Langcliffe Quarry Sidings, Stainforth Road, Langcliffe, North Yorkshire

Archaeological Building Recording, Evaluation and Watching Brief Report

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Langcliffe Quarry Sidings, Stainforth Road, Langcliffe, North Yorkshire

Archaeological Building Recording, Evaluation and Watching Brief Report

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Summary

Oxford Archaeology (OA) North was commissioned by Craven District Council to undertake archaeological building recording, evaluation and watching brief on the site of a proposed industrial development at Langcliffe Quarry Sidings, near Settle in the Yorkshire Dales National Park (centred on NGR SD 82373 66217). The site is dominated by a Hoffmann lime-burning kiln and is part of a Scheduled Monument *Craven and Murgatroyd Lime Works 400m North East of Langcliffe Mill* (Scheduled monument no. 1020888).

The development area is south of the Hoffmann Kiln, in an area formerly occupied by railway sidings and then used until the late twentieth century as a refuse transfer site and council storage depot. Craven District Council are redeveloping the site to provide industrial units, offices and workshops (to include facilities for site interpretation).

In addition to archaeological trenching undertaken during an earlier proposed development in 2008, a Heritage Impact Assessment and Historic Building Survey of buildings on the site was undertaken in 2020. This included recommendations for the recording of the extant loading bay wall in the southern part of the proposed development, archaeological monitoring of geotechnical test pits, and archaeological trenches to be targeted on features depicted on historic mapping. Scheduled Monument Consent was granted for these works.

Geotechnical trial pits monitored in December 2020 and January 2021 established the presence of significant and large-scale makeup deposits across the site, in some places more than 3m deep. Natural bedrock was only identified close to the former working face of Stainforth Scar. On the lower levels of the site the makeup layers were derived from quarry waste, and particularly in the southern area of Stainforth Sidings, kiln waste derived from lime burning. Here, it appears that a flat surface was formed by tipping material along the edge of the steep-sided valley to create a level area on which to lay out the railway and sidings. This layout was largely in place by the time of the OS map of 1894, with the Spencer kilns (operational from *c* 1900-1927) and associated infrastructure at the south end of the site in place by 1909.

Seven trenches were then excavated in April 2021, which revealed evidence for sub-surface footings associated with demolished remains of the former barn/stables to the south-west of the Hoffmann kiln, and fire brick flooring with evidence for railway tracks beneath the later concrete floor of the single storey red brick workshop to the south of Craven Cottage. There was also evidence, in the form of footings and a possible firebrick flue, in the location of a chimney illustrated on the 1909 OS map and historic photographs of the site. Also identified was a stone-flagged culvert in the north-eastern part of

the site, which may have run alongside the railway lines running downslope from the Hoffmann kiln.

A firebrick wall, retaining an area of extensive made ground, at the southern extent of the site was recorded through photogrammetric survey. It is thought that the area of made ground to the south and west of the wall had been used as a loading bay, used to unload coal and fill wagons with lime from the nearby Spencer Kilns. The condition and full extents of the loading bay wall were not fully established during earlier phases of work. In April 2021, the wall was badly overgrown and its northern extent appeared to be sealed by overburden dating to the use of the site as a council depot. Removal of the overburden and plant growth along the embankment thought to represent the northern continuation of the extant wall was undertaken by machine and revealed that the visibly extant remains of the wall were all that survived. The results of the photogrammetric survey clearly illustrated that the wall was not of a single phase, with elements of infill and differential coursing indicating several construction phases along both its length and height, and that it was constructed from reused firebricks, likely from the nearby Spencer Kilns.

Acknowledgements

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The project was managed for OA North by Paul Dunn. The watching brief during the geotechnical trenching was undertaken by James Hodgson, and that on the stone building footings by Jamie Quartermaine. The evaluation and recording of the loading bay wall was directed by Andy McGuire, supported by Liberty Bennett. This report was written by Helen Evans with illustrations being produced by Mark Tidmarsh and Maranda Wareham.

1 INTRODUCTION

1.1 Scope of work

1.1.1 Oxford Archaeology (OA) North was commissioned by Craven District Council to undertake historic building recording, archaeological evaluation and watching brief on the site of a proposed industrial development at Langcliffe Quarry Sidings, near Settle in the Yorkshire Dales National Park (YDNP; centred on NGR SD 82373 66217). The site is dominated by a Hoffmann lime-burning kiln and is part of a Scheduled Monument *Craven and Murgatroyd Lime Works 400m North East of Langcliffe Mill* (NHLE 1020888; Fig 1).

1.1.2 The development area lies to the south of the Hoffmann Kiln, in an area formerly occupied by railway sidings and then used until the late twentieth century as a refuse transfer site and council storage depot. Craven District Council are redeveloping the site to provide industrial units, offices and workshops (to include facilities for site interpretation). Pre-application consultation with Historic England and YDNPA in 2019 and 2020 has resulted in the layout of the development designed to reflect the prominence of the Hoffmann Kiln at the north end of the site, and to the south, the associated railway sidings and visibility from the Settle/Carlisle railway line (Campbell Driver Partnership 2020).

1.1.3 A Heritage Impact Assessment and Historic England (2016) Level 2 Historic Building Survey of buildings on the site affected by the proposed development has been undertaken (OA North 2020a). The latter included recommendations for archaeological evaluation trenching on the site of proposed new buildings and beneath two now demolished buildings. An additional pre-application condition by YDNPA was to archaeologically record a former loading bay wall at the southern end of the site, which is to be demolished and its line re-instated as part of the site's development.

1.1.4 In addition to the Heritage Impact Assessment and Historic Building Survey (OA North 2020a) which drew on earlier surveys and evaluation trenching on the site (LUAU 1989; OA North 2009), Written Schemes of Investigation (WSI) for both the evaluation trenching (OA North 2020b) and recording of the loading bay wall (OA North 2021) have been submitted by the client as part of the planning process. Scheduled Monument Consent for the evaluation trenching and geotechnical investigation was conditionally granted by Historic England (8th October 2020; S00240344).

1.1.5 This report documents the results of the watching briefs undertaken during the geotechnical works on 2nd and 3rd November 2020 and 15th January 2021, as well as the evaluation trenching and recording of the former loading bay wall, which was undertaken between 14th and 16th April 2021.

1.2 Location, topography and geology

1.2.1 Langcliffe Quarry is in Ribblesdale, 2.5km north of Settle in the Craven district of North Yorkshire (NGR SD 82373 66217; Fig 1), within the Yorkshire Dales National Park (YDNP). The site lies just to the south of the boundary between the parishes of Stainforth, in the north, and Langcliffe, to the south. Ribblesdale forms the route of

the Settle to Carlisle Railway, constructed in the 1870s. The line was instrumental in the siting of lime quarries and kilns along its length, exploited for the import of coal and the export of lime.

1.2.2 Carboniferous limestones are the dominant rocks of the Yorkshire Dales National Park; it contains 36% (1052 ha) of Britain's limestone pavement, which form many of the iconic landscapes of the area (White 2006). Langcliffe lies on the Yoredale Series of Carboniferous limestones, which were formed on the floor of a sub-tropical sea, *c* 330 million years ago, by the slow accumulation of calcium carbonate material, such as shells and corals (BGS 2020). The Yoredale Series consists of a repeated sequence of limestone, mudstone and sandstone with an occasional coal seam on the sandstone (*ibid*).

1.3 Archaeological and historical background

1.3.1 The archaeological and historical background of the site have been covered in some detail in the Heritage Impact Assessment and Historic Building Survey (OA North 2020a). The historic background of the site will not be discussed in detail here suffice to say that the proposed development area largely took in the railway sidings to the south of the Hoffmann kiln, which provided access to the Settle to Carlisle line. The sidings and associated works and buildings are most clearly illustrated on the Ordnance Survey (OS) 25" map of 1909 (Fig 3) and aerial photographs of final years of the site dating to 1938 (Plate 1).

Plate 1: Aerial Photo of the site in 1938 (Britain From Above, 2021)

2 AIMS AND METHODOLOGY

2.1 Aims

2.1.1 The project aims and objectives were as follows:

i. to adhere to and fulfill the agreed programme of works associated with the archaeological potential of the site;
ii. to determine or confirm the general nature of any remains present;
iii. to determine or confirm the approximate date or date range of any remains, by means of artefactual or other evidence;
iv. to bring together, in a stratigraphic narrative and in relation to the historic mapping of the site, the results of the geotechnical watching briefs, evaluation trenching and historic building recording of the loading bay wall;
v. to compile a professional archival record of any archaeological remains within the excavation works.

2.2 Methodology

2.2.1 The full methodology is outlined in the WSIs (OA North 2020b and 2021) and were adhered to in full, and as such, was fully compliant with prevailing guidelines and established industry best practice (CIfA 2020a; 2020b; 2020c; 2020d; 2021; Historic England 2015). A programme of field observation accurately recorded the character of the deposits within the excavations.

2.2.2 ***Watching brief***: geotechnical test pits undertaken by PWA Geo-Environmental Ltd, on behalf of Craven District Council, were subject to archaeological watching brief. The test pits were set out by PWA Geo-Environmental Ltd and were either excavated by hand or by JCB 3CX, fitted with a toothless or toothed bucket, to their required depth. The test pits were not entered due to their depth and any recording was done externally.

2.2.3 All deposits were recorded on *pro forma* watching brief record sheets and a photographic record was retained. The geotechnical data, provided by PWA Geo-Environmental Ltd, were used to create detailed stratigraphic descriptions.

2.2.4 ***Evaluation trenching***: the existing hard-standing and overburden were removed by 8-tonne 360° tracked excavator, fitted with a toothless ditching bucket and breaker, to the surface of the first significant archaeological deposit or a safe working depth, under direct archaeological supervision at all times. Subsequent cleaning and investigation of all archaeological deposits was undertaken manually, using either hoes, shovel scraping, and/or trowels depending on the subsoil conditions.

2.2.5 The trenches were located by use of a differential geographic positioning system (dGPS), accurate to within 0.02-0.03m, and altitude information was established with respect to Ordnance Survey Datum. Prior to excavation, the trenches were scanned using a Cable Avoidance Tool (CAT) and Signal Generator (Genny), to identify potential services. All trenches were excavated in a stratigraphic manner.

2.2.6 All information identified during the site works was recorded stratigraphically, using a system adapted from that used by the former Centre of Archaeology of English

Heritage, with an accompanying pictorial record (plans, sections, and digital photographs). Primary records were available for inspection at all times.

2.2.7 Results of all field investigations were recorded on *pro forma* context sheets. The site archive includes both photographic images and accurate large-scale plans and sections at appropriate scales (1:50; 1:20; 1:10).

2.2.8 ***Historic building recording***: the photogrammetric survey of the former loading bay wall was undertaken utilising a hand-held and mast-mounted camera, taking multiple images from varying angles of the structure. Survey control was established through targets placed on the wall and on top of the wall, being recorded by use of a dGPS, accurate to within 0.02-0.03m. The images taken on site were then processed in Agisoft Photoscan Pro software, to produce a photogrammetric three dimensional model of the structure, which could then be imported into CAD to produce an elevation for incorporation into this report.

2.2.9 ***Archive***: a full professional archive has been compiled in accordance with the WSI, and in accordance with current CIfA (2020d) and Historic England (2015) guidelines. The archive will be deposited with the local record office in due course.

3 RESULTS

3.1 Introduction and presentation of results

3.1.1 The results of the geotechnical test pit watching brief, evaluation and historic building recording are presented below, and include a stratigraphic description of the trenches that contained archaeological remains. The full details of all test-pits monitored can be found in *Appendix A*, whilst the full details of all trenches with dimensions and depths of all deposits can be found in *Appendix B*. Trenches 3 and 6 were devoid of archaeological remains and will be discussed no further.

3.2 General soils and ground conditions

3.2.1 The soil sequence in the trenches consisted wholly of anthropogenically-derived material, which in many cases was redeposited natural quarry waste in the form of large-scale makeup layers. This was not recognised during the 2009 evaluation where what was erroneously identified as glacial till was recorded at various depths of *c* 0.4-0.6m across the site (OA North 2009). Except for the area upslope of the Hoffmann Kiln in the area of the former quarry, no definitive natural geology was encountered during the geotechnical trenching. Ground conditions throughout the evaluation trenching were generally good, and the site remained dry throughout. This was not the case during the geotechnical pits where heavy rain and flooding hampered the works.

3.3 Geotechnical test pit watching brief

3.3.1 ***November 2020 watching brief***: 14 test-pits were excavated across the proposed development site (Fig 2). The majority of the test-pits identified similar sequences of made ground deposits, with natural geology only potentially being identified in Test-Pits (TP) 11 and 12, as the former quarry face (Plate 2). The deeper test-pits, up to 3.5m in depth, identified the earliest layers of the made ground, generally as quarry waste of limestone boulders or gravel. Some of the test-pits contained evidence for railway sleepers in the upper deposits, potentially relating to the railway sidings.

Plate 2: TP 11, facing south-east

3.3.2 The only test-pit containing archaeological remains was TP 08, in the southern part of the site, which tentatively identified, close to the base of the trench, at approximately 3.5m deep, the west/east-aligned wall retaining the tipped deposits forming the loading bay platform (Plate 3). However, due to the depth the structure was identified, no further investigation could be undertaken.

Plate 3: TP 08 showing brickwork at the base, and in the top right-hand side

3.3.3 ***January 2021 watching brief***: three small test-pits were excavated adjacent to the single-storey stone-built shed (OA3; Fig 2) to the immediate south of the former barn (OA1; Fig 2) adjacent to the entrance to the Hoffmann kiln. The shed is to be retained by the development and the pits were excavated to inform its structural investigation. Two pits were excavated (one *c* 0.5m deep and another *c* 1.0m deep) against the eastern elevation of the building. The lowest deposit identified was an orange redeposited natural silty gravelly clay, which was sealed by a layer of dark grey kiln waste with traces of hydrocarbon contamination, above which, at a depth of *c* 0.3m, was a modern levelling layer of limestone chippings and topsoil (Plate 4). Against the southern elevation a single test-pit excavated to a depth of *c* 0.4m identified orange redeposited natural silty gravelly clay overlain by modern makeup (Plate 5).

Plate 4: Test-pits against the eastern elevation of the single-storey shed (OA3)

Plate 5: Test-pit against the southern elevation of the single-storey shed (OA3)

3.4 Evaluation trenches

3.4.1 ***Trench 1***: took in the demolished footprint of the former barn/stables (OA1; Fig 2). Although it was originally designed to take in the older, northern part of the old stables building (OA North 2020a), site conditions meant the trench was moved a few metres to the south and took in the early twentieth-century southern extension. Orientated west/east, the trench was 7m long, 2m wide and was excavated to a maximum depth of 1.8m, including a sondage along its northern extent (Fig 4). The trench was not fully excavated on its western edge due to the presence of a plastic service pipe, probably associated with the toilets formerly occupying this part of the building (Plate 6; OA North 2020a).

Plate 6: Trench 1, facing east

3.4.2 The earliest deposit identified within the trench was quarry waste ***101***, encountered at approximately a depth of 1.5m and extended beyond the maximum extent of the trench, at 1.8m deep. Two walls of the former building were identified cutting quarry waste ***101***, the eastern wall, ***103***, was 0.46m wide and constructed from undressed coursed limestone (Plate 7). Wall ***103*** had a wider foundation step, approximately 0.14m wider than the wall at a depth of 0.3m, the foundation then continued for a further 0.3m deeper. Perpendicular to the wall ***103*** (but not stratigraphically connected) was ***102***, a stone wall aligned approximately west/east and 0.9m wide. The footings were 1.5m deep and capped with light blue grey cementitious mortar

containing infrequent inclusions of lime. These structures were sealed by demolition overburden ***100***.

*Plate 7: Trench 1, stepped wall footings **103***

3.4.3 ***Trench 2***: took in part of the footprint of a proposed new building to the south-east of the Hoffmann kiln, where tramways/railways are shown on the historic mapping (Fig 3). The narrow cuttings for these railways remain extant adjacent to and outside the development area. Aligned north-west/south-east, Trench 2 was 10m long and 1.9m wide and was excavated to a depth of between 0.8m and 1.1m (Fig 5; Plate 8).

Plate 8: Trench 2 showing stone culvert, 1m scale

3.4.4 The earliest deposit identified within the trench was a layer of made ground, formed of silty clay with abundant yellow brown limestone quarry waste, ***203***. This was

excavated to a depth of 0.4m. In the eastern half of the trench, quarry waste ***203*** was cut by a culvert, ***204***, which was 2.1m wide and aligned north/south (Plate 8). It was constructed from large stone slabs ***205***, at 0.6m below ground level, and was backfilled with dark grey limestone gravel ***206***. Both the yellow brown quarry waste ***203*** and the backfill of the culvert ***206*** were sealed by a layer of dark grey ashy clay kiln waste ***202***, approximately 0.10m thick. This was overlain by a 0.35m-thick hardcore levelling layer formed of crushed limestone quarry waste, ***201***, which was, in turn, overlain by the present tarmac surface ***200***. There was no evidence for the former railway track, depicted on historic mapping (Fig 3).

3.4.5 ***Trench 4***: positioned to investigate the presence of a former chimney stack depicted on historic mapping and a mid-twentieth century aerial photograph (OA North 2020a; Fig 3; Plate 1). Although the chimneys precise function is unknown it may have been connected to an engine in the Craven Cottage workshop and associated with the nearby Spencer kilns.

Plate 9: Trench 4, facing west

3.4.6 The earliest deposit identified was a layer of limestone quarry waste ***405***, into which double-skinned firebrick wall ***402*** was cut (Fig 6). Aligned north/south, wall ***402*** crossed the width of the trench and terminated against structure ***404,*** a double-skinned brick wall constructed from red machine-made brick. The part of the wall observed within the trench edge was 1.2m long and aligned west/east, with a northern return continuing through the baulk (Plates 9 and 10). Structure ***404*** possibly represents the chimney, with structure ***402*** being the remains of a possible flue. Both

structures were mortared with light blue grey Portland cement. A west/east-aligned wooden sleeper with iron fittings for track shoes (***403***) was identified 2.5m west of structure ***402***, 0.25m below the modern surface. The modern surface was formed of 0.1m deep gravelly hardcore ***401***, which was, in turn, overlain by a thick layer of concrete (***400***).

*Plate 10: Red-brick structure **404** and firebrick structure **403***

3.4.7 ***Trench 5***: was located to investigate the below-ground remains of the demolished red-brick building (OA 5; Fig 2) to the south of the Craven Cottage workshop. The function of this building is not known, although it may have been related to the former chimney or railway sidings associated with the Spencer kilns. Trench 5 was aligned west/east and was 10m long, 2m wide and had a maximum depth of 0.35m (Plate 11; Fig 7). It was 10.3m to the south of Trench 4.

Plate 11: Trench 5, facing west

3.4.8 In the western part of the trench, three railway sleepers, ***504***, overlay a deposit of white, oil-stained railway ballast, ***506***. Railway sleepers ***504*** measured 2.76m long, 0.24m wide and were separated by *c* 0.5m. Their orientation was slightly different to that of the former workshop building to the east, but consistent with that shown on the OS map of 1909 (Fig 3). Also consistent with the historic OS map, the edge of another railway line was evidenced by another railway sleeper set upon stained railway ballast at the western extent of the trench (Plate 11). The sleepers were sealed by a 0.1m deep layer of dark grey overburden ***507***, which was overlain by a 0.10m layer of yellow brown limestone chippings ***508***, which was, in turn, overlain by modern hardcore ***502***. One of the 2008 evaluation trenches (OA North 2009, Trench 2), immediately to the north of Trench 5, also revealed evidence of rail tracks visible on the 1909 OS map (Fig 3).

3.4.9 In the eastern part of the trench, structures associated with the demolished red brick building were identified. Firebrick floor surface, ***503***, was delineated to the west and east by red-brick floor surface ***508***, which appeared to be contemporary. The floor surfaces abutted brick wall ***505*** at the eastern extent of the trench and the western workshop wall, ***507***, at the western edge of the floor surfaces (Plate 12 and Fig 7). Walls ***505*** and ***507*** were formed of frogged-red-brick, 0.34m wide. The internal floor surfaces ***503*** and ***508*** were bonded with light blue-grey Portland cement. Red bricks were laid as stretchers to form surface ***508***, were 1m wide to the east, 0.8m wide to the west and were laid either side of a central, firebrick-constructed element of the floor (***503***). Floor surface ***503*** was 2.7m wide, with the firebricks laid as soldiers. There was evidence of a recess in the shape and depth of a railway sleeper; with grooves in the surface perpendicular to the recess and separated by 1.35m, suggesting the former presence of railway lines within the building (Fig 7). Hardcore ***502*** overlay the

brick floor surfaces, which were sealed by the former concrete floor of the workshop (***501***). This was overlain by demolition rubble (***500***), 0.1m deep, derived from the recent destruction of the building.

*Plate 12: Detail of floor surfaces **503** and **508**, facing west*

3.4.10 ***Trench 7***: was positioned to take in the site of a proposed new building at the south end of the site, in the location of a loading platform formed of made ground at the south-eastern extent of Stainforth Sidings. The platform is contained by a wall which remains partially extant (*Section 3.5*). The trench was aligned south-east/north-west, was 9.5m long, 2m wide and had a maximum depth (including a 0.3m sondage) of 1.5m (Plate 13; Fig 8).

Plate 13: Trench 7, illustrating sleepers and wall footings

3.4.11 The earliest deposit identified within the trench was a coherent deposit of crushed and burnt lime with coal inclusions (***702***), at 0.7m below the modern surface, two railway sleepers, not obviously *in situ*, were found within this deposit at the eastern end of the trench. Cutting the lime deposit, was the truncated foundation of firebrick wall ***703***, running the full width of the trench and extending beyond the excavated area. The line of this footing, which was visible as only one stretcher course, appeared to correspond with a dog-leg in the loading bay retaining wall illustrated on the OS map of 1909 (Fig 3). Overlying lime deposit ***702*** in the eastern part of the trench was a layer of yellowish brown crushed limestone ***704***, *c* 0.1m deep. Overlying crushed limestone ***704*** was mixed demolition deposit ***701***, which comprised of dumps and spreads of crushed concrete, limestone quarry waste, clay, burnt lime, fire brick and charcoal, 0.5m deep. This was, in turn, overlain by topsoil ***700***, with a maximum depth of 0.20m.

3.5 Historic building recording

3.5.1 At the southern extent of the site, a firebrick wall, *c* 2m high, retains an area of made ground to its west (Plate 14). The top layer of bricks corresponds with the present ground level to the west, which is thought to have been used as a loading bay, used to unload coal and fill wagons with lime from the Spencer kilns. A wall on the same line, seemingly on the line of a former field wall, is illustrated on the historic mapping, apparently associated with a steep downward slope to the east of the railway line (Fig 3). The line of the wall, partially in the form of a rubble bank and corresponding with

the break of slope between the loading bay and the sidings, was recorded during the 1989 LUAU survey (Fig 2).

Plate 14: The extant element of the loading bay wall, showing removal of overburden

3.5.2 The condition and full extents of the loading bay wall were not fully established during earlier phases of work. In April 2021, the wall was badly overgrown and its northern extent appeared to be sealed by overburden dating to the use of the site as a council depot. Removal of the overburden and plant growth along the embankment thought to represent the northern continuation of the extant wall was undertaken by machine and revealed that the visibly extant remains of the wall were all that survived (Plate 20). The remains were subject to photogrammetric survey, the results clearly illustrating the wall was not of a single phase. There are elements of infill and differential coursing indicating several construction phases along both its length and height (Fig 9).

3.5.3 As detailed above, excavation of Trench 7 revealed a single course of a firebrick wall *c* 0.4m below the ground level and sealed by modern overburden (*Section 3.4.11*). Three courses of a firebrick wall were identified in TP 8, *c* 25m to the north, also sealed by *c* 0.3m of modern overburden, with the remains of a possible second wall observed at a depth of *c* 3m (*Section 3.3.2*). Whilst the wall in Trench 7 corresponds with a boundary depicted on the 1909 OS map, those in TP08 do not (Fig 3). TP08 is, however, on approximately the same alignment as the extant element of the loading bay wall to the south, which may have continued further north than is shown on the historic mapping.

3.5.4 Both firebrick walls identified in Trench 7 and TP08 sat upon made ground layers formed predominately of burnt lime, which seems likely to have derived from the Spencer kilns. In the 2008 evaluation, Trench 3 revealed that these layers had a depth of at least 3.6m and had been tipped into the area defined by the loading bay wall,

making up the platform by levelling up the natural slope (OA North 2009). It seems likely that the extant structure, and the fragments of wall revealed by excavation, defined areas into which waste material was tipped and these were replaced or added to over time, as the area of made ground expanded.

3.5.5 The firebricks themselves were waste from the lime burning process. Firebricks were recorded in use at the site where they lined the Spencer kilns, operational from *c* 1900-1927, and were periodically replaced (Johnson 2002). Vitrified fire bricks are visible in many of the buildings across the site and make up much of the Spencer kiln's retaining wall (OA 8) close to the present site entrance.

4 DISCUSSION

4.1 Reliability of field investigation

4.1.1 The majority of the trenches were excavated in their intended positions and managed to identify the historical structures they were intended to target. Trenches 1, 4 and 5 were required to be moved slightly or curtailed due to spoil heaps, exposed drain covers and proximity to trees. Trench 6 was also moved slightly eastwards to maintain distance from the Settle to Carlisle railway line. Ground conditions throughout the fieldwork were generally good and the archaeological remains, where identified, were easily identifiable, due to their structural nature.

4.2 Evaluation objectives and results

4.2.1 The principal aims and objectives identified above in *Section 2.1.1* was to obtain sufficient information to establish the presence, absence, character, extent, state of preservation and date of any archaeological deposits or structures within the area of the proposed development, and to report on the results of these works. To meet these aims and objectives, the programme of archaeological monitoring, trenching and recording was designed to provide adequate coverage across the site and target structures identified on the historic mapping. All of the trenches were successfully excavated, although 4 trenches were altered or reduced in size due to site constraints.

4.3 Interpretation

4.3.1 The seven trenches excavated in 2021 have revealed evidence for sub-surface footings associated with demolished remains of the former barn/stables (OA North 2020a; OA 2 and OA 3) to the south-west of the Hoffmann kiln, and fire brick flooring (***503***; Fig 7) beneath the later concrete floor of the red brick building (OA 5) to the south of the Craven Cottage workshops. This indicated that the concrete floor of this building had been constructed over a brick surface upon which a rail track had been laid, which broadly concurs with its interpreted use as a wagon workshop (OA North 2020a). Both buildings were constructed on top of significant deposits of limestone quarry waste. There was also partial subsurface evidence, in the form of footings and a possible firebrick flue, in the location of the red brick chimney (***404***) illustrated on the 1909 OS map (Fig 3) and historic photographs of the site (Plate 1). Also identified was a culvert (***204***; Fig 5) in the north-eastern part of the site, which may have run alongside the railway lines running downslope from the Hoffmann kiln and associated water courses.

4.3.2 Trenching and geotechnical trial pits across the site have established the presence of significant and large-scale makeup deposits across the site, in some places more than 3m deep. Natural bedrock was only identified close to the former working face of Stainforth Scar. On the lower levels of the site the makeup layers were derived from quarry waste, and particularly in the southern area of Stainforth Sidings, kiln waste derived from lime burning. Here, it appears that a flat surface was formed by tipping material along the edge of the steep-sided valley to create a level area on which to lay out the railway and associated loading platform. The Craven limeworks was built in the early 1870s, adjacent to the planned Settle to Carlisle Railway, which opened to freight in 1875. Whilst none of the trial pits were immediately adjacent to the extant Settle

Carlise line, it seems likely that preparatory work for the railway and sidings included the laying down of significant amounts of makeup and ballast in the form of quarry waste. This preparatory work also formed the basis (including site infrastructure and hard standings) utilised by the limeworks. This was largely in place by the time of the OS map of 1894 (OA North 2020a), with the Spencer kilns (operational from *c* 1900-1927) and associated infrastructure at the south end of the site in place by 1909 (Fig 3). Where excavations have illustrated the sequence of deposits associated with the railway, a layer of ashy grey kiln waste (e.g. ***202***, ***302***, ***507***) appears to represent the 'working floor' of the limeworks.

4.3.3 It seems that significant areas of the site were completely cleared of railway infrastructure after it closed in 1939 and was subsequently converted for use as a council depot and refuse tip. Elements of brickwork (including firebricks probably derived from the Spencer kilns) relating to former industrial structures survive around the edges of the development site and where structures were retained for use by the Council depot. Although *in situ* railway sleepers have survived in places across the site beneath mid-twentieth century makeup/levelling deposits, and are comparable to the layouts shown on the historic mapping, this was not the case in all locations.

4.3.4 No further archaeological fieldwork was recommended by the local curator or the inspector of monuments.

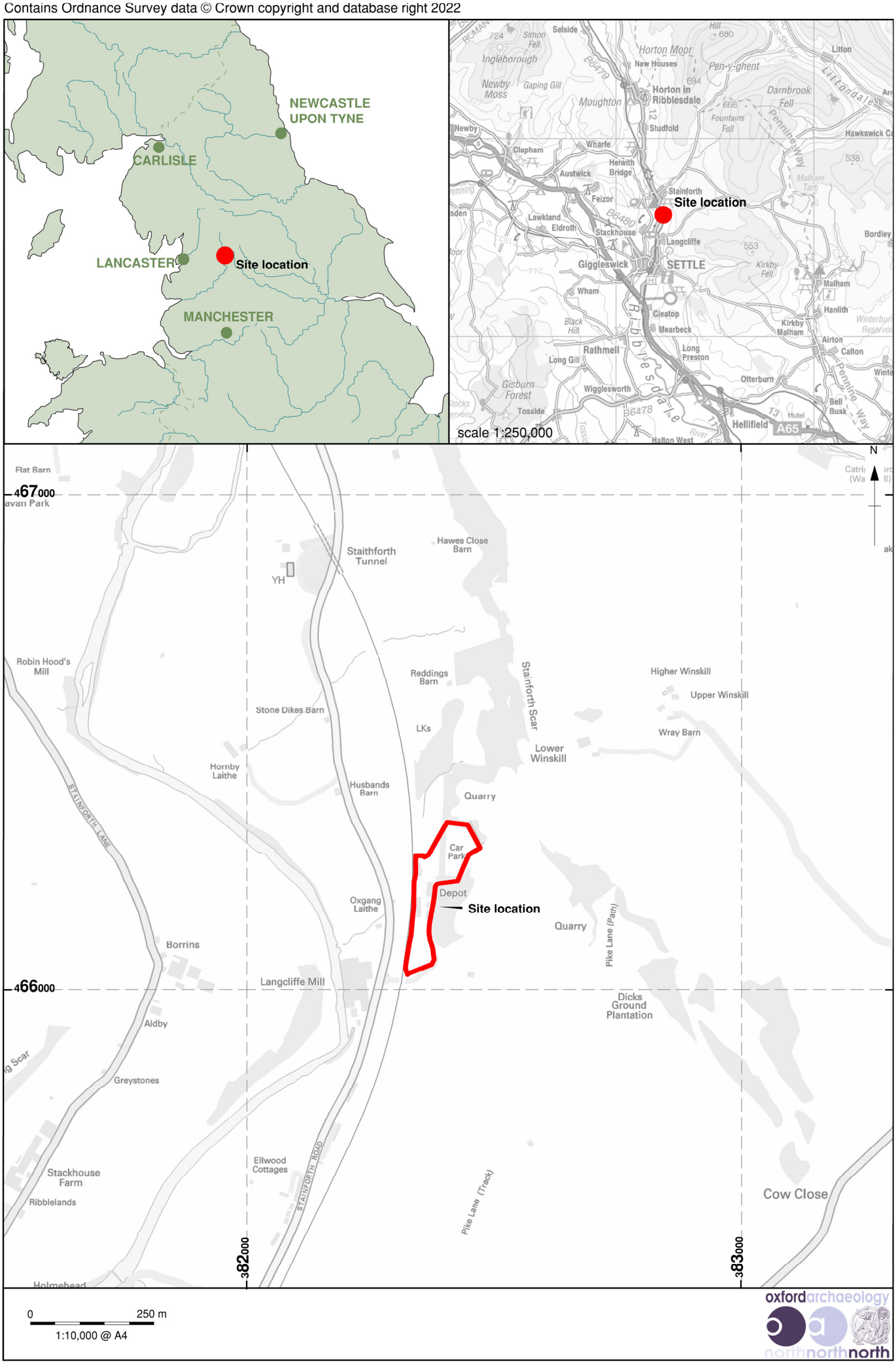


Figure 1: Site location

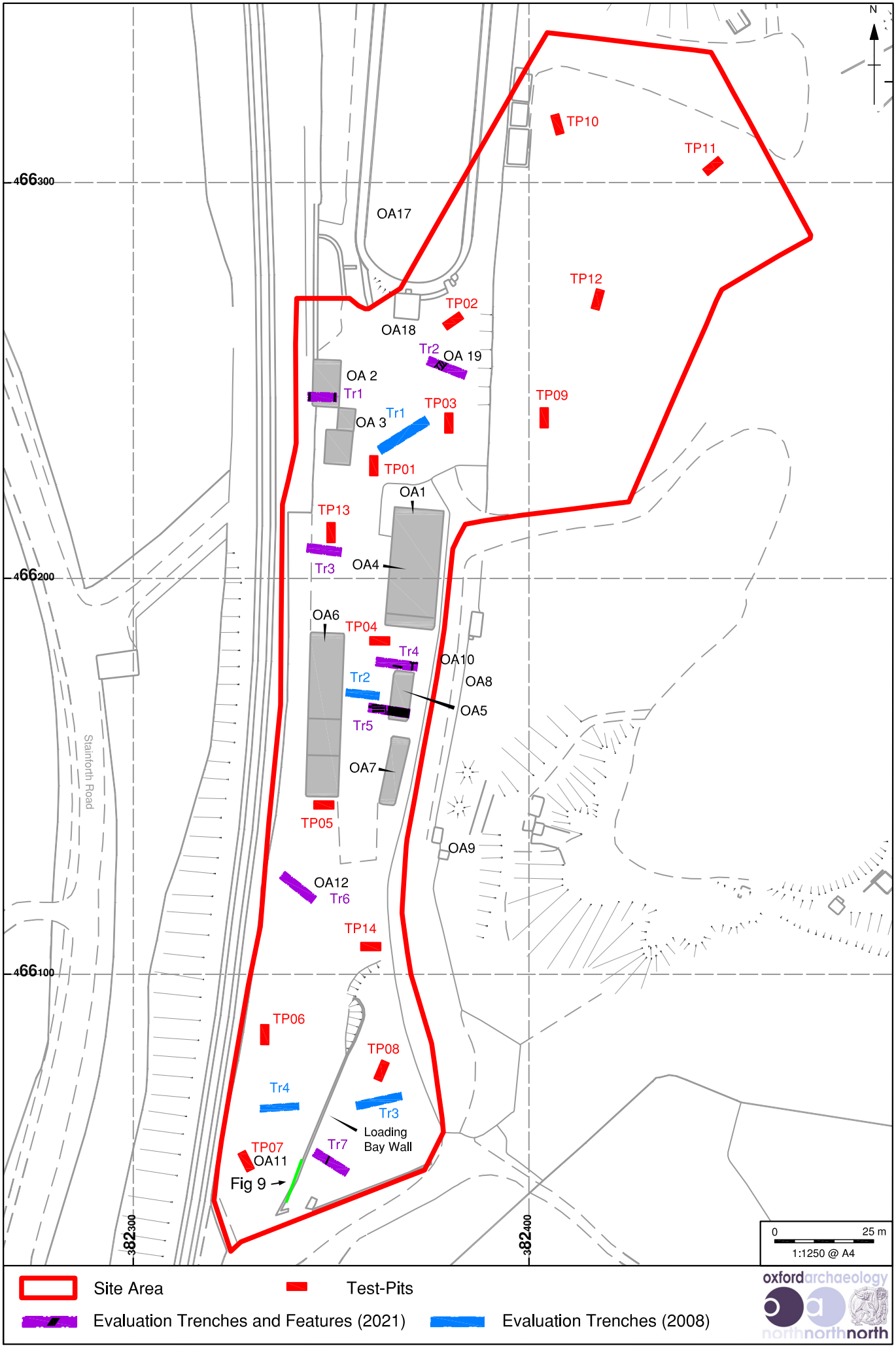


Figure 2: Locations of evaluation trenches and watching brief test-pits, overlaid onto LUAU 1989 survey plan

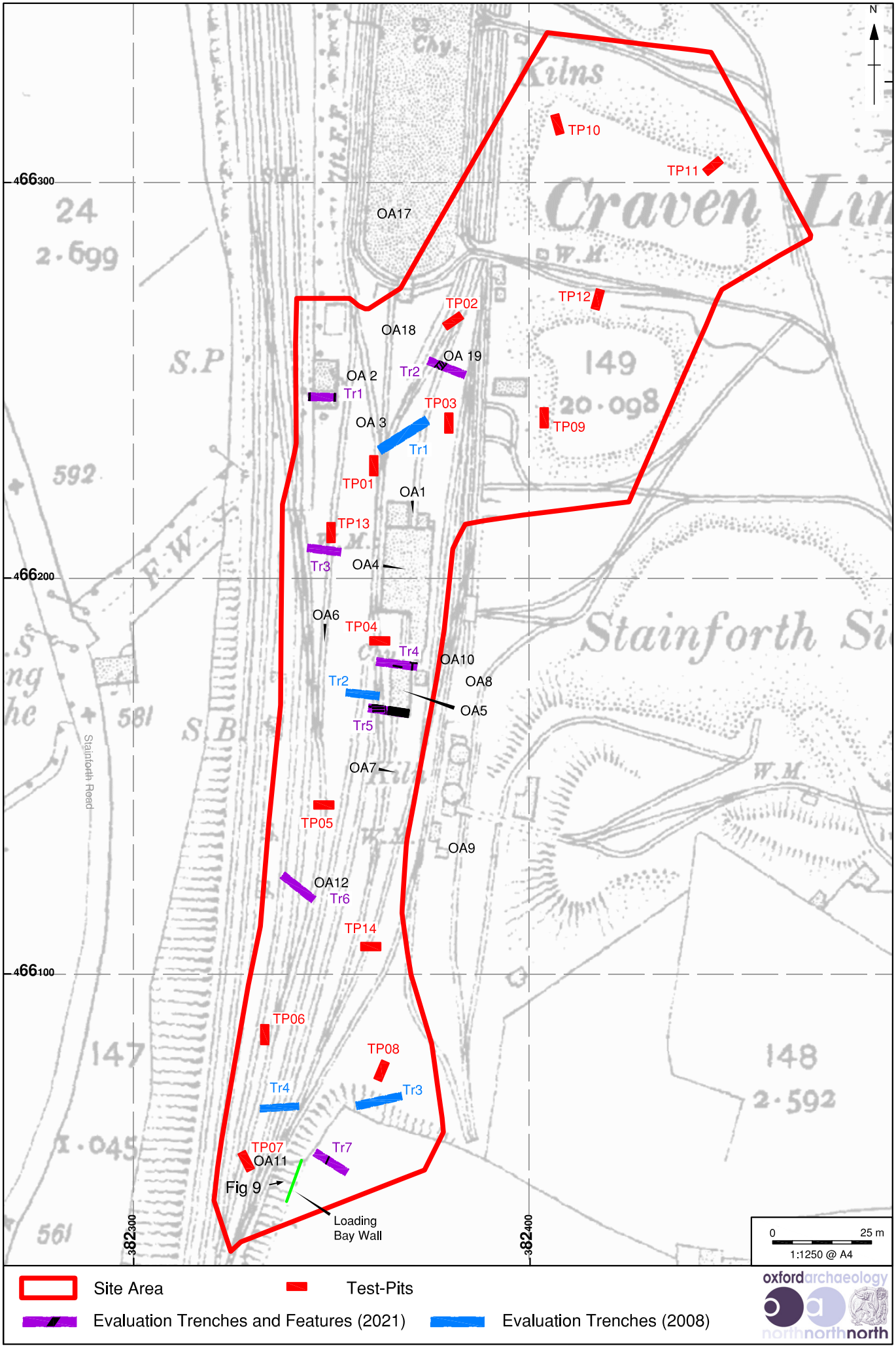
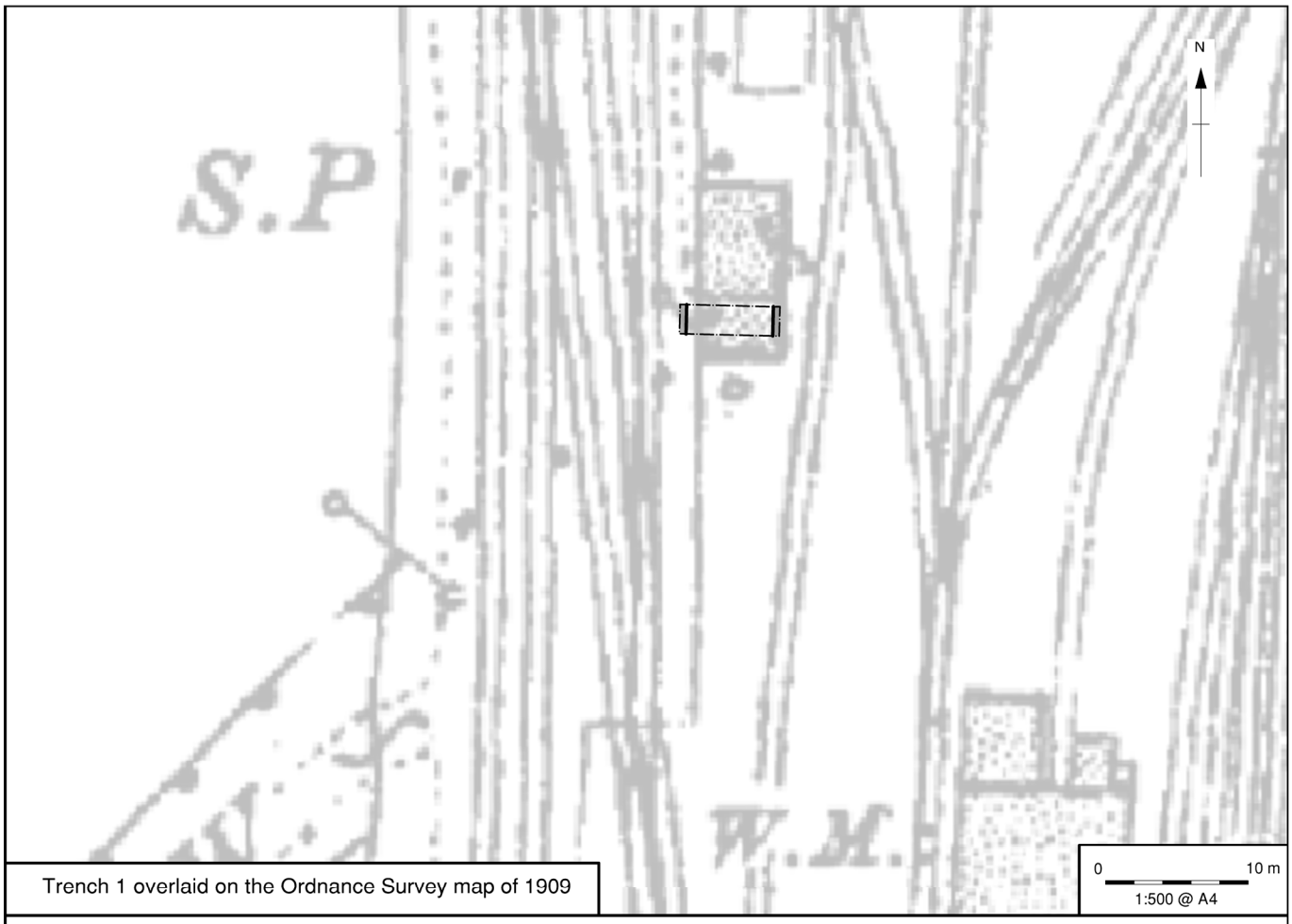


Figure 3: Locations of evaluation trenches and watching brief test-pits overlaid on the Ordnance Survey map of 1909



Trench 1 overlaid on the Ordnance Survey map of 1909

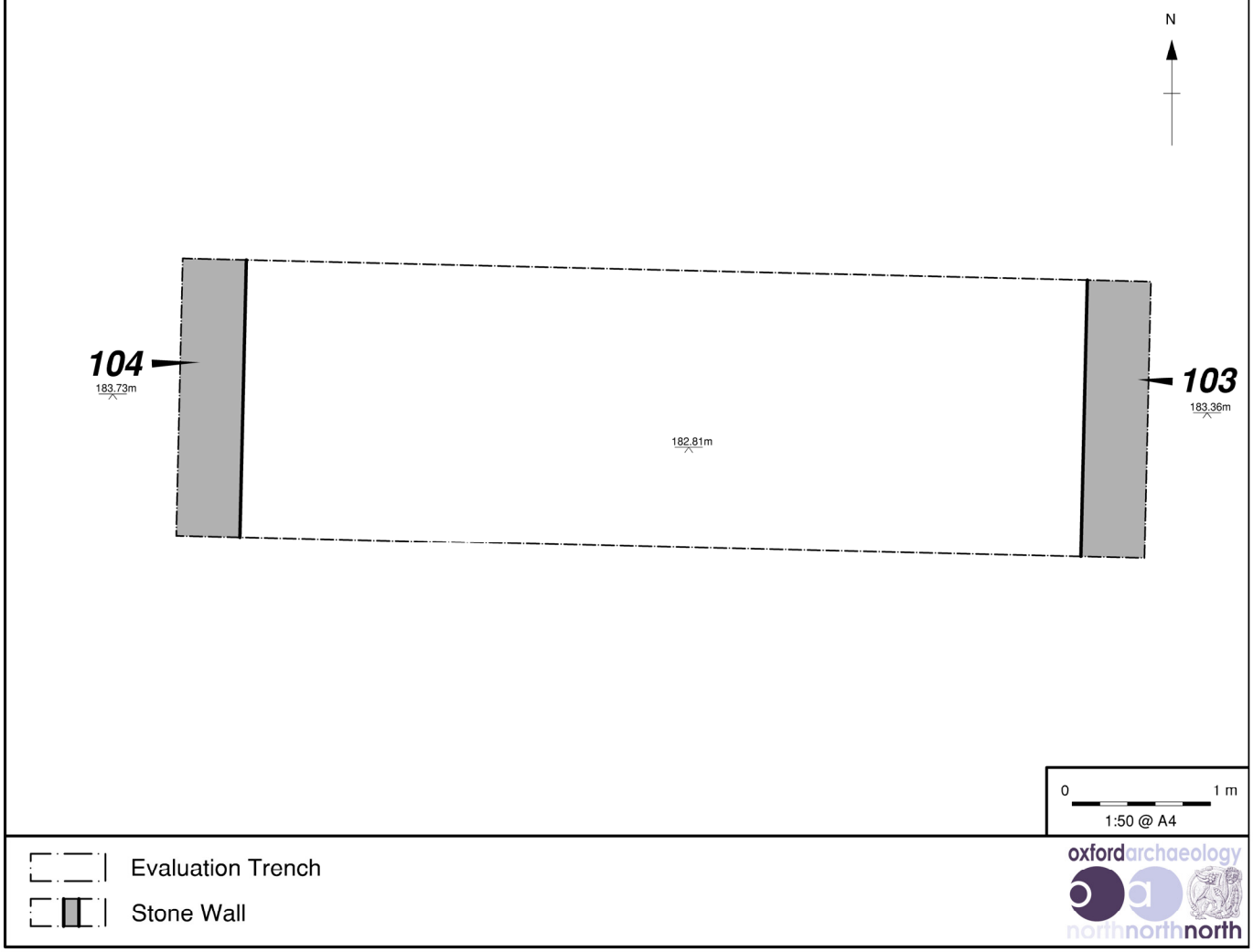


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Figure 4: Plan of Trench 1

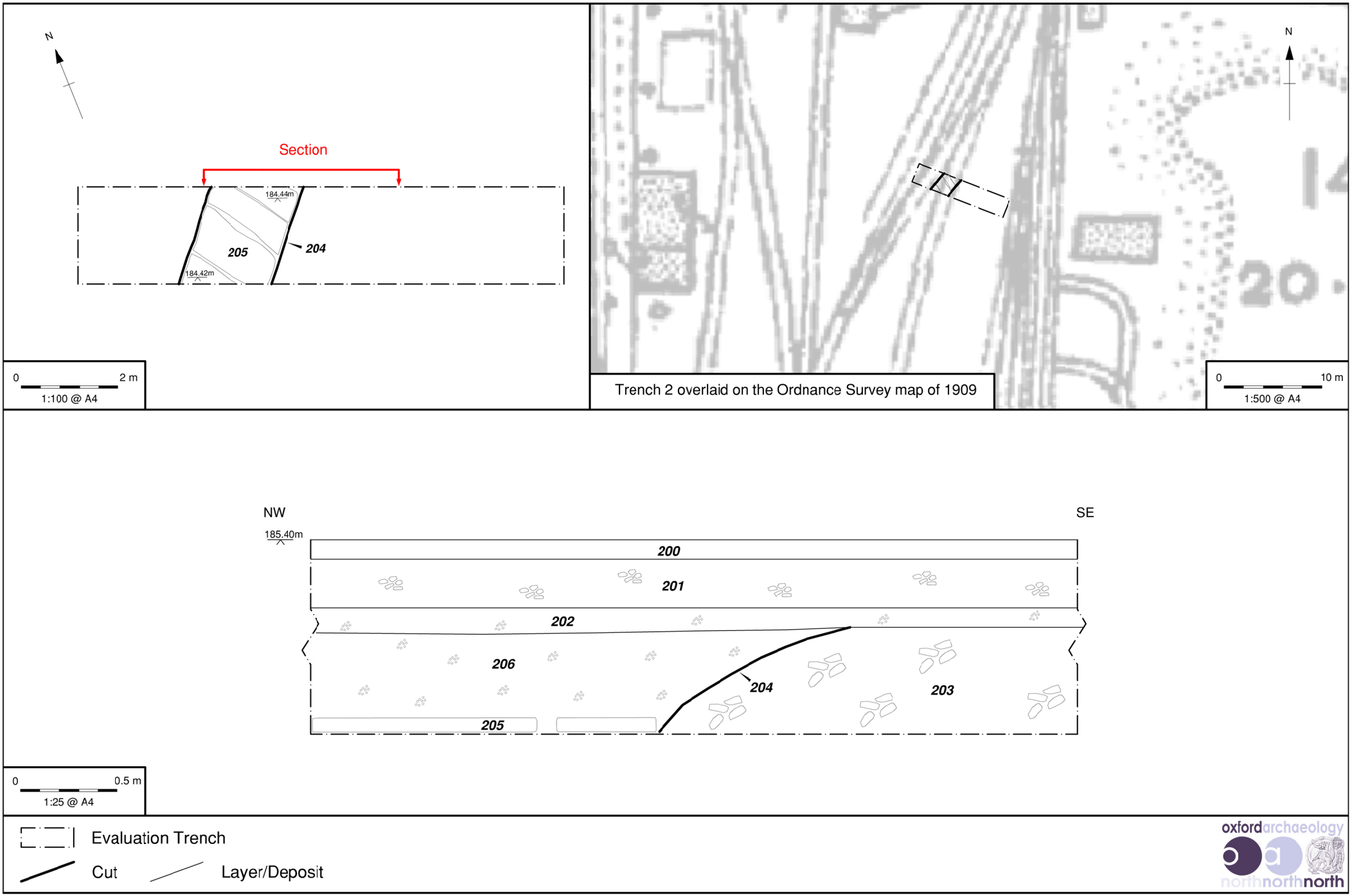

Figure 5: Plan and cross-section of Trench 2

Trench 4 overlaid on the Ordnance Survey map of 1909

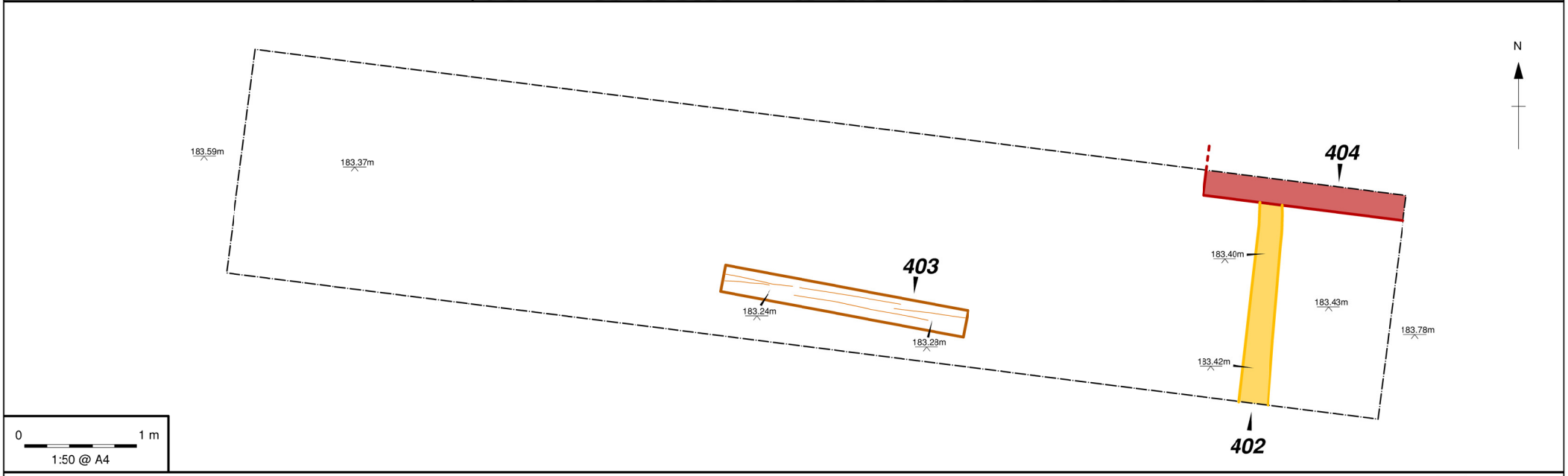

Figure 6: Plan of Trench 4

Trench 5 overlaid on the Ordnance Survey map of 1909

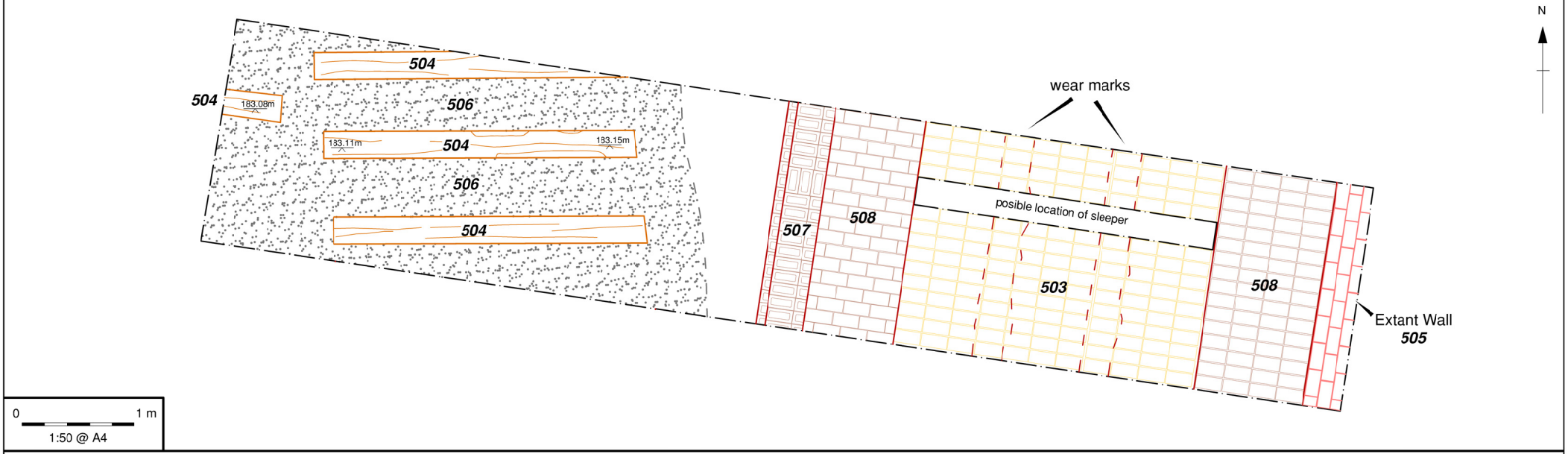

Figure 7: Plan of Trench 5

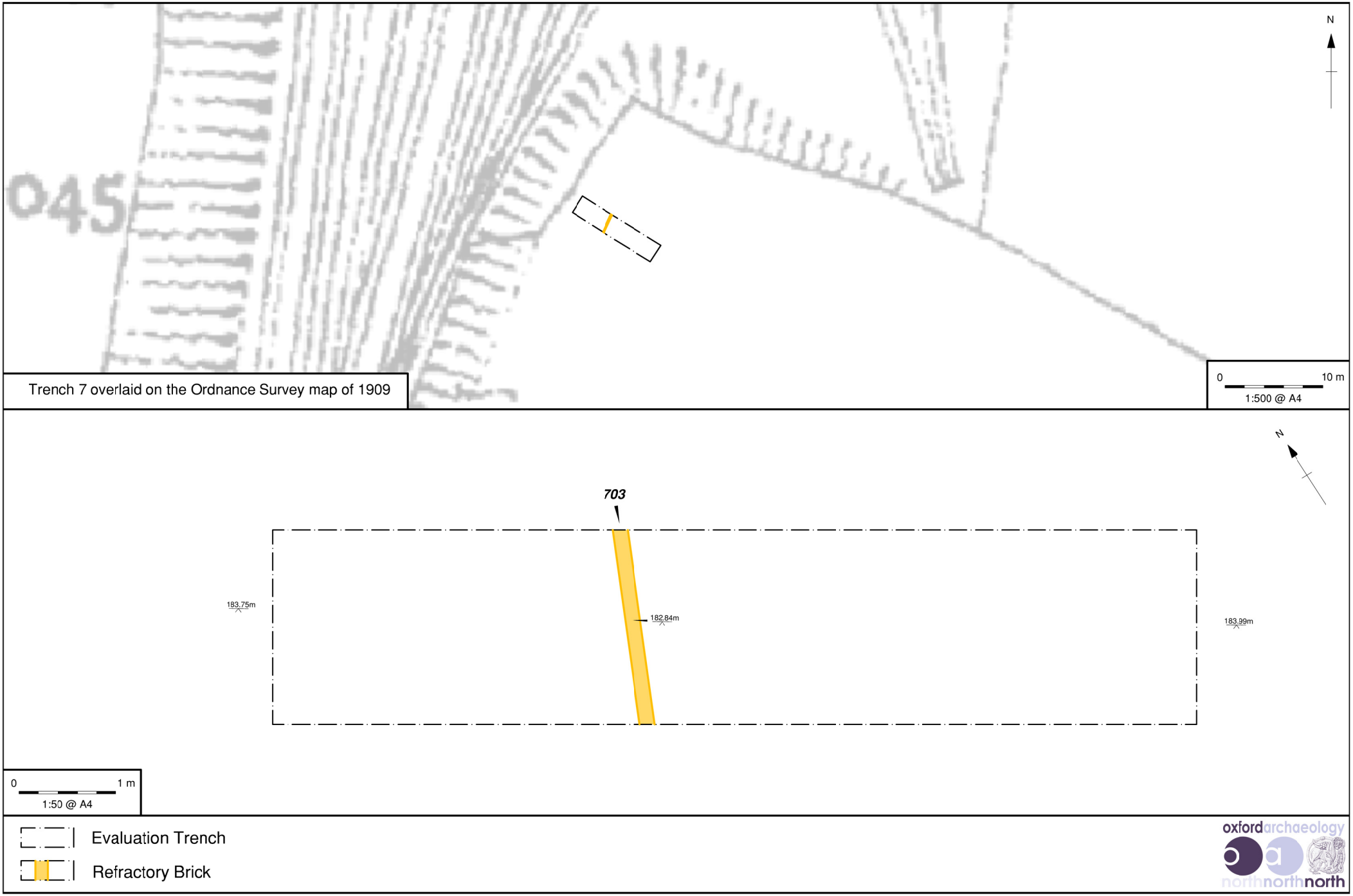

Figure 8: Plan of Trench 7

Figure 9: Photogrammetric model of the extant remains of the loading bay wall

APPENDIX A TEST-PIT DESCRIPTIONS

TP no	Max depth (m BGL)	Descriptions
01	2.2m	Tarmac over light brown limestone gravel to 0.3-4m; dark grey coarse limestone ballast to 0.6m, over railway sleeper fragments, on brown clayey sandy limestone gravel. 0.7-0.8 medium sub angular limestone cobble and 1.3-1.4m medium sub angular boulder content. Trial pit terminated at 2.2m due to collapse of sides and resistance in made ground.
02	0.6m	Tarmac over light brown limestone gravel. Trial pit terminated at 0.6m due to water ingress and collapse of sides
03	1.1m	Tarmac over light brown sand limestone gravel to 0.4m, over reddish-brown limestone gravel to 0.7m, over a thin (*c*. 0.05m) coal/ashy deposit, over reddish-brown clayey limestone gravel with cobbles to 1.1m. Trial pit terminated at 1.1m due to resistance in made ground.
04	2.2m	Vegetation over limestone gravel to 0.30, over dark grey sandy gravelly clay with brick inclusions to 0.40m, over railway sleeper (2.5 x 0.4m) at 0.40-0.60m, over light brown clayey limestone gravel to 1m, over soft brown gravelly silty clay with rare black staining. Trial pit terminated at 2.2m due to resistance, possible concrete obstruction.
05	3.1m	Vegetation over dark brown clayey silt topsoil, with rare ceramic and glass fragments to 0.2m, over light brown limestone gravel to 0.7m, over light grey sandy limestone gravel (locally dark brown) to 1.3m, over brown gravelly clayey silty sand and limestone gravel to 2.6m, over angular limestone boulders. Trial pit terminated at 3.1m due to reach of excavator
06	2.8m	Vegetation over light grey sandy gravel to 0.2m, over dark grey sandy limestone and brick gravel to 0.5m, over grey sandy limestone gravel to 0.8m, over firm brown limestone gravelly clay. A lense of reddish brick fragments concrete and blasted coal at 2.2 to 2.4m. Trial pit terminated at 2.8m due to pit instability.
07	3.4m	Vegetation of dark grey limestone gravel to 0.2m, over light grey sandy concrete gravel to 0.7m, over dark brown gravelly silt including fragments of sandstone, limestone, lime, slag and brick to 1.4m. Over brown gravelly sand. Gravel formed of lime, limestone and concrete. Deposit dips east at 1.40m. Limestone boulders at 2.3m. Trial pit terminated at 3.4m due to possible bedrock obstruction.
08	3.5m	Moss and vegetation over light grey gravel to 0.3m, with basal 0.1m brownish grey and including a west-east-aligned brick wall. Over light grey limestone gravel to 1.1m, over crushed white lime gravel locally decomposing into a white silt to 1.8m. Over light grey limestone and concrete gravelly sand. Trial pit terminated at 3.5m on lowest reach of the excavator.
09	1.9m	Tarmac over light grey gravel makeup to 0.4m, over light brown limestone gravel with medium angular limestone cobble content to 1.3, over brown clayey limestone gravel. Trial pit terminated at 1.9m on possible bedrock obstruction

TP no	Max depth (m BGL)	Descriptions
10	3.0m	Moss over limestone cobbles and boulders with silty sandy gravel to 1.10m, over white sub-angular burnt lime gravel locally decomposing, angular limestone boulders at 2.3-2.5m. Trial pit terminated at 3m due to instability.
11	1.1m	Moss over grey limestone gravel with low limestone cobble content. Small piece of metalwork at 0.20m. Trial pit terminated at 1.1m on stepped bedrock construction, possibly quarry face wall.
12	1.4m	Moss over grey limestone gravel to 1.1m, over brown silty limestone gravel to 1.3m, over grey silty limestone gravel. Trial pit terminated at 1.5m on stepped bedrock construction
13	3m	Tarmac over light brown sandy limestone gravel to 0.4m, over grey clayey gravel to 0.5, over soft brown gravelly clayey silt with limestone and coal. Pockets of stiff sandy clay 1.5-1.7m, and subrounded limestone and concrete cobble content at 1.6-1.7m. Trial pit terminated at 3m due to resistance in made ground and groundwater seepage.
14	0.4	Vegetation over gravel to 0.2m, over light brown gravel 0.4m. Trial pit terminated at 0.4m on unbroken blue water main obstruction.
14a	2.6	Vegetation over grey angular gravel to 0.2, over light brown gravel. 0.3-0.5m railway sleeper debris, over angular limestone boulders (up to 500mm) at 0.5-0.6m, over limestone cobbles 0.6 to 0.7m, then a light grey band of lime 0.10m thick, at 1.00-1.10m. Over brown limestone gravel to 2.6m.

APPENDIX B TRENCH DESCRIPTIONS AND CONTEXT INVENTORY

Trench 1						
General description					**Orientation**	E-W
Trench moved southwards from its planned position due to the presence of a large spoil heap. Excavated to a 1.2m then a sondage along its northern extent, down to 1.8m, revealing context ***101***. Natural deposits were not encountered. Its western 1.6m was not excavated below the demolition overburden due to the presence of a blue plastic water pipe on a north-west/south-east alignment					**Length (m)**	7
					Width (m)	2
					Avg depth (m)	1.8
Context No	**Type**	**Width (m)**	**Depth (m)**	**Description**	**Finds**	**Date**
100	Layer	-		Demolition overburden	-	-
101	Layer	-	1.5-1.8m+	Quarry waste, reconstituted ground formed of light brownish yellow limestone chippings, beneath wall footings ***102***, ***103***, ***104***	-	-
102	Structure	0.9	1.5	West/east oriented limestone rubblestone footings capped with concrete/cementitious mortar, with infrequent lime inclusions; overlay ***101***	-	-
103	Structure	O.46	-	North/south oriented lime rubblestone footings perpendicular to ***102***, but unknown stratigraphic relationship. Overlies ***101***. East wall of building. Foundation step below, an additional 0.14m wide	-	-
104	Structure	0.46	1.8	North/south oriented lime rubblestone footings perpendicular to ***102***, but unknown stratigraphic relationship. Overlies ***101***. West wall of building. Foundation step below, an additional 0.14m wide	-	-

Trench 2		
General description	**Orientation**	NW-SE
A trench placed over the position of a rail track shown on the 1909 OS map, to the south-east of the Hoffmann kiln. No evidence of the railway was located but there was a stone culvert in the eastern half of the trench. This was exposed but not excavated. Trench excavated to a maximum depth of 1.10m to reveal the culvert and otherwise 0.8m. Natural deposits were not encountered	**Length (m)**	10
	Width (m)	1.9
	Avg depth (m)	0.8-1.0

Context No	Type	Width (m)	Depth (m)	Description	Finds	Date
200	Layer	-	0.08	Tarmac	-	-
201	Layer	-	0.35	Hardcore; light yellowish brown abundant angular crushed limestone chippings	-	-
202	Layer	-	0.1	Hydrocarbon residue- dark grey ashy clay, overlay ***206*** and ***203***	-	-
203	Layer	-	0.5m+	Makeup layer, cut by ***204***. Dark yellow brown quarry waste and silty clay makeup layer containing frequent large (*c* 0.4) angular limestone	-	-
204	Cut	2.1m	0.5m+	Construction cut for culvert, cuts ***203***, filled by ***206***	-	-
205	Structure	0.6-0.8	0.10	Stone slabs- culvert	-	-
206	Fill	-	0.5	Dark grey gravelly fill of culvert ***204***, overlay stone slabs ***205***. Overlain by makeup layer ***202***.	-	-

Trench 3

General description	Orientation	E-W
Trench identified a series of makeup layers but no archaeological features. Excavated to a maximum depth of 0.65m where redeposited natural quarry waste was identified.	Length (m)	8.5
	Width (m)	2
	Avg depth (m)	0.65

Context No	Type	Width (m)	Depth (m)	Description	Finds	Date
300	Layer	-	0.09	Tarmac	None	15.04.21
301	Layer	-	0.14	Light brown hardcore, abundant lime chippings	None	15.04.21
302	Layer	-	0.6	Blackened mixed ashy clay and gravelly limestone quarry waste	None	15.04.21
303	Layer	-	0.28+	Redeposited natural orange clayey gravel quarry waste	None	15.04.21

Trench 4

General description	Orientation	E-W
Trench placed to investigate the remains of a chimney seen on historic photographs and maps. Moved slightly south of its planned position due to the presence of a drain. Identified red brick probable chimney base and possible associated firebrick flue (recorded *in situ*)	Length (m)	10.3
	Width (m)	2
	Avg depth (m)	0.8

Context No	Type	Width (m)	Depth (m)	Description	Finds	Date
400	Layer	-	0.15	Concrete	-	-
401	Layer	-	0.10	Hardcore	-	-
Context No	Type	Width (m)	Depth (m)	Description	Finds	Date

402	Structure	-	0.3	Firebrick wall of two skins, 0.3m BGL, 0.22 x 0.11 x 0.06m. Observed for 2m crossing the trench on a north/south alignment running into/up to ***403***. Blue/grey cementitious mortar. Possible flue. Not removed.	-	-
403	Structure	0.24	-	Railway sleeper, 2.2 x 0.24m, with iron fittings for track shoes. Located 2.5m west of ***402*** and aligned east/west). 0.25m BGL.	-	-
404	Structure		0.78+	Red brick wall, partially extant, observed at 0.4m and down to 0.78 (excavated depth). Base not identified. Structure is aligned east/west with a north return continuing through western baulk. Bricks are machine made. Blue/grey cementitious mortar.	-	-

Trench 5						
General description					**Orientation**	E-W
Trench over demolished remains of single storey red brick workshop OA5. Removal of former concrete surface revealed a firebrick floor ***503*** flanked by red brick surfaces ***508*** which abutted the former walls of the building (***505***, ***507***). The firebrick surface retained evidence of a railway track in the form of grooves and the shadow of a former sleeper. Externally to the building were a series of sleepers (***504***) laid on ballast (***506***). These were on the same orientation as railway tracks shown on the OS map of 1909					**Length (m)**	10
					Width (m)	2
					Avg depth (m)	0.35
Context No	**Type**	**Width (m)**	**Depth (m)**	**Description**	**Finds**	**Date**
500	Layer		0.1	Recent demolition rubble overburden	-	-
501	Layer		0.1	Tarmac	-	-
502	Layer		0.15	Hardcore	-	-
503	Structure			Firebrick surface with grooves indicating former rail line. Situated within former red brick workshop OA5	-	-
504	Structure			Sleepers, 3 of, equally distanced	-	-
505	Structure			Extant red brick wall, east edge of the trench	-	-
Context No	**Type**	**Width (m)**	**Depth (m)**	**Description**	**Finds**	**Date**
506	Structure			Railway hardcore/ballast, oil stained	-	-

507	Structure			Frogged brick wall 0.34m wide with foundation step to west face	-	-
508	Structure			Red brick surfaces delineating firebrick surface ***503*** and abutting extant wall ***505***	-	-

Trench 6						
General description					**Orientation**	NW-SE
Trench excavated to a max depth of 0.9m. No archaeological features identified, and natural deposits not encountered.					**Length (m)**	10
					Width (m)	2
					Avg depth (m)	0.9
Context No	**Type**	**Width (m)**	**Depth (m)**	**Description**	**Finds**	**Date**
600	Layer	-	0.2	Topsoil, only in the west end of the trench	None	16.04.21
601	Layer	-	0.2-0.4	Hardcore	None	16.04.21
602	Layer	-	0.1	Dark grey gravelly clinker (burnt coal)	None	16.04.21
604	Layer	-	0.4+	Orange brown mixed redeposited natural clay/crushed limestone quarry waste	None	16.04.21

Trench 7						
General description					**Orientation**	E-W
Trench positioned to take in the location of a loading platform at the south-eastern extent of Stainforth Sidings, contained by a partially extant wall. A sequence of mixed crushed limestone, firebrick, coal-rich and burnt lime demolition deposits (***701***, ***702***, ***704***) were identified. 0.4m below the surface was the truncated foundation of a firebrick wall (***703***) which corresponded with a dog-leg in the loading bay wall illustrated on the OS map of 1909. Two railway sleepers, not obviously in situ, were sat on the limestone makeup layer (***704***) at the same level as the footings.					**Length (m)**	30
					Width (m)	2
					Avg depth (m)	0.30
Context No	**Type**	**Width (m)**	**Depth (m)**	**Description**	**Finds**	**Date**
700	Layer	-	0.2	Topsoil	-	-
701	Layer	-	0.5m	Mixed demolition deposit including clay, burnt lime, firebrick fragments, charcoal/clinker and concrete. Overlies ***702***	-	-
702	Layer	-	c 1.2m	White burnt lime deposit, including coal/charcoal	-	-
703	Structure	-	0.12m	Fire brick wall, one course of	-	-

APPENDIX C BIBLIOGRAPHY

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APPENDIX D SITE SUMMARY DETAILS

Site name:	Langcliffe Quarry Sidings, Stainforth Road, Langcliffe, North Yorkshire
Site code:	LQS19
Grid Reference	SD 82373 66217
Type:	Watching brief, evaluation and historic building recording
Date and duration:	WB 3 days: 2nd and 3rd November 2020; and 15th January 2021 Evaluation and building recording 3 days: 14th to 16th April 2021
Location of archive:	The archive is currently held at OA North, Mill 3, Moor Lane Mills, Moor Lane, Lancaster, LA1 1QD, and will be deposited with the local record office in due course.
Summary of Results:	Geotechnical trial pits monitored in December 2020 and January 2021 established the presence of significant and large-scale makeup deposits across the site, in some places more than 3m deep. Natural bedrock was only identified close to the former working face of Stainforth Scar. On the lower levels of the site the makeup layers were derived from quarry waste, and particularly in the southern area of Stainforth Sidings, kiln waste derived from lime burning. Here, it appears that a flat surface was formed by tipping material along the edge of the steep sided valley to create a level area on which to lay out the railway and sidings. This layout was largely in place by the time of the OS map of 1894, with the Spencer kilns (operational from *c* 1900-1927) and associated infrastructure at the south end of the site in place by 1909. Seven trenches were then excavated in April 2021, which revealed evidence for sub-surface footings associated with demolished remains of the former barn/stables to the south-west of the Hoffmann kiln, and fire brick flooring with evidence for railway tracks beneath the later concrete floor of the single storey red brick workshop to the south of the Craven Cottage. There was also evidence, in the form of footings and a possible firebrick flue, in the location of a chimney illustrated on the 1909 OS map and historic photographs of the site. Also identified was a stone-flagged culvert in the north-eastern part of the site, which may have run alongside the railway lines running downslope from the Hoffmann kiln. A firebrick wall, retaining an area of extensive made ground, at the southern extent of the site was recorded through photogrammetric survey. It is thought that the area of made ground to the south and west of the wall had been used as a loading bay, used to unload coal and fill wagons with lime from the nearby Spencer Kilns. The condition and full extents of the loading bay wall were not fully established during earlier phases

of work. In April 2021, the was badly overgrown and its northern extent appeared to be sealed by overburden dating to the use of the site as a council depot. Removal of the overburden and plant growth along the embankment thought to represent the northern continuation of the extant wall was undertaken by machine and revealed that the visibly extant remains of the wall were all that survived. The results of the photogrammetric survey clearly illustrated that the wall was not of a single phase, with elements of infill and differential coursing indicating several construction phases along both its length and height.

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