ARCHAEOLOGICAL BUILDING SURVEY, WALKOVER SURVEY AND TRENCHING REPORT

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BROUGHTON MOOR ROYAL NAVAL ARMAMENTS DEPOT (RNAD), GREAT BROUGHTON, BROUGHTON, CUMBRIA

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BROUGHTON MOOR ROYAL NAVAL ARMAMENTS DEPOT (RNAD),
GREAT BROUGHTON,
CUMBRIA

ARCHAEOLOGICAL BUILDING SURVEY, WALKOVER SURVEY
AND TRIAL TRENCH EVALUATION

Summary

Northern Archaeological Associates Ltd (NAA) has been commissioned by Story Homes Ltd to undertake the preparation of an archaeological building survey, walkover survey and trial trench evaluation report for a section of Broughton Moor Royal Naval Armaments Depot (RNAD), Broughton Moor, Great Broughton, Cumbria (NGR NY 3059 5317, Figure 1). This work forms Phase 1 of the Derwent Forest project, a regeneration project for the site, which will see the demolition of a number of buildings to facilitate housing development on the edges of the site.

The archaeological investigation was required by Cumbria County Council Historic Environment Service (CCCHES) as the project affects an area considered to have archaeological potential. The archaeological investigation was conducted in line with a Written Scheme of Investigation (WSI – NAA 2014a), which was submitted to CCCHES (archaeological advisors to Allerdale Borough Council) to ensure that the archaeological investigation constituted a scheme of works approved by the local planning authority.

The Royal Naval Armaments Depot was established in 1938 covering 425 hectares and comprised 132 magazines, stores, laboratories and ancillary structures linked by a railway. It expanded to 490 hectares during the Second World War and was used for the storage of munitions by several countries in the post-war period, until it was closed in 1992. Many the depots' buildings and some of its infrastructure still survives. The buildings are of some local interest. Four of the buildings were proposed for demolition, and therefore a Level 1 building survey (English Heritage 2006) of the buildings was required in advance of this. The buildings were visited on the12th and 13th of May 2014, and were fully recorded by means of photographic and written record. The building survey confirmed the findings of an earlier report (Thomas 1997), which confirmed these to be corrugated asbestos-clad timber framed magazines, connected by a narrow gauge railway system, with alternate examples surrounded by an earthen bund (known as a traverse). The examples demonstrated some variation in the number of doors, and other fittings, but otherwise conformed to the standard description as given in the earlier report. The most interesting aspect of the magazines was the graffiti, which dated back to their original war-time, and immediate post-war, usage and provided some socio-historic information.

A walkover survey of the immediate vicinity of these buildings was also required, in order to identify the location of any surviving earthwork features related either to the armaments depot, or earlier phases of activity on the site. An earlier desk-based assessment (Conolly 2001) had identified a number of archaeological sites pre-dating the establishment of the depot, most of which dated to the 19th century and related to coal mines that occupied the site before the construction of the depot in 1938. Earlier land use was also represented by

the presence of a medieval ridge and furrow field system, and a possible building platform was also identified (Conolly 2001, 1). The walkover survey confirmed the survival of ridge and furrow earthworks, particularly on the western side of the survey area, and a number of earthworks which appeared to relate to the 19th century coal workings, including the building platform, on the eastern side. These earthworks were investigated as part of the trial trench evaluation.

The trial trench evaluation, which numbered fourteen trenches, was required to test the sub-surface survival of any archaeological features within the development boundary. The work was undertaken between the 2nd and 9th June 2014, and revealed two trackways possibly connected with the 'Old Shaft'/colliery workings depicted on the Ordnance Survey map of 1866. The building platform was investigated, but no evidence of any foundations was recorded.

The current report is considered to be a comprehensive record of this section of the armaments depot and its immediate curtilage. No further work is recommended.

Acknowledgements

Northern Archaeological Associates would like to thank Phil Houghton, Story Homes Ltd, and Rachel Lightfoot, Positive Planning Solutions, for their help during the inspection and assistance throughout the project. NAA would also like to cordially thank Roger Thomas, English Heritage, for providing additional information and his expertise on this and other RNAD sites. Jeremy Parsons, Historic Environment Officer, Cumbria County Council, is also cordially thanked for all his assistance.

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BROUGHTON MOOR RNAD, GREAT BROUGHTON,

CUMBRIA

ARCHAEOLOGICAL BUILDING SURVEY, WALKOVER SURVEY

AND TRIAL TRENCH EVALUATION

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1.0 INTRODUCTION

1.1 Northern Archaeological Associates Ltd (NAA) has been commissioned by Story Homes Ltd to undertake an archaeological building survey, walkover survey and trial trench evaluation report for a section of Broughton Moor Royal Naval Armaments Depot (RNAD), Broughton Moor, Great Broughton, Cumbria (NGR: NY 3059 5317) (Figure 1).

1.2 Allerdale Borough Council and Cumbria County Council jointly acquired the RNAD in August 2008. The site is one of the largest brownfield sites in the North West of England. A lease agreement for the site was agreed with Derwent Forest Developments Consortium and development of the site, known as the Derwent Forest Project, is being managed by Story Construction. Phase 1 of the project, which is being undertaken by Story, will see the initial demolition of a number of buildings to facilitate the layout of 25 plots for self-build housing development on the edges of the site boundary, to be sold to fund planning and environmental impact assessments, and the development of a master-plan for the site; the archaeological recording within this report covers this phase. Phase 2 will involve the sale of a further 125 plots, in line with the site remediation plan, and will be covered by a future phase of works.

Plate 1: Aerial photograph Broughton Moor RNAD, from the south-west (© Simon Ledlingham/Visit Cumbria website)

1.3 The Royal Naval Armaments Depot was established in 1938 covering 425 hectares and now comprises approximately 320 to 350 structures (Integra 2001b), including magazines, stores, laboratories and ancillary structures linked by a railway. It expanded to 490 hectares during the Second World War and was used for the storage of munitions by several countries in the post-war period until it was closed in 1992. Many the depots' buildings and some of its infrastructure still

survives; at its peak, the complex included about 1000 structures (Thomas 1997, 4).

1.4 Four of the buildings are currently proposed for demolition. The buildings are of some local interest, and therefore a Level 1 building survey (English Heritage 2006) of the buildings was required by Cumbria County Council in advance of this. In addition, a walkover survey of the immediate vicinity of these buildings was required, in order to identify the location of any surviving earthwork features related either to the armaments depot, or earlier phases of activity on the site (Parsons 2014a). A trial trench evaluation, numbering fourteen, 15m or 25m by 2m trenches, was also required to test the sub-surface survival of any archaeological features within the development boundary (Parsons 2014b).

1.5 The survey and assessment was carried out, under optimum conditions, by a Project Manager on the 12th and 13th of May 2014. Full access to the property was provided by the client. The survey was conducted in accordance with a Method Statement (NAA 2014a) approved in advance by Cumbria County Council Historic Environment Officer, and followed all relevant standards and guidance published by English Heritage (2006, 2007) and the Institute for Archaeologists (2008). The trial trench evaluation, informed by the survey, took place between the 2th and 9th of June 2014. The evaluation was undertaken in accordance with a Written Scheme of Investigation (NAA 2014b) submitted to, and approved by, Cumbria County Council Historic Environment Officer in advance of the works, and followed all relevant standards and guidance published by the Institute for Archaeologists (2009).

1.6 The following report details the results of all aspects of the survey, assessment and trial trench evaluation.

Project Aims and Objectives

1.7 The principal aim of the project was to provide a pre-intervention, descriptive record of the section of the armaments depot to be developed, to act as a permanent record of the heritage asset and mitigate against its subsequent loss.

Site Walkover Survey

1.8 An inspection survey of the proposed development site was carried out on the 12th and 13th of May 2014. The survey utilised the plans of the scheme as supplied by Positive Planning Solutions Ltd and Story Construction Ltd. The objectives of this survey were:

- to confirm the presence and condition of previously recorded assets;
- to identify additional sites of potential cultural heritage interest;
- to assess current landscape character, ground conditions and land use; and
- to assess the likely impact that the development might have on the significance and setting of specific heritage assets and the historic landscape.

Building Survey

1.9 An English Heritage Level 1 building survey of four of the munitions stores within the proposed development site was carried out on the 12th and 13th of May 2014. The survey comprised a written and photographic record of the buildings, which was cross-referenced to previous surveys undertaken by English Heritage (Thomas 1997). The objectives of this survey were:

- the production of an annotated site plan, depicting the form and location of any structural features;
- a written and photographic record of the four armaments depot magazines and their structural features, providing details of their form, function, date and significance;
- a short illustrated report summarising the history of the armaments depot, and
- an archive of additional photographs.

Trial Trench Evaluation

1.10 An archaeological trial trench evaluation of the proposed development site was carried out in June 2014. The objectives of the evaluation were:

- to establish the presence, nature, extent, preservation and significance of any archaeological remains within the site;
- to provide a detailed record of any such archaeological remains;
- to recover and assess any associated structural, artefactual and environmental evidence;
- to determine which areas within the proposed area of topsoil stripping require archaeological mitigation in the form of preservation in situ, open area investigation in advance of stripping, or monitoring of soil stripping during construction works;
- to prepare an illustrated report on the results of the evaluation to be deposited with the Historic Environment Record (HER) held by Cumbria County Council Historic Environment Service and the National Monuments Record (NMR); and
- to evaluate the potential for further unrecorded significant archaeological remains to be present within the site.

2.0 METHODOLOGY

Site Walkover Survey

2.1 The information obtained from previous studies (Thomas 1997, Conolly 2001) was 'ground-truthed' through a rapid walkover of the proposed development area, to check and enhance the existing baseline information derived from the rapid desk-based assessment and to identify additional sites not previously recorded. The on-site survey work was undertaken in accordance with the procedures

set out in Understanding the Archaeology of Landscapes; A Guide to Good Recording Practice (English Heritage 2007).

2.2 Identified features were recorded by means of a written record, and a key plan showing the location of each feature has been included in the final report. A digital photographic record was also made of identified features. All photographs were taken using a digital SLR camera at a resolution of 10 megapixels, and included a graduated photographic scale of appropriate dimensions. A catalogue of all unedited and edited images will be submitted with this report as part of the archive.

Building Survey

2.3 As a Level 1 survey, a detailed metric survey of the armaments depot was not required, though a measured floor plan of the interior of the armaments depot was produced as requested (Figure 2). A basic summary written description was made of the structures, noting the form and location of significant features, such as blocked doors, windows, internal arrangements and any evidence for fixtures or fittings of any significance.

2.4 An external and internal photographic record was made of the building using a digital SLR camera at a resolution of 10 megapixels. All photographs were taken from vantage points as near parallel as possible to the elevations being recorded. The photographic record includes general views of the interior - looking from all directions - as well as detailed shots of representative examples fixtures and fittings (windows, doors etc.). A catalogue of all unedited and edited images will be submitted with this report as part of the archive. Each photograph contains a graduated photographic scale of appropriate dimensions.

Trial Trench Evaluation

2.5 Fourteen trial trenches, measuring between 15m and 25m by 2m, were excavated within the proposed development area (Figure 3). Three trenches (Trenches 15-17), located to the east and outside of the Depot's perimeter fence could not be excavated as this area could not be accessed by plant at the time of the works. The trenches were located in order to provide an appropriately targeted excavation sample of the proposed development area. Features identified during walkover surveys, including the possible waggonway, building platform and earthwork mounds at the east of the site were targeted in particular.

2.6 All trial trenches were excavated by a mechanical excavator fitted with a toothless ditching bucket under the direct supervision of a monitoring archaeologist. Machine excavation continued to a level at which archaeological deposits were identified, or down to natural subsoil deposits, whichever was encountered first.

2.7 Where structures, finds, soil features or layers of archaeological interest were exposed, these were cleaned, assessed, excavated by hand and recorded as appropriate. Excavation was undertaken in order to characterise the site's archaeology and ensure recovery of artefactual and environmental evidence.

2.8 A drawn record of all archaeological features was made at an appropriate scale. Sections/profiles were drawn at a scale of 1:10 and their location accurately identified on the appropriate trench plan. Plans were drawn at a scale of 1:20, although trenches largely devoid of archaeological features were recorded at a scale of 1:50. Drawings include appropriate data on levels relative to Ordnance Datum. Written descriptions of archaeological features/deposits was recorded on pro forma context sheets, which employ standard archaeological recording conventions. A photographic record of the site was undertaken using 35mm format black and white prints. Digital images were also taken using a digital camera at a resolution of 10 megapixels.

2.9 The trial trenches were located using sub-centimetre GPS.

2.10 The site code used for the evaluation was **CBM14**.

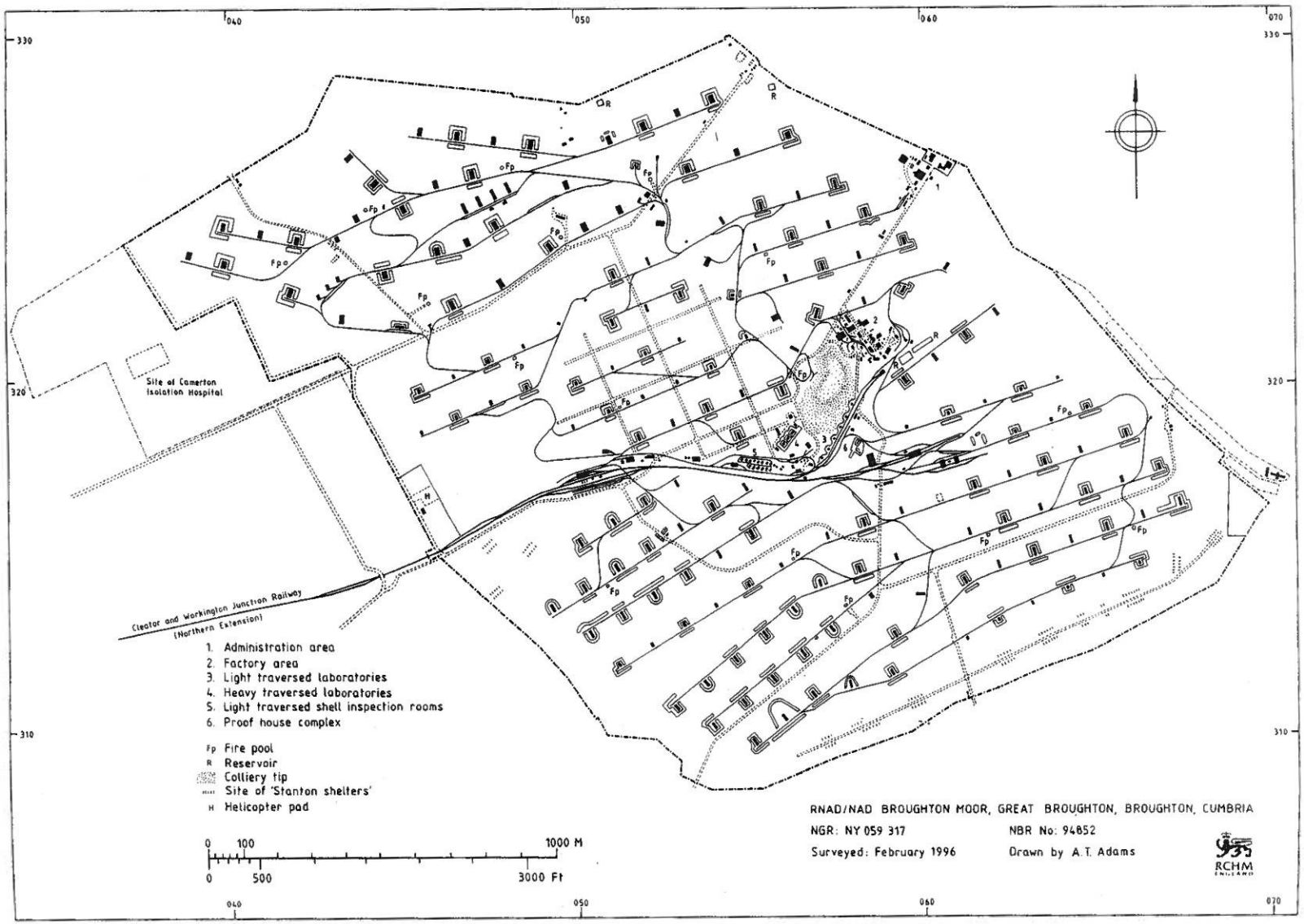

Plate 2: Plan of Broughton Moor RNAD, after Thomas 1997, 3.

3.0 BACKGROUND INFORMATION

Location

3.1 Broughton Moor RNAD lies to the north-west of Great Broughton, in the Borough of Allerdale, Cumbria (NGR NY 3059 5317). The site is located on the northern side of the Derwent Valley; the River Derwent, at its closest position, is located approximately 500m to the south of the site.

3.2 The site of the depot covers 434 hectares (1072 acres), and comprises a mixture of pasture and rough grazing, broadleaf and conifer plantations, and gorse. The solid geology comprises Carboniferous Middle Coal Measures Formation - a combination of shale, siltstone, coal and sandstone - overlain by drift deposits of Devensian till, primarily stiff, grey, sandy silty clay with coarse gravel and occasional cobbles (Integra 2013a, 8-9).

3.3 The archaeological evaluation was undertaken within a large triangular area across two pasture fields on the eastern edge of the RNAD. These two fields were bounded by open pasture fields to the north, a disused railway embankment to the south, and Depot buildings to the west (which formed the focus of the building survey), with the Depot perimeter fence, wasteland and Moor Road to the east.

3.4 The land sloped broadly downwards from a height of 78.79m OD at the north-west ,to the southern edge of the field, at a height of 72.17m OD. The field also sloped downwards to this area from the east, causing the ensuing depression to be waterlogged.

Ownership

3.5 The armaments depot is leased by the Derwent Forest Developments Consortium from Allerdale Borough Council. The site works are being managed by Story Construction, who kindly provided full access during the site inspection, undertaken on the 12th and 13th May 2014, and the archaeological evaluation, undertaken from the 2nd June 2014.

Designations

3.6 Broughton Moor RNAD is not a designated heritage asset, and does not lie near to a Conservation Area (Figure 1).

Previous Work

3.7 The Royal Naval Armaments Depot has been extensively recorded by the Royal Commission on the Historical Monuments of England in 1997 (Thomas 1997). In addition to the records made for this survey, the MoD/Admiralty took extensive aerial photographs (APs) of the depot for camouflage testing and holds original plans and similar records. An extensive documentary and photographic record therefore exists (Conolly 2001, 7).

3.8 Headland Archaeology Ltd was commissioned to undertake an archaeological assessment of the site, commissioned by Allerdale Borough Council as part of a feasibility study on possible future

development (Conolly 2001). The desk-based assessment identified a total of twenty-four sites in and around the depot. Most of these date to the 19th century or later and relate to mines that occupied the site before the construction of the depot in 1938. Earlier land use is represented by the presence of a medieval field system and areas of ridge and furrow. An artificial mound was also identified and interpreted as a possible building platform (Conolly 2001, 1).

4.0 HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

Colliery

4.1 The Ordnance Survey mapping of 1866 depicts the survey area as open fields, some of which are clearly strip fields (enclosed ridge and furrow cultivation), particularly around the settlement of Great Broughton, whilst the remainder are probably the result of Parliamentary Enclosure in the 19th century. The wider project area also included two moors, Camerton Common and Ribton Moor, and pockets of woodland along Holdens and Flamiggs Gills in the south of the site. Small-scale coal extraction related to Seatonmoor and Camerton collieries is evident and a brick and tile works is shown towards the northern edge of the project boundary. Within the survey area, a shaft is shown, marked *'old shaft (coal)'* (Plate 3). The earlier shafts are likely to have only been shallow, and would have been limited by availability of breathable air and the water table. The Integra report (2013a) identified several extensive areas disturbed by bell pits or clusters of abandoned shafts.

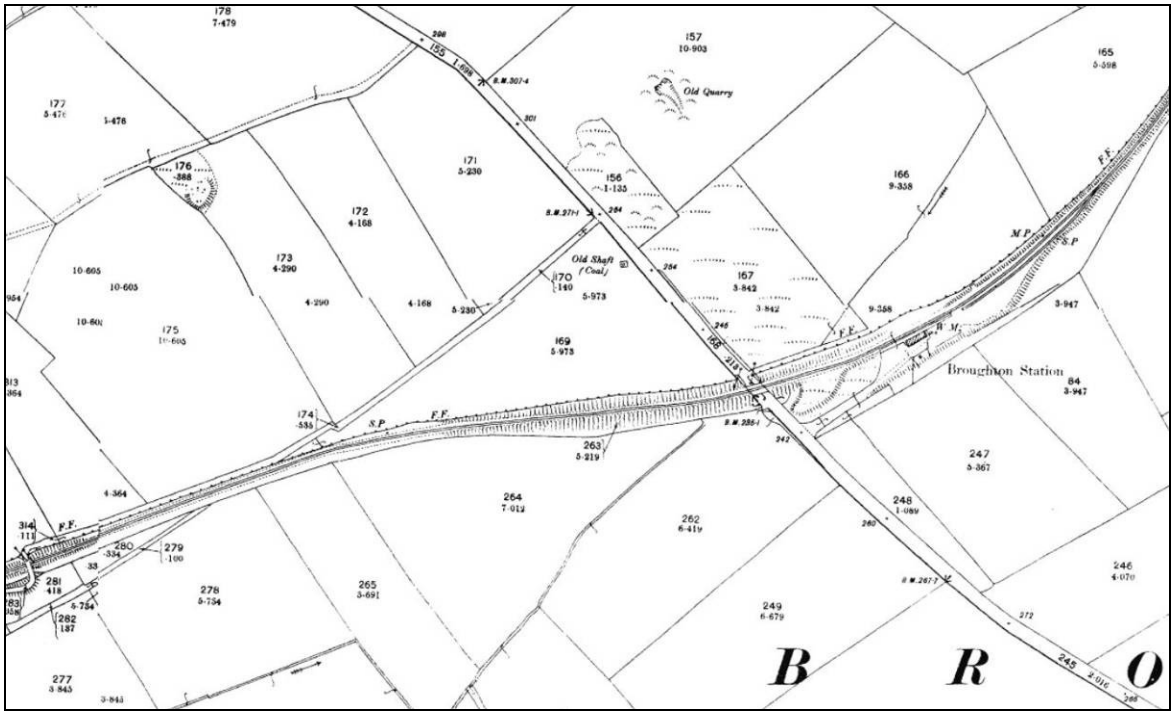

Plate 3: Ordnance Survey map (1901), showing the survey area in the centre.

4.2 Buckhill Colliery was opened in 1873 to the west of the survey area, with associated beehive coke ovens, gasometer and reservoirs. Little now survives of the colliery, other than a large spoilheap, as

most of the colliery infrastructure was demolished for the construction of the depot, but the colliery would have been employing deeper mining methods; the Integra report (2013b) identified various colliery spoil heaps, seventy-four known and thirty-seven unconfirmed mine shafts, one adit (horizontal mine level, used for access and/or drainage). The colliery went out of business in 1932. By 1900, a railway was built to link the colliery to the Cleator and Workington Junction Railway (Northern Extension), and this line forms the southern boundary of the study area. The line runs eastwards to Broughton Station, which lies east of the site and closed in 1908 (Conolly 2001, 3).

Royal Naval Armaments Depot (Plate 2)

4.3 The site was acquired by the Ministry of Defence in 1938, for use as a Royal Naval Armaments Depot (RNAD), as part of the Admiralty's pre-war expansion plans (Thomas 1997, 1). The depot, centred on the disused colliery and utilising the existing rail links of the Cleator and Workington Junction Railway (Northern Extension), was completed in 1939. The complex originally comprised: 132 timber-framed corrugated-asbestos clad magazines of five and nine bay design; various sheds and other stores; inspection and laboratory areas; and administration and ancillary structures, linked by a narrow gauge railway, which connected to standard gauge railway through two groups of exchange sidings and three transit sheds (Thomas 1997, 1). Some of these lay within Ribton Wood, which was planted in the early 1920s. The depot was initially used solely for the storage of ammunition, but this was later extended to include the inspection, maintenance, repair, proofing and disposal of various ordnance (Capita DBS 2001, 8). The original site covered 800 acres (Thomas 1997, 1).

4.4 During the Second World War the depot was extended to the present size, to cope with the extra demand, surrounded by a 10.46km 'unscaleable' *Daicoit* perimeter fence (Thomas 1997, 2). The now demolished Camerton Smallpox/Isolation Hospital was acquired and a further thirty-seven magazines, as well as stores, laboratories and ancillary buildings, were built. There was only one major incident during the depot's wartime service. This involved the accidental detonation of a Mk 2 'Hedgehog' anti-submarine mortar round within building 416 (C Line) in January 1944, killing eleven and wounding a further seventy (Thomas 1997, 2). The area of the explosion was cleared and redeveloped (Capita DBS 2001, 9).

4.5 After the War, the Royal Navy continued to use the depot with few major changes until 1963, when tenancy was transferred to the Federal Republic of Germany for the storage of naval munitions, principally mines, and later limited processing and inspection (Thomas 1997, 2). In 1977, the United States Navy took over tenancy of the depot, using it to store munitions for their fleet in the Norwegian Sea, as well as activities associated with munitions modifications and testing (Capita DBS 2001, 10). During this period it was used for the storage of 20,325 tonnes of munitions, approximately half of the US Navy's pre-positioned stock of ammunition (Thomas 1997, 2). In 1981 it became a NATO establishment and remained so until its closure. The rundown of the site began in 1991, and by July of that year an Explosive Ordnance Disposal (EOD) search had

been completed. The last train to leave the depot left on the 3rd June 1992 (Thomas 1997, 3). The clearance process by the Ministry of Defence involved removal of all explosives, ammunition and explosive contamination, and also ensured no fuel remained on-site, with above ground tanks removed and below ground tanks filled in with concrete (Integra 2013b, 8). A certificate of search/clearance of explosive materials and other dangerous substances was issued in December 1992, allowing the depot to be placed on the disposal list; it was closed on the 31st December 1992 (Thomas 1997, 3).

Plate 4: Perimeter fence south of Residence Gate

5.0 LANDSCAPE SURVEY

Introduction

5.1 The development boundary, which comprises a triangular block of land delineated by the railway embankment to the south, and a field boundary to the north, was subject to a rapid walkover survey. A further block of land, east of the fence and between the fence and the road, was also examined, as this forms part of the development boundary, but was not included in the plan which accompanied the brief. Other features within the vicinity have also been noted where they may be impacted on by the development.

5.2 The fence surrounding the depot comprises a 2.10m high, cranked chain-link fence topped with three strands of barbed-wire. There are concrete curved blocks part-buried along the base of the

fence in the location of the gate, formerly known as Residence Gate, presumably to stop intruders digging under the perimeter.

Plate 5: Ridge and furrow north of ESH 86, facing south from the railway line

Medieval Ridge and Furrow

5.3 The desk-based assessment identified that the survey area lies within a series of strip fields in the south-eastern corner of the depot, measuring 35-40 m in width, though some have been merged to form larger fields. Strip fields are narrow fields formed through the enclosure and consolidation of blocks of medieval ridge and furrow, and usually occurred from the medieval period onwards. The desk-based assessment identified that the hedges and low banks defining these fields were in fair condition, though the hedges were no longer maintained. Ridge and furrow was also identified in discrete blocks in the south-east and north-west corners of this area (Conolly 2001, 5 and Figure 2). During the walkover survey, further ridge and furrow was identified in a block within the fields to the north and south of ESH 86. The ridge and furrow comprises a broad ridge c3m in width, with a narrower furrow c2m wide, and is evidently sinuous, as is common with this type of earthwork. The ridges run north-south from the line of the Cleator and Workington Junction Railway southwards, to a point just south of the explosives storehouse, where the orientation of the ridges turns east-west.

Post-Medieval Coal Mining

5.4 Along the eastern edge of the site, tentative evidence for post-medieval coal mining was identified. There is no indication of any activity on the First Edition Ordnance Survey mapping of 1866, other than a shaft marked '*old*' in the north-east corner of the development boundary (see Plate 3). The position of this shaft is hard to gauge, but seems to correspond with a fenced area within the zone just beyond the perimeter fence (Plate 6), which has no identifiable entrances and is therefore likely to have been enclosed to eliminate the risk of base staff falling down the workings. The Integra survey (2013a) identified this shaft to be 20+m in depth. Most of the area surrounding this shaft has been the location of 20th century housing, and is therefore unlikely to preserve any evidence of

infrastructure related to the shaft.

Plate 6: Fenced area within outer zone - probable location of shaft

5.5 Within the development boundary, a building platform was identified. This corresponds with a site identified during the walkover survey undertaken as part of the desk-based assessment (Site 20 - Conolly 2001, 13). The walkover identified this as a sub-rectangular platform on south-east facing slope, measuring approximately 18 by 14 m and standing to a maximum height of 0.75 m. The platform respects an adjacent track shown on the First Edition Ordnance Survey, possibly a waggonway. A further possible shaft was noted to the north-west, and outside the current development area, possibly associated with further waggonways. The building platform was examined during the trial trenching phase (Section 7).

5.6 Along the western edge of the modern track are a series of small mounds running alongside a north-west, south-east aligned linear hollow; a further east-west aligned hollow, possibly a drain, cuts across this hollow, again associated with small heaps and mounds. The earthworks may relate to mining activity, or may be modern, perhaps relating to the removal of pipework which connected the housing with the sewage treatment plant (see below). These earthworks were also examined as part of the trial trenching phase (Section 6)

Plate 7: Building platform, facing north

Plate 8: The Cleator and Workington Junction Railway, facing east

Railways

5.7 The southern edge of the development area comprises track-beds (both standard and narrow gauge) and railway embankment, originally part of the rail infrastructure, which served the site and formed part of the Cleator and Workington Junction Railway. No actual rail tracks were observed; the majority of the rails were taken up and removed from site in the early 1990s, and the track only now survives encased in concrete, at road crossing points (Capita DBS 2001, 6).

5.8 The railway embankment has been cut through by a track leading from Residence Gate to the development area; the date of this cutting is hard to gauge, as it is not depicted on any Ordnance Survey mapping, but is probably modern (20th century) in date. The modern fence, a 2.10m high, cranked chain-link fence topped with three strands of barbed-wire, now runs across the top of the embankment; the original fence presumably followed the same line.

5.9 Examination of the bank shows it to have been built of mine spoil from coal mining, which contains large quantities of clinker, fragments of brick and other debris. Most of the embankment, however, survives as a turfed earthwork, preserving the lines of the former trackways.

Plate 9: Sewage treatment plant, showing valve-wheels on tank

Sewage Treatment Plant

5.10 Immediately south of the development area is a small sewage treatment plant, which may be affected by the development. There were originally five sewage treatment plants on site (Integra

2013b, 5). Site effluent is understood to have been treated on-site in primary settlement and filter beds prior to discharge into nearby watercourses. Anecdotal evidence, relating to the period 1981 to 1992, suggests that sewage sludge arising from the treatment process was tankered off the site for disposal; there is no evidence available regarding disposal of the sludge prior to this, and it is possible that it was spread on the land (Capita DBS 2001, 15). The plant connects to a pipeline running downhill from the east, to the rear of Building 676A, and was presumably installed to serve the 20th century housing to the north-east, as well as the depot.

Water-Pipelines

5.11 The water supply for the site is believed, at least in part, to have been supplied in asbestos cement pipework, which fed fire pools (static water storage tanks associated with fire fighting measures), which were located around the site. The tanks were supplied from two on-site reservoirs located close to the northern site boundary which were themselves fed from water pumped from the River Derwent south of the site (Capita DBS 2001, 15; Thomas 1997, 17). A pipeline was noted running downslope and north-east to the rear of Building 676A, and feeding a large concrete tank adjacent to the railway embankment. This may subsequently provide water for the sewage treatment plant (above).

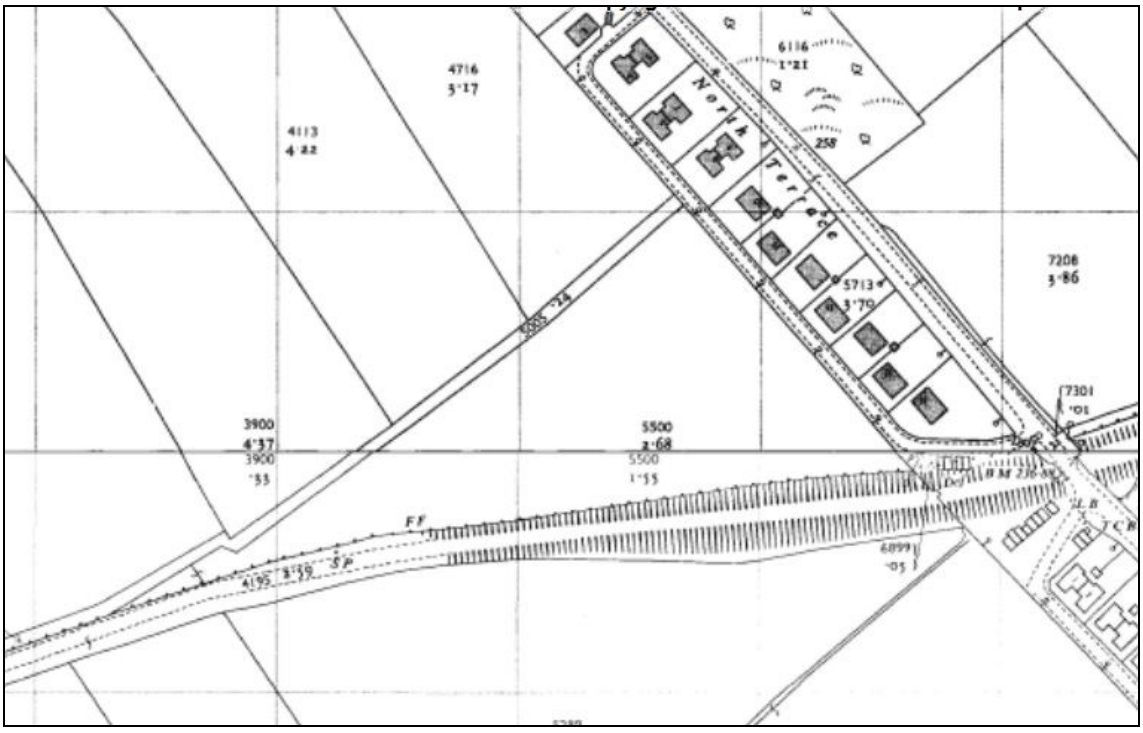

Plate 10: Ordnance Survey map (1960), showing the survey area in the centre, and housing along eastern perimeter.

20th Century Housing

5.12 The area to the east of the perimeter fence is depicted as built up with housing dating from 1938,

and completed by 1960. This area, named as North Terrace, lay within an asphalt perimeter road, with pavements, which still survives, with a further terrace, South Terrace, extending south-eastwards from in front of Residence Gate. The housing has long been demolished, but was presumably built for the staff at the depot. The perimeter road still survives.

Building 676A

5.13 Building 676A is a small single room brick building, presumed to be a guardhouse for Residence Gate. The brickwork is set in stretcher-bond, with ceramic ventilators, and is built on a concrete base. The doors and windows have concrete lintels, except the rear door, which has been inserted and has a timber lintel; the windows are metal casements - no doors survive. The roof slopes south-westwards, and is covered with corrugated asbestos sheeting, which has iron fixings to hold it in place. The interior of the building is clad in fibre-board, with no fixings evident; a toilet was inserted into the south-eastern corner, separated by means of a breeze-block partition. Electricity was supplied by overhead lines to the north-eastern corner of the building.

Plate 11: Building 676A, facing west

6.0 BUILDING SURVEY

Plate 12: ESH 87, facing north. Note covers for telephone adjacent to the ranging pole.

Introduction

6.1 The Explosive Store Houses (ESH) or magazines are described by Roger Thomas (1997, 12), as follows:

'The magazines are constructed of either corrugated asbestos-clad timber framing or of brick and reinforced concrete, and come in two permutations of bay length, five bays or nine bays. Wartime green and dark-earth camouflage paint survives on many of the more sheltered magazines, particularly those in Ribton Wood.

The magazines are laid out in rows, generally on a northeast / southwest axis. A spur of the narrow-gauge railway system, which provides the only means of access, serves each row. The magazines in each row are spaced at 109.72m (360ft) centres and are staggered in relation to the magazines in the next row. As originally built, the majority of the magazines in each row were constructed alternately with, or without an earth traverse (revetment); however, with the passage of time, ten of the un-traversed magazines have been provided with traverses, using spoil from the coal tip at Buckhill Colliery. The average height of a traverse is 3.05m (10ft).

A typical nine-bay timber framed magazine is a single-storey, 27.43 x 7.92m (90 x 26ft) rectangular plan, corrugated-asbestos clad, timber-framed structure, with a corrugated-asbestos clad gable roof,

carried on spaced-board strutted timber trusses, with steel king posts. The verges of the roof are notable, as they do not have any form of guttering. Brackets are attached to the ridge at both ends of the roof, to accept lightning conductors.

Plate 13: North bank of traverse around ESH 87, facing south; note slightly wider flattened base and boggy quarried area

The first bay projects over a loop off the narrow-gauge railway spur, to form a roofed loading bay; the end wall of which is partially covered with corrugated asbestos sheeting. A 57cm (22½in) high platform runs across the gable wall of the magazine, and access is provided to the interior by a centrally set, 1.83m (6ft) wide double doorway. A 1.37m (4ft 6in) wide double doorway, which functioned as an emergency exit is located in the rear gable.

Internally, the concrete floor is laid with gritless asphalt, and the walls and roof are lined with fibreboard. Painted marks on the walls and floors indicate the height, and floor area within which ammunition could be stacked. A monorail gantry ran the length of the centre line of the interior. A 'Magazine Placard' giving general instructions, and a fire notice are attached to the back of the doors. Unofficial records of issues of ammunition are often written on the walls in pencil, or chalk. Some graffiti also exists: for example, a very lively chalk drawing of two children on roller-skates, entitled the "Terrible Twins", in Magazine 79.

Four, three-pane timber deadlight windows in each side wall, light the interior of the magazines. The windows are staggered and occupy alternate bays in opposite walls. Internally, a heavy zinc wire mesh, to prevent them being accidentally broken, protects the windows. There is little variation to the design of these magazines across the depot, apart from Magazine 49 (Heavy Shell Magazine), which is equipped with a 1016.04kg (1 ton) 'A' frame lifting gantry. The five bay timber-framed magazine is identical in construction to the nine bay example and differs only in its length, which is 15.23m (50ft), and the number of windows."

6.2 The survey recorded four examples of ESH, which were all five bay examples (ESH numbers 65,

66, 86, and 87). These had minor variations to the above description, but generally conform to the standard description as reproduced above. The following additional features were noted.

Plate 14: Semi-circular revetted recess in north side of south bund of traverse; this example, at ESH 87, is revetted with a stone wall

Traverses

6.3 The ESH are alternatively surrounded by earth bunding, known as 'traverses', the purpose of which was to isolate each ESH, thus reducing the potential for a single explosive incident from impacting on nearby ESHs (Capita DBS 2001, 5). Whilst seen to be grassed, the materials used to construct these bunds is uncertain. Anecdotal evidence (Capita DBS 2001, 17) suggests that the usual method of construction comprised a stone 'foundation' topped by an earth embankment with material often being sourced from adjacent land; colliery spoil was not used, because of its poor engineering properties (though Roger Thomas indicates later traverses were built of this material). Of the surveyed examples, ESH 66 and 87 had traverses.

6.4 The southern bank of the traverse is a long continuous bund 65m in length and about 5m in height, with a slight northward return at each end. This bank forms the southern side of the track opposite the entrance to the ESH. The northern bank is narrower and roughly square in shape, with sides 30m in length and 2-4m in height, enclosing the west, north and east sides of the ESH. All the traverses have triangular profiles with a very narrow, flat walkway along the top; the outer edges of

the northern bank also have a slightly wider flattened base, corresponding to the original ground surface, left perhaps as an additional water-proofing measure (Plate 13). It was clear from the survey that the material forming the banks had been obtained from the machine excavation of a terrace cut into the hillside, on which the building sits, and a wider area around the position of the ESH, usually on the north side, which was a large irregular rectangular cut, now mostly quite boggy.

Plate 15: Stone wall, ESH 87

6.5 The narrow gauge track runs broadly east-west between the two banks. The north returns of the south bank are revetted by a stone wall, c.1.6m in height, and made of random coursed roughly squared blocks, with cement mortar (Plate 15). Most of these walls have been partially rendered with cement to stabilise them, and the eastern example at ESH 87 has also had ceramic drain pipes inserted along the base; in contrast, the eastern example at ESH 66 has collapsed entirely. The southern ends of the north banks are revetted by a smooth concrete wall, with shuttering impressions evident; these may be slightly later, and the original revetting may have been timber. The concrete revetments are angled, to allow the movement of narrow-gauge waggons to the sidings within the ESH. At the centre of the southern bank is a semi-circular recess, located approximately central to the bund and directly opposite the doorway of the ESH (Plate 14). The recesses measure approximately 3m in length and 1.5m in width, and whilst most have now collapsed and are infilled by bund material, they are still discernible. The example at ESH 87 was

revetted with a random-coursed stone wall 0.8m in height (Plate 14), but this was a lone example; the other examples had no discernible revetment, suggesting they were perhaps originally revetted with timber. The function of these recesses is unknown. The western end of the southern bank of the traverse for ESH 66 also incorporates a rectangular recess, revetted with a similar stone wall. This recess houses valves for a pair of fire hydrants, connected to a gravity-fed fire main which runs north-south underneath the southern bund (Thomas 1997. 17). The pipeline continues downslope and beyond the survey area.

Plate 16: Rectangular spoil heap south of ESH 86, facing north

6.6 The ESH without traverses (surveyed examples ESH 65 and 86) have a large rectangular heap of spoil in front and south of the buildings, from the machining of the terraces cut into the hillslope, on which the buildings are located (Plate 16). The spoil heaps measure approximately 20m by 10m, and are 1.2m in height. They are aligned either with the south edge of the narrow-gauge waggonway, or at right-angles to it. The heaps are flat-topped, and also include the semi-circular recess on the north side, in the same way as the traverses. The un-traversed magazines also included the line of a land drain, cut c.8 from the edge of the platform , and running east-west across the slope above the magazine with a drain running down either the west or east side, and connecting to the trackside drainage. This was presumably excavated to catch the run-off from the hillslope, and to stop the magazines flooding.

6.7 Each of the ESH have two steps leading from the rear door down to the building platform; the

examples with a traverse have a flight of eighteen steps cut into the inner edge of the bank, opposite the rear doors, and running up to the top of the traverse. The steps are revetted with timber planking, held in place with sawn iron rails. The examples without a traverse have a short flight of four or five steps, leading up the edge of the terrace cut into the hillside; all of these examples were badly damaged by cattle. The steps were installed to allow rapid escape from the ESH in the event of an accident.

Plate 17: External telephone boxes, ESH 87; note 'L.C.E' sign and iron fixing for gates

Explosives Store-House (ESH)

6.8 The ESH are largely as described by Roger Thomas, apart from ESH 87, which had two access doorways, rather than one centrally placed example. None of the doors survive in the buildings. All of the buildings, but particularly ESH 65 and 66, still carry faded green paint, and have kerb-markings along the edge of the platforms. At each corner of the buildings was a sign, white

background and blue lettering, with the following inscription: 'L.C.E', 'TUBE NO. (Number)' or 'COIL NO. (Number)', 'R^{T}L^{S} (Number) F^{T}', 'PAR^{L} (Number) F^{T}' and a small blue arrow at the base (Plate 17). The function of this is uncertain, but may relate to the positions of fire-fighting equipment. The ESHs are notable for not having any evidence of electric cabling for lighting or powering the gantries, and were clearly reliant solely on daylight for illuminating the interior. There was also no evidence for any kind of communications within the buildings, other than at ESH 87, which has two telephone boxes at the south-east corner, one with a door, which look to have housed telephones or radios. Cabling is visible running up to these from ground level (Plate 17).

6.9 At each end of the porch, L-shaped iron fixings are visible on upright posts attached to the ESH, and to the porch uprights. These appear to have originally supported gates at each end of the porch, in order to control the access of locomotives into the magazines. The magazines may have carried warning signs, indicating when a locomotive or waggon was in position and being loaded, or may have allowed magazines to be closed off, when they were empty or undergoing maintenance.

Plate 18: Exterior for shutter for ventilator, with pulley wheel below and fixings on shutter and ceiling above; note graffiti

6.10 Ventilation to the sheds was provided by a large ventilator above the main door, which appears to have been omitted from Roger Thomas' description (Plates 18 and 19). The ventilator, which is incorporated into the bay above the main doors, is timber framed, with eight louvered slats visible

from the interior. The exterior of the ventilator is covered by a green-painted shutter, with three recessed panels, hinged at the top. The shutter was lifted by means of a cord on a system of pulley wheels, attached to the exterior porch timberwork above and beneath the shutter, and affixed to the shutter at the base by means of an eye-bolt. The cord probably supported a counter-weight to allow the easy raising and lowering of the shutter. The shutters in ESH 66, 86 and 87 had all been repainted; the painters had added their initials and date on the ceiling of the porch ('SH 68' in ESH 66 (Plate 18); 'JS 76' in ESH 87). Sub-floor ventilation also appears to have been used in ESH 65; along the edge of the platform were two small ventilation slits covered with iron grilles, although examination of these indicated that the rear of these had been blocked with concrete. This tentatively indicates that the original floors of the magazines may have been timber, and were later replaced with concrete; no evidence of further slits was noted in other magazines, though these may have been obscured by vegetation and debris.

Plate 19: Double-gantry in ESH 87, facing south. Note louvered ventilator in the centre of the wall

6.11 The magazines with traverses all had gantries installed within their interiors, whilst those without traverses did not. This may indicate that the heavier, and perhaps more dangerous, ammunition was stored in the magazines with traverses, whilst the lighter ammunition, which could be carried manually, was held within the un-traversed examples. ESH 66 had a single gantry only, comprising an I-beam girder welded to plates bolted onto the roof trusses, which ran the length of the building

and out through the door. In contrast, ESH 87 had two doors within the south elevation (Plate 19). A double-gantry, running through these doors, was fixed to an internal frame of iron I-beams with bracing cross-struts. The exterior ends of the gantry were supported by iron A-frames fixed into the ground. The gantries presumably held manually turned geared hoists on rollers which could be slid along the gantry and lowered into the locomotives and waggons at the sidings.

6.12 The floor of the magazines is now completely obscured with soil and cow-dung, but where sections of this material has been washed away, particularly close to voids in the walls where rain has washed in, paint-marks were discernible demarcating the edges of the walls.

Plate 20: Stencilled sign, ESH 65

Graffiti and Signs

6.13 The four magazines examined all carried graffiti on the fibreboard cladding fixed to the timber framing, in either pencil or chalk. Most affixed signs have now been removed (though faint letter traces survive); signs painted or stencilled onto the walls still survive. The graffiti varies in content, but can be summarised as:

- Depictions of (mostly) women in their underwear the style of which looks to be 1940s/1950s in date. The later 20th century depictions are cruder and display a greater interest in the female anatomy rather than the aesthetics of the female form;
- Portraits of faces, usually in side-profile, which appear to be fairly early, perhaps 1950s. Some of these appear associated quite closely with the name William R. Kirkbride (1958-1965 dates);
- Initials and names, with dates, of men working in the depot; some of these have been written on when they have retired, and give their service dates ('*Harry Seaton Kendall, left RNAD 20 yrs, Aged 65 Yrs, 20/7/60*' - ESH 87). Also names of companies serving at RNAD;
- Arithmetic and lists of ordnance, and crude maps of buildings, which may have been drawn to show new recruits how to get to different parts of the depot;

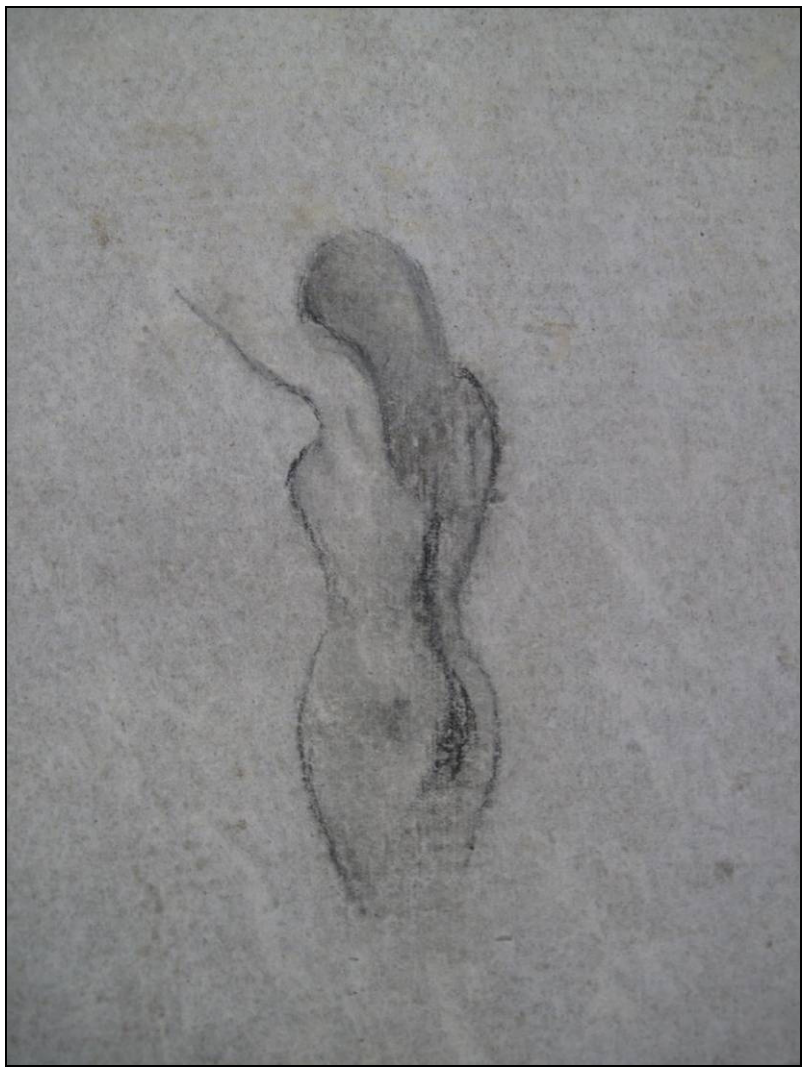

Plate 21: Depiction of female form, ESH 65

- Quotes and bits of poetry ('*youth is a blunder, manhood a struggle, old age a regret - Disraeli*' - ESH 66), games of Hangman (mostly in ESH 66, using names of military

engagements), jokes about colleagues ('*J. Warwick - Gestapo Agent*' - ESH 66), and funny cartoons, sometimes political (a particularly funny depiction of Neil Kinnock and Margaret Thatcher in ESH 86, their dialogue is mostly unprintable).

Plate 22: 'My Uncle Adolf', ESH 66

Narrow-Gauge Railway

6.14 The narrow gauge railway comprised a 76cm (2 ft 6in) wide track, with motive power provided by electric locomotives (Thomas 1997, 14). Apart from ESH 65, the narrow-gauge railway ran directly in-front of the magazines, with a siding taking waggons to the loading bays within the covered porch area. No evidence of track now survives in the vicinity of the examined magazines, but examination of track elsewhere indicates that a combination of concrete and timber sleepers were used. Evidence of drainage channels were visible along the sides of the track, particularly around ESH 65, for catching run-off from the hillsides. This was presumably piped under the track for discharge downslope. The track bed is constructed of hardcore, now mostly turfed over, but visible in patches. Damage seems quite minimal.

6.15 ESH 65 had a slightly different arrangement of track, as this magazine was at the end of one of the branch-lines. There was only one line at this magazine, running straight through the porch, rather than diverting around it. At the eastern end of the line was a mound of soil, presumably operating as a buffer; this had an iron upright post set within the mound, with a circular setting mid-way up the post, and hooks welded onto a circular plate fixed to the top. The function of this post is uncertain, but presumably supported a sign indicating the end of the line.

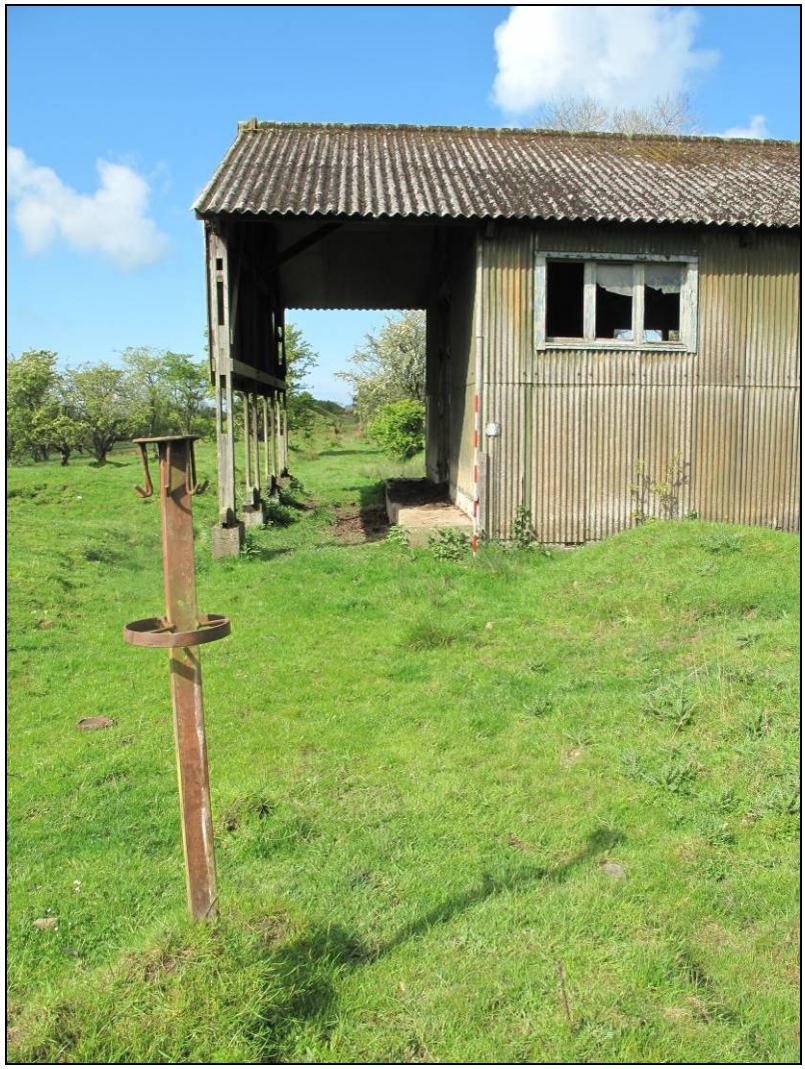

Plate 23: Iron upright, ESH 65, facing west

7.0 TRIAL TRENCH EVALUATION

Introduction

7.1 Fourteen trial trenches, measuring between 15m – 33m by 2m were excavated within the proposed development area (Figure 3). Three additional trenches (Trenches 15-17), located to the east and outside of the Depot's perimeter fence, were not excavated, as this area could not be accessed by plant at the time of the works.

7.2 The evaluation revealed a possible hollow-way (Trench 12) connected with the 'Old Shaft' depicted on the Ordnance Survey map of 1866, as well as a series of very shallow plough furrows (Trenches 4 and 13) and stone-built field drains ('French' drains). A number of earthworks identified during walkover surveys, including a possible building platform (Trenches 8 and 9), a waggon-way (Trench 3) and various mounds (Trenches 9 and 12) were also investigated.

7.3 The natural substrate consisted of light-yellow, brown clay, with frequent light blue grey clay mottling and occasional rounded stones and gravel.

Trench 1

7.4 Trench 1 measured 17.5m x 2m and was located at the south-west of the proposed development area (Figure 3). A single stone built 'French' drain (103) was located in this trench.

7.5 The drain (103) was aligned north-west to south-east, and consisted of large angular stones set within a U-shaped cut (Figure 4 - Section A), and capped with further stone (105). This had stopped functioning, with the voids between stones filled with mid-grey silty clay. The upper profile of the drain was much wider, possibly forming a ditch, although no evidence of this feature could be seen on historic mapping. The upper profile of the feature appeared to have gradually in-filled with subsoil, consisting of mid-brown, grey clayey sand (104). The drain did not appear to have been constructed into the base of a pre-existing ditch, as no cut could be seen in the upper fill. The feature measured a maximum of 1.3m in width and 0.38m in depth, and did not produce any finds.

7.6 The ditch/drain was sealed by light-grey, brown silty sand subsoil (101) measuring 0.2m in thickness, which was in turn sealed by a 0.2m thick layer of topsoil (100); mid-grey brown, silty sand. A sherd of black-glazed red earthenware of 18th – 19th century date was recovered from the topsoil.

Trench 2

7.7 Trench 2 measured 16.7m x 2m, and was shortened to avoid an entrance to the field used by cattle. No archaeological finds or features were recorded in this trench.

Context	*Depth below ground (BGL)*	*Interpretation*	*Description*
200	*0 – 0.2m*	*Topsoil*	*Mid-grey brown silty clay*
201	*0.2m – 0.3m*	*Subsoil*	*Light-grey brown clayey silt*
202	*0.3m+*	*Natural*	*Light-yellow brown clay, with frequent light blue grey clay mottling and occasional rounded stones and gravel*

Trench 3

7.8 Trench 3 was located to investigate the waggon-way which formed the northern boundary to the site. The trench revealed a poorly preserved cobbled surface (302) and a boundary ditch (304) on parallel north-east to south-west alignments (Figure 4).

7.9 The waggon-way surface (302) measured approximately 4.5m in width and consisted of large rounded stones in a matrix of mid- to dark-grey, silty clay, laid directly over the natural clay (303). The waggon-way was located within a north-east to south-west aligned depression in the field, indicating that it had been excavated as a 'hollow-way'. The surface itself was very rough, having been heavily disturbed by rooting from the hedgeline directly above.

7.10 Ditch 304 was located on a parallel alignment to the immediate south-east and measured 0.85m in width and 0.18m in depth with moderate sides and a concave base. It was filled with dark-grey, silty clay (305) that did not produce any finds. Although this ditch was located on the downward slope of the waggon-way and presumably excavated for drainage, it was not contemporary and may have been a later field boundary. This is due to a parallel earthwork bank, consisting of dark grey, silty clay, presumably formed from the ditch's up-cast and mixed with topsoil, being located partially over the south-eastern edge of the waggon-way.

7.11 Both the waggon-way and the ditch were sealed by the topsoil (300), 0.3m thick, which did not produce any finds.

Trench 4

7.12 Trench 4 revealed two north-west to south-east aligned shallow plough furrows (Figure 4). Furrow 403 (Plate 24) measured 2.05m in width but only 0.03m in depth, and was filled with mid reddish brown silty sand (404) that did not contain any finds.

7.13 The furrows were sealed by a 0.15m thick layer of light-brown yellow, silty clay subsoil (401),

which was in turn sealed by mid-brown, grey silty clay topsoil (400), measuring 0.2m in thickness. Neither layer produced any finds.

Plate 24: Furrow 403, Trench 4, facing north

Trench 5

7.14 Trench 5 did not contain any archaeological finds or features.

Context	*Depth below ground (BGL)*	*Interpretation*	*Description*
500	*0 – 0.32m*	*Topsoil*	*Mid-grey brown silty clay*
501	*0.32m – 0.48m*	*Subsoil*	*Light-grey brown clayey silt*
502	*0.48m+*	*Natural*	*Light-yellow brown clay, with frequent light blue grey clay mottling and occasional rounded stones and gravel*

Trench 6

7.15 No archaeological finds or features were recorded within this trench.

Context	*Depth below ground (BGL)*	*Interpretation*	*Description*
600	*0 – 0.17m*	*Topsoil*	*Mid-grey brown silty clay*
601	*0.17m – 0.28m*	*Subsoil*	*Light-grey brown clayey silt*
602	*0.28m+*	*Natural*	*Light-yellow brown clay, with frequent light blue grey clay mottling and occasional rounded stones and gravel*

Trench 7

7.16 No archaeological finds or features were recorded within this trench.

Context	*Depth below ground (BGL)*	*Interpretation*	*Description*
700	*0 – 0.3m*	*Topsoil*	*Mid-grey brown silty clay*
701	*0.3m – 0.5m*	*Subsoil*	*Light-grey brown clayey silt*
702	*0.5m+*	*Natural*	*Light-yellow brown clay, with frequent light blue grey clay mottling and occasional rounded stones and gravel*

Trenches 8 and 9

7.17 Trenches 8 and 9 were located at the north-east of the site in order to investigate a possible building platform, and an earthwork mound identified during the walkover surveys (Figure 2). The length of both trenches was altered to take account of errors in the position of the platform recorded during the walkover.

7.18 Trench 8 measured 33m in length and was excavated into the western edge of the possible building platform down to natural clay, with the top of the platform at the eastern end of the trench exposed following removal of top- and subsoils only. The natural clay (802) was recorded at a height of approximately 78.1m OD, with the platform constructed directly atop and formed from a 0.5m

thick layer of mixed redeposited yellow brown natural clay and dark-brown, grey topsoil (801). This contained a clay pipe stem, a sherd of blue and green painted whiteware and a sherd of black-glazed red earthenware, indicating a late 18th – 19th century date for the construction of the mound. Although this was interpreted as a building platform, no foundations were recorded on its upper surface.

7.19 The platform was sealed by a 0.45m thick layer of dark-brown, grey topsoil (800), which did not produce any finds.

7.20 Trench 9 measured 17m in length and was located over an earthwork mound and the southern edge of the possible building platform. The building platform was again revealed to be constructed from a layer of redeposited natural yellow-brown clay (901), measuring 0.34m thick, sealing a layer of buried subsoil (904), 0.2m thick. This subsoil contained a clay pipe bowl fragment and a sherd of factory produced whiteware. The platform was sealed by a thin layer of topsoil (900), which did not produce any finds.

7.21 The earthwork mound (Plate 25) at the east end of the platform was formed from a large dump of topsoil (903), measuring at least 0.4m in height over the natural level of the field and did not produce any finds.

7.22 A waterlogged depression was located between the building platform and earthwork mound in this area, with a stone built 'French' drain recorded in the base of the trench, presumably constructed to help drain this area.

Plate 25: Earthwork mound 903, Trench 9, facing north-west

Trench 10

7.23 No archaeological finds or features were recorded within this trench.

Context	*Depth below ground (BGL)*	*Interpretation*	*Description*
1000	*0 – 0.35m*	*Topsoil*	*Mid-grey brown silty clay*
1001	*0.35m – 0.4m*	*Subsoil*	*Light-grey brown clayey silt. Patchy, located mainly at northern end of trench.*
1002	*0.4m+*	*Natural*	*Light-yellow brown clay, with frequent light blue grey clay mottling and occasional rounded stones and gravel*

Trench 11

7.24 No archaeological finds or features were recorded within this trench.

Context	*Depth below ground (BGL)*	*Interpretation*	*Description*
1100	*0 – 0.2m*	*Topsoil*	*Mid-grey brown silty clay*
1101	*0.2m – 0.42m*	*Subsoil*	*Light-grey brown clayey silt*
1102	*0.42m+*	*Natural*	*Light-yellow brown clay, with frequent light blue grey clay mottling and occasional rounded stones and gravel*

Trench 12

7.25 Trench 12 was located at the east of the site in order to investigate a curvilinear depression and an earthwork mound identified during the walkover surveys (Figure 3). The trench measured 25m x 2m and revealed a potential north-east to south-west aligned hollow-way (1202, Figure 5, Plate 26), two ditches (1211, 1215) and a series of drains (1203-1206, 1210) were recorded. The two earthwork features were revealed to be mounds of dumped topsoil only.

7.26 The natural subsoils in this area were slightly different to those recorded across the rest of the site, with a dark grey clay layer (1214) underlying the mid brown yellow clay (1209) seen elsewhere. The natural was relatively flat in this trench, measuring between 73.3m OD and 73.17m OD.

7.27 The hollow-way (1202) had been excavated into the natural clay and was presumed to be on a north-east to south-west alignment. The feature was broad and shallow, measuring at least 11.4m in width and 0.35m in depth, with potentially two phases of surface. The earliest layer (1212, Plate

26) was laid directly at the base of the cut, and consisted of moderately well-sorted rounded gravel and crushed sandstone in a matrix of dark yellow-grey clay. This deposit measured only 4m in width and was limited to areas between field drains 1204 and 1205.

Plate 26: Hollow way 1202, Trench 12, facing west

7.28 This surface appeared to infill (1207, 1216) two ditches (1211, 1215) that had been excavated within the hollow-way on broadly parallel alignments (Figure 5, 1211: 1215 not pictured). The function of these ditches was not clear, although Ditch 1215 may have been used for drainage. Ditch 1215 measured 0.56m in width and 0.25m in depth with a V-shaped profile, whilst Ditch 1211 measured 0.83m in width and 0.19m in depth (Figure 5, Section B). Neither feature produced any finds.

7.29 A potential further surfacing (1201) was recorded directly atop surface (1212), and consisted of moderately well-sorted rounded stones. This was recorded as a much smaller patch of metalling, measuring only 1.4m in width and it was uncertain if this was just the worn upper part of surface 1212 (Plate 27).

7.30 The hollow-way appeared to have been backfilled, as surface 1201 and ditches 1211 and 2015 were sealed by a mixture of dark grey and yellow-brown redeposited natural clay, 0.22m thick. This layer had been truncated by a series of north-east to south-west aligned 'French' and ceramic land drains (1203 – 1206, 1210). The hollow-way was sealed by mid-grey brown, silty clay topsoil (1200), which measured at least 0.3m in thickness. The topsoil contained two sherds of glass and three sherds of 19th – 20th century pottery.

Plate 27: Surface 1212, Trench 12, facing north

7.31 The earthwork mound identified in this area during the walkover surveys (Figure 3) was revealed to consist of dumped topsoil, which did not produce any finds. The curvilinear depression, also identified during the walkovers, did not appear to be a depression in the level of the field itself, instead being formed by low mounds of further topsoil, which again did not contain any dateable material.

Trench 13

7.32 A single shallow plough furrow (1303) and a stone built 'French' drain was located within this trench (Figure 5). The furrow measured approximately 1.6m in width and 0.03m in depth, and was filled with soft light brown grey clayey silt (1304) that did not produce any finds.

Context	*Depth below ground (BGL)*	*Interpretation*	*Description*
1300	*0 – 0.2m*	*Topsoil*	*Mid-grey brown silty clay*
1301	*0.2m – 0.45m*	*Subsoil*	*Light-grey brown clayey silt. Patchy, located mainly at northern end of trench.*
1302	*0.45m+*	*Natural*	*Light-yellow brown clay, with frequent light blue grey clay mottling and occasional rounded stones and gravel*

Trench 14

7.33 Trench 14 measured 24m x 2m and was located at the south-east corner of the site (Figure 2) in order to further investigate a curvilinear depression identified during the walkover surveys and sampled by Trench 12. The curvilinear earthwork appeared to shallow out in this area of the field, although a series of dumps of material had formed a rough-terraced slope downwards to the south-west (Figure 3).

7.34 The natural clay was recorded at the north-eastern end of the trench at a height of 72.36m OD. This sloped downwards following the natural contour of the field to a height of 70.41m OD. A 'French' drain was recorded cutting through the natural on a north-west to south-east alignment at the south-western end of the trench.

7.35 The natural clay was overlain by a buried subsoil (Figure 5, Section C - 1406), measuring 0.12m in thickness, which was in-turn overlain by a buried topsoil (1405), consisting of mid-brown, grey silty clay, 0.25m thick. This appeared to represent the previous surface of the field, which was covered by a large layer of redeposited natural light-yellow, brown clay (1404), 0.32m thick. A possible right-angled turn at the south-west corner of this deposit, as well as its make-up, could suggest that this may have been a building platform similar to that at the north-east of the field, although a flat top to this deposit could not be identified.

7.36 Further deposits of redeposited natural (1401, 1402) and topsoil (1404) were dumped along the south-western edge of this putative platform, with layer 1402 producing a plant pot sherd. This redeposited material was sealed by the dark-brown, grey silty clay topsoil (1400), which contained two sherds of 19th – 20th century pottery.

8.0 DISCUSSION

8.1 Broughton Moor Royal Naval Armaments Depot (RNAD) covers 490 hectares and comprises 169 Explosive Store Houses (ESH) as well as stores, laboratories and ancillary structures linked by a narrow-gauge railway. The current survey examined only a small part of this complex, comprising four of the ESH and the landscape surrounding these. The survey area was also examined by means of an archaeological trial trench evaluation, to test the survey area for previously unidentified sub-surface archaeological remains.

8.2 The four ESH examined, confirmed the findings of an earlier report (Thomas 1997), which identified the structures to be corrugated, asbestos-clad, timber framed, magazines, all of five bays, connected by a narrow gauge railway system. Alternate examples of the ESH are surrounded by an earthen bund (known as a traverse), a number of which included retaining walls along their edges; where the ESH had traverses, they also included a gantry in the interior of the magazine, which suggests they were used for larger and heavier ammunition. The soil for the traverses had clearly been quarried out of the hillside in the immediate vicinity of the magazines; where the ESH had no traverses, a substantial rectangular spoil heap was still present on the opposite (south) side where soil had been quarried out the hillside to allow the creation of a terraced platform for their construction. The ESH all showed some survival of the wartime green and dark-earth camouflage paint, and markings in the interior were visible in some examples, with demarcations indicating where different explosives should be stored. The examples demonstrated some variation in the number of doors, and other fittings, but otherwise conformed to the standard description as given in the earlier report. The most interesting aspect of the magazines was the graffiti, which dated back to their original war-time, and immediate post-war, usage and provided some socio-historic information. This included often amusing observations and humour, many of which are unprintable, and a wide varieties of portraits and illustrations of people – most typically women.

8.3 The walkover survey undertaken within the immediate vicinity of these buildings identified a number of surviving earthwork features related either to the armaments depot, or earlier phases of activity on the site. Features related to the RNAD include the existing chain-link fence, a sentry box, and water and sewage pipelines, the latter connected to a sewage treatment plant. A section of the Cleator and Workington Junction Railway also runs through the site, visible as a large earthen embankment, which was used in part to transport the explosives off-site. Blocks of houses existed along the eastern side of the survey area, between the perimeter fencing and the road, but access to this area was impossible, and these were not examined.

8.4 The walkover survey also confirmed the presence of archaeological sites pre-dating the establishment of the depot in 1938, mostly dating to the 19th century and relating to coal mines that occupied the site. These included a building platform identified during the earlier walkover, and a possible waggonway along the northern edge of the survey area. The earthworks were investigated as part of the trial trench evaluation. Earlier land use was also represented by medieval field systems and areas of ridge and furrow, particularly on the western side of the survey area, to

the north and south of ESH 86.

8.5 The trial trench evaluation revealed a possible hollow-way connected with the 'Old Shaft' depicted on the Ordnance Survey map of 1866, a series of very shallow plough furrows and stone-built field drains ('French' drains). A number of earthworks identified during walkover surveys, including a possible building platform, a waggon-way and various mounds were also investigated. The hollow-way recorded within Trench 12, would appear to be a route to the 'Old Shaft' depicted on the Ordnance Survey map of 1866, due to its postulated alignment within the trench; although no dating evidence for this feature was recovered. The trackway would appear to be relatively early, however, as it was truncated by both stone-built 'French' drains and ceramic drains. A trackway noted on the same 1866 map, possibly again leading to the 'old shaft'/colliery' was fossilised as the northern boundary to the field. This appears to have been replaced by a small boundary ditch to the south, and subsequently by the current hedge/tree line.

8.6 The earthwork mounds along the eastern edge of the proposed development area were revealed to consist mainly of redeposited topsoil (Trenches 9 and 12). Although these did not contain any finds, they may have resulted from activity within the RNAD, as they were located directly over the contemporary level of the field, within the boundary of the base. A series of dumps of redeposited natural and topsoil were recorded at the south-west end of the field (Trench14) forming a broad slope to the south-west in this area. A possible right-angled turn in some of this material could suggest that it was a building platform, although the lack of a flat top to the earthwork feature and its amorphous shape may indicate that it was simply material moved from elsewhere, perhaps from within the Depot.

8.7 The building platform at the north-east end of the proposed development was constructed from a mix of redeposited natural clay and topsoil, and contained pottery and clay pipe of late 18th – 19th century date. Although this was interpreted as a platform for a structure, no evidence of any foundations was recorded at the top of the earthwork, which could suggest that any possible structure may have been slight, or that it was a further example of dumped material which may have been bunded.

8.8 Three plough furrows were recorded during the evaluation within Trenches 4 and 13, although these may have originally extended over a wider area, as the recorded examples were very shallow, measuring only 0.03m in depth. No dating evidence was recovered from the furrows, and it is uncertain whether these originated in the medieval or post-medieval periods. Their shallow size could suggest that this area was not ploughed for a significant period of time, or that the ploughing itself was relatively shallow.

8.9 A series of drains was recorded across the site, potentially with two main phases consisting of stone built 'French' drains and ceramic pipe drains, presumably to alleviate waterlogging of depressions in the level of the field that was evident at the time of the evaluation. Little artefactual evidence was recovered during the evaluation, the finds mainly consisting of a few fragments of late post-

medieval pottery and clay pipe, mainly from topsoil and subsoil layers.

9.0 CONCLUSIONS

9.1 The current report is considered to be a comprehensive record of this section of the armaments depot and its immediate curtilage. No further work is recommended, though further survey work on the ridge and furrow around ESH86 would be desirable if extensive landscaping is to be undertaken in this area.

9.2 There is no indication that any additional information regarding the above ground structures would be gained from further investigation or from monitoring during the demolition works. The potential for any below ground archaeology is perceived to be low, though there remains the potential for medieval deposits related to the open field systems, and post-medieval deposits related to the coal workings, to be uncovered.

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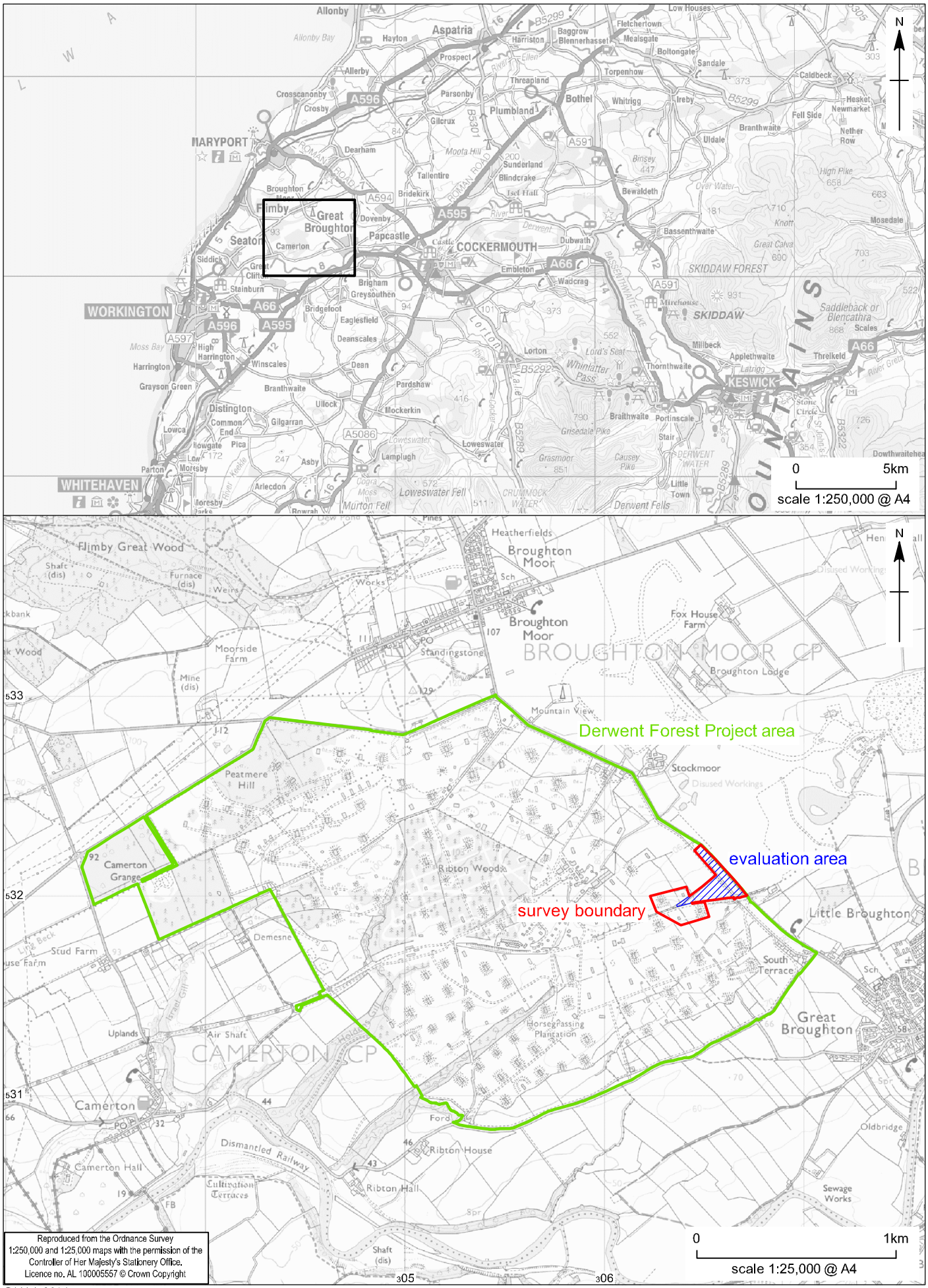
Parsons, J 2014b *Brief for an archaeological evaluation Derwent Forest Phase 1. Land at the former Broughton Moor RNAD, Great Broughton*.

Thomas, RC (1997) *RNAD Broughton Moor, Broughton, Cumbria: Survey Report,* RCHME/English Heritage report

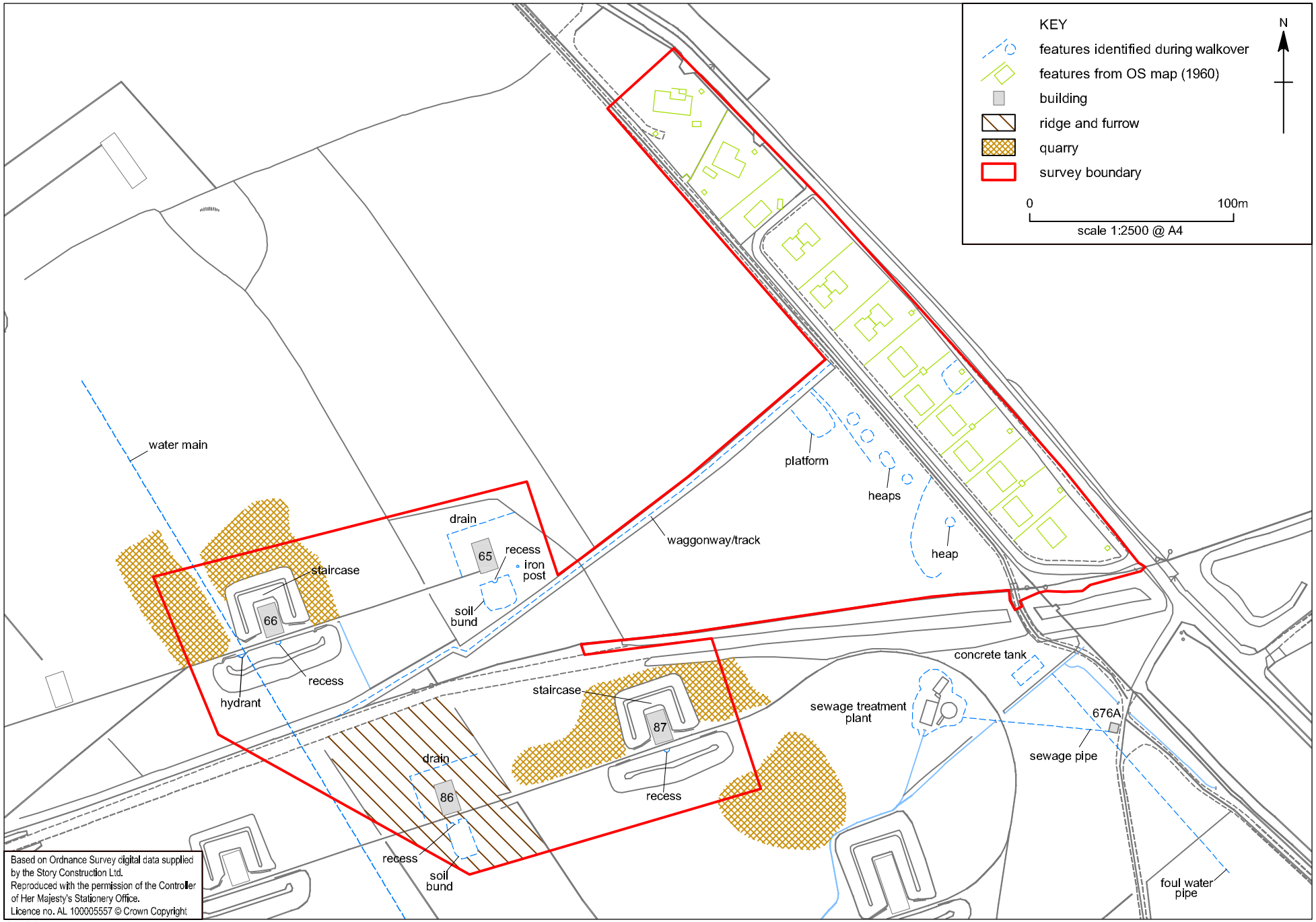
Maps and Plans

1866 1:10,560 Ordnance Survey Map (6" to 1 mile)

1901 1:2,500 Ordnance Survey Map (25" to 1 mile)

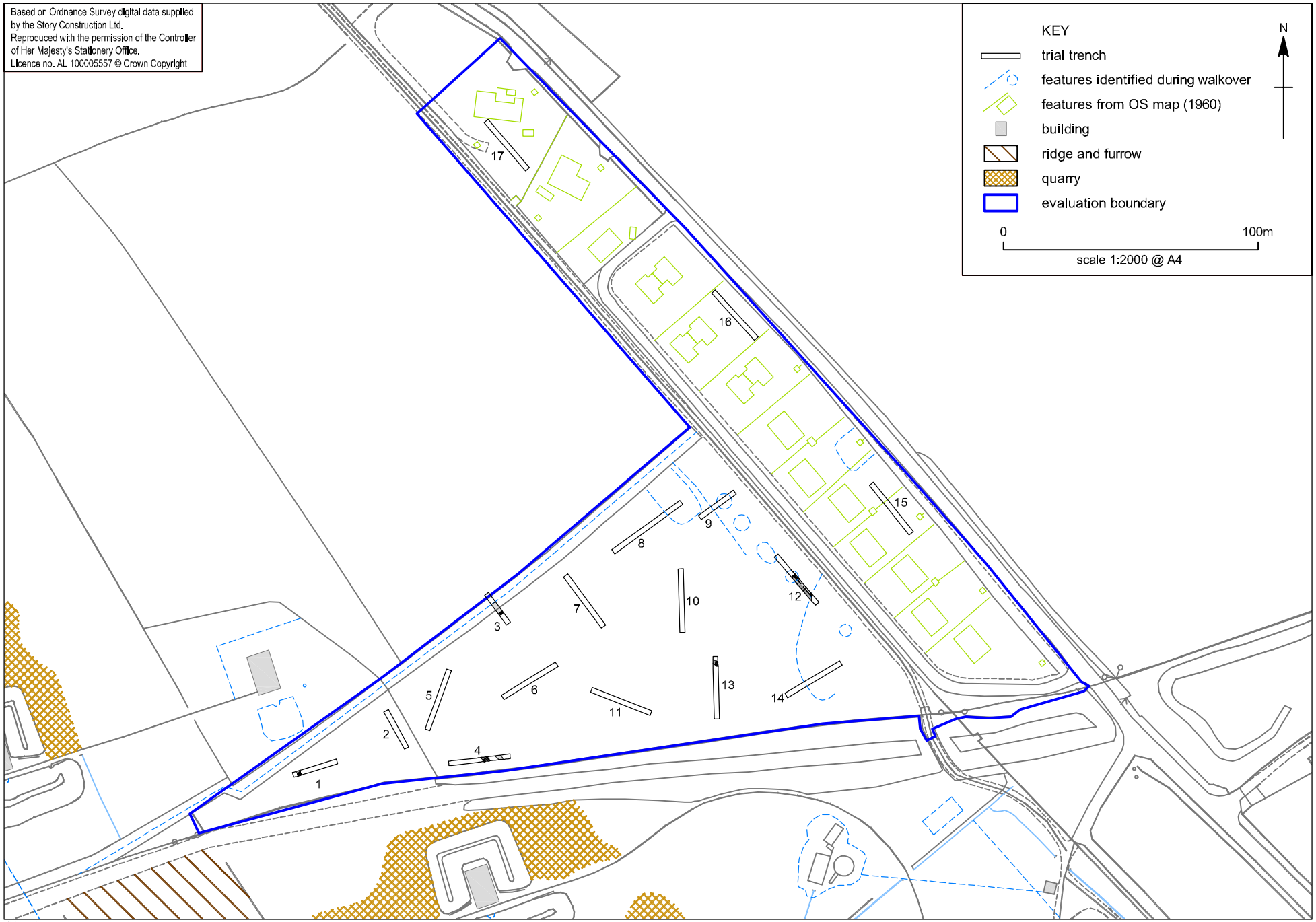


Broughton Moor RNAD: site location *Figure 1*



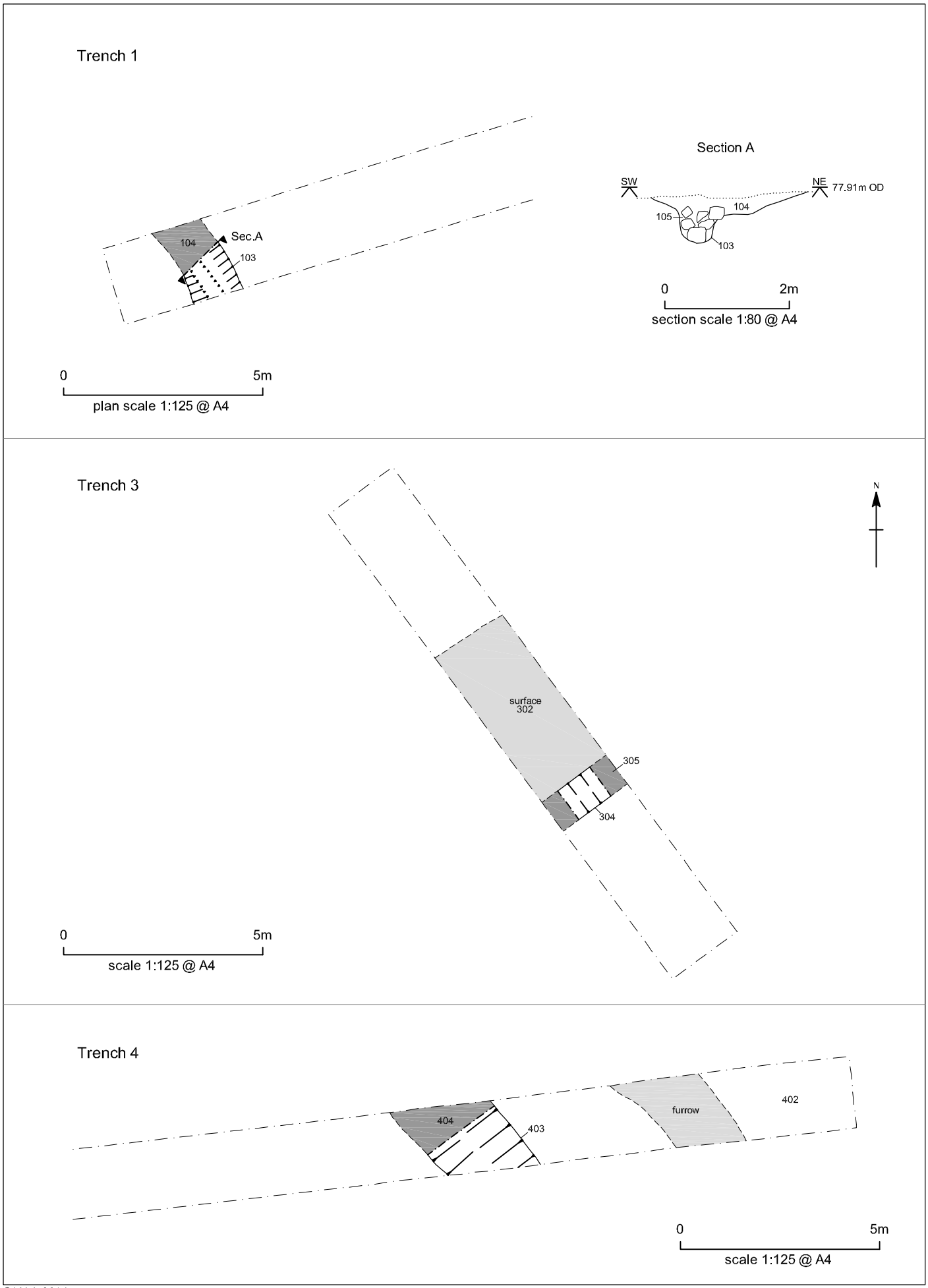
Broughton Moor RNAD: results of walkover and building recording

Figure 2

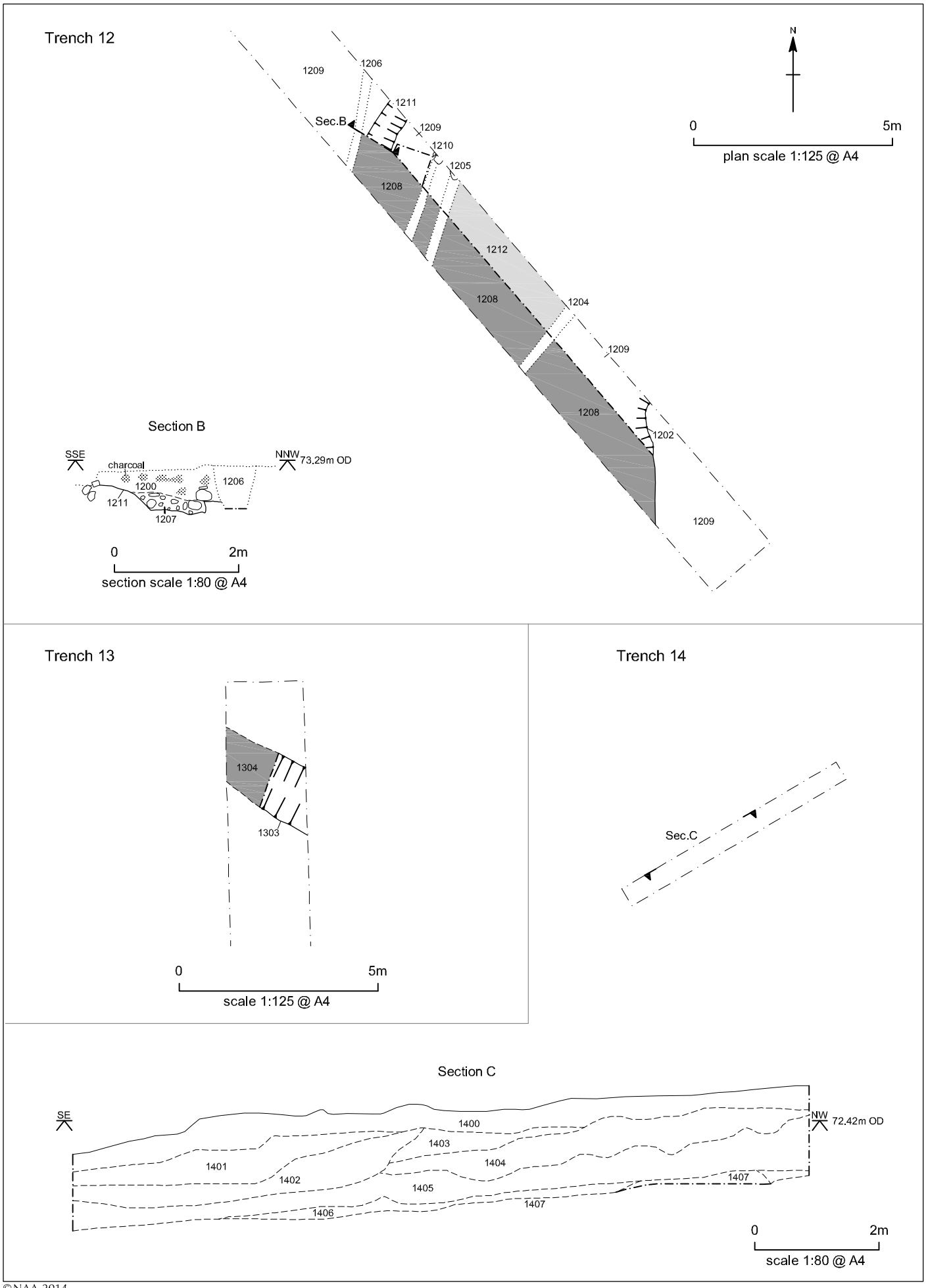


Broughton Moor RNAD: trial trench locations

Figure 3



Broughton Moor RNAD: Trenches 1, 3 and 4 *Figure 4*



Broughton Moor RNAD: Trenches 12, 13 and 14 *Figure 5*

Broughton Moor RNAD: furrow 403

Plate 1

Broughton Moor RNAD: earthwork mound

Plate 2

Broughton Moor RNAD: hollow-way 1202 *Plate 3*

Broughton Moor RNAD: surface 1212 *Plate 4*

APPENDIX A

CONTEXT CATALOGUE

Context	Trench	Interpretative description	Relationships	Finds and sample information
100	1	Topsoil	Above 101	Contained a sherd of black glazed red earthenware
101	1	Subsoil	Below 100, above 104	
102	1	Natural	Cut by 103	
103	1	Ditch / French drain	Filled by 104, 105, cuts 102	
104	1	Upper fill of ditch / drain 103	In 103, below 101, above 105	
105	1	Lower fill of ditch / drain 103	In 103, below 104	
200	2	Topsoil	Above 201	
201	2	Subsoil	Above 202, below 200	
202	2	Natural	Below 201	
300	3	Topsoil	Above 301	
301	3	Subsoil	Below 300, above 302, 305	
302	3	Track-way surface	Below 301, above 303	
303	3	Natural	Below 302, cut by 304	
304	3	Boundary ditch	Filled by 305, cuts 303	
305	3	Fill of ditch 304	In 304, below 301	
400	4	Topsoil	Above 401	
401	4	Subsoil	Below 400, above 404	
402	4	Natural	Cut by 403	
403	4	Furrow	Filled by 404, cuts 402	
404	4	Fill of furrow 403	In 403, below 401	
500	5	Topsoil	Above 501	
501	5	Subsoil	Below 500, above 502	
502	5	Natural	Below 501	
600	6	Topsoil	Above 601	
601	6	Subsoil	Below 600, above 602	
602	6	Natural	Below 601	
700	7	Topsoil	Above 701	
701	7	Subsoil	Below 700, above 702	
702	7	Natural	Below 701	
800	8	Topsoil	Above 801	
801	8	Building platform material	Below 800, above 802, same as 901	Contained a sherd of flat ware, a sherd of red glazed earthenware and a clay pipe stem.
802	8	Natural	Below 801	
900	9	Topsoil	Above 901, 902, 903	
901	9	Building platform material	Below 900, above 904	
902	9	Waterlogged depression	Below 900, above 904	
903	9	Mound material (topsoil)	Below 900, above 904	
904	9	Subsoil (buried)	Below 901, 902, 903, above 905	Contained a clay pipe bowl and a sherd of factory produced white ware.

Context	Trench	Interpretative description	Relationships	Finds and sample information
905	9	Natural	Below 904	
1000	10	Topsoil	Above 1001	
1001	10	Subsoil	Below 1000, above 1002	
1002	10	Natural	Below 1001	
1100	11	Topsoil	Above 1101	
1101	11	Subsoil	Below 1100, above 1102	
1102	11	Natural	Below 1101	
1200	12	Topsoil	Above 1214	Contained two sherds of glass, a sherd of yellow glazed red earthenware, a sherd of transfer printed ware and a white ware teacup handle.
1201	12	Track-way layer?	Below 1208, above 1212	
1202	12		Filled by 1201, 1208, 1212, cuts 1202	
1203	12	French drain	Cuts 1208, below 1213	
1204	12	Ceramic field drain	Cuts 1208, below 1213	
1205	12	French drain	Cuts 1208, below 1213	
1206	12	Ceramic field drain	Cuts 1208, below 1213	
1207	12	Fill of ditch 1211	In 1211, below 1208	
1208	12	Dumped clay layer over track-way	Below 1213, above 1201, 1207, cut by 1203, 1204, 1205, 1206, 1210	
1209	12	Natural	Cut by 1202, above 1212	
1210	12	Ceramic field drain	Cuts 1208, below 1213	
1211	12	Ditch	Filled by 1207, cuts 1209	
1212	12	Track-way layer	Below 1201, above 1209, 1216	Contained a piece of natural chert.
1213	12	Natural	Below 1209	
1214	12	VOID	VOID	
1215	12	Ditch	Filled by 1216, cuts 1209	
1216	12	Fill of ditch 1215	In 1215, below 1212	
1300	13	Topsoil	Above 1301	
1301	13	Subsoil	Below 1300, above 1304	
1302	13	Natural	Cut by 1303	
1303	13	Furrow	Filled by 1304, cuts 1302	
1304	13	Fill of furrow 403	In 1303, below 1301	
1400	14	Topsoil	Above 1401	Contained a sherd of factory produced white ware and a sherd of blue & white transfer printed ware.
1401	14	Redeposited natural	Below 1400, above 1402	
1402	14	Redeposited natural	Below 1401, above 1403	Contained a plant pot body sherd embossed '--EY & ---'
1403	14	Topsoil dump	Below 1402, above 1404	
1404	14	Redeposited natural	Below 1403, above 1405	
1405	14	Buried topsoil	Below 1404, above 1406	
1406	14	Buried subsoil	Below 1405, above 1407	

Context	Trench	Interpretative description	Relationships	Finds and sample information
1407	14	Natural	Below 1406	

APPENDIX B

FINDS CATALOGUE

Context	Material	Object type	Artefact description	Period	Quantity	Weight (g)
100	Pottery	Hollow ware	Black glazed red earthenware, base sherd. Internal glaze.	18th-19th C	1	72
801	Pottery		Black glazed red earthenware, sherd	18th-19th C	1	2
801	Pottery	Flat ware	Rim sherd, painted blue;green leaf on white background.	18th-19th C	1	1
801	Clay pipe	Stem	Stem SBD 4	Late 18th C	1	1
904	Clay pipe	Bowl	Bowl fragment with spur and stem	18th C	1	3
904	Pottery	-	Factory produced white ware	19th-20th C	1	0
1200	Glass	Bottle	Light green body sherd, small diameter possibly mineral water/drinks bottle	19th-20th C	1	15
1200	Glass	Jar	Clear rim sherd; stoppered closure.	19th-20th C	1	12
1200	Pottery	Hollow ware	Tea cup handle in factory produced white ware	19th-20th C	1	5
1200	Pottery	Sherd	Green and white transfer printed	19th-20th C	1	1
1200	Pottery	Hollow ware	Yellow glazed red earthenware, possible pancheon fragment; internal glaze.	19th-20th C	1	22
1212	Stone	Chert	natural		1	45
1400	Pottery	Flat ware	Blue and white transfer printed white ware; plate rim sherds	19th-20th C	2	70
1400	Pottery	Hollow ware	Factory produced white ware; two rim sherds and one body	19th-20th C	3	24
1402	Pottery	Plant pot	Body sherd, embossed --EY & ---	19th-20th C	1	14

APPENDIX C

WALKOVER REPORT

NORTHERN ARCHAEOLOGICAL ASSOCIATES
BROUGHTON MOOR ROYAL NAVAL ARMAMENTS DEPOT (RNAD)
WALKOVER SURVEY REPORT

Site name: Broughton Moor RNAD **Grid reference**: NY 3059 5317

Parish: Broughton Moor **District**: Allerdale **County**: Cumbria

Administrative authority: Allerdale Borough Council

Development: Phase 1 of the Derwent Forest Project

Client: Story Contracting Ltd

Planning application reference: N/A

Site supervisor: N/A **Project manager**: Matthew Town

Date(s): 10/08/2014

NAA project number: 1199 **Site code**: CBM14

Reasons for walkover survey:

Variation of redline boundary to include an additional area to the north of the previous walkover survey area, measuring 200m in length by 80m in width, orientated broadly ENE WSW.

Results:

The walkover was undertaken on a bright sunny day, with good visibility. The survey area lies immediately north of an area covered previously by a walkover survey, and reported previously (Pole and Town 2014). This report is supplemental to that phase of works.

The survey area covers the southern third of two fields. The western field measures 67m in width, and includes within it one of the Explosive Store Houses (ESH 65), fenced off and covered in the previous survey. The field contains no earthworks of interest, though vestigial traces of medieval ridge and furrow are visible running broadly north-south. The field boundaries also have the sinuous characteristics of strip

fields, indicating consolidation of open fields into enclosures, presumably in the post-medieval period.

Plate 1: Potential coal shaft, facing south

Plate 2: Circular iron structure, facing north

The eastern field measures 133m in width, and appears to be the result of the amalgamation of two strip fields into one. A faint, low, linear earthwork is visible

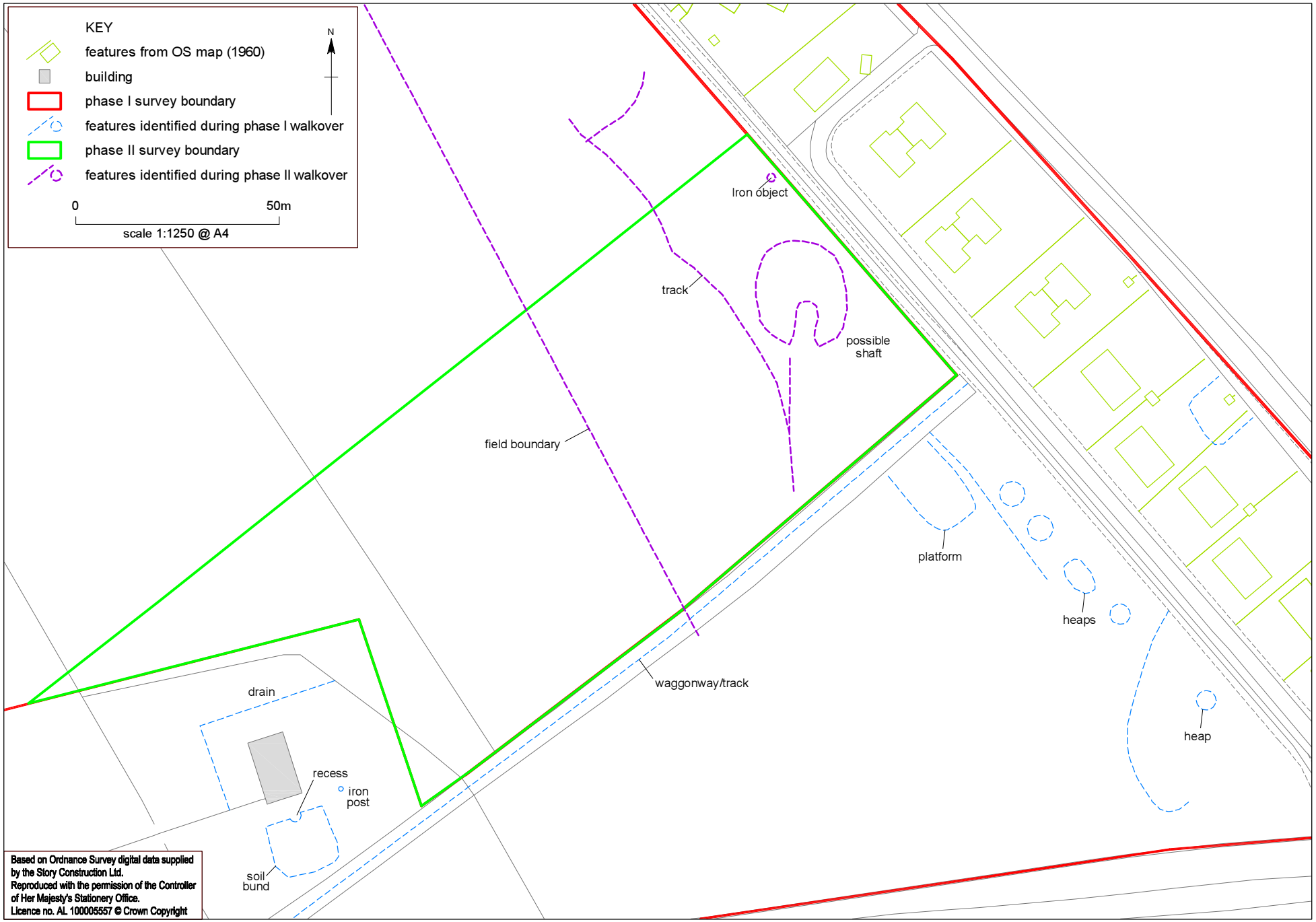
running up the centre of this field, which appears to mark the position of a grubbed-out boundary; this corresponds with a slight variation of alignment in the southern field boundary, and a more acute change of alignment in the northern boundary. Both fields also appear to have faint traces of ridge and furrow (though no apparent earthworks), with the traces perhaps more noticeable in the more western of the two fields.

The more eastern of the two fields includes a number of earthworks potentially related to early coal mining at the site (see Pole and Town 2014, 17). Running north from a previously identified waggonway is a narrow linear feature, c.1.5m in width, which appears to fork eastwards at its northern end (just beyond the survey boundary). This looks to be a trackway or potentially a further waggonway. The trackway runs close to a potential post-medieval coal-mining shaft (Plate 1); this comprises a broad flattened spoil heap c20m in diameter and 1.5m in height, with a sub-circular hollow (presumably the shaft) to the south of the centre. The hollow is c.7m across, and may have been connected to the trackway. The earthworks are entirely turfed over.

Located close to the western edge of the modern track is a circular iron structure, visible as iron edges protruding out of the turf. This measures approximately 2.5m in diameter, and its function is unclear, but may be related to coal-mining or perhaps the later armaments depot.

Documentation: Site Notes, Digital Photographs

Report number: NAA 14/39_Appendix
Report date: *17/08/2014*



Broughton Moor RNAD: results of walkover and building recording

Figure A1