NAA

ARCHAEOLOGICAL LANDSCAPE SURVEY

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HEIGHTS QUARRY, WEARDALE, CO. DURHAM

prepared for

Heaton Planning / Aggregate Industries

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NAA 16/142
March 2018

NAA Document Authorisation

<table>
<tr><td colspan="2">Project name</td><td colspan="3">Heights Quarry, Weardale, Co. Durham</td><td>Project number</td></tr>
<tr><td colspan="2">Report title</td><td colspan="3">Heights Quarry, Weardale, Co. Durham: Archaeological Landscape Survey Report</td><td rowspan="2">1271</td></tr>
<tr><td colspan="2">Report No.</td><td colspan="4">NAA 16/142</td></tr>
<tr><td>Revision</td><td>Date</td><td>Filename</td><td colspan="3">NAA_1271_Rpt_16_142_LS_2.pdf</td></tr>
<tr><td rowspan="3">v.1
v.2</td><td rowspan="3">04/11/16
01/03/18</td><td>Description</td><td colspan="3">- Archaeological landscape survey prior to quarry extension
- Additional survey and boundary revisions</td></tr>
<tr><td></td><td>Prepared by</td><td>Edited by</td><td>Approved by</td></tr>
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HEIGHTS QUARRY, WEARDALE, NORTH PENNINES, CO. DURHAM

ARCHAEOLOGICAL LANDSCAPE SURVEY

Summary

Northern Archaeological Associates Ltd (NAA) was commissioned by Heaton Planning, on behalf of their client Aggregate Industries, to undertake an archaeological landscape survey prior to a proposed extension to Heights Quarry, Weardale, Co. Durham. The survey was carried out in support of a planning application for the extension to the north-west of the existing quarry workings, expanding the quarry by up to 31ha.

Heights Quarry was established in the late 19th century by the Weardale Iron Company, for the extraction of limestone, and expanded through the 20th century to its current limits. A desk-based assessment and walkover survey of the proposed extension was undertaken in 2015 by NAA. The DBA identified a number of archaeological features within the survey area, related to post-medieval lead and ironstone mining.

The northern edge of the quarry has now encroached on Heights Mine, a lead mine established in the late 18th or early 19th century by the Blackett Beaumont Company, which lies immediately to the north-west of the current quarry. The mine was worked for ironstone by the Weardale Iron Company from around 1850, and may have been abandoned in 1868. The walkover survey identified water-management features related to ore dressing (which occurred outside the survey area) and shafts which follow the line of a level, which extends north-eastward through the proposed extension.

Durham County Council have requested a measured survey of any archaeological features completed pre-determination, in order to identify clearly the scale/scope/extent of the features within the survey area that are likely to be impacted on by the quarry extension. A better understanding of the position and course of the level was also required, as it is a heritage asset which will be partly removed by the quarry during its proposed blasting operations. The extent and survival was unknown but it was presumed to run through on the line of the shafts identified on the surface.

This report details the results of the measured survey on the mining remains, and a consideration of the likely impact of the quarry on the heritage assets within the proposed extension boundary.

HEIGHTS QUARRY, WEARDALE, NORTH PENNINES, CO. DURHAM

ARCHAEOLOGICAL LANDSCAPE SURVEY

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1.0 INTRODUCTION

1.1 Northern Archaeological Associates Ltd (NAA) was commissioned by Heaton Planning, on behalf of their client Aggregate Industries, to undertake an archaeological landscape survey of post-medieval mining remains at Heights Quarry, Weardale, Co. Durham (NGR 392057 539500). The survey was carried out in support of a planning application for the extension to the north-west of the existing quarry workings, expanding the quarry by up to 31ha.

1.2 This report provides a Historic England Level 2/3 record of the post-medieval mining remains at Heights Quarry (English Heritage 2007, 23). The requirements for this work were discussed in advance with the Durham County Council. All work was conducted in accordance with relevant standards and guidance as published by Historic England (English Heritage 2007), the Chartered Institute for Archaeologists (CIfA 2014) and the Yorkshire, the Humber and the North East: A Regional Statement of Good Practice for Archaeology in the Development Process.

Project Aims and Objectives

1.3 The principal aim of the project was to provide a Historic England Level 2/3 record of the post-medieval mining remains, suitable to partially mitigate against their loss as a result of the extension of the quarry, which will remove the remains entirely. The mitigation is only partial as Durham County Council has also indicated it would like to see some further intrusive investigation of their remains, through trenching, and potentially underground survey of the surviving level and galleries (Boldrini *pers. comm.*).

1.4 As such, the objectives of the landscape survey were:

- Metric Survey of the archaeological features, and the production of a hachured site plan, depicting the form and location of the mining remains;
- Digitising of the mine plans to provide a record of the sub-surface mining remains; and
- A summary description of the identified features.

Scope of the Project

1.5 The metric survey solely comprised the features within the proposed extraction boundary, which were due to be destroyed as a result of the quarry extension. Features were identified during the walkover surveys (NAA 2015), which lie beyond this boundary, and these have been omitted as there will be no direct impact to them. The features include the 15th century *High of the Park* pale embankment and the dressing floor for Heights Mine, which was served by the water management features within the survey boundary itself. Following a revision of the proposed boundary in 2017, a further site visit was conducted on the 30th January 2018 to examine any additional features liable to be affected. The results have been combined into the report.

2.0 METHODOLOGY

Metric Survey

2.1 The metric survey was undertaken by a trained surveyor using a survey quality GPS (Global Positioning System). GPS uses electronic distance measurement along radio frequencies to satellites to enable a positional fix in latitude and longitude which can be converted mathematically to Ordnance Survey National Grid Coordinates. The survey was conducted to Historic England Level 3, at a scale of 1:50, providing a record of all archaeological features within the proposed extraction boundary.

2.2 Accuracy levels were in accordance with Historic England guidelines, and the site was surveyed using the OS grid. All heights were tied into the OS datum.

2.3 The plans and survey drawings were produced in AutoCAD 2012 with structured layer control. Full digital data (DWG and DXF formats) will be provided with the site archive.

Mine Plans

2.4 At the time of the initial desk-based assessment (NAA 2015), it was identified that archival records for the Weardale Lead Company, covering the whole of the Beaumont lease in Co. Durham from the 1860s onwards, survived in the Durham County Records Office. This included plans of the company's workings at Heights Mine (D/WL/2/2/28) and at Heights Veins (D/WL/2/2/21-28). However, access to these archives was restricted by the document's owner, who would not grant permission to view any records pertaining to the Weardale Lead Company (NAA 2015, 11).

2.5 Since the desk-based assessment in 2015, a search of the quarry's own drawings archive has provided some copies of these plans, dated to 1975, and these have been digitised and added to the survey drawings.

3.0 BACKGROUND INFORMATION

Location

3.1 The site is situated within Weardale, in the North Pennines Area of Outstanding Natural Beauty (AONB), approximately 1.7km north-east from the village of Westgate and 2.7km north-west from the village of Eastgate, Co. Durham.

3.2 Covering approximately 31ha, the proposed extension is centred at NGR 392057 539500 and comprises an irregular shaped parcel of undeveloped moorland. The study area is bounded to the west by Park Burn and rough pasture; to the north and east by further moorland and to the south by rough pasture, the remains of Heights Mine and the modern extent of Heights Quarry.

Geology and Soils

3.3 Weardale forms part of the Alston block of the North Pennine Orefield, with the mineral bearing deposits in the region intruding into a series of Lower to Upper Carboniferous sediments including shales, sandstones, and limestones. Within the proposed quarry extension the solid geology comprises bands of limestone of the Great Limestone Member, the Stainmore Formation and Little Limestone, as well as Firestone Sandstone and Stainmore Mudstone and Sandstone (BGS Sheet 26 – Wolsingham).

3.4 The primary mineral deposits within the region comprise galena, fluorite, and quartz. Galena is the principal mineral from which lead ore is recovered; galena deposits are found within veins, near vertical fissures within the surrounding solid geology across the study area. The veins in the region trend south-west to north-east across the valley, with a secondary cross vein running north-west to south-east. The site is situated at the intersection of three veins, with two major veins – Heights North and Heights South veins, bisected by the secondary West Cross vein. The Heights South and West Cross veins are still visible within Heights Quarry today, and are both approximately 1.8m in width. Heights North Vein is yet to be exposed (BGS 1990, 197; Fairbairn 1996).

3.5 The site itself is situated along a moderate dip slope, between a sharp decrease in elevation to the south towards the River Wear, and a rise in elevation to the north, towards Northgate Fell. The proposed extraction area is situated at approximately 400m aOD (above Ordnance Datum) at the south of the site, increasing in elevation to 425m aOD at the north.

Designations

3.6 There are no designated heritage assets within the site boundary. The Westgate Conservation Area is situated approximately 1.3km to the south-west of the site and will not be affected.

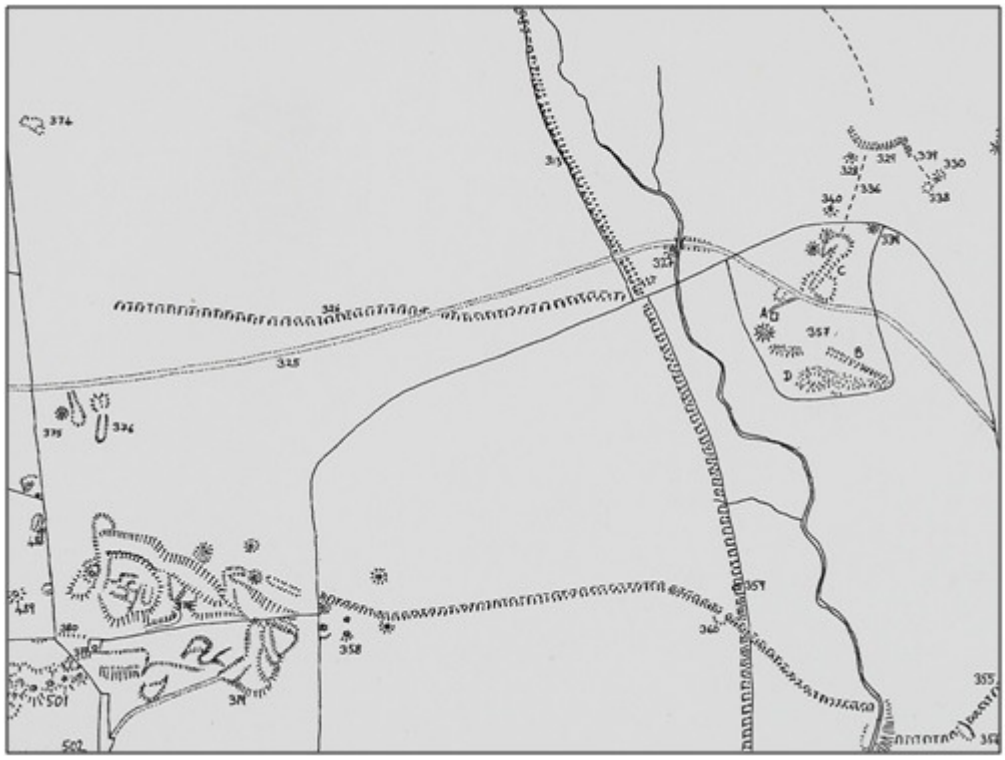

Plate 1: excerpt from the Stanhope Park Archaeological Survey, 2004; the site and Heights Quarry is situated in the top right corner of the image. Further features include former medieval deer park boundary and the remains of Rigg Mine situated at the bottom left of the image

Previous Work

3.7 Two phases of archaeological earthwork survey and field observation have been undertaken within the landscape surrounding the proposed extraction boundary. Undertaken by the Friends of Killhope in the early 2000s, the Stanhope Park Surveys attempted to characterise Stanhope's Medieval Deerpark and surrounding landscape. A variety of upstanding archaeological remains were identified across the study area,

ranging in date from the Late Iron Age, to the 19th century, with evidence for Heights Mine recorded within site boundary (Stanhope Park Archaeological Survey 2004; Plate 1).

3.8 In 2015, NAA undertook a desk-based assessment and walkover survey of the proposed extension in support of the current planning application. The DBA identified a number of archaeological features within the survey area, related to post-medieval lead and ironstone mining (NAA 2015). These features form the focus of the current survey.

Plate 2: extract from the First Edition Ordnance Survey map of 1861; Heights Mine lies to the bottom right of the image

4.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

4.1 Heights Mine is thought to have been established in the late 18th or early 19th century as a lead mine by the Blackett-Beaumont company; references to '*West Heights'* in 1727 may refer to this mine, though this is not definitive. The mine is situated at the intersection of three lead veins: Heights North, Heights South and West Cross veins. The Heights North Vein workings extended to Northgate Level (BGS 1990, 197) situated approximately 1.3km to the north-east of the site. The mine also

adjoined the early 20th century Heights Pasture Mine, established at the southern extent of Heights Quarry at the site of earlier mine workings, along Heights South Vein. Most of these latter workings have now been lost to quarrying.

4.2 The mine is first depicted on the First Edition Ordnance Survey of 1861 (Plate 2) to the immediate south of the site (BGS 1990, 197). Heights Mine comprised a single level, aligned north-east to south-west, with associated shafts, spoil heaps and a waggonway or packhorse route. South-west of the level was a dressing floor, enclosed by a sub-rectangular drystone wall. Dressing involved the sorting of pure lead ore from the surrounding 'dead' rock and minerals (bouse), by the partial crushing (both by hand and mechanical crushers), washing and sieving of material to a suitable size, before being transported to a smelt mill (NAMHOa 2016).

4.3 The dressing floor was served by an extensive water management system, including a complex of leats and dams. Rectangular buildings are also visible within the dressing floor. These features are clearly visible on the Ordnance Survey mapping and the Stanhope Park Survey (Plates 1 and 2).

Plate 3: Heights Mine, level entrance, facing north-east; the dynamited mouth lies somewhere left of the ranging pole

4.4 Heights Mine was sold to the Weardale Iron Company for ironstone in 1850, as lead mining became increasingly less financially viable in the second half of the 19th century (BGS 1990, 197; Fairbairn 1996, 93). With the lead veins formed within near

vertical fissures, and the associated ironstone flats in roughly horizontal bodies through the surrounding bedrock, once mining the lead veins became uneconomic, the ironstone flats were often worked utilising the existing mine structures (Forbes *et al.* 2003, 28-29). Ironstone is usually processed away from mining sites, so it is probable the dressing floor was disused after 1850.

4.5 By the end of the 19th century, Heights Mine was no longer in use, and is recorded on the 1899 Ordnance Survey Plan as '*Disused*'. None of the watercourses are shown on this map, which suggests that they had become infilled, and that the mine may have been derelict for some time. It is probable that the mine was closed following its abandonment in 1868 by the Weardale Iron Company. The entrance to the level was dynamited by the owners of Heights Quarry during the 1970s to prevent trespassing by fluorspar collectors (Plate 3).

5.0 SUMMARY DESCRIPTION OF FEATURES

5.1 The features identified within the site boundary can be summarised into two distinct classes: water management features serving the dressing floor (dams, leats, and small reservoirs) and shaft mounds connected to the level serving Heights Mine (the entrance to which lies south-west of the survey area). The numbers used are those used within the original desk-based assessment (NAA 2015), to prevent any confusion.

Plate 4: the Heights Dam earthwork (HA71)

5.2 The water management features included a dam (referred to as *'Heights Dam'* on the First Edition Ordnance Survey Mapping), which comprised a semi-circular earthen embankment, with a flattened top. The embankment measured 35m in length and 8.50m wide, and was 0.90m high on the south-western side. At the eastern end, an overspill leat (HA69) headed south-eastwards, taking excess water out the reservoir as necessary; most of this leat has now been removed by the quarry, but originally fed a further dam, shown on the Ordnance Survey mapping, and presumably then dressing floors around Heights Pasture Mine (and others). The leat measured a maximum of 1.5m wide and up to 0.5m deep, with a shallow earth bank on its south-west, downslope side.

5.3 The water from the dam was directed downslope through a breach in the centre, which presumably originally held a timber sluice-gate. The downslope leat (HA68), which was 1.75m wide, and 0.20m deep, extended 55m to the field boundary wall, which formed the southern boundary of the survey area. The leat was not traced beyond this point, but would have extended into the dressing floor, to serve the crushing and dressing machinery in that area.

Plate 5: bridge footings HA76, facing south-west

5.4 Upslope from the dam, a leat snaked up the hillside, hollowing the contours, to intersect with Park Burn, 605m to the north-west. The leat, which was up to 1.8m wide, had been cut into the slope edge, with a slight embankment on its south-west, downhill, side. Park Burn itself had been partially dammed, at the head of the leat, to create a body of water to flow down the leat; this was not surveyed, as it lay beyond

the survey boundary, but was recorded during the previous walkover survey (NAA 2015).

5.5 The dressing floor was served by a packhorse route, which extended north-westwards and crossed the Park Burn by means of a bridge, the footings of which survived on the edge of the survey boundary. The footings, (HA76), comprised six even courses of roughly dressed limestone blocks on each side; a flattened recessed area on both sides of the beck, to the rear of the wall, presumably originally held the timbers for a clapper bridge. The footings measured 3.75m in length and stood 1.3m in height.

5.6 Nine shafts were identified across the survey, given a group number HA72. The shafts varied in size. Some of the smaller shafts, with low spoil collars, c3m in diameter, lay away from the main workings, and appear to have been little worked; these may have been exploratory shafts only. The larger shafts, c6m in diameter, lay along the line of the main Heights Level, and probably served primarily as air shafts, rather than as haulage shafts. Most of these had been infilled, their spoil collars having been pushed into the shafts and flattened off, presumably as a safety measure. There is a single outlier, HA75, to the north of the main workings, which does not appear to be extensively worked. It will not be affected by the extraction but was surveyed anyway as lies within the boundary.

Plate 6: one of the larger shafts overlying the course of Heights Level

6.0 DISCUSSION

6.1 NAA was commissioned by Heaton Planning, on behalf of their client Aggregate Industries to undertake a phase of archaeological landscape survey of the post-medieval mining remains at Heights Quarry, Weardale, Co. Durham.

6.2 A full metric survey of these remains has now been carried out, and this is considered sufficient to partially mitigate against their loss through expansion of the quarry. The assessment of the mine plans has confirmed that the main level for Heights Mine does extend through the proposed extraction area, and will be partly removed by the quarrying operations.

6.3 The exact form and extent of the level and its associated workings is unclear. The mine plans seem to indicate a long continuous level, running broadly NESW, with further galleries extending at right angles roughly at its mid-point within the survey area – one gallery extending northwards, and further gallery extending southwards; the latter has now been removed by the current quarry workings. The wider areas, shaded in grey on the drawings, seem to show where the ironstone deposits, which usually occurred as large flats, have been worked out, and are presumably reasonably large open spaces. This is confirmed, to an extent, by section drawings also within the records held by the quarry (Figure H2-11 not reproduced).

6.4 Access to this mine is currently unavailable, as the entrance to the mine was dynamited in the past. It is therefore also unclear what condition the mine will be in, and whether roof-falls have blocked the mine (perhaps caused by the proximity of blasting operations to the mine), whether the mine is flooded, or whether the workings are still in a good state of preservation.

6.5 To answer this question, there are a number of potential options available, prior to extraction commencing. These can be summarised as follows:

- **Reopen the Mine:** whilst the simplest procedure will be to reopen the entrance of the mine, Health and Safety provisions mean that this is unlikely to be practical. Blasting operations at the quarry could have caused destabilisation of sections of the mine. There is also anecdotal evidence that the flats were extensively worked out for ironstone in the 19th century, and that any roof supports were removed after operations ceased; mine explorers reported several roof falls in the mine, because of this (Pete Jackson *pers. comm.*). Any exploration is also likely to be

immediately hampered where there have been rock-falls/cave-ins impeding progress into the mine, or where sections of the mine have flooded.

- **Geophysical Survey:** a GPR (Ground Penetrating Radar) survey would work but may only pick up the first section of the mine level, where it is nearest the surface. As access to the mine is not possible, consideration of this technique should be given. Discussions with a GPR specialist indicate that lower resolution scans would reach between 5 and 10m below the ground surface and would certainly be sufficient to map the location and extent of the mine workings more accurately. The use of multi-array carts would give a range of depths which would help understanding of the survival of the mine. GPR does not work well in water-logged conditions, and therefore this technique should only be carried out after the stripping of overburden (see below), which would be carried out by the quarry prior to blasting. The mapping from the surface will establish extents, survival (whether collapsed or flooded, or as an open gallery) and can be used to inform further investigatory works as needed.

- **Strip and Map:** as the overburden will need to be stripped prior to commencement of any blasting works, it will be possible to locate the mine workings more accurately after this has occurred, using GPR as outlined above. It may also be possible to access sections of the mine once the stripping has been completed, potentially via shafts or collapses in the mine structure. The stripping, if monitored archaeologically, could also provide localised sections through the surveyed earthwork features, such as the mine shafts and reservoir. Durham County Council had recommended some intrusive investigation through targeted archaeological trial trenching; the use of strip and map could provide a more flexible approach than trenching, allowing identified archaeological features to be rapidly recorded before their removal.

6.6 The GPR survey and Strip and Map should be carried out as a condition of planning consent, to allow the quarry to make a start on the removal of overburden prior to blasting.

6.7 The techniques listed above will only identify and/or map to a limited extent the workings; if the workings, or parts of the workings, are adjudged to be in very good condition, consideration to further recording of the underground workings should also be given, in the form of laser scanning, or similar techniques, prior to their removal.

Any artefacts within the mine should be accurately located prior to their removal as part of this survey.

7.0 REFERENCES

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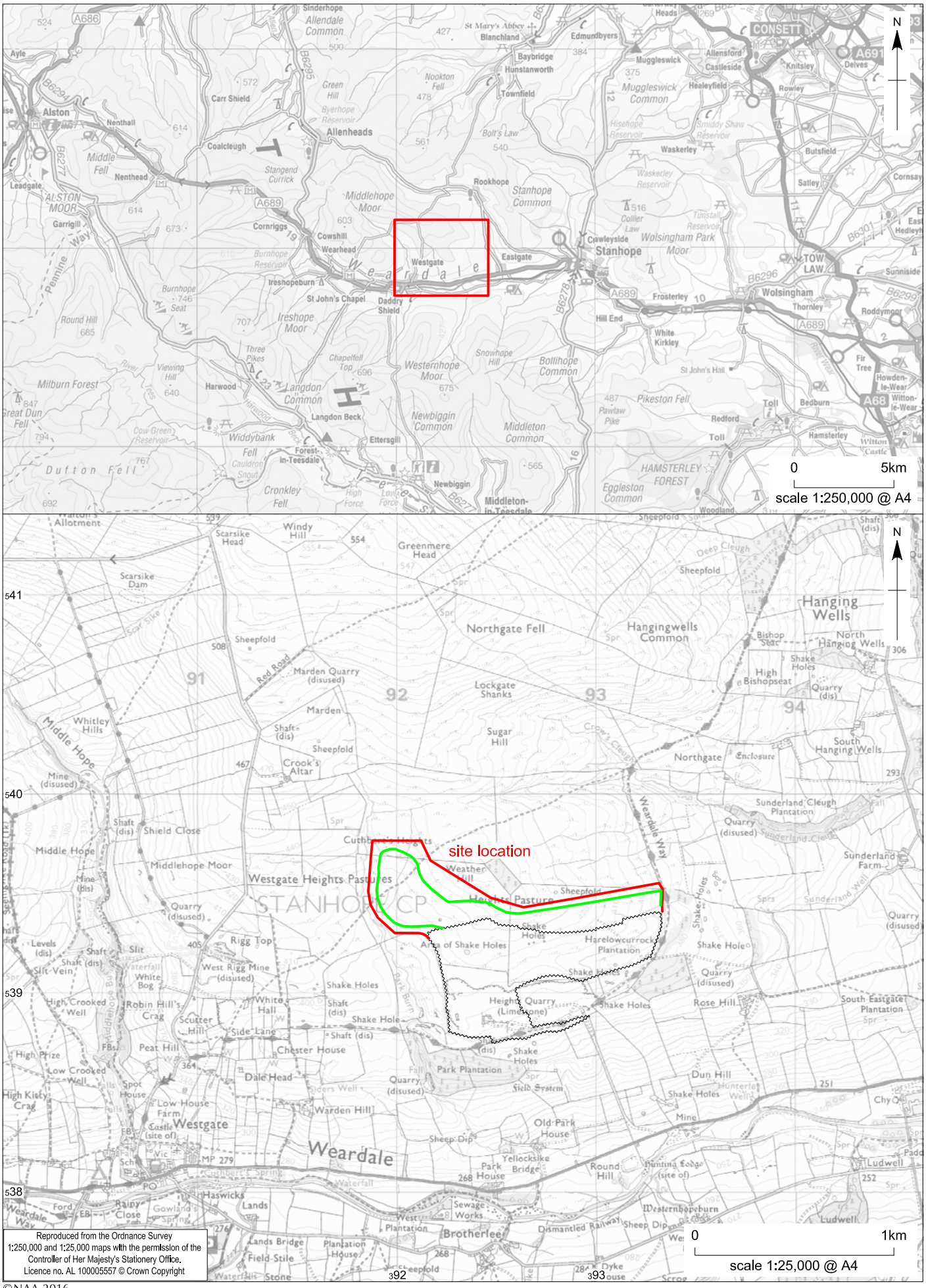
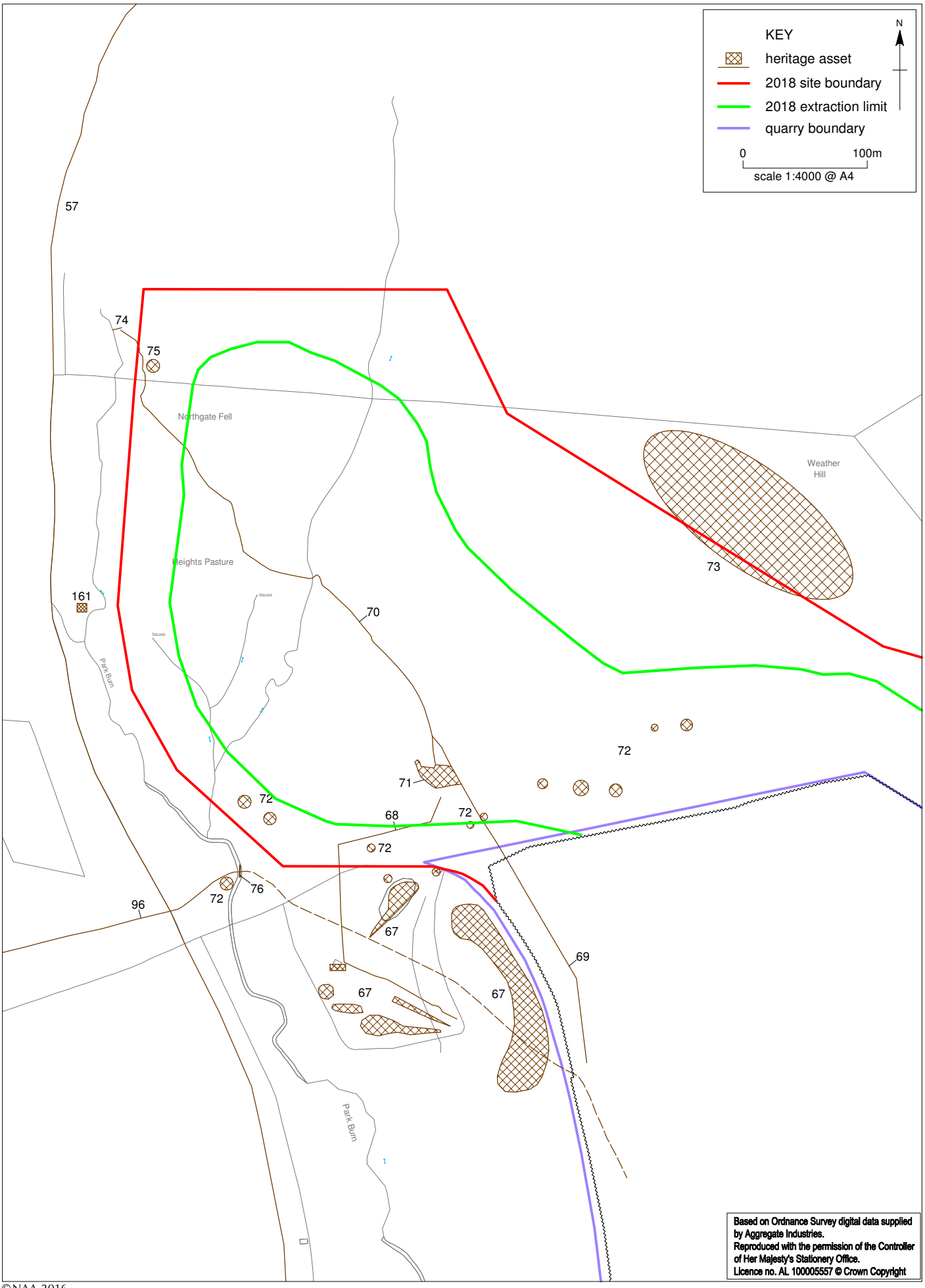
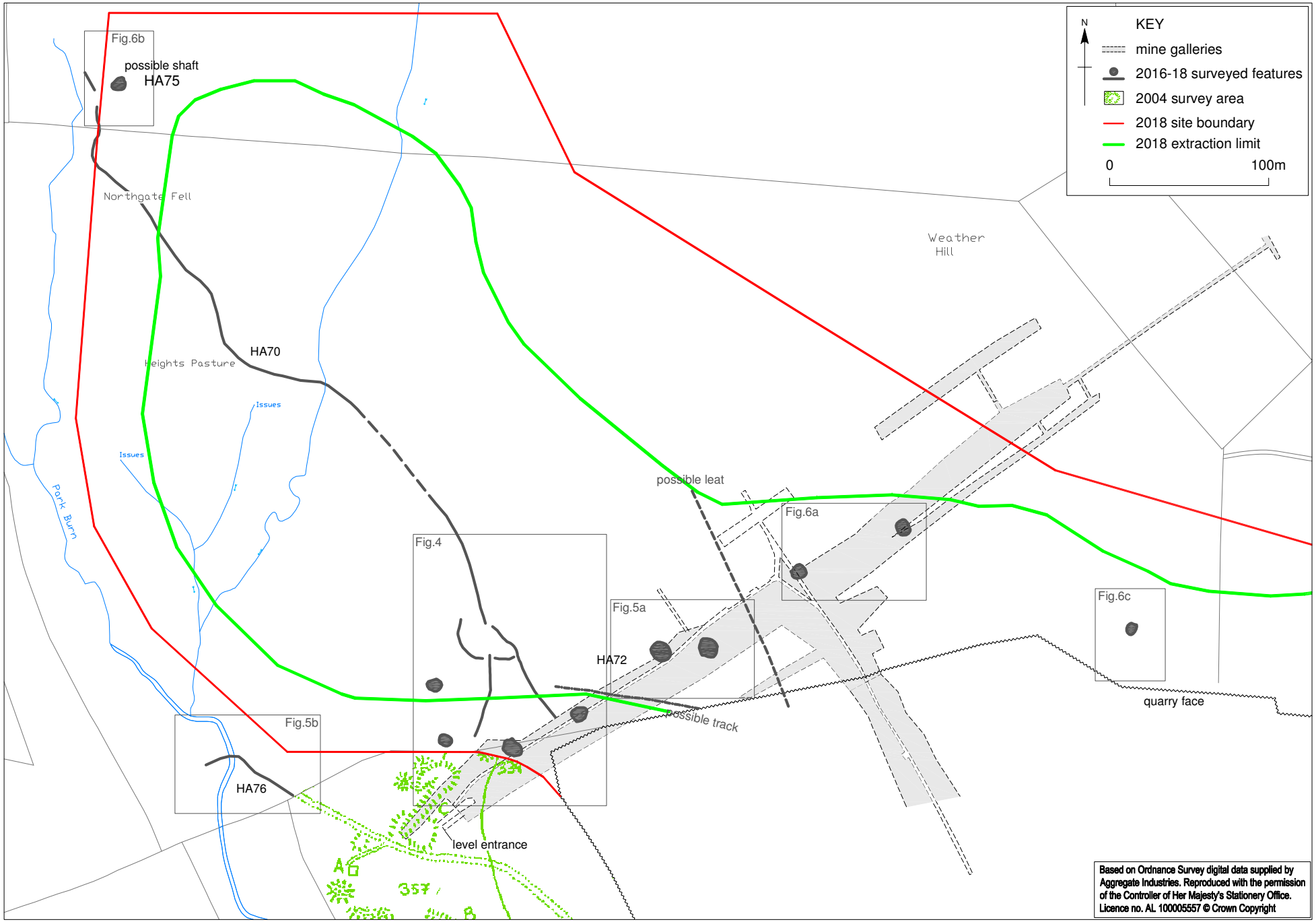


Heights Quarry: site location *Figure 1*

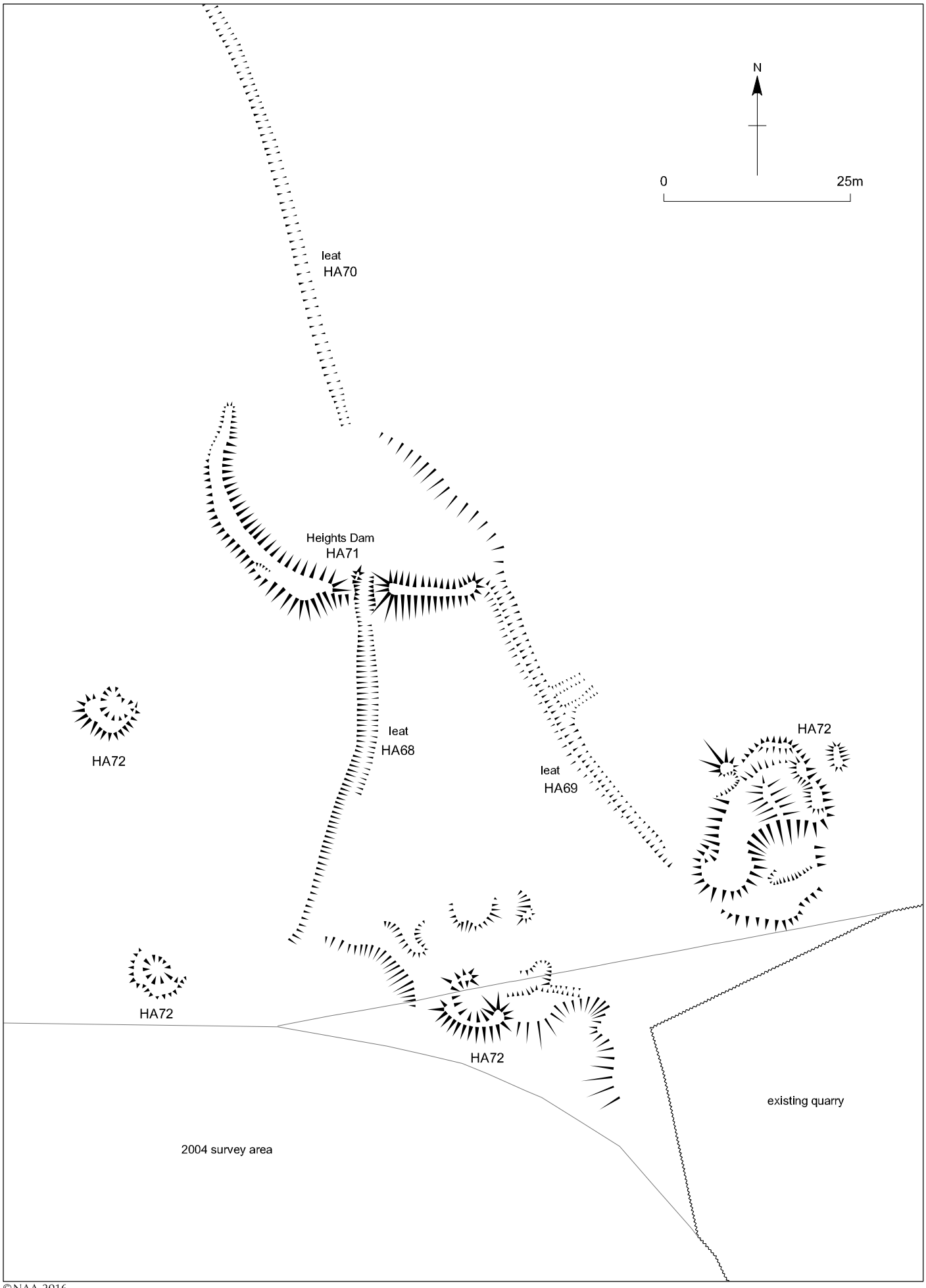


Heights Quarry: heritage assets identified during walkover survey *Figure 2*

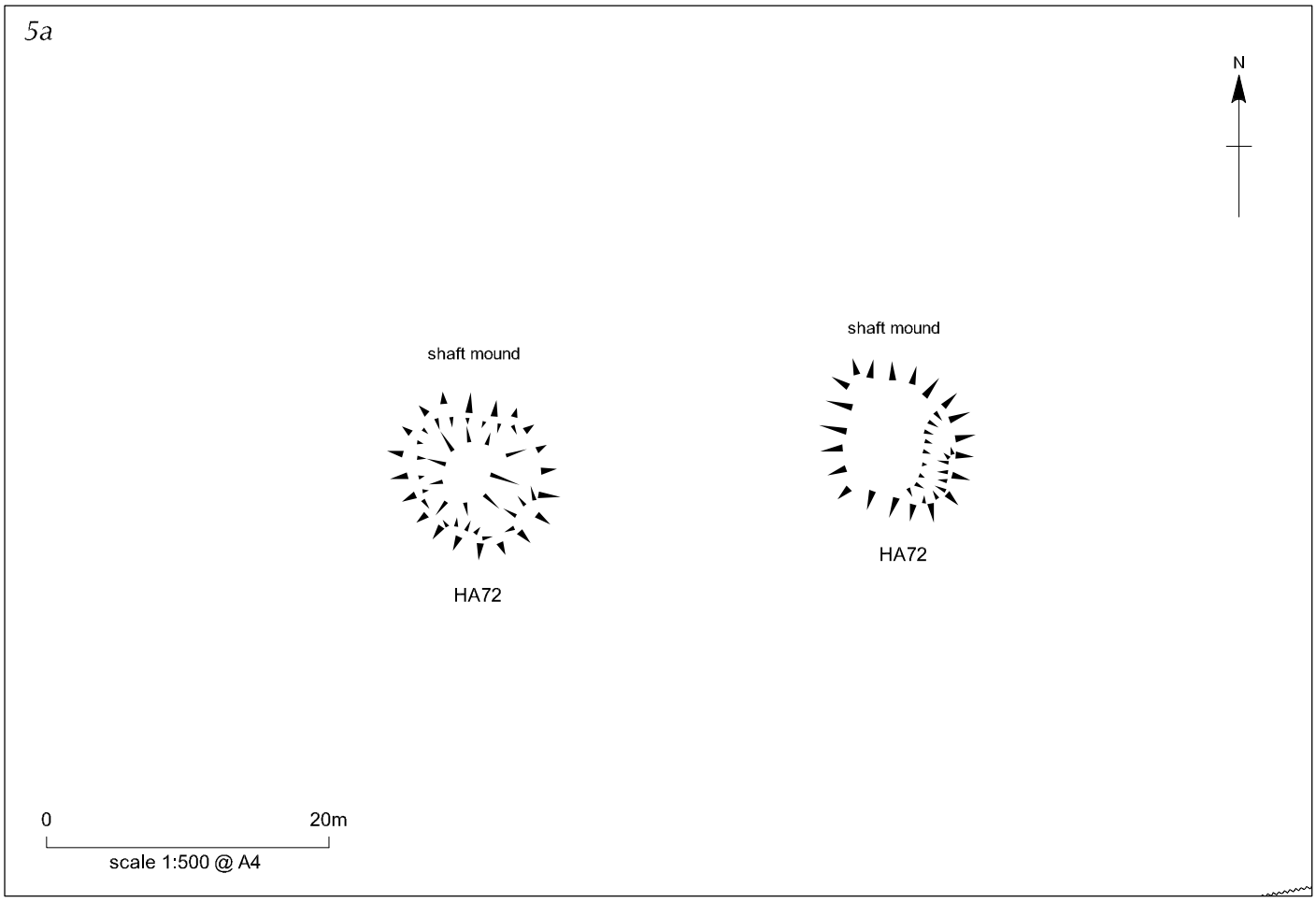


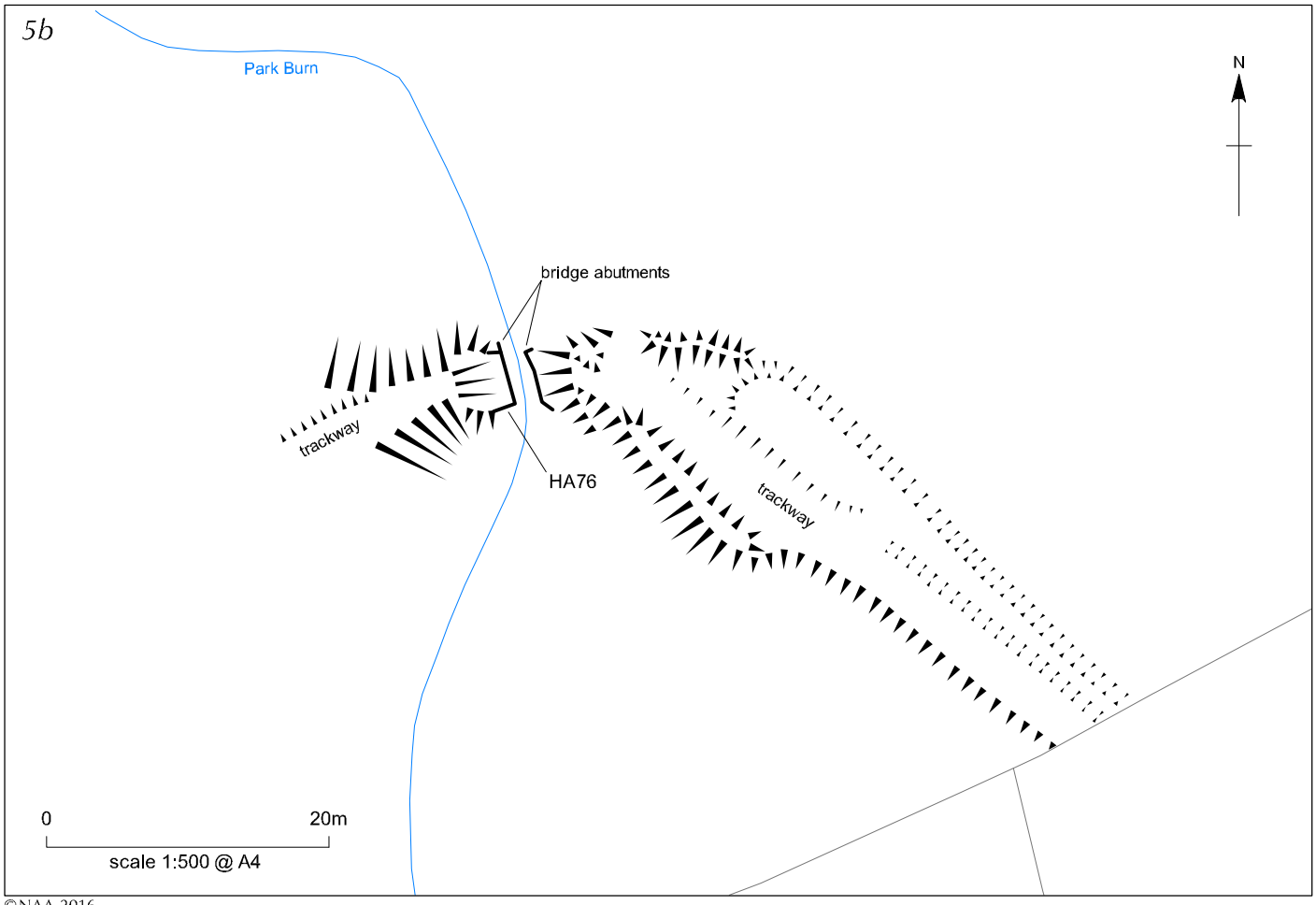
Heights Quarry: topographic survey results overlain on mine galleries

Figure 3

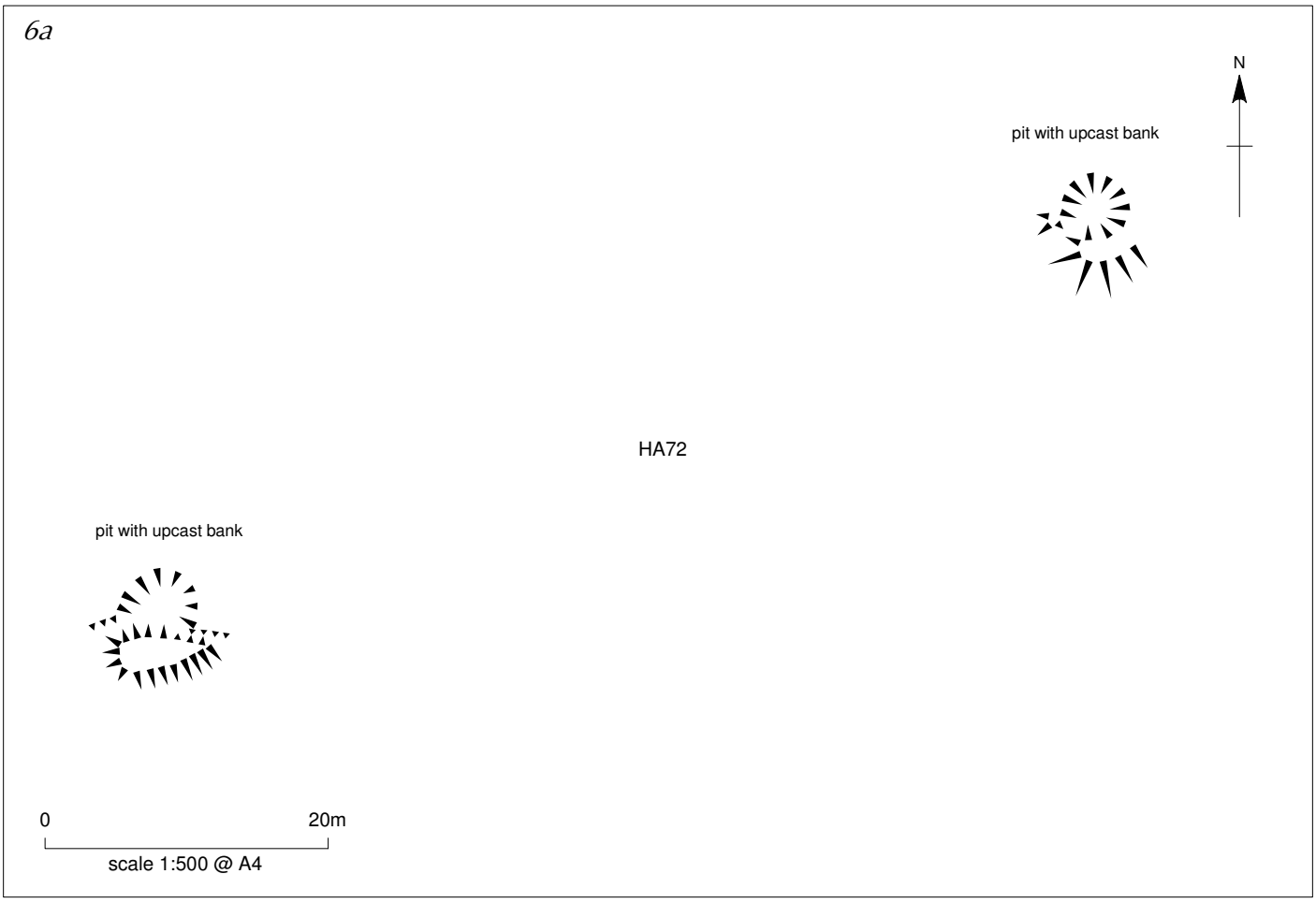


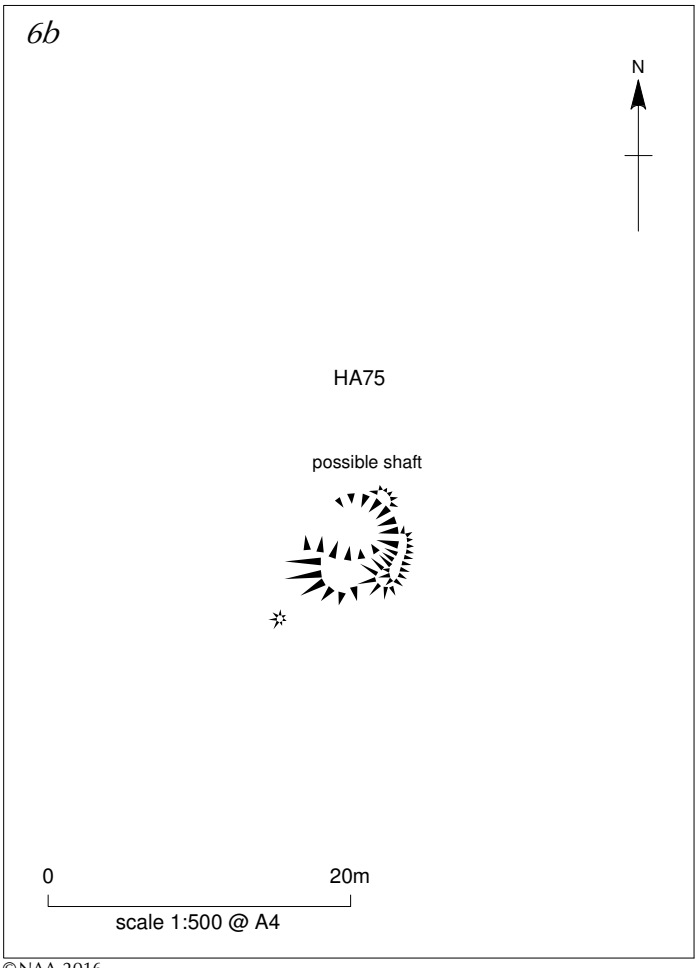
Heights Quarry: topographic survey results *Figure 4*

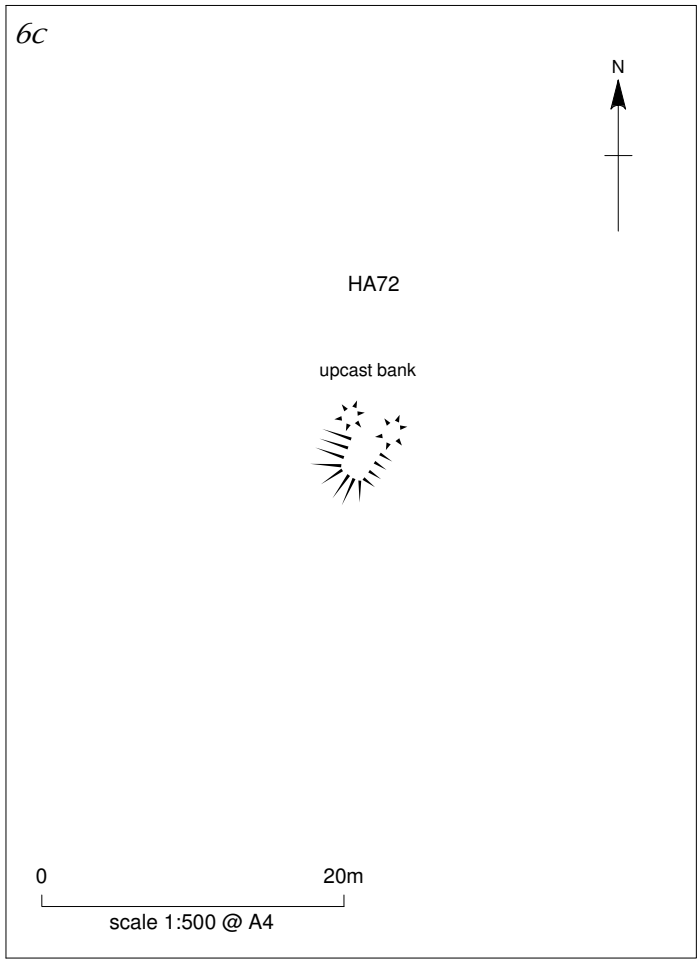




Heights Quarry: topographic survey results *Figure 5*







Heights Quarry: topographic survey results *Figure 6*