal window would be the most restricted due to the rising tides.

Three post-holes, each approximately 0.3m square, appear to be associated with this set of parallel rutways, although no evidence of timber posts was found during the excavation of one of these post-holes during the 2005 survey.

The 2006 survey identified a fourth post-hole (fig.9), located adjacent to a rutway and close to a large, prominent pedestal-boulder[1].

[1] Pedestal-boulders are the remains of a layer of harder rock that once protected the softer material beneath. Now exposed to the effects of undercutting by the erosive actions of the sea, these boulders now sit atop 'pedestals' of the softer material.

Fig.9 Post-hole (foreground) closely associated with the large pedestal-boulder and rutway (left centre)

The excavation of this post-hole on the last day of the survey revealed the remains of a substantial round timber post, together with a number of other timber packing pieces. Unfortunately, torrential rain and strong winds prevented either photographs or a plan of the feature being made, although a measured sketch did prove just possible (fig.10). This feature was backfilled prior to leaving the site while funding is sought for potential dendrochronological dating of the timbers.

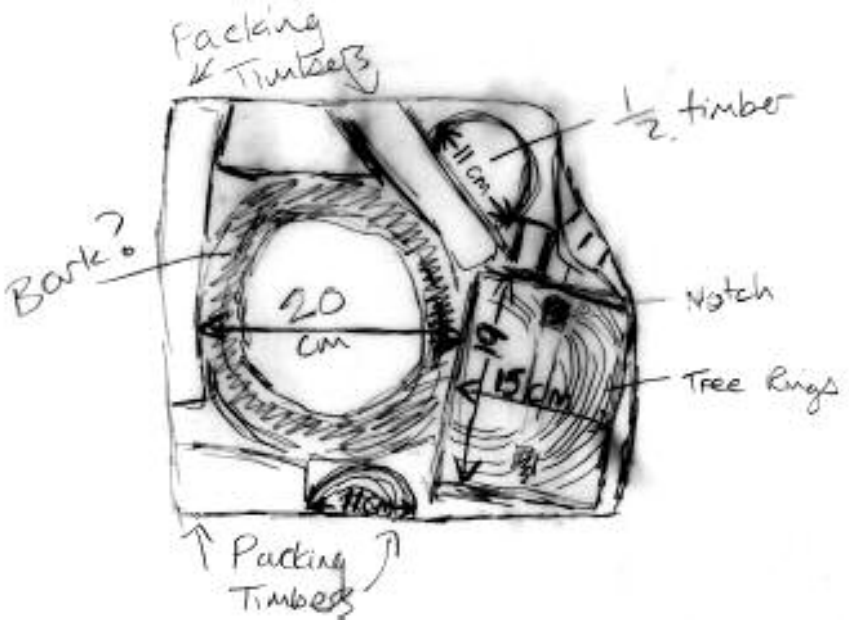

Fig.10 Sketch of the post-hole excavated on the last day in atrocious weather

8 Paired-boulders

From field observations taken during the 2005 survey, it was noted that that some of the rutways were seen to run either between prominent pairs, or close to large individual rocks/boulders still attached to the softer bedrock, leading to the suggestion that perhaps this was a deliberate act to provide a navigation aid for the carts when the ground surface was not visible.

To test this theory, a number of these prominent pedestal-boulders were surveyed. Each was examined for any evidence of fixtures or fittings that may, for example, have supported iron or wooden posts that could have been used to hang lanterns on during periods of darkness.

Given the massive area of boulder-strewn foreshore and with only limited time available, an arbitrary set of criteria for recording these pedestal-boulders was established, namely that they be large or distinctive and lie close to a set of rutways. Despite the visual masking caused by the profusion of large tide-washed boulders over 50 individual boulders were recorded.

It was found that in many cases the rutways passed too close to the boulders to be simply avoiding them as a hazard. Although there was no evidence of any fixtures or fittings, given the existing evidence and the unknown rate of pedestal-boulder loss, it is likely that there was a direct association between at least some of the rutways and boulders.

9 Post-holes

The alignment of the post-hole and associated pedestal-boulder in fig.6, closely paralleling a rutway, suggests that both features may well have been used in conjunction as a navigational aid for carts, adding weight to the earlier suggestion that rutways were routed between other prominent marks such as the pedestal-boulders.

10 Discussion - Potential Operational Use of the Rutways

From previous archaeological investigations, it is reasonable to assume that the Saltburn rutways were associated with either, or both, the Alum and Ironstone industries.

While there are documentary accounts of Alum works in operation at both East and West Saltburn between 1670-1685, and again briefly between 1765-1775 (Miller, 2002), no physical evidence of the sites of these works has been found.

Nevertheless, these Works would have required large quantities of raw material to produce the alum. For example, it has been estimated that during the late 18th century the Alum industry required “250 tons of kelp and 150 tons of urine…”, together with some 1800 tons of coal, to produce approximately “300 tons of mixed potash and ammonium alum” (Morrison, 1981, cited in Owen 1986, p.24). With the Yorkshire works between them shipping over 5000 tons of alum between May 1790 and April 1791 (Barton, in Miller, 2002), some idea of the scale of this operation can be gained.

Sea-transport was the only practical and cost-effective method of supplying these materials and exporting the finished product, primarily through the use of relatively small ships and boats, as the example in fig.11 below shows. Although some of the larger Works were served by natural harbours or purpose-built docks, it is likely that at Saltburn vessels simply 'took the ground' on the firm sands of Saltburn beach.

Fig.11 A common-place scene as coal is unloaded from a small schooner, that has 'taken the ground' (image courtesy of the Whitby Lit. & Phil. Soc.)

This being the case, the association of the rutways and the East and West Saltburn works is not clear, although they may have served to transport seaweed harvested from the rocky foreshore around Huntcliff. With this crop only being accessible at low water, maximising the time available for cutting and loading would certainly have been increased by the carts using the rutway system.

This can be illustrated through the maritime *Rule of Twelfths* (Appendix 1). It would be possible, based on this rule and with an additional series of field observations, to determine the approximate point in the tidal cycle when use of the rutways would no longer be possible.

The Ironstone industry is also likely to have made use of the rutway system; up until the early 19th century, ironstone that had eroded out of the cliffs was collected directly from the beach. This material may well have been loaded into carts and transported to Saltburn prior to being loaded into ships.

This theory however, does not explain the numerous rutways (including the three parallel rutways), running north towards a natural gulley/cut feature at the edge of the wave-cut platform. It is possible that this feature was used by small vessels to load/offload, however, the preferred option for any ship's

Master would be to beach his vessel on sand rather than on a rocky shore where the risk of damage would be much higher.

An additional factor to be considered here is that in recent years, this area has suffered substantial sand loss. It is possible therefore, that during the main working periods of the alum and ironstone industries, sand levels were significantly higher, providing a relatively firm, sandy base for small vessels to load/unload, in what are now bare rock-strewn gulleys.

11 Conclusions

The 2005 and 2006 Saltburn Rutway Surveys have begun the long task of recording a network of rutways traditionally thought to be associated with the local Alum and/or Ironstone industries.

Although long-known about, these industrial archaeological features have never been accurately plotted or defined along this particular stretch of coast. The two surveys carried out to date have concentrated on the area of foreshore between Saltburn and Huntcliff Foot, and have clearly identified an extensive network of rutways, which continue south towards Skinningrove.

Although the process of recording the physical evidence is now well underway, many more questions are being raised than answers found, for example, which industry did these rutways serve? Who cut them and how long did it take? Who used the rutways and how often? Did these people establish themselves in business as hauliers with regular contracts to load/unload the ships, or was the work carried out by locals on an *ad hoc* basis?

Some of these questions can and will be answered through documentary research; in the meantime further survey work will be carried out to establish the full extent of the surviving rutways, eventually linking in with other recorded rutway systems further down the coast.

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Appendix 1

The maritime *Rule of Twelfths* is rule of thumb based on the assumption that the interval between Low and High Water is approximately six hours. It calculates that in the first hour after low tide the water level will rise by one twelfth of the range, in the second hour two twelfths, and so on following the sequence 1:2:3:3:2:1.

For example, using the 2007 River Tees Entrance tide tables, the approximate tidal range (the difference in height between Low and High Water), for a neap tide is 3.6m.

Taking Low Water to be a height of 0m:
In the first hour after Low Water, the tide will rise 1/12th of the tidal range ie. 0.3m.
In the second hour, the tide rises by 2/12ths (1/6th) ie. 0.6m.
As these increments are cumulative, at the end of the second hour the actual depth of water is 0.9m (1/12th + 2/12ths).
In the third hour the tide will rise by a further 3/12ths (0.9m), bringing the overall depth of water to 1.8m and so on until High Water.

Tidal ranges are always greater for Spring Tides; for the Tees this figure is around 5m.